

Prevalence of nosocomial infections in Lordegan Shohada hospital from 2017 to 2022



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Abstract

Introduction: Healthcare-acquired infections or nosocomial infections are a common problem in all countries.

Objectives: The aim of this study was to conduct an epidemiological evaluation of nosocomial infections in Lordegan Shohada hospital from 2017 to 2022.

Methods: This study was descriptive-analytical cross-sectional. The case finding was based on Centers for Disease Control (CDC) definitions for nosocomial infection and the nosocomial infection questionnaire of the Ministry of Health and medical treatment of Iran. Cases of nosocomial infection were confirmed based on clinical findings and tests then registered in the Iranian nosocomial infection surveillance system.

Results: Overall, 48 343 patients were at risk for nosocomial infections during the study period; of these, 274 (0.6%) cases of nosocomial infections were detected, of which 132 were men (48%), and 142 (52%) were women. The most common type of nosocomial infection in this study was surgical site infections (0.33%), pneumonia (0.27%), and ventilator-associated events (0.10). The highest rate of nosocomial infection was reported from intensive care units (0.2).

Conclusion: The prevalence of nosocomial infections in this center has been low compared to the global norm. This is not the reason that the majority of nosocomial infections are low. The most important reason was the irrational use of antibiotics and, therefore, the hiding of infection cases. The prevalence of microbial resistance is increasing since this issue is worrying in nosocomial infection control.

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Introduction

Nosocomial infections appear within 48 hours after the patient is admitted to the hospital and can increase mortality, duration of patient aging, and the economic burden on patients and the government(1,2). Significant risk factors for hospital-acquired infections include diabetes, intubation, children (Especially premature babies), and elderly People with underlying diseases (2).

According to the latest Centers for Disease Control (CDC) edition, the most common nosocomial infections include bloodstream infections, urinary tract infections (UTIs), surgical site infections (SSIs), pneumonia, and ventilator-associated event (VAE) (3).

Based on studies, the most common pathogens responsible for nosocomial infections are bacteria, viruses, and fungal

Key point

The prevalence of nosocomial infection in this center has been low compared to the global norm; this is not the reason that the prevalence of nosocomial infection is low; the most important reason for that is the irrational use of antibiotics and, therefore, the hiding of infection cases.

parasites (3).

Nosocomial infections are critical in evaluating hospitals' performance in infection prevention and patient safety. Increasing antimicrobial agents and advanced medical procedures puts patients at risk for nosocomial infections (4).

Nosocomial infections are a significant problem for public health worldwide, with a prevalence of 0.3%-20.7% in different countries (2); according to the World Health Organization, approximately 15% of



hospitalized patients suffer from these infections and these infections are responsible for 4% to 56% of all neonatal mortality (3).

The intensive care unit (ICU) is one of the essential parts of the hospital, which plays a vital role in patients with severe conditions. Therefore, incidence of these types of infections in the intensive care unit due to invasive procedures is higher than in other hospital wards that do not perform such procedures (3,5).

Although it is complicated to pinpoint the exact source of infection, the most important source of these infections is transferred from health care workers during procedures or from the surrounding environment of the patient (2).

Recent studies have shown that several major nosocomial pathogens are the leading cause of hospital-acquired infections, which can survive for a long time, despite disinfection and can be transmitted by the hands of healthcare workers. There is evidence that contaminated surfaces play an important role in the transmission of *Clostridium difficile*, vancomycin-resistant enterococci, methicillin-resistant *Staphylococcus aureus* (MRSA), *Acinetobacter baumannii*, and *Pseudomonas aeruginosa* (6-10).

Microbial resistance to antibiotics is one of the most critical challenges in nosocomial infection control, the most important cause of which is the unreasonable prescription of antibiotics. Several studies have shown that the resistance of common pathogens causing hospital infections is increasing rapidly, leading to more patient deaths due to hospital infections. Among Gram-positive organisms, the essential resistant pathogens are; MRSA, multi-drug-resistant (MDR) pneumococci, and vancomycin-resistant enterococci (VRE) and extended-spectrum β-lactamases (ESBLs) in *Klebsiella pneumonia* (11).

Objectives

This study aims to conduct an epidemiological evaluation of nosocomial infections in Lordegan Shohada hospital from March 2017 to 2022.

Methods

This study was descriptive-analytical cross-sectional. The case finding was based on CDC definitions for nosocomial infection and the nosocomial infection questionnaire (Form No. 1) of Iran’s Ministry of Health and medical treatment. This questionnaire included demographic information, cause of hospitalization, vital signs, laboratory test results, and radiography. Cases of nosocomial infection were confirmed based on clinical findings, tests and then registered in the Iranian nosocomial infection surveillance system.

All stages of data analysis were analyzed by SPSS software version 23 at a p-value level of 0.05 and a confidence interval of 95%.

Results

Overall, 48343 patients were at risk for nosocomial infections during the study period; 274 (0.6%) cases of nosocomial infections were detected, of which 132 were men (48%). The most common type of nosocomial infection in this study was SSI (0.33%), pneumonia (0.27%), and VAE (0.10). The highest rate of nosocomial infection was reported from ICUs (0.2) (Table 1).

Klebsiella, *E. coli*, and *Staphylococcus epidermidis* were the most common infectious agents. In instrument-related infections, 74 cases were associated with ventilation, 12 with urinary catheter, 6 with peripheral venous catheter, and six with other tools. Of 274 cases of nosocomial infections, 215 have been discharged, and 53 have died (Table 1). Eighty-six microbial agents causing hospital infections were found in this study; the most common microorganisms causing nosocomial infections were *Klebsiella* (23, 27%), *E. coli* (13, 15%) and different types of staphylococci (17, 20%) (Table 2).

During the investigation period, there were 45 (16%) cases of microbial resistance to antibiotics. Out of these, 18 (40%) were *Klebsiella*, 11 (24%) were *E. coli* cases which

Table 1. The overall prevalence of nosocomial infections

		Number	Percent
Nosocomial infections	No	48069	99.4
	Yes	274	0.60
Gender	Male	132	0.48
	Female	142	0.52
Type of nosocomial infections	Blood stream infections	11	0.04
	Ventilator-associated events	74	0.1
	Pneumonia	76	0.27
	Surgical site infections	90	0.33
	Urinary tract infections	18	0.065
	Other	5	0.018
Ward	Pediatric	9	0.03
	Gynecological surgery	27	0.10
	Internal women	26	0.94
	Obstetrics and gynecology	37	0.14
	Men	37	0.14
	Neonatal intensive care unit	37	0.14
Tools	Cardiac care unit	11	0.04
	Intensive care unit	90	0.33
	Ventilator, endotracheal tube, tracheostomy	70	0.26
	Urinary catheter	12	0.04
Outcome	Peripheral venous catheter	6	0.02
	Other	6	0.02
	Discharge	215	0.78
	Outcome	53	0.19
	Missed	6	0.02

Table 2. The overall prevalence of nosocomial infections Organism

Organism	Number	Percent
<i>Acinetobacter</i>	6	2.18
<i>Staphylococcus epidermidis</i>	10	3.64
<i>Staphylococcus aureus</i>	4	1.45
Positive coagulase <i>Staphylococcus</i>	1	0.36
Negative coagulase <i>Staphylococcus</i>	2	0.72
<i>Streptococcus pneumoniae</i>	1	0.36
<i>Escherichia coli</i>	13	4.74
<i>Enterobacter</i>	8	2.91
<i>Enterococcus</i>	2	0.72
<i>Bacillus anthracis</i>	1	0.36
Other bacteria	1	0.36
Other mushrooms	3	1.09
<i>Serratia</i>	5	1.82
<i>Pseudomonas aeruginosa</i>	5	1.82
<i>Citrobacter</i>	1	0.36
<i>Klebsiella</i>	23	8.39
Unknown	188	68.61
Total	274	100.0

showed resistance to ESBL, 5 (11%) were *Staphylococcus aureus* cases which showed resistance to MRSA, and 2 (4%) were *Enterococcus* cases which showed resistance to VRE. Additionally, there were three cases of *Pseudomonas aeruginosa* and 6 (15%) cases of *Acinetobacter* which showed resistance.

Discussion

The overall prevalence of nosocomial infections in our study is approximately 0.6. However, in other studies conducted in Iran and by the WHO, the nosocomial infection rate appears to be lower (5). This decrease may be due to various reasons, such as the inability to follow up on cases discharged from the hospital, irrational use of antibiotics, and lack of reporting of nosocomial infections.

Our study revealed that the majority of reported nosocomial infections occurred in the ICU, which is consistent with other studies conducted in Iran (5,6). Additionally, based on our research, the most common type of nosocomial infection in this ward was VAE, which may be attributed to the high level of invasive procedures such as intubation and suction of the endotracheal tube.

According to our study, the most prevalent nosocomial infection in this center was SSI. According to the study by Zahraei et al, UTI was the most prevalent nosocomial infection in their center (7).

Moreover, the most prevalent nosocomial infection in pediatrics (<12 years old), was pneumonia. Ventilator-associated pneumonia is the second most common hospital-acquired infection between children and NICUs (8).

Colonization of critically ill patients with nosocomial organisms usually occurs after 48-72 hours of admission. In this study, the most important pathogens were *Klebsiella* (18%) and *E. coli* (13%), which is consistent with most studies (9).

The prevalence of microbial resistance in the field of nosocomial infection control was 16% in this study. further, the most common cases of microbial resistance were *Klebsiella*, *E. coli*, and *Staphylococcus aureus*, which is similar to the results of the study by Nurain et al (12).

Conclusion

Although the prevalence of nosocomial infections in this center has been lower than the global norm, this cannot be attributed to the low prevalence of nosocomial infections. The most significant factor is the irrational use of antibiotics and the underreporting of infection cases. The results of our study indicate an increasing prevalence of microbial resistance, which is concerning in the field of nosocomial infection control.

Limitation of the study

This study is a single-center experience and requires further investigation through larger studies.

Authors' contribution

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Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

The research adhered to the principles of the Declaration of Helsinki and was approved by the Ethics Committee of Shahrekord University of Medical Sciences. All study protocols were approved by the institutional ethical committee at Shahrekord University of Medical Sciences with the ethical code #IR.SKUMS.REC.1401.035.

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