

## **Nosocomial infections in a district hospital in Turkey.**

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### **Abstract**

**Nosocomial infections are significantly important health problems for both hospitals and patients. No data are available on nosocomial infections in South-East Anatolian region of Turkey region. This study was performed to determine the nosocomial infection rate and type in Kiziltepe State Hospital, Mardin within one year. The surveillance data of nosocomial infections in Kiziltepe State Hospital between January 1<sup>st</sup> and December 31<sup>th</sup>, 2010, was evaluated retrospectively. The epidemiological data was collected by laboratory and hospital-based active surveillance method between January and December 2010. 10,410 patients were hospitalized during this period. 27 (0.26%) hospital-acquired infections were detected. Incidence density was calculated to be 1.46. The highest rate of hospital infections (0.50%) was seen in the intensive care unit. The highest rate of infection was observed in the Thoracic Surgery Clinic (4.1%). In total, 55.5% of detected hospital-acquired infections were surgical site infections, 25.9% urinary tract infections and 11.1% were pneumonia. The frequency of nosocomial infections was found to be low in this hospital compared to other hospital infection rates reports from Turkey. The low infection rate was related with rapid patient circulation. The rate of nosocomial infection is high in intensive care unit patients, especially for surgical site infections. The results provide epidemiological information that will help to implement infection control policies in this hospital.**

**Keywords:** Nosocomial infections, surveillance, infection rate

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### **Introduction**

All over the world, 109 million people are hospitalized every year for various reasons and more than 10 million people are infected with nosocomial infection have been reported by the World Health Organization [1]. Hospital-acquired infections (HIs) are defined as infections developed within 48-72 hours of admission to hospital and if there was no evidence that the infection was present or incubating at the time of admission to the ICU [2]. Hospital infections or nosocomial infections (NIs) prolong the hospital stay; increase the cost of additional treatment with high mortality and morbidity [3]. NIs are most commonly seen ICU units. Although ICU patients create a group as little as 5-10% of all hospitalized patients, 25% of nosocomial infections are emerging in these patients [4]. 53.6% of common nosocomial infections in the ICU are fatal. Given this rate, importance

of the prevention of infections is more well understood [5]. NI rates, indicating the quality of care in hospitals today is regarded as the most important criteria. CDC (Center for Disease Control-CDC) designated universal precautions for the prevention of nosocomial infections are known to have considerable influence. In addition, with the implementation of the basic methods of protection from infection, nosocomial infections are reported to be reduced by 30% [4, 6].

Surveillance is the primary method used to obtain data on nosocomial infections. Nosocomial infection surveillance provides important data for the detection of infected patients, the determination of areas and types of this infection, determination of the factors that led to the development of this infection. Surveillance data collection and analysis should be carried out together with the absolute infection control measures [7]. Control of these

infections is possible with every hospital follow-up of surveillance results, these results are compared with other hospital infection rates and effective infection control measures. In a different study, the incidence of nosocomial infection is reported to range between 3.1-14.1% [8].

Infection rates in many hospitals are monitored and analyzed with Infection Control Committee. The results obtained in accordance with each hospital's specific infection rates, risk services are determined, the infection control measures are taken and according to hospital property and requirement training of health personnel programs are restated [9]. This study was performed to assess the rate of NIs and the type of nosocomial infections in state hospital within one year.

**Materials and Methods**

A retrospective study was conducted between January-December 2010 in Kiziltepe State Hospital which has 79 bed capacity, Mardin, South-East Anatolian region of Turkey. In this study, patients hospitalized to the Kiziltepe State Hospital which has 79 bed capacity were monitored by Hospital Infection Control Committee with laboratory and clinical methods based on a prospective active surveillance. Data was collected in January-December 2010. Data were collected between January-December 2010 retrospectively. NI are evaluated according to the "Centers for Disease Control and Prevention (CDC)" criteria. Infections after 72 hours of hospitalization and after discharge within 10 days were considered to be hospital-acquired [10]. NI diagnosis and anatomical localization were established on the basis of the standard definitions of Centers for Disease Control and Prevention (CDC), modified for our setting. In accordance with above definitions, all infections present at admission or incubating at the moment of patient's admission were not considered as nosocomial infection, but as externally acquired infections. An infection was considered hospital acquired if it developed in hospital and manifested 48 hours (typical incubation period for most bacterial NIs) or more following a patient's admission to hospital. The study included all patients hospitalized for more than 24 hours and over 18 years of

age. Patients with a fatal outcome occurring within the initial 24 hours, or whose length of ICU stay was shorter than 24 hours, were excluded from further research. Following admission to the ICU, each patient was examined and underwent laboratory tests.

Information about each patient was entered into a questionnaire that contained the following data: age, sex, underlying disease, invasive procedures, treatment modalities (use of prophylactic antibiotics, etc), change in body temperature, data on physical examination and laboratory findings, invasive procedures. All patients were followed until final disease outcome, i.e., cure and discharge or death.

Incidence rates of patients with NIs and all recorded NIs were calculated as a ratio of the number of patients with NIs or number of recorded NIs to the number of patients in the study (x100). To calculate the density of NIs, the ratio of the total number of NIs recorded in the observed period to total number of patient days (x1000) was determined.

Data were collected and analysed using National Nosocomial Infections Surveillance Programme in Turkey. Primary data were analysed using descriptive statistical methods, methods of statistical hypothesis testing, analysis of outcomes and potential predictors. Rate and frequencies of NIs were calculated as % and number.

**Results**

During this period, 10,410 patients were hospitalized. 27 (0.26%) hospital-acquired infections were detected and nosocomial infection rate was calculated to be 1.46. With a maximum of 0.50% of nosocomial infections in intensive care unit (ICU) were seen. Distribution and rates of NIs are shown in Table 1. The highest incidence rate of hospital acquired infections was observed in the Thoracic Surgery Clinic (4.1%) (Table 2). The most frequent type of nosocomial infection is surgical site infection (55.5%). About 25.9% of infections were associated with urinary tract infection, 11.1% with pneumonia, respectively (Table 3).

**Table 1.** Clinics-Incidence rates and incidence densities of NIs for 2010 in Kiziltepe State Hospital

Clinics	No of hospitalized patients	No of hospitalized days	No of nosocomial infections	Incidence rates of nosocomial infections%	Incidence densities of nosocomial infections
Surgical Medical Branches	7.627	6.708	17	0,22	2,53
Internal Medical Branches	1.912	1.912	6	0,31	0,72
Intensive care unit	602	1.458	3	0,50	2,06
ICU / Neonatal	269	968	1	0,37	1,03

*NIs Incidence Rate (%) = 100 x (No of nosocomial infections / No of hospitalized patients)*

*NIs Incidence densities = 1000 x (No of nosocomial infections / No of hospitalized days)*

**Table 2.** NIs in Kiziltepe State Hospital: Clinic and site-specific incidence rates and incidence densities

Clinics	No of hospitalized patients	No of hospitalized days	No of nosocomial infections	Incidence rates of nosocomial infections %	Incidence densities of nosocomial infections
Internal Diseases	503	1.750	0,00	0,00	0,00
Neurology	76	164	0,00	0,00	0,00
Chest Diseases	239	1.194	2	0,84	1,68
Pneumonia					
Neurosurgery	201	188	0,00	0,00	0,00
General Surgery	1.840	2.281	2	0,11	0,88
Urinary Tract Infection					
Surgical Site Infection (SSI)	1.840	2.281	7	0,38	3,07
Pediatric Surgery	41	63	0,00	0,00	0,00
Thoracic Surgery	49	158	2	<b>4,08</b>	12,66
Surgical Site Infection (SSI)					
Deep incisional					
Cardiology	153	501	0,00	0,00	0,00
Infectious Diseases	18	93	0,00	0,00	0,00
Pediatrics	923	4.656	2	0,22	0,43
Urinary Tract Infection					
Other infections of the lower respiratory tract (non-pneumonia)	923	4.656	2	0,22	0,43
Combined Intensive Care Unit-Urinary Tract Infection	602	1.458	3	0,50	2,06
Otolaryngology	578	489	0,00	0,00	0,00
Ophthalmology Surgery	117	39	0,00	0,00	0,00
Obstetrics And Gynecology	4.198	2.734	4	0,10	1,46
Surgical Site Infection (SSI)					
Orthopedics	244	310	0,00	0,00	0,00
Ürology	359	446	2	0,56	4,48
Surgical Site Infection (SSI)					
Neonatal Intensive Care	269	968	1	0,37	1,03
Pneumonia					

NIs Incidence Rate (%) =  $100 \times (\text{No of nosocomial infections} / \text{No of hospitalized patients})$

NIs Incidence densities =  $1000 \times (\text{No of nosocomial infections} / \text{No of hospitalized days})$

**Table 3.** NIs in Kiziltepe State Hospital: site-specific incidence rates and incidence densities

Type of NIs	No of hospitalized patients	No of hospitalized days	No of nosocomial infections	Incidence rates of nosocomial infections %	Incidence densities of nosocomial infections
Uriner tract infection	10.410	17.492	7 (25.9%)	0,07	0,40
Pneumonia	10.410	17.492	3 (11.1%)	0,03	0,17
Other infections of the lower respiratory tract (non-pneumonia)	10.410	17.492	2 (7.5 %)	0,02	0,11
Surgical Site Infection (SSI)	10.410	17.492	15 (55.5%)	0,14	0,86

## Discussion

Because hospital infections prolong duration of hospitalization, hospital infections cause increased mortality and cost of treatment. In the ICU length of hospital stay, invasive procedures and widespread use of broad-spectrum antibiotics are major risk factors for the development of nosocomial infections. High

mortality rate of nosocomial infections in intensive care unit emphasizes the importance of these infections. When these units are compared to other units of hospitals, more widely used broad spectrum antibiotics; cross-infection and contamination of the unit are seen more frequently in these units. Therefore, nosocomial infections were 5-10 times more common than others in these units [11].

Hospital infections had become a major health problem in the last 30 years. In our country during the last decade, in many hospitals including Kiziltepe State Hospital, the size of the infections were studied by implementation of surveillance and control programs for prevention and control of nosocomial infections and preventions have been put into action [12].

According to World Health Organization data, more than 109 million people in worldwide are hospitalized for various reasons each year. More than 10 million of these patients will develop nosocomial infection [1]. In 17 countries in Europe, a study involving 1,417 adult patients in ICU patients in 10,038, 20.6% developed at least one time, hospital infection have been reported [13]. From 22 university hospitals in our country, in a similar study involving 56 ICUs, 49% of patients in the ICU, development of nosocomial infection one or more have been identified [14].

In several studies conducted in our country the rate of nosocomial infection has been reported to vary between 1% and 16% [15]. The incidence of nosocomial infection in Kiziltepe State Hospital was identified as low in our study. This is lower than the general rate of our country and the world, due to the different characteristics of each type of hospital, as well as properties of patients and data collection methods, to make comparison may not always be accurate [9]. The reason of finding the lowest infection rates in our hospital may be due to the circulation of patients in our hospital quickly. The incidence of nosocomial infections is 5-10 times higher in the ICU service compared to other surgical and internal medicine. 45% of all episodes of nosocomial bacteremia and pneumonia are seen in intensive care patients approximately [6].

In our study, the rate of infection is highest in the intensive care units (0.50%). Similarly, the highest nosocomial infection rate reported by Vançelik et al. and Öncü et al. was in ICU [15, 16]. Similarly in the study of Üstün et al. [17], between January 1997 and December 2006, the average nosocomial infection rates and incidence density were found to be, 2.0% and 2.3/1000 patient day respectively and the most common nosocomial infection was found to be surgical site infection, urinary tract infection and pneumonia, respectively. Urinary tract infections are located in the first place in terms of frequency nosocomial infections. They are responsible for 40 to 60% of nosocomial infections. Urinary tract infection with pneumonia in intensive care units is one of the two most common forms of infection. Urethral catheter use approximately in the 80% of patients, in the remaining cystoscopic and other urological procedures have been implicated [3]. In our study, the first of surgical site infection, urinary tract infections and pneumonia follow it respectively.

Surgical site infection is examined under the third category; superficial incisional, deep incisional and organ space. Many of surgical wound infections are formed by the bacteria that is transmitted during surgery directly to the tissues and usually caused by bacteria from the patient's own settled catheter [18]. For the prevention of surgical site infections it is important to keep short preoperative hospitalization, to control the underlying disease. Appropriate use of prophylactic antibiotics is one of the important elements of effective prevention programs [3].

While in the study of Erdinç et al. [19] covering the 1999-2003 years, the highest nosocomial infection rate in neurology, neurosurgery, pediatrics and dermatology clinics is reported, Küçükbayrak et al. [20] mentioned the highest rates in the surgery and internal medicine ICU. In our study, highest rate was seen in the chest surgery clinic (4.1%).

To combat hospital infections today the most widely accepted strategy is to make patient and laboratory-based prospective active surveillance studies regularly and to guide treatment according to the obtained data [21].

To reduce nosocomial infections, surveillance results should be monitored regularly, indications of invasive procedures should be evaluated well, should not compromise the principles of infections and intensive efforts must be applied consciously on the use of antibiotics.

As a result, the incidence of nosocomial infections in our hospital decreased during 2010 compared to previous years. However, as in previous years, nosocomial infections in intensive care unit continue to be the major problem.

### Conflict of interest

All author report no conflict of interest relevant to this article.

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