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NEAR EAST UNIVERSITY
INSTITUTE OF HEALTH SCIENCES

NURSES' AWARENESS ON HOSPITAL ACQUIRED INFECTION RISKS OF THE GERIATRIC PATIENTS

Ibrahim S.S. Abumettleq

In Partial Fulfillment of the Requirements for the
Degree of Master of Nursing (Acute Care)

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Advisor:
Prof.Dr. NurhanBayraktar

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List of Abbreviations

Items of Abbreviations	Context
HAI	Hospital Acquired Infection
VAP	Ventilator-Associated Pneumonia
SSI	Surgical Site Infection
BSI	Blood Stream Infection
UTI	Urinary Tract Infection
CLABSI	Central Line-associated Bloodstream Infection
CAUTI	Catheter-associated Urinary Tract Infections
HCAI	Healthcare-associated Infection
NI	Nosocomial Infection
RTI	Respiratory Tract Infection

APPROVAL

The directorate of Graduate school of Health sciences, this study has been accepted by the thesis committee in nursing program as a master of Acute nursing thesis.

Thesis committee:

Chair: Assoc, Prof, Ümran DAL YILMAZ (Near East University).

Member: Prof.Dr.Nurhan BAYRAKTAR. (Near East University).

Member: Assist, Prof.GültenSucu DAĞ. (Eastern Mediterranean University).

APPROVAL:

According to the relevant article of the Near East University Postgraduate study-education and examination Regulation, this thesis has been approved by the above-mentioned members of the thesis committee and the decision of the board of Directors of the institute.

Prof. Dr. K. Hüsnü Can BAŞER

Director of Graduate institute of Health sciences

DECLARATION

I hereby declare that the work in this thesis entitled "Nurses' Awareness on Hospital Acquired Infection Risks of the Geriatric Patients" is the study of my own research efforts undertaken un the supersession of **Prof.Dr.Nurhan BAYRAKTAR.**

My deepest thanks to **Prof.Dr.Nurhan BAYRAKTAR**, my supervisor, for her expertise,- ongoing support and mentorship during my research.

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Nurses' Awareness on Hospital Acquired Infection Risks of the Geriatric Patients

ABSTRACT

Introduction: A hospital-acquired infection (HAI), also known as a nosocomial infection, is an infection that is acquired in a hospital or other healthcare facility. There is need to increase knowledge and awareness of nurses on HAI risks and prevention to avoid the spread of the infections in the hospital.

Objectives: The main aim of the study is determination of nurses' awareness of hospital-acquired infection risks of the geriatric patients.

Methods: The study was performed on the register nurses who work in the Near East University Hospital. A total of 168 nurses work in the Near East Hospital. All voluntary nurses who work in adult care clinics was composed the sample of the study.Data were be collected using a questionnaire in September and October2017.

Results: Results of the study showed high level knowledge of nurses only on general knowledge on HAI of the geriatric patients. Whereas nurses had inadequate knowledge on HAI risks of the geriatric patients. It was also determined that there was the statistically significant difference in term of education levels and experiences of nurses with different items on HAIrisks of the geriatric patients.

Conclusion: Based on the results of the study implementations of comprehensive, systematic, and continuous educational programs in order to enhance the knowledge and practices of the nurses on HAI was recommended.

Keywords: Nosocomial infection, geriatrics, infections risks, nursing

1. INTRODUCTION

1.1. Definition of the Problem

Worldwide aged population has been increasing (Ozdemir et.al. 2013). In the last 30 years, population over 65 years increased at a ratio of 63% in the world and this increase is rising constantly. In 1900, only 1% of the earth's population--15 million persons--was >65 years of age. By 1992, 6% of the global population, or 342 million persons, were in this category. By the year 2050, these figures will have risen to 20% and 2.5 billion, respectively. It is estimated that at the year 2025, world's elderly population will exceed 800 million and about 20% of the world population will be 65 years and older in 2050. The average life expectancy at birth rapidly increased over the latter half of this past century (Rosenthal 2008).

The World Health Organization (WHO) describes older age as 65 years or older. Increasing ratio of elderly population results in increased health problems of this age group and this is a worldwide community problem (Ozdemir et.al. 2013). Aging is associated with numerous chronic illnesses and comorbid conditions, polypharmacy and immunosuppressive medications, and changes in the immune system (Rosenthal et.al. 2003). The aged body is different physiologically from the younger adult body, and during old age, the decline of various organ systems becomes manifest (Avci et.al. 2012). These changes with age have important practical implications for the clinical management of elderly patients (Fahed 2007).

As growing number of the global population is aging; accordingly, a higher number of elderly patients are hospitalized for various causes (Solis-Hernandez et.al. 2016). The increasing number of persons >65 years of age form a special population at risk for nosocomial and other health care-associated infections. The frequency and severity of infectious diseases increase in elderly patients because of humoral and cellular immunity changes, organ and tissue dysfunctions and underlying chronic diseases in his patient group (Ozdemir et.al. 2013). The elderly has defective host defenses that compromise their ability to ward off infectious agents; factors influencing immune competence include immune senescence, changes in no adaptive immunity, chronic diseases, medications, malnutrition, and functional impairment (Reissig 2012). Physiologic accompaniments of aging are changes in no adaptive immunity that render the elderly more vulnerable to infection. Chronic diseases including cancer, atherosclerosis, diabetes mellitus, and dementia predispose to certain types of infection (Yang 2010).

Medications such as sedatives, narcotics, anticholinergic, and gastric acid immune suppressants may further suppress innate defenses. Malnutrition, which reduces cell-mediated immunity, may be more common in the geriatric community at large than is generally realized. Alone or in combination, these defects in host defense place geriatric populations in the forefront of nosocomial infection statistics (Öztekinet al 2009).

According to studies conducted in this population, age is a risk factor for acquiring nosocomial infections (Solis-Hernandez et.al. 2016). Data conducted in the United States of America from National Nosocomial Infections Surveillance system indicated that person's ≥ 65 years of age accounted for 54% of all nosocomial infections (Gupta 2010). Similarly, Gross and colleagues observed a decade-specific risk for nosocomial infection of 10 per 1,000 discharges from birth through the fifth decade. This risk steadily rose from the fifth decade onward, exceeding 100 infections per 1,000 discharges in patients > 70 years of age. Coworkers, who reported a similar increase in nosocomial infections after the fifth decade, calculated daily nosocomial infection rates of 0.43% and 0.63% for persons aged ≤ 60 years and ≥ 60 years, respectively. In a study from Turkey, it was found that the incidence of hospital acquired infections per 1000 patient days was 2.49 in the elderly and 1.64 in the younger patients' group the most common site of infection in the elderly patients was the urinary tract, whereas in non-elderly group this was the lower respiratory tract. The incidence density of urinary tract infections, respiratory tract infections, surgical site, skin and soft tissue infections, primary bacteremia, and prosthesis infections were significantly higher in the elderly group. Compared with younger population, elderly had also higher mortality and morbidity rates due to infections (Avci et.al. 2012). It was also showed that hospital acquired infections were more frequent in elderly population and overall mortally was greater in the elderly group (Solis-Hernandez et.al. 2016).

Nosocomial infections are a major problem in health sector in terms of morbidity and mortality as well as prolonged hospitalization and increased costs. Incidence of nosocomial infections in developed countries varies between 5-10%, whereas in developing countries the ratio is reported up to 25%. In the United States, it is reported that at least 30,000 people dies due to nosocomial infections per year and patient hospitalization period extends 7-10 days and also 10 billion dollars extra cost per year is spent. The additional mortality rate of nosocomial infections is up to 33% and the highest mortality rates occur after nosocomial pneumonia

(Ozdemir et.al. 2013). The magnitude and diversity of health care-associated infections in the aging population are generating new arenas for prevention and control efforts (Khodavaisy2011).

Nurses play a pivotal role in preventing hospital-acquired infections, not only by ensuring that all aspects of their nursing practice are evidence based, but also through nursing research and patient education. There are many effective ways of preventing the spread of infectious microorganisms from one patient to another. Hand hygiene is widely acknowledged to be the single most important activity for reducing the spread of disease. Personal protective equipment (PPE) is used to protect patients from the risks of cross-infection (Kahlmeter 2012).

Defining the risk factors, which promote infections, has a key role in management (Ozdemir et.al. 2013). It is important for nurses to be aware of the infection risks of elderly individuals to prevent nosocomial infections in elderly patients. However, a study was not found in the Turkish Republic of Northern Cyprus about this subject. Determination of awareness of the nurses about the nosocomial infection risks of the elderly individuals may be useful in improving evidence-based infection control measures in health care settings and infection control preparedness.

1.2 Aim of the study

The aim of the study was to determine nurses' awareness on hospital acquired infection risks of the geriatric patients. Furthermore, the study questions are as the following:

- Are nurses aware of hospital acquired infection risks of the geriatric patients?
- Is there any differences between descriptive characteristics and awareness of the nurses on hospital acquired infection risks of the geriatric patients?

2. BACKGROUND OF THE STUDY:

2.1 Geriatric Patients and Hospital Acquired Infections:

The geriatric population, defined as people over the age of 65, comprised 6.2% of the world population in 1992 and is estimated to reach 20% by 2050(Gupta K,2010). The decline in physiological reserve in organs makes the elderly prone to develop some kinds of diseases and

easily suspected to infections, elderly patients may suffer from complications from mild problems (Yang 2010).

Physiological changes occur with aging in all organ systems. The cardiac output decreases, blood pressure increases, and arteriosclerosis develops. The lungs show impaired gas exchange, a decrease in vital capacity and slower expiratory flow rates (Rosenthal et.al. 2003). Functional changes, largely related to altered motility patterns, occur in the gastrointestinal system with senescence, and atrophic gastritis and altered hepatic drug metabolism are common in the elderly (Eckenrode et al 2011; Metersky ML Year). Progressive elevation of blood glucose occurs with age on a multifactorial basis and osteoporosis is frequently seen due to a linear decline in bone mass after the fourth decade. The epidermis of the skin atrophies with age and due to changes in collagen and elastin the skin loses its tone and elasticity. Lean body mass declines with age and this is primarily due to loss and atrophy of muscle cells. Degenerative changes occur in many joints and this, combined with the loss of muscle mass, inhibits elderly patients' locomotion (Fahed 2007).

Aging increases the susceptibility to hospital-acquired infections. Infections are considered hospital acquired if they first appear 48 hours or more after hospital admission or within 30 days after discharge (Khodavaisy 2011). Although the leading causes of death among the elderly are chronic diseases such as heart disease, cancer, and stroke, infectious diseases remain among the top 10 causes of death. Nosocomial infections have emerged as an important cause of morbidity and mortality in elderly patients leading to prolonged hospital stay, treatment failure and increased cost of healthcare (Ozdemir et.al. 2013). According to the Centers for Disease Control and Prevention (CDC), pneumonia, influenza, and septicemia are responsible for death (Solis-Hernandez et.al. 2016).

About 5-10% of patients admitted to hospitals in the United States develop a nosocomial infection. The Centers for Disease Control and Prevention estimate that more than two million patients develop hospital-acquired infections in the United States each year. About 90,000 of these patients die because of their infections (Eckenrode S, Bakullari A,2011 Metersky ML). Moreover, both morbidity and mortality for many infections may be several-fold higher in the elderly with respect to the young. The susceptibility to infection is influenced by numerous elements (Kahlmeter G, 2012).

Prevention is the most effective measure to reduce morbidity, mortality, and the expense of infections in the geriatric patients. Hospital-acquired infections usually are related to a procedure or treatment used to diagnose or treat the patient's illness or injury. About 25% of these infections can be prevented by healthcare workers taking proper precautions when caring for patients. Geriatrics differs from standard adult medicine because it focuses on the unique needs of the elderly person (Öztekin et al 2009).

Prompt diagnosis and initiation of appropriate supportive and antimicrobial therapy is a critical strategy for the management of infection in the geriatric patients. However, early detection is more difficult in the elderly because the typical signs and symptoms, such as fever and leukocytosis, are frequently absent (Eckenrode et al. 2011; Metersky 2011). A change in mental status or decline in function may be the only presenting problem in an older patient with an infection.

2.2 Hospital Acquired Infection Risks of the Geriatric Patients:

Nosocomial infections can affect any person regardless of age, sex, or race. These diseases seem to impact the geriatric population, whether because of increased risk factors for acquiring infections or because of inadequate host defense (Fahed GP, 2007). Infections in geriatric patients are secondary to the age-related decline of the immune system, known as immunosuppression. Comorbid conditions such as heart disease, diabetes, or chronic obstructive pulmonary disease often can complicate infections, diminishing the ability to treat them effectively (Gupta, (2010). Presence of multiple medical problems, nutritional deficiency and regression of immunity contribute to the susceptibility of older people to develop infections.

In addition to functional impairments (immobility, incontinence, dysphagia) associated with ageing, necessitate the use of urinary catheters, other invasive devices and antibiotics enhance susceptibility to nosocomial infections (Reissig, 2012). Frequent hospital visits and extended nursing care stays expose the elderly to higher rates of infections. Many hospitalized patients need a steady supply of medications or nutrients delivered to their bloodstream (Rosenthal, 2008). Any type of invasive procedure can expose a patient to the possibility of infection. Common causes of hospital-acquired infections include urinary bladder

catheterization, respiratory procedures, surgery and wounds, intravenous (IV) procedures. Bacteria transmitted from the surroundings, contaminated equipment, or healthcare workers' hands can invade the site where the catheter is inserted. A local infection may develop in the skin around the catheter. The bacteria also can enter the blood through the vein and cause a generalized infection. The longer a catheter is in place, the greater the risk of infection (Eckenrode et al. (2011); Metersky (2011).

Urinary tract infection (UTI) is the most common type of hospital-acquired infection in elderly patients. Most hospital-acquired UTIs happen after urinary catheterization. Pneumonia is the second most common type of hospital-acquired infection. Bacteria and other microorganisms are easily brought into the throat by respiratory procedures commonly done in the hospital (Ozdemir et.al. 2013). The microorganisms come from contaminated equipment or the hands of health care workers. Some of these procedures are respiratory intubation, suctioning of material from the throat and mouth, and mechanical ventilation (Solis-Hernandez et.al. 2016). Surgical procedures increase a patient's risk of getting an infection in the hospital. Surgery directly invades the patient's body, giving bacteria a way into normally sterile parts of the body. An infection can be acquired from contaminated surgical equipment or from healthcare workers. Following surgery, the surgical wound can become infected. Other wounds from trauma, burns, and ulcers may also become infected (Rosenthal 2008).

2.3 Prevention of Hospital Acquired Infections of the Geriatric Patients:

Infection control is an important component in reducing the risk of nosocomial transmission from patient to patient. There are three keys areas should be addressed for optimal management of hospital acquired infectious diseases in geriatric patients, infection control, vaccination, and patient education (Rosenthal 2008).

Primary prevention with vaccination should be encouraged in all geriatric patients. Recommendations include influenza vaccine annually and pneumococcal vaccine after age 65, unless chronic conditions dictate administration sooner. Revaccination for Pneumococcus should be strongly considered for those at highest risk. Family members or caregivers for the elderly also should receive influenza vaccination as a preventive measure (Solis-Hernandez et.al. 2016).

Many known age-related changes affect the metabolism of drugs in the elderly. Adjusting medications based on the patient's renal function is important to minimize adverse effects, which may be more frequent and severe in the elderly population. This predisposition to adverse effects is related to the physiologic changes of aging, as well as to chronic underlying illnesses, polypharmacy, and inappropriate dosing by prescribers (Öztekinet al 2009). Antibiotics should be used only when necessary. Use of antibiotics creates favorable conditions for infection with the fungal organism Candida. Overuse of antibiotics is also responsible for the development of bacteria that are resistant to antibiotics.

Prevention of the HAIs in the hospitals and other healthcare facilities has developed extensive infection control programs to prevent nosocomial infections (Ozdemir et.al. 2013). These programs focus on identifying high risk procedures and other possible sources of infection. High risk procedures such as urinary catheterization should be performed only when necessary and catheters should be left in for as little time as possible (Ozdemir et.al. 2013).

Medical instruments and equipment must be properly sterilized to ensure they are not contaminated. Frequent handwashing by healthcare workers and visitors is necessary to avoid passing infectious microorganisms to hospitalized patients. Studies have shown that good hand washing in combination with the use of a virucidal foam or alcohol product can reduce the infection rate by up to 50%. All health care professionals and visitors should wash their hands prior to and after patient contact. In addition to hand washing, gloves play an important role in reducing the risks of transmission of microorganisms (Khodavaisy 2011). Patients with highly resistant organisms should remain in isolation as required (Solis-Hernandez et.al. 2016).

2.4 Nurses' Roles in Prevention of Hospital Acquired Infections of the Geriatric Patients:

Nurses have important roles in preventing hospital-acquired infections (HAI), not only by ensuring that all aspects of their nursing practice are evidence based, but also through nursing research and patient education and patient advocating. Nurses are in the unique position to affect change to improve patient care standards (Solis-Hernandez et.al. 2016).

The nurse has many tools available to create a safe environment for patients. Universal precautions are the cornerstones of a safe environment that is free of infection. According to the

Center for Disease Control and Prevention (CDC, 2016) universal precautions are designed to prevent the transmission of blood borne pathogens when providing first aid or healthcare (Rosenthal et.al. 2003).

All hospitals have infection control procedures and policies, and staff takes every precaution to avoid infections. The most important way to reduce the spread of infections is hand washing always wash regularly with soap and water and using the aseptic technique (Khodavaisy2011). Aseptic technique is a key component of all invasive medical procedure. Aseptic technique used to carry out a procedure in a way that minimizes the risk of contaminating an invasive device. Furthermore, nurses should wear, sterile gloves sterile gowns, sterile drapes, masks, before contact with patient (Eckenrode et al, Metersky,2011). Various forms of isolation exist and are applied depending on the type of infection and agent involved, to address the likelihood of spread via airborne particles or droplets, by direct skin contact, or via contact with body fluids. Also important is to get a vaccine for those infections and viruses that have one, when available (Solis-Hernandez et.al. 2016).

Nurse should observe and report signs of infection such as redness, warmth, discharge, and increased body temperature. With the onset of infection, the immune system is activated, and signs of infection appear. Assess temperature of neutropenic clients every 4 hours and report a single temperature of >38.5° C or three temperatures of >38° C in 24 hours (Khodavaisy 2011).

Patient education is an important and nurses should recognize the need for patient education. Infection control addresses factors related to the spread of infections within the healthcare setting (whether patient-to-patient, from patients to staff and from staff to patients, or among-staff). There are a variety of ways to improve patient education and understanding the risks of the HAI. Healthcare provider should investigate the best practices used by the most successful providers and adapt the best ideas for use in their own organizations. Healthcare providers are increasingly recognizing that developing an effective system of patient education is one of the most cost-effective ways to maintain the health status and decrease the risks and prevent the infections

(Gupta 2010).

3. METHODOLOGY

3.1 Study Design

The study was planned with descriptive design.

3.2 Study Setting

The study was conducted at the Near East University Hospital, North Cyprus. The Near East University hospital the largest and leading university of Cyprus which is in northern part of Nicosia, the capital of North Cyprus. The services of Hospital of Near East University 209 private, single patient rooms, 8 operating theatres, 30-bed Intensive Care Unit, 17-bed Neonatal Intensive Care Unit, an advanced laboratory where a wide array of medical and experimental tests can be carried out, 22 other labs specializing on certain medical tests. The hospital has an infection control committee.

3.3 Sample Selection

The study was performed on the register nurses who work in the Near East University Hospital. A total of 168 nurses work in the Near East Hospital. All voluntary nurses who work in adult care clinics were composed the sample of the study with 97.6% access rate.

3.4 Study Tools

A questionnaire that was developed by the researchers based on the literature was used as data collection tool in this study. The questionnaire contained two sections. The first section was regarding to demographics characteristics of nurses and included 11 questions. The second section consisted 33 questions regarding awareness of nurses on hospital acquired infection risks of geriatric patients with 3 choices (Agree, not agree, don't know). Since all the nurses in the hospital can speak Turkish, the questionnaire was prepared as Turkish.

3.5 Pilot Study

A pilot study was performed on ten nurses for clarity of the tool. After the pilot study, questionnaire will be revised for clarity.

3.6 Data Collection

The data was collected using a questionnaire in September and October 2017. The questionnaires were administered by researchers on nurses while they are on the wards or clinics during duty shift with self-completion method. Completion of the questionnaire took almost 20 minutes.

3.7 Ethical Aspect

Ethical approval was obtained from the Near East Institutional Reviews Board (IRB) of Near East University Hospital (Appendix 3). In addition, informed consent from the nurses and organizational permission were obtained (Appendix 4).

3.8. Data Analysis

Package of Social Sciences (SPSS) software version 20.0 was used to analyze the collected data. The methods used to analyze the data include an analysis of descriptive statistic variables such as frequency and percentages for the categorical variables. The Pearson Chi-Square test was done to determine the differences. When F statistic was significant, the chosen level of significance is $p < 0.05$.

4. Results

In this chapter, results of the study conducted to determine knowledge and practices of the nurses on HAI.

Table 4.1 Descriptive Characteristics of the Nurses (N=164)

Descriptive Characteristics	N	%
Age (Mean:27.7)		
< = 25	79	47.9
26 – 30	63	38.4
> =31	22	13.7
Educational degree		
Health care vocational high school (HCVHS)	32	19.4
Bachelor degree	128	78.2
Master degree	4	2.4
Gender		
Male	52	32.1
Female	112	67.9
Working experience as registered nurse		
< = 5	109	66.1
6-10	48	29.1
> =11	7	4.8
Years of hospital experience		
< = 5	110	67.1
6-10	48	29.1
> =11	6	3.8
Working experience in the unit		
< = 5	96	58.8
6-10	55	33.6
> =11	13	7.6
Currently working unit		
Emergency care	34	23.2
Intensive care unit (ICU)	28	16.7
Medical unit	27	15.8
Obstetrics/gynecology unit	21	12.8
Oncology unit	11	6.3

Surgical unit	30	17.7
Rehabilitation unit	13	7.5

Descriptive characteristics of the nurses are shown in Table 4.1. A total of 164 questionnaires were administered for this study. Most frequent age group was $< = 25$ (47.9%) and mean ages of the participants were 27.7 years. Results showed that the majority of the nurses were female (67.9%) and had bachelor's degree (78. 2%).Furthermore, it was determined that, majority of the nurses had 5 years or less experience of nursing (66.1%) and working in the Near East University Hospital (67.1%). Currently working units of the nurses were emergency (23.2%), surgical (17.7%), intensive care (16.7%), medical (15. 8%).Majority of nurses had working experience on the unit 5 years or less (58.8%).

Table 4.2 Educational Characteristics of the Nurses' on Hospital Acquired Infection Risks of the Geriatric Patients (N=164)

Educational Characteristics of the Nurses	N	%
Previous Educationon Hospital Acquired Infection Risks of the Geriatric Patients		
Yes	68	41.2
No	96	58.8
Educational resource(N=68) *		
School	24	35.3
Courses	13	19.1
Web resources	12	17.7
Congress/conferences	12	17.7
In-service education	7	10.2
Perceived quality of geriatric care education (N=68) *		
Excellent	20	29.4
Very good	29	42.7
Good	19	27.9
Fair/poor	0	0.0
Need for education on geriatric care		
Yes	164	100

*Percentages were calculated based on N=68

Table 4.2 demonstrateseducational characteristics of the nurses. The majority of the nurses had not received previous education on hospital acquired infection risks of the geriatric patients (58.8%). Nurses received education on hospital acquired infection risks of the geriatric patients from five types of resources including school (35. 3%). Regarding to quality of the hospital acquired infection risk of the geriatric patient's education, participants rated as very good (42.7%). However, none of the nurses had fair or poor statement. Furthermore, all of the nurses stated that they need for education on geriatric care.

Table 4.3 Nurses'General Knowledge on Hospital Acquired Infections of the Geriatric Patients (N=164)

Statements on Hospital Acquired Infections of the Geriatric Patients	True / False	Correct answer		Wrong answer / I don't know	
		N	%	N	%
Hospital acquired infections(HAI)in the elderly people are seen more often than younger people.	(T)*	110	67.1	54	32.9
There is increased resistance to infections in the elderly.	(F)**	89	53.9	75	46.1
Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolong hospital stay and increased cost.	(T)*	120	72.2	44	27.8
Compared with younger population, elderly have higher mortality and morbidity rates due to HAI.	(T)*	135	83.1	29	16.9
Intensive care unit the highest suspected area in hospital for elderly patient to have HAI.	(T)*	112	67.2	52	32.8
Classical sign and symptoms of infections occur generally in elderly.	(F)**	70	42.9	94	57.1
Deterioration in consciousness, apathy,incontinence, tachycardia or tachypnea may be main indications of infection in elderly.	(T)*	118	71.5	46	28.5
High fever occurs every time as one of the main finding of infection in elderly.	(F)**	66	40.8	98	59.2

(T)*=True statement

(F)=False statement**

Table 4.3 shows nurses' general knowledge on hospital acquired infections of the geriatric patients. It was found that, the majority of nurses had correct answers in majority of the items (6 of 8 items). Most frequent correctly known items were, **"Compared with younger population, elderly have higher mortality and morbidity rates due to HAI"** (83.1%), "Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolong hospital stay and increased cost" (72.2%), "Deterioration in consciousness, apathy, incontinence, tachycardia or tachypnea may be main indications of infection in elderly" (71.5%), "Intensive care unit the highest suspected area in hospital for elderly patient to have HAI" (67.2%) and "Hospital acquired infections (HAI) in the elderly people are seen more often than younger people"(67.1%) respectively.However, "Classical sign and symptoms of infections occur generally in elderly" (42.9%) and "High fever occurs every time as one of the main finding of infection in elderly" (40.8%) were frequent wrong or "I don't know" answers of the nurses.

Table 4.4 Nurses' Knowledge on Hospital Acquired Infection Risks of the Geriatric Patients(N=164)

Statements on Hospital Acquired Infection Risks of the Geriatric Patients	True/ False	Correct answer		Wrong answer / I don't know	
		N	%	N	%
Elderly have functional deficiencies (immobilization, dysphagia) that may predispose HAI.	(T)*	96	58.2	68	41.8
Defective respiratory mucosal defense mechanisms in elderly population may lead to have HAI.	(T)*	81	49.1	83	50.9
There is not important relationship between incontinence and HAI in geriatric patients.	(F)**	48	29.9	116	70.1
Elderlymay have enlarged prostate that may predispose HAI.	(T)*	106	64.9	58	35.1
There is no interaction between decreased gastric acidity, bowel peristaltism and HAI among elderly people.	(F)**	44	26.7	120	73.8
Elderly may have decrease in kidney functions that may predispose HAI.	(T)*	60	36.8	104	63.2
There is no interaction between decreased liver function and HAI in elderly people.	(F)**	51	31.3	113	68.7
Elderly may have bladder diverticula that may predispose HAI.	(T)*	110	66.1	54	33.9
Elderly may have reduced wound healing that may predispose HAI.	(T)*	103	62.7	61	37.3
Aging is associated with changes in immune system function resulting in increased susceptibility to infection.	(T)*	127	77.1	37	22.9
Elderly may have atherosclerosis that may predispose HAI.	(T)*	118	71.7	46	28.3
Skin integrity impairment, thinned skin, loss of lipid and water content in skin are risk factors for HAI among the elderly patients.	(T)*	94	57.1	70	42.9
Aging increases the incidence of chronic diseases and facilitates development of infections.	(T)*	55	33.3	109	66.7
Elderly may have chronic obstructive pulmonary disease (COPD) that may predispose HAI.	(T)*	45	26.7	119	73.3
Elderly may have diabetes mellitus (DM) that may predispose HAI.	(T)*	106	64.9	58	35.1
Neurological disorders such as dementia and stroke don't predispose to infections.	(F)**	55	33.9	109	66.1
Elderly people may use medications, such as immuno-suppressants, anticholinergic and sedatives that may predispose to HAI.	(T)*	94	57.1	70	42.9

Utilization of medical devices doesn't responsible for increased frequency of infections in the elderly.	(F)**	104	62.8	60	37.2
Malnutrition in elderly population can lead to hospital acquired infection.	(T)*	48	28.7	116	71.3
Bloodstream infections are the serious threating in elderly.	(T)*	72	43.1	92	56.9
Urinary catheters may prevent urinary infections in elderly.	(F)**	44	26.7	120	73.8
Respiratory and vascular catheter infections are associated with the highest mortality rates in the elderly patients.	(T)*	90	54.6	74	45.4
Most common sites of infections in the elderly are the urinary, respiratory and surgical site infections.	(T)*	110	66.1	54	33.9

(T)*=True statement

(F)=False statement**

The table 4.4 shows the nurse's knowledge on hospital acquired infection risks of the geriatric patients. It was found that, approximately halfof the items (12 of 23 items) were known correctly by the majority of nurses. Results showed that, highest correct answers among nurses are about "Aging is associated with changes in immune system function resulting in increased susceptibility to infection" (77.1%), "Elderly may have atherosclerosis that may predispose HAI" (71.7%), "Elderly may have bladder diverticula that may predispose HAI" (66.1%), "Most common sites of infections in the elderly are the urinary, respiratory and surgical site infections" (66.1%), "Elderly may have diabetes mellitus (DM) that may predispose HAI" (64.9%), "Elderly may have enlarged prostate that may predispose HAI" (64.9%) "Utilization of medical devices doesn't responsible for increased frequency of infections in the elderly" (62.8%) and "Elderly may have reduced wound healing that may predispose HAI" (62.7%) items respectively.

Furthermore, most frequent wrong or "I don't know" answers were about "There is no interaction between decreased gastric acidity, bowel peristaltism and HAI among elderly people" (73.8%), "Urinary catheters may prevent urinary infections in elderly" (73.8%), "Elderly may have chronic obstructive pulmonary disease (COPD) that may predispose HAI" (73.3%), "Malnutrition in elderly population can lead to hospital acquired infection" (71.3%),"There is not important relationship between incontinence and HAI in geriatric patients" (71.3%), "There is no interaction between decreased liver function and HAI in elderly people" (68.7%), "Aging increases the incidence of chronic diseases and facilitates development of infections" (66.7%), "Neurological disorders such as dementia and stroke don't predispose to infections." (66.1%) and "Elderly may have decrease in kidney functions that may predispose HAI" (63.2%) items respectively.

Table 4. 5 Comparison of the Nurses' Some Descriptive Characteristics with Their General Knowledge on Hospital Acquired Infections of the Geriatric Patients (N=164)

General Knowledge on HAI of the Geriatric (Statements)	Educational Degree				P value	Years of Nursing Experience				P value	Previous Education				P value
	HCVHS		Bachelor			<=5		6-10			Yes		No		
	Correct answer					Correct answer					Correct answer				
	N	%	N	%		N	%	N	%		N	%	N	%	
Hospital acquired infections in the elderly people are seen more often than younger people.	21	65.6	97	75.2	.278	73	78.1	44	80.6	.321	40	59.7	72	75.2	.451
There is increased resistance to infections in the elderly.	20	62.5	99	76.7	.162	67	71.3	34	60.6	.254	46	69.1	49	52.1	.231
Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolong hospital stay and increased cost.	23	71.9	105	81.4	.731	80	84.5	36	63.5	.753	56	85.8	83	87.6	.140
Compared with younger population, elderly have higher mortality and morbidity rates due to HAI.	28	87.5	89	68.9	.315	67	71.3	44	80.6	.134	39	58.3	55	55.2	.434
İntensive care unit the highest suspected area	20	62.5	97	75.2	.710	80	84.5	50	90.5	.632	58	87.0	74	77.3	.125

in hospital for elderly patient to have HAI.															
Classical sign and symptoms of infections occur generally in elderly.	18	58.9	71	55.3	.361	53	56.6	31	56.8	.169	40	60.1	52	54.3	.528
Deterioration in consciousness, apathy,incontinence,ortachy caredia,tachpnea may be main indications of infection in elderly.	22	71.4	89	68.9	.718	79	84.1	44	78.4	.543	40	59.7	85	89.0	.351
High fever occurs every time as one of the main finding of infection in elderly.	15	56.4	73	58.6	.482	51	54.2	29	53.9	.259	38	57.9	50	52.4	.269

Comparison of the nurses' educational degree, years of nursing experience and previous education with general knowledge on hospital acquired infections of the geriatric patients shown in Table 4. 5.It was determined that there were no statistically significant differences between items and descriptive characteristics (P>0.05).

Table 4.6 Comparison of the Nurses' Some Descriptive Characteristics with Their Knowledge on Hospital Acquired Infection Risks of the Geriatric Patients

General Knowledge on HAI of the Geriatric (Statements)	Educational Degree				P value	Years of Nursing Experience				P value	Previous Education				P value
	HCVHS		Bachelor			<=5		6-10			Yes		No		
	Correct answer					Correct answer					Correct answer				
	N	%	N	%		N	%	N	%		N	%	N	%	
Elderly have functional deficiencies (immobilization, dysphagia) that may predispose HAI.	13	43.1	91	70.7	.652	55	58.3	29	53.0	.732	25	38.7	40	41.5	.349
Defective respiratory mucosal defense mechanisms in elderly population may lead to have HAI.	22	66.3	94	72.7	.674	57	60.1	19	32.7	**.021**	44	65.9	51	53.0	.210
There is not important relationship between incontinence and HAI in geriatric patients.	25	68.5	89	69.2	.463	65	69.4	21	39.8	.541	55	60.2	68	71.3	.627
Elderlymay have enlarged prostate that may predispose HAI.	24	70.9	97	75.4	.518	67	72.2	46	81.4	.473	38	624	33	33.1	.156
There is no interaction between decreased gastric	15	46.6	81	62.4	.529	60	63.2	44	79.1	.310	19	28.1	54	57.1	.121

Statement															
acidity, bowel peristaltism and HAI among elderly people.															
Elderly may have decrease in kidney functions that may predispose HAI.	10	30.8	59	45.2	.195	35	36.9	15	27.1	.271	26	39.8	46	48.7	.337
There is no interaction between decreased liver function and HAI in elderly people.	14	43.9	83	63.9	.245	44	45.3	22	40.4	.193	33	48.1	53	56.7	.227
Elderly may have bladder diverticula that may predispose HAI.	22	66.3	91	70.7	.577	66	70.6	41	74.4	.366	45	69.1	67	71.0	.193
Elderly may have reduced wound healing that may predispose HAI.	16	47.4	75	58.2	.471	34	36.2	27	45.8	.221	31	46.2	57	60.5	.241
Aging is associated with changes in immune system function resulting in increased susceptibility to infection.	23	67.9	93	72.1	.237	63	66.9	29	53.0	.423	47	70.4	66	68.6	.833
Elderly may have atheroscleros is that may	7	24.4	50	35.8	.203	27	28.1	7	62.7	**.041**	14	22.1	20	21.4	.965

predispose HAI.															
Skin integrity impairment, thinned skin, loss of lipid and water content in skin are risk factors for HAI among the elderly patients.	16	47.1	90	70.1	.243	49	52.2	18	29.8	.110	31	46.2	55	57.6	.738
Aging increases the incidence of chronic diseases and facilitates development of infections.	18	24.3	76	58.1	.317	61	63.6	32	58.1	.273	46	68.8	59	61.6	.239
Elderly may have chronic obstructive pulmonary disease (COPD) that may predispose HAI.	11	31.4	38	29.1	.859	33	35.3	17	29.4	.441	20	29.7	28	30.8	.988
Elderly may have diabetes mellitus (DM) that may predispose HAI.	18	24.3	88	68.1	.397	69	74.3	35	59.9	.252	40	63.7	60	61.7	.361
Neurological disorders such as dementia and stroke don't predispose to infections.	26	74.1	77	59.7	.391	62	63.1	31	57.6	.262	37	61.8	58	60.9	.172
Elderly people may use medications, such as	8	24.9	40	31.2	.259	21	22.6	17	29.8	.307	16	23.4	30	31.2	.394

immuno-suppressants, anticholinergic and sedatives that may predispose to HAI.														
Utilization of medical devices doesn't responsible for increased frequency of infections in the elderly.	21	65.1	94	72.7	.416	57	60.1	42	74.8	.599	42	63.4	62	63.8	.915
Malnutrition in elderly population can lead to hospital acquired infection.	12	35.1	60	46.2	.162	37	37.9	25	45.2	.212	24	37.8	48	50.1	.143
Bloodstream infections are the serious threating in elderly.	10	30.8	50	35.8	.437	32	33.6	18	30.0	.444	22	32.4	35	36.2	.481
Urinary catheters may prevent urinary infections in elderly.	23	67.9	95	73.5	.005	58	62.1	43	75.6	.231	51	76.3	69	72.1	.551
Respiratory and vascular catheter infections are associated with the highest mortality rates in the elderly patients.	6	23.6	33	25.7	.741	22	23.7	13	24.3	.864	12	19.2	26	27.5	.636
Most common sites of infections in	19	58.7	95	73.5	.172	47	49.7	25	45.5	.721	30	46.5	65	68.4	.198

the elderly are the urinary, respiratory and surgical site infections.															

Table 4.6shows comparison of the nurses' some descriptive characteristics with their knowledge on hospital acquired infection risks of the geriatric patients. It was determined that there weren't statistically significant differences in terms of majority of the items on knowledge on hospital acquired infection risks of geriatric patients and educational degree, years of nursing experience andprevious education of the nurses (P>0.05). There were statistically significant differences between correct answers of some items on risk factors, and educational degree and years of experiences of the nurses. Bachelor's degree nurses' correct knowledge rates were higher (73.5%) than nurses graduated from the health care vocational high school (67.9%) in terms of "Urinary catheters may prevent urinary infections in elderly" item. Furthermore, nurses who had 5 years or less experience had higher knowledge rates (60.1%) than the nurses who had 6-10 years' experience (32.7%) in terms of "Defective respiratory mucosal defense mechanisms in elderly population may lead to have HAI" item. However, regarding to "Elderly may have atherosclerosis that may predispose HAI" item, the nurses who had 6-10 years' experience had higher knowledge rates (62.7%) than the nurses who had 5 years or less experience (28.1%). These differences were found significant statistically (P<0.05).

5. DISCUSSION

This descriptive study was conducted to evaluate nurses' general knowledge on hospital acquired infection risks of the geriatric patients. The study was performed on the registered nurses with different gender, age, experience and the level of education. Furthermore, the majority of nurses were working in the emergency care, intensive care unit and medical and surgical units where hospital acquired infections may occur frequently.

Health professionals should be knowledgeable about hospital acquired infections and risks of the geriatric patients in order to prevent and manage effectively this important and frequent problem. In the United States, the Centers for Disease Control and Prevention (CDC) estimated roughly 1.7 million hospital-associated infections, from all types of microorganisms, including bacteria and fungi combined, cause or contribute to 99,000 deaths each year. In Europe, where hospital surveys have been conducted, the category of gram-negative infections is estimated to account for two-thirds of the 25,000 deaths each year. (Aruther 2013).

Regarding the educational characteristics of the nurses on hospital acquired infection risks of the geriatric patients; it is a satisfying result that the highest population of nurses had received previous education on hospital acquired infections. Moreover, most nurses received their education throughout school and taking courses related to the awareness on the hospital infections. In fact, it is important for the nurses to increase their knowledge about hospital acquired infection through web resources or attending international congress related to hospital awareness on acquired infections of via in-service education. Nurses evaluated the quality of geriatric care education on hospital acquired infections rate as was very good and excellent and good respectively. However, all of the nurses stated that they need education about geriatric care and this result is important in terms of showing awareness of the educational requirements and willingness of the nurses about education.

Regarding to nurses' general knowledge on hospital acquired infections of the geriatric patients; the majority of nurses had correct answers in majority of the items (6 of 8 items). This is satisfying result in terms of showing nurses' general awareness about hospital acquired infection among geriatric patients. A majority of the nurses had correct answers for "Compared with younger population, elderly have higher mortality and morbidity rates due to HAI" (T), "Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolong

hospital stay and increased cost" (T), "Deterioration in consciousness, apathy, incontinence, tachycardia or tachypnea may be main indications of infection in elderly" (T), "Intensive care unit the highest suspected area in hospital for elderly patient to have HAI" (T)," Hospital acquired infections (HAI) in the elderly people are seen more often than younger people" respectively.Relevant literature demonstrates similarities on the result of this recent study. In the study conducted by Russo (2013), it was found that the majority of nurses choose that the elderly patients have higher morbidity and mortality rate than younger population which similar to our finding. Burnett (2012) stated that the intensive care units have the highest suspected area for hospital acquired infections than other departments in the hospital. Furthermore, (Karahalios 2013) stated that the hospital acquired infections appear in the elderly patients more than the younger patients. Moreover, majority of the nurses choose wrong or I don't know answers about "There is increased resistance to infections in the elderly" (F), "High fever occurs every time as one of the main finding of infection in elderly" (F) items respectively. Relevant study by (Gales 2014) shows that the nurses choose wrong answers about the old patients has increased resistance to infections. (Presentado 2013) stated that nurses choose that "The fever happens every time as the main finding of the infection among elderly patients". However early detection is difficult in the elderly because the typical signs and symptoms, such as fever and leukocytosis, are frequently absent. A change in mental status or decline in function may be the only presenting problem in an older patient with an infection.

Examination of nurses' knowledge on hospital acquired infection risks of the geriatric patients showed that approximately halfof the items (12 of 23 items) were known correctly by the majority of nurses. The most frequent correct answerswereabout "Aging is associated with changes in immune system function resulting in increased susceptibility to infection" (T), "Elderly may have atherosclerosis that may predispose HAI" (T) items. This satisfying result shows that the nurses aware of changing in immunity system due to aging and this may can led to the hospital acquired infection. Relevant study by (Wakefield 2010) stated that the immune system in the elderly patients is changing that is the reason of susceptibility to infection, also the elderly may have atherosclerosis that may predispose (Salsano,2014 D.R. Giacobb 2011). The above items were as risk factors for increase the incidence of the infections in elderly stay at the hospital was stated by (Khaef et al 2014) also.

Majority of the nurses had correct answers in "Most common sites of infections in the elderly are the urinary, respiratory and surgical site infections" (T) and" Elderly may have bladder diverticula that may predispose HAI" (T) items respectively.Relevant study conducted by (Roth, 2013, and La 2011) showed similar finding throughout that the most common sites of infections are the urinary, respiratory and surgical site infections.While another study by (Brogan 2010) stated that elderly mayhave bladder diverticula that may predispose HAIwhich is similar to our current study. Furthermore, majority of nurses had correct answers in "Elderly may have enlarged prostate that may predispose HAI" (T) and "Elderly may have reduced wound healing that may predispose HAI" items. Relevant study showed the two items above as major risk factors by (Sanagou, 2014), the study was determining that the if the elderly had enlarged prostate that may predispose for hospital acquired infections, also showed that the elderly maybe reduce wound healing and in this case the patients will have the chance to get hospital acquired infections. "Skin integrity impairment, thinned skin, loss of lipid and water content in skin are risk factors for HAI among the elderly patients" (T) items are among the correct answers of the nurses. (LA2011, and Juh 2010) stated that elderly patientslose the skin lipid and water, skin become thin this is the main risk factor of HAI.Because the patientswill loss the flora of the skin and this may cause toinfection.

(Sheng2011) stated that, in the modern healthcare system, the live saving invasive treatment devices and procedures are increasingly threading the patients. For example, while catheters provide lifesaving therapy, they also have an iatrogenic effect, by being a route of transmission of microorganisms to the patient's body, thereby causing infection. In the present study, "Utilization of medical devices doesn't responsible for increased frequency of infections in the elderly" (F) was among the items that correctly known by the nurses. A study conducted in Western Europe demonstrated that the medical devices are the main reasons for the infection among geriatric patient in the hospital (44.8%) (Arthur R. H, 2012).

However, majority of the nurses choose wrong or I don't know answers about "Catheters may prevent urinary infections in elderly" (F) item. A study showed that the urinary catheter during invasive procedure is one of the most common causes of the hospital acquired infections among older patients. They identified that 51% of the geriatric patients in both gender get the hospital acquired infection during the urinary catheter procedure (Remis RS, 2014).

In the present study, "Neurological disorders such as dementia and stroke don't predispose to infections" (F) was among the wrong or I don't know of the majority of the nurses.However, a study implement in Greece on geriatric patients shows that the proportion of older patients experiencing infections is higher in patients with stroke.During the first days of stroke patients are associated with larger infarct volumes, higher mortality, and poorer functional outcome and this will lead to hospital acquired infections.Furthermore, accumulating clinical evidence also suggests that acute stroke may induce significant immunological changes that could facilitate the appearance of infection in human stroke (Chrousos GP2014).

Furthermore, majority of the nurses had wrong or I don't know answers in "There is not important relationship between incontinence and HAI in geriatric patients" (F), "There is no interaction between decreased gastric acidity, bowel peristaltism and HAI among elderly people" (F) items.However,most elderly people had been incontinent at hospital admission (64%), had more than one incontinent episode per day or a catheter (72%), and had concomitant fecal incontinence (64%). The majority of incontinent patients had substantial cognitive impairment and limitations in mobility. Complications such as urinary tract infection and skin breakdown occurred in almost 45% and were more common in patients with catheters and this will lead to the hospital acquired infections (Joseph G. 2013). Moreover, it is indicated in the relevant literature that, the gastric acid has relationship with the hospital acquired infections.Secretion of acid is an important function of the human stomach; the acid kills the great majority of bacteria which are ingested and thus provides a first line defense against enteric infection.A study implements in England showed that 35% of geriatric patients had HAI related to loss of the gastric acid and secretions related to Helicobacter pylori bacteria and in this case the patients will be predispose to hospital acquired infections (Joseph B. 2013).

More than half of the nurses had correct answers about "Elderly have functional deficiencies (immobilization, dysphagia) that may predispose HAI" (T) and "Elderly people may use medications, such as immuno-suppressants, anticholinergic and sedatives that may predispose to HAI" (T) items. A research showed that, immuno-suppressants prescribing with broad-spectrum antibiotics to patients increased the risk of hospital acquired Drug-Resistant

Acinetobacter Baumannii infections. A similar finding was also observed in china study thatimmuno-suppressants usage was associated with hospital-acquired infections (Tao L 2011). A study showedpositive correlation between prevalence of hospital-acquired infection and immobilization among geriatric patients during their stay in the hospital, also it showed that there is relationshipbetween the using of immunosuppressants that can lead to get the hospital infections among geriatric patients (Gravel D 2015).

Furthermore, nurses who had wrong or I don't know answers in "Bloodstream infections are the serious threating in elderly" (T), "Malnutrition in elderly population can lead to hospital acquired infection" (T) items. A study showed that the malnutrition among old patients can easily exposure to the hospital acquired infections, in the other hand if the geriatric patients get bloodstream infections it can be serious threading also can be lead to death. This study also found immune deficiency of patients as a risk factor for hospital acquired infection (Wilson, A.P. 2012).

Nurses should know the general information about the hospital acquired infection risks for example; Hospital-acquired infections are caused by viral, bacterial, and fungal pathogens, also necessary to know the most common types for instance, bloodstream infection (BSI), pneumonia, ventilator-associated pneumonia (VAP), urinary tract infection (UTI), and surgical site infection (SSI).Studies indicated that registered nurses' hands are the main source of HAI transmission among geriatric patients, and therefore, handwashing by nurses is the most important procedure in preventing HAIs. (Quinn, F.M 2015).

Comparison of the nurses' educational degree, years of nursing experience and previous education with general knowledge on hospital acquired infections of the geriatric patients shown showed no statistically significant differences (P>0.05).

Comparison of the nurses' some descriptive characteristics with their knowledge on hospital acquired infection risks of the geriatric patients showed that, there weren't statistically significant differences in terms of majority of the items. There were statistically significant differences between correct answers of some items on risk factors, and educational degree and years of experiences of the nurses. Regarding the educational degree of the nurses, it was determined that, bachelor's degree nurses' correct knowledge rates were higher than nurses

graduated from the health care vocational high school in terms of "Urinary catheters may prevent urinary infections in elderly" item. Higher education in nursing will help them to learn how to make better health care decisions. This can help them also to achieve better patient outcomes, reduce costs and optimize operational efficiency. Overall, the goal of furthering nursing education is for let the nurses able to understand and apply knowledge in health care setting to make proper judgments calls through evidence-based practice. (Richards 2011).

Experience was also found as a significant factor that affect knowledge of the nurses on hospital acquired infection risks of the geriatric patients. Nurses who had 5 years or less experience had higher knowledge rates than the nurses who had 6-10 years' experience in terms of "Defective respiratory mucosal defense mechanisms in elderly population may lead to have HAI" item. However, regarding to "Elderly may have atherosclerosis that may predispose HAI" item, the nurses who had 6-10 years' experience had higher knowledge rates than the nurses who had 5 years or less experience. All nurses that have different experience level should be educated with in service education programs in order to improve their knowledge and skills. (Berrouane 2015).

6. CONCLUSION

Hospital acquired infections are considered one of the most serious and complex health problems worldwide. The current study showed higher level of knowledge of nurses only on the general knowledge about hospital acquired infections of the geriatric patients. Furthermore, nurses had limited knowledge on hospital acquired infection risks of the geriatric patients. This result show that nurses' need to be educated about hospital acquired infection risks of the geriatric patients andall of the nurses stated that they need education about geriatric care. Implementation of some strategies to increase the level of awareness among the nurses is necessary in order to improve the quality of health care for geriatric patients in the hospital.

In the present study, comparison of the nurses' some descriptive characteristics with their knowledge on hospital acquired infection risks of the geriatric patients showed that, there weren't statistically significant differences in terms of majority of the items. Regarding the educational degree of the nurses, bachelor's degree nurses' correct knowledge rates were higher

than nurses graduated from the health care vocational high school in terms of "Urinary catheters may prevent urinary infections in elderly" item. This result also shows the importance of educational level. Continuous educations including update theoretical knowledge about hospital acquired infections among geriatric nursing will help to improve the health care for patients. Professional training program can affect for well outcome and reflect inpatients services.

7. FINDINGS AND RECOMMENDATIONS

7.1. Findings

Main findings of the study that was performed with the aim of determinations of the knowledge and practices of hospital acquired infections risks among near east university hospital were listed as followings:

- The mean ages of the participants were 27.7 years, the majority of the nurses were female (67.9%) and had bachelor's degree (78. 2%). The majority of the nurses had 5 years or less experience of nursing (66.1%) and, was working the emergency department (23.2%). (Table 4.1).
- The majority of the nurses had not received previous education on hospital acquired infection risks of the geriatric patients (58.8%). Most frequent educational resource was school (35. 3%), and all of the nurses stated that they need for education on geriatric care. (Table 4.2).
- Regarding the general knowledge on hospital acquired infections of the geriatric patients; the majority of the nurses had correct answers in majority of the items (6 of 8 items). Most frequent correctly known items were **"Compared with younger population, elderly have higher mortality and morbidity rates due to HAI"** (83.1%), "Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolong hospital stay and increased cost" (72.2%), "Deterioration in consciousness, apathy, incontinence, tachycardia or tachypnea may be main indications of infection in elderly" (71.5%). "Classical sign and symptoms of infections occur generally in elderly" (42.9%) and "High fever occurs every time as one of the main finding of infection in elderly" (40.8%) were frequent wrong or "I don't know" answers of the nurses. (Table 4.3).
- Regarding nurses' knowledge on hospital acquired infection risks of the geriatric patients; approximately halfof the items (12 of 23 items) were known correctly by the majority of nurses. Results showed that, highest correct answers among nurses are about "Aging is associated with changes in immune system function resulting in increased susceptibility to infection" (77.1%), "Elderly may have atherosclerosis that may predispose HAI" (71.7%), "Elderly may have bladder diverticula that may predispose HAI" (66.1%). The most frequent wrong or "I don't know"

answers were about "There is no interaction between decreased gastric acidity, bowel peristaltism and HAI among elderly people" (73.8%), "Urinary catheters may prevent urinary infections in elderly" (73.8%), "Elderly may have chronic obstructive pulmonary disease (COPD) that may predispose HAI" (73.3%). (Table 4.4).

- According to comparison of the nurses' some descriptive characteristics with their general knowledge on hospital acquired infections of the geriatric patients, it was determined that there were no statistically significant differences between items and descriptive characteristics (P>0.05). Table (4.5).

- Regarding to comparison of the nurses' some descriptive characteristics with their knowledge on hospital acquired infection risks of the geriatric patients, it was determined that there weren't statistically significant differences in terms of majority of the items, but it was found that there were statistically significant differences between correct answers of some items on risk factors, and educational degree and years of experiences of the nurses. Table (4.6).

7.2. Recommendations

Based on the results of the study following recommendations were made:

- Implementation of comprehensive, systematic, and continuous educational programs in order to enhance the knowledge and practices of the nurses on hospital acquired infections among geriatric patients. Increasing the level of awareness among nurses is necessary about the hospital acquired infections, risks and prevention in geriatric patients.

- Development of institutional protocols, establishment of guidance booklets to provide HAI information are required in order to improve nursing practice on hospital acquired infections risks of the geriatric patients.

- Experimental studies are recommended with more expanded nursing groups that focusing nursing practices on HAI prevention.

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Appendix 1. HEMŞİRELERİN YAŞLI HASTALARDA HASTANE ENFEKSİYONU RİSKLERİNE İLİŞKİN FARKINDALIKLARI

1. HemşirelerinÖzellikleri No:		
1. Yaş		
2. Cinsiyet	□ Erkek	□ Kadın
3. Eğitim	□ Lise □ Yükseklisans	□ Lisans □Doktora
4. Hemşire olarak çalışma deneyimi (Yıl olarak)		
5. Hastanedeki deneyimi (Yıl olarak)		
6. Birimde çalışma deneyimi (Yıl olarak)		
7. Halen çalışılan hastane birimi	□ AcilServis	□YoğunBakımÜnitesi
	□ Dahiliye	□ KadınHastalıkları&Doğum
	□Onkoloji	□ Cerrahi
	□Rehabilitasyon	□ Diğer
8. Önceden yaşlı hasta bakımı konusunda eğitim alma durumu	□ Evet	□ Hayır
9. Eğitim alınan kaynak	□ Okul □Kurslar □ İnternet	□ Hizmetiçieğitim □ Kongre / konferanslar □ Diğer
10. Yaşlıbakımı eğitiminin kalitesine ilişkin görüşü	□ Mükemmel	□ Çokiyi
	□İyi	□Orta
	□ Yetersiz	
11. Yaşlıbakımı konusunda eğitime gereksinim duyma durumu	□ Evet	□ Hayır

2. Yaşlı hastalarda hastane enfeksiyonu risklerine ilişkin ifadeler	Doğru	Yanlış	Bilmiyorum
1. Yaşlı bireylerde hastane enfeksiyonları gençlerden daha sık görülür.			
2. Yaşlı bireyler enfeksiyonlara karşı dirençlidir.			
3. Hastane enfeksiyonları, morbidite ve mortalitenin, hastanede kalış süresinin uzamasının ve maliyet artışının başlıca nedenleridir.			
4. Yaşlılarda hastane enfeksiyonu nedeniyle mortalite ve morbidite oranları gençlere göre daha yüksektir.			
5. Yoğun bakım ünitesi, yaşlı bireylerde hastane enfeksiyonu gelişimi açısından en yüksek riskli alandır.			
6. Erken taburculuk, yaşlı bireylerde hastane enfeksiyonu gelişimi açısından önemli bir risk faktörüdür.			
7. Yaşlanma ile ortaya çıkan doku ve organ değişiklikleri, yaşlı hastalarda hastane efeksiyonları için risk faktörleridir.			
8. Yaşlılarda fonksiyonel sorunlar (immobilizasyon, disfaji gibi) hastane enfeksiyonlarına yatkınlığı artırabilir.			
9. Yaşlılarda solunum sistemi mukozal savunma mekanizmalarına ilişkin sorunlar hastane enfeksiyonlarına yatkınlığı artırabilir.			
10. Yaşlılarda inkontinans ile hastane enfeksiyonları arasında önemli bir ilişki yoktur.			
11. Yaşlılarda prostat büyümesi hastane enfeksiyonlarına yatkınlığı artırabilir.			
12. Yaşlılarda mide asiditesinin ve bağırsak peristaltizminin azalması ile hastane enfeksiyonları arasında ilişki yoktur.			
13. Yaşlılarda böbrek fonksiyonlarındaki azalma hastane enfeksiyonlarına yatkınlığı artırabilir.			
14. Yaşlılarda karaciğer fonksiyonunun azalması ile hastane enfeksiyonları arasında ilişki yoktur.			
15. Yaşlılarda mesane divertikülüne bağlı hastane enfeksiyonlarına yatkınlık artabilir.			
16. Yaşlılarda yara iyileşmesinin yetersizliği hastane enfeksiyonlarına yatkınlığı artırabilir.			
17. Yaşlanmaya bağlı bağışıklık sistemi işlevlerindeki değişiklikler hastane enfeksiyonlarına yatkınlığı artırabilir.			
18. Yaşlılarda ateroskleroz hastane enfeksiyonlarına yatkınlığı artırabilir.			
19. Yaşlılarda ciltte bütünlüğün bozulması, incelme, lipid ve su kaybı hastane enfeksiyonlarına yatkınlığı artırabilir.			

20. Yaşlanmaile birlikte kronik hastalıkların görülme sıklığı artar ve bu durum enfeksiyonların gelişmesini kolaylaştırır.			
21. Yaşlılarda kronik obstrüktif akciğer hastalığı (KOAH) hastane enfeksiyonlarına yatkınlığı artırabilir.			
22. Yaşlılarda diabetes mellitus (DM) hastane enfeksiyonlarına yatkınlığı artırabilir.			
23. Demans ve inme gibi nörolojik bozukluklar hastane enfeksiyonlarına yatkınlığı artırmaz.			
24. Yaşlılar, immunosupresif, antikolinerjik ve sedatif gibi hastane enfeksiyonlarına yatkınlığı artırabilecek ilaçlar kullanabilirler.			
25. Tıbbi cihazların kullanımı, yaşlılarda hastane enfeksiyon sıklığının artışını etkileyen bir faktör değildir.			
26. Yaşlı bireylerde malnutrisyon hastane enfeksiyonlarına yatkınlığı artırabilir.			
27. Kan dolaşımı enfeksiyonları yaşlılarda ciddi tehdit oluşturmaktadır.			
28. İdrar kateterleri yaşlı hastalarda üriner enfeksiyonları önleyebilir.			
29. Yaşlı hastalarda solunum yolu ve vasküler kateter enfeksiyonları en yüksek mortalite oranları ile ilişkilidir.			
30. Yaşlılarda en sık görülen hastane enfeksiyonlarıüriner, sistem, solunum sistemi ve cerrahi alan enfeksiyonlarıdır.			
31. Yaşlı bireylerde genellikle enfeksiyonların klasik belirti ve bulguları görülür.			
32. Bilinç azlığı, apati, inkontinans, taşikardi ve takipne yaşlılarda enfeksiyonun ana belirtileri olabilir.			
33. Yüksek ateş, yaşlı hastalarda enfeksiyon bulgularından biri olarak her zaman görülür.			

Appendix 2. NURSES' AWARENESS ON HOSPITAL ACQUIRED INFECTION RISKS AMONG THE GERIATRIC PATIENTS

2. Characteristics of Nurse Participants Subject Number:		
12. Age		
13. Gender	□ Male	□ Female
14. Education	□ High school □ Master degree	□ Bachelor's □ PhD
15. Working experience as registered nurse (As years)		
16. Working experience in the hospital (As years)		
17. Working experience in the unit (As years)		
18. Currently working unit of the hospital	□ ER/urgent care	□ ICU
	□ Medical	□ Obstetrics/gynecology
	□ Oncology	□ Surgical
	□ Rehabilitation	□ Other
19. Previous geriatric care education	□ Yes	□ No
20. Educational resource	□ School □ Courses □ Web resources	□ In-service education □ Congress/conferences □ Other
21. Perceived quality of the *geriatric* care education	□ Excellent	□ Very good
	□ Good	□ Fair
	□ Poor	
22. Need for education on geriatric care	□ Yes	□ No

2. Hospital acquired infection (HAI) risks among the geriatric patients	TRUE	FALSE	I don't know
1. Hospital acquired infections (HAI) in the elderly people are seen more often than young people.			
2. There is increased resistance to infections in the elderly.			
3. Hospital acquired infections (HAI) are major causes of morbidity and mortality, prolonged hospital stay and increased cost.			
4. Compared with younger population, elderly have higher mortality and morbidity rates due to HAI.			
5. Intensive care unit the highest suspected area in hospital for elderly patient to have HAI.			
6. An important risk factors of HAI in the elderly patients is early discharge.			
7. Tissue and organ changes with aging are risk factors in elderly patient to have HAI.			
8. Elderly have functional deficiencies (immobilization, dysphagia) that may predispose HAI.			
9. Defective respiratory mucosal defense mechanisms in elderly population may lead to have HAI.			
10. There is not important relationship between incontinence and HAI in geriatric patients.			
11. Elderly may have enlarged prostate that may predispose HAI.			
12. There is no interaction between decreased gastric acidity, bowel peristaltism and HAI among elderly people.			
13. Elderly may have decrease in kidney functions that may predispose HAI.			
14. There is no interaction between decreased liver function and HAI in elderly people.			
15. Elderly may have bladder diverticula that may predispose HAI.			
16. Elderly may have reduced wound healing that may predispose HAI.			
17. Aging is associated with changes in immune system function resulting in increased susceptibility to infection.			
18. Elderly may have atherosclerosis that may predispose HAI.			
19. Skin integrity impairment, thinned skin, loss of lipid and water content in skin are risk factors for HAI among the elderly patients.			

20. Aging increases the incidence of chronic diseases and facilitates development of infections.			
21. Elderly may have chronic obstructive pulmonary disease (COPD) that may predispose HAI.			
22. Elderly may have diabetes mellitus (DM) that may predispose HAI.			
23. Neurological disorders such as dementia and stroke don't predispose to infections.			
24. Elderly people may use medications, such as immuno-suppressants, anticholinergic and sedatives that may predispose to HAI.			
25. Utilization of medical devices doesn't responsible for increased frequency of infections in the elderly.			
26. Malnutrition in elderly population can lead to hospital acquired infection.			
27. Bloodstream infections are the serious threating in elderly.			
28. Urinary catheters may prevent urinary infections in elderly.			
29. Respiratory and vascular catheter infections are associated with the highest mortality rates in the elderly patients.			
30. Most common sites of infections in the elderly are the urinary, respiratory and surgical site infections.			
31. Classical signs and symptoms of infections occur generally in elderly.			
32. Deterioration in consciousness, apathy, incontinence, or tachycardia, tachypnea may be main indications of infection in elderly.			
33. High fever occurs every time as one of the main findings of infection in elderly patients.			

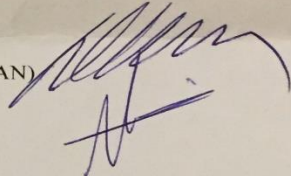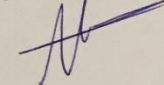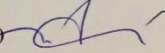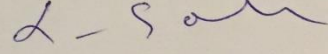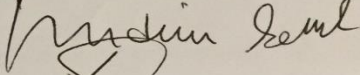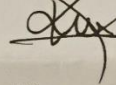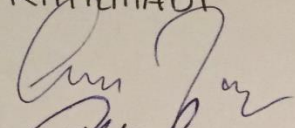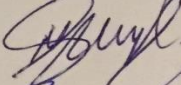**Appendix 3.**Ethical Approval Near East Institutional Reviews Board (IRB)

EK: 513-2017

YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR DEĞERLENDİRME ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 25.05.2017
Toplantı No : 2017/47
Proje No : 414

Yakın Doğu Üniversitesi Sağlık Bilimler Fakültesi öğretim üyelerinden Prof. Dr. Nurhan Bayraktar'ın sorumlu araştırmacısı olduğu, YDU/2017/47-414 proje numaralı ve **"Nurses Awareness on Hospital Acquired Infection Risks of the Geriatric Patients"** başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, etik olarak uygun bulunmuştur.

1. Prof. Dr. Rüştü Onur (BAŞKAN)

2. Prof. Dr. Nerin Bahçeciler Önder (ÜYE)

3. Prof. Dr. Tamer Yılmaz (ÜYE) KATILMADI

4. Prof. Dr. Şahan Saygı (ÜYE)

5. Prof. Dr. Şanda Çalı (ÜYE)

6. Prof. Dr. Nedim Çakır (ÜYE)

7. Prof. Dr. Kaan Erler (ÜYE)

8. Doç. Dr. Ümran Dal Yılmaz (ÜYE) KATILMADI

9. Doç. Dr. Eyüp Yaycı (ÜYE)

10. Doç. Dr. Nilüfer Galip Çelik (ÜYE)

11. Yrd. Doç.Dr. Emil Mammadov (ÜYE)