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Prevalence of Nosocomial Infection at a Razi teaching Hospital, during 2010-2015.

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ABSTRACT

There is no doubt that Nosocomial Infections (NIs) have adverse impacts on patients and sometimes the health care workers (HCWs). NIs causes an extra cost of health care. The main objective of this study was to evaluate the prevalence of NIs in Razi teaching Hospital, Ahvaz, southwest of Iran, during 2010-2015. The present study was a descriptive and cross- sectional study. This study, conducted on all the patients who were hospitalized with signs and symptoms of infection after 48 hours of hospitalization in Razi teaching Hospital in Ahvaz, Iran, during 2010-20145. Data was taken from Infection Disease Committee (IDC). Sampling was already performed for 6 years during 2010-2015. Data about the patients' site of infection, ward of hospitalization, type of NIs were collected. Raw data of NIs was processed using Excel software. After processing data, outputs were classified into charts and tables in term of Nosocomial infections cases. Based on our result, the highest cases for NIs observed in 2015. We concluded that the incidence of NIs was low (<2%) in this hospital during 2010-20145. Numbers of NIs were estimated 128, 142, 174, 154, 189 and 207 persons for 2010, 2011, 2012, 2013, 2014 and 2015, respectively. The results of the present study showed that the Most NIs was reported in wards of obstetrics and gynecology (OBGYN). Regarding the etiology of infection, *Escherichia coli* were the most frequent pathogen. The finding of this study showed that the incidence of NIs was lower than national standard. We also noticed that Number of NIs during six successive years were term of increasing.

Keywords: Nosocomial Infections, Patient, Hospital, Prevalence, Ahvaz.

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INTRODUCTION

Seriousness of Nosocomial Infections (NIs) lays in the fact that high, potentially harmful infections incidence and can be harmful for Patient hospitalization [1, 2]. NIs occurs 48 to 72 hours after hospital admission, due to the patient's stay in the hospital [3]. NIs is among the common threats in the teaching hospitals and medical centers. The main sources of NIs are environmental health hospital, carelessness medical staff, catheter intensive, surgery, various medical processes, failure to use appropriate personal protective equipment and Underlying disease [4, 5]. The exposure to NIs is extremely risky for Patient health because these Infections enter the repository, blood and urinary system. Several studies show a connection between NIs incidence and increased hospitalization, high hospital costs, disability and causes of mortality [6]. Therefore, the prevention of NIs through identification, removal, and protective activity of cases can be very effective and reducing the length of treatment and time of hospitalization [7]. The most common infections are urinary tract infection (UTI), pneumonia, surgical site infections (SSIs) and bloodstream infection (BSI) [8].

In many cases, NIs can due to resistance to a variety of antibiotics that this issue Will be very threat in the treatment of these infections in the future [8, 9]. in the United States, Center for Disease Control (CDC) reported that each year among approximately two million persons occur NIs result in up to 4.5 billion dollars additional health care expenses annually and nearly 90000 individuals among hospitalized patients die due to this incidence [10, 11]. Strategies for the reduction of the risk of NIs can include training of appropriate HCWs, increasing knowledge of authorities about these infections, hand hygiene, reduction of use of intensive devices and reduction of direct contact with patients [12, 13]. The results of different studies have shown that spending much cost for diagnosis and education can decrease the rate of NIs [14]. Saeidimehr et al in 2015 calculated the rate of nosocomial infection rates during one year in Naft Grand hospital, Ahvaz, Iran [1]. In similar works Salmanzadeh et al studied the Evaluation of nosocomial infections in a teaching hospital [2]. In 2008, in Taiwan's hospital Maa et al estimated the Incidence density and relative risk of nosocomial infection [15]. An investigation in Italy in 2001 showed that pulmonary infections were the most common NIs and the duration of hospitalization was an important factor affecting the incidence of infection [16]. In similar work, Amini et al in their study had shown adverse Factors on Frequency of NIs [17]. The purpose of this study was to estimate the rate of NIs at Razi teaching Hospital in six year.

MATERIALS AND METHODS

Methods

The present study was a descriptive and cross- sectional study. The NIs cases in Razi teaching hospital in 2010 through 2015 were calculated based on the utilizing the National Nosocomial Infections Surveillance (NNIS) [18, 19]. Sampling was already performed for all the patients who were developed signs and symptoms of infection after 48 hours of hospitalizations in Razi teaching hospital with approximately 220 beds, in the southwest of Iran, at 6 years by Infection Disease Committee (IDC). Therefore, in the present study six years samples in Razi teaching hospital were taken. In the present study, the infection control supervisor, according to reported cases of NSIs, observation, and after consultation with infectious diseases specialists, recorded the cases of NIs, wards in which the NIs occurred, and the sampling methods. NIs sampling was performed at random from patients with infections, including CBC, urine, chest x-ray and blood culture. Data collection forms consisted of Category of patients' information such as site of infection, ward of hospitalization, type of NIs. These collection data's then were processed by Excel software using.

Description of study area

Ahvaz city, with a population of 1 million approximately is located between 48 to 49 degrees and 29 minutes of the eastern longitude in the Greenwich meridian and 30 to 32 degrees and 45 minutes of the northern latitude from the equator [20-23]. Ahvaz is located in the dry area of Iran with an area of 140 square kilometres [24, 25]. To perform this study data was taken from Razi teaching hospital. This Hospital is a tertiary-care hospital with 220 beds, and is located in the center of Ahvaz. Location of the Razi teaching hospital in Ahvaz is presented in figure 1.

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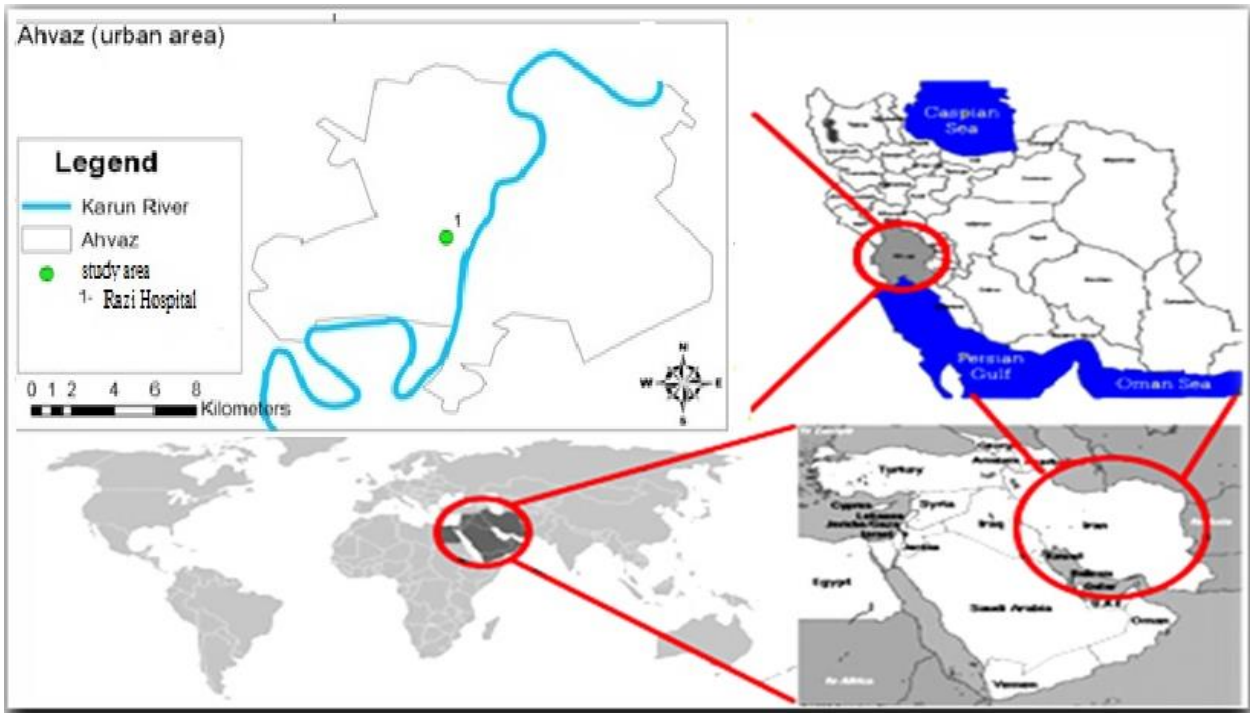

Figure 1: Location of the Razi teaching hospital in Ahvaz city, in the south west of Iran

Statistical Analysis

In the present study, we used descriptive statistics (frequency, mean, and standard deviation for each variable) to find Prevalence of Nosocomial Infection at a Razi teaching hospital. The coded data were entered in SPSS software version 16.

RESULTS

This study was done on 12563,14265, 16635 ,15779, 17896 and 19236 patients who were hospitalized for more than 48 hours, from which 128, 142, 174, 154, 189 and 207 cases were identified with multidrug-resistant infection during 2010-2015, respectively. The number of NIs in different wards of the hospital, including ICU, CCU, OBGYN, orthopedic, general surgery, Emergency, Operating room, infectious diseases and internal medicine during 2010-2015 are presented in table 1. Numbers of NIs in OBGYN and general surgery during five successive years were higher than those Numbers of NIs in another ward (Table 1). The highest rate of NIs was observed in OBGYN [62(29.95%)] ward during 2015 (Table 1).

Table 1: The Number of NIs in the hospital wards during 2010-2015

Hospital ward	Number of NIs **2010**	Number of NIs **2011**	Number of NIs **2012**	Number of NIs **2013**	Number of NIs **2014**	Number of NIs **2015**
ICU	28(21.87%)	30(21.13%)	40(22.99%)	33(21.42%)	52(27.51%)	49(23.67%)
CCU	1(0.78%)	2(1.4%)	3(1.72%)	1(0.65%)	-	4(1.93%)
OBGYN	45(35.15%)	53(37.32%)	58(33.33%)	51(33.11%)	50(26.45%)	62(29.95%)
Orthopedic	19(14.84%)	25(17.6%)	17(9.77%)	34(22.07%)	18(9.52%)	32(15.45%)
General surgery	8(6.25%)	17(11.97%)	14(8.05%)	6(3.89%)	25(13.22%)	28(13.52%)
Emergency	5(3.9%)	3(2.11%)	5(2.87%)	-	-	8(3.86%)
Operating room	4(3.12%)	2(1.4%)	1(0.57%)	-	-	3(1.45%)
Infectious diseases	13(10.15%)	6(4.22%)	21(23.56%)	27(17.53%)	35(18.51%)	17(8.21%)

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internal medicine	5(3.9%)	4(2.82%)	15(8.62%)	2(1.29%)	9(4.76%)	4(1.93%)
Total	128(100%)	142(100%)	174(100%)	154(100%)	189(100%)	207(100%)
	Abbreviations: OBGYN: Obstetrics and Gynecological; ICU: Intensive Care Unit; CCU: Coronary Care Unit					

Number of NIs cases related to different wards has shown in Figure 2. The numbers of cases of NIs were 128, 142, 174, 154, 189 and 207 in 2010 until 2015, respectively. As seen, an increasing trend was observed between number of cases NIs incremented years (during 2010-2015) (figure 2).

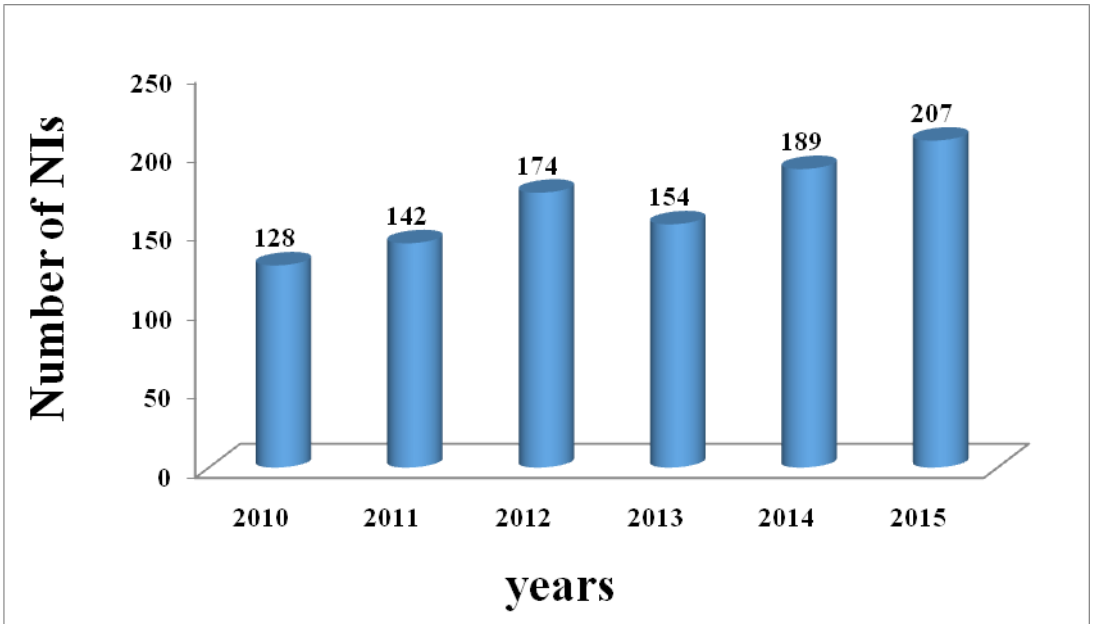

Figure 2: Relationship between cumulative of NIs in Razi teaching hospital during 2010 - 2015

Totally, the incidence of NIs was 1.01, 0.995, 1.045, 0.975, 1.056 and 1.07 percent in this center during six years. SSIs were the most number of infection 387, followed by UTI 310, pneumonia 234 and blood stream infections (BSIs) 70 (Table 2).

Table 2: Frequency distribution type of infection by hospital ward, based on culture results during 2010 - 2015

year / Type of infection	2010	2011	2012	2013	2014	2015	Total type of infection
Pneumonia	35(27.34%)	30(21.13%)	42(24.13%)	28(18.18%)	51(26.98%)	48(23.18%)	234(23.54%)
UTI	45(35.15%)	55(38.73%)	52(29.88%)	12(7.8%)	68(35.97%)	78(37.68%)	310(31.18%)
SSI	43(33.59%)	51(35.91%)	75(43.10%)	84(54.55%)	62(32.8%)	72(34.78%)	387(38.93%)
BSI	5(3.9%)	6(4.22%)	5(2.87%)	30(19.48%)	15(7.93%)	9(4.35%)	70(7.04%)
Total	128(100%)	142(100%)	174(100%)	154(100%)	189(100%)	207(100%)	994(100%)

The predominant bacteria in different wards were Escherichia coli, coagulase positive staphylococci, coagulase negative staphylococci, Klebsiella, Pseudomonas aeruginosa, streptococci, Enterobacter and bacillus, respectivlly. (Table 3)

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Table 3: Frequency distribution of isolated microorganisms by hospital ward during 2010 - 2015

year / Microorganism	2010	2011	2012	2013	2014	2015
Escherichia coli	70(54.69%)	79(55.63%)	75(43.10%)	90(58.44%)	80(42.33%)	106(41.21%)
Klebsiella	11(8.60%)	8(5.63%)	18(10.34%)	12(7.8%)	26(13.76%)	18(8.69%)
Enterobacter	2(1.56%)	3(2.11%)	3(1.72%)	5(3.24%)	6(3.17%)	8(3.86%)
streptococci	6(4.69%)	2(1.41%)	4(2.29%)	5(3.25%)	7(3.71%)	9(4.35%)
Pseudomonas aeruginosa	5(3.9%)	8(5.63%)	11(6.32%)	3(1.95%)	15(7.94%)	5(2.41%)
coagulase positive staphylococci	13(10.16%)	19(13.38%)	30(17.24%)	21(13.64%)	27(14.28%)	32(18.36%)
coagulase negative staphylococci	20(15.62%)	22(15.49%)	26(14.95%)	16(10.39%)	25(13.23%)	27(13.04%)
Bacillus	1(0.78%)	1(0.704%)	3(1.72%)	2(1.29%)	3(1.59%)	2(0.97%)
Total	128(100%)	142(100%)	174(100%)	154(100%)	189(100%)	207(100%)

Figure 3 shows relationship between the categories of infection versus number of NIs during six successive years. Totally, the incidence of NIs was 1.01, 0.995, 1.045, 0.975, 1.056 and 1.07 in 2010 until 2015, respectively, in Razi teaching hospital. SSIs were the most frequent category of infection (38.93%), followed by UTI (31.18%), pneumonia (23.54%) and blood stream infections (BSIs) (7.04%) during 2010-2015 (figure 3). Keep in mind that SSIs, as compared to other types of infection, were the most frequent category of infection.

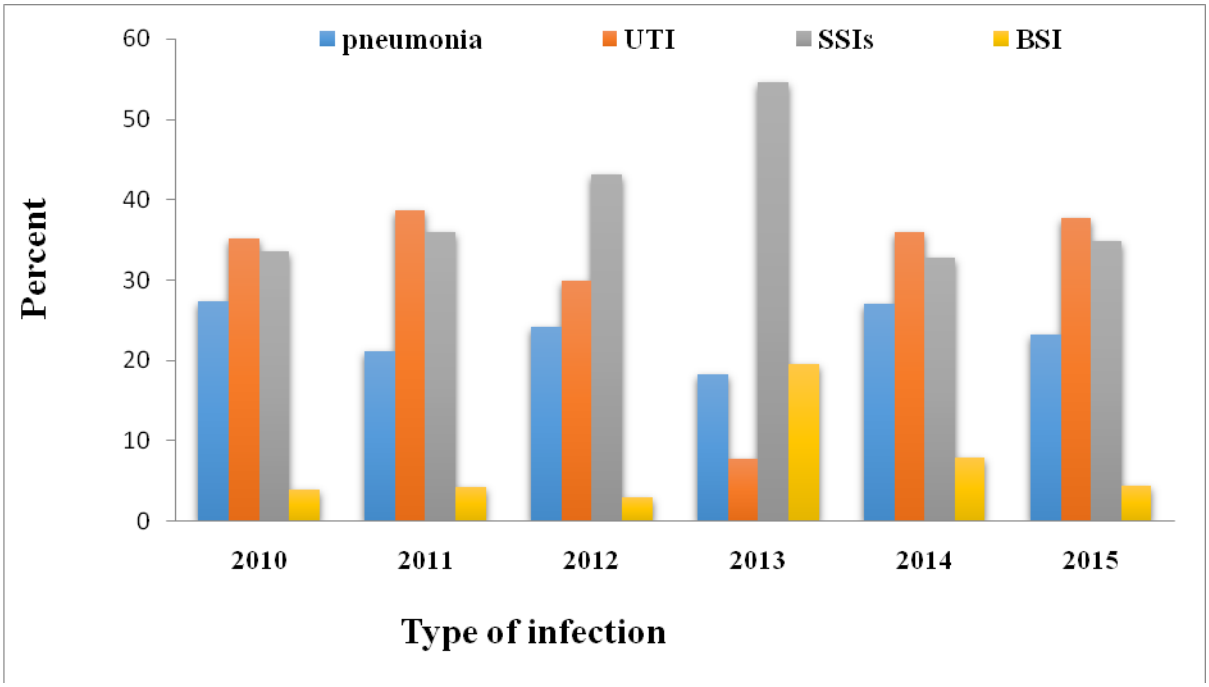

Figure 3: Percentage of NIs based on type of infection, Razi Hospital, during 2010-2015

DISCUSSION

In this study, we estimate prevalence of NIs at a Razi teaching hospital, during 2010-2015 in Ahvaz, Iran. In recent years, NIs have been considered a serious threat to the quality of life and health of patients and HCWs. In this study, we summarized cases of NIs among patients and different wards.

According results of this research, the number of cases of NIs was 128, 142, 174, 154, 189 and 207 during 2010 until 2015, respectively, and the incidence was 1.01% in 2010, 0.995% in 2011, 1.045% in 2012, 0.975% in 2013, 1.8% in 2014 and 1.07% in 2015, which was lower compared to rates of referenced NIs in the guideline book.

In a study performed by Maa et al in Taiwan's hospital, the rate of infection was about 40% [15]. In another study in IRAQ, Qader et al reported prevalence rate of NIs was about 36 percent [26]. There are some possible reasons contributing to the low prevalence of NIs in our study, including lack of a reporting system for NIs and using less invasive modes of treatment for patients. Saeidimehr et al in 2015 was performed on Nosocomial Infection Rates During One Year in Naft Grand Hospital, Ahvaz, Iran. Based on result there, the rate of NIs was 2.0374% during the preceding year [1]. Salmanzadeh et al in their study had shown the estimated rate of Nosocomial Infections in a Teaching Hospital in Ahvaz, Iran. They demonstrated that a prevalence rate of NIs was 0.975 percent [2].

In the present study, E.coli was the most frequent pathogen, but Javanbakht et al in 2012 carried out survey on the incidence of cross infections in Imam Reza hospital, Mashhad. Based on their results, *Klebsiell aspp*, Was the most frequent pathogen [27].

As the results show, the highest rate of NSIs was observed in OBGYN award during 2010 until 2015. In a similar work, Afrasiabi's in Yasuj reported that 39.3% of operating room personnel had coetaneous injury, representing the highest rate [28]. According to result study Luzzati, in Triveneto area, Italy, Prevalence of nosocomial infections was about 30 percent in ICU ward [16]. In another study in the Hospital of Arak, Iran, the rates of surgical site infections were high and was highest in the ICU ward [17].

According to the results of our study, SSIs were the most common type of infection in our hospital. In a similar work, Pellizzer's et al in Italy reported that UTI (28.4%)was the most frequent sites of infection [29]. Based on the study by Javanbakht et al in Mashhad and Appelgren, SSIs were the most common type of infection [27, 30]. Qader et al [26] and Luzzati et al [16] reported in their studies that pneumonia was the most common type of infection. These differences may be due to the number of patients studied, place of study, and genetic susceptibility.

CONCLUSION

This study was conducted to estimate the rate of NIs in Razi teaching Hospital, Ahvaz, southwest of Iran, during 2010-2015. The results that our study showed were that an increase in the patents and HCWs knowledge can be reduce the rate of NIs. In conclusion, it should be mentioned that the incidence rate of NIs among patients, in this hospital was low. Improving the hospital environment, Careful monitoring, public education, hand hygiene and application of useful medicine device will have an important role in controlling cases of NIs.

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Conflict of Interests: There are no conflicts of interests among the authors.

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