

Nosocomial Infection and Mortality Rate in Intensive Care Units

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Abstract

According to figures, the risk of death is 2.48 times higher in patients with hospital infections than in other patients. The current paper was aimed to discuss the past literature regarding the problem of nosocomial infections in intensive care unit (ICU). The electronic search was conducted in the databases: EBSCO, CINHALL and PubMed. According to literature, the rates of nosocomial infections in ICU was high. Mostly, the current infection control system in hospitals is likely to continue ineffective unless the principal barriers and challenges are sufficiently addressed.

Keywords: Nosocomial Infections; ICU; Mortality Rate

Introduction

Infection, also known as Hospital Acquired Infection (HAI), is an infection that affects a patient within 48 hours of admission to the hospital [1]. The first national survey on the topic of hospital infection was conducted in Australia through public and private hospitals in 1984 [2].

There are several factors that may increase the chance of a patient being exposed to a hospital infection; among these factors, decreased immunity of the patient, increasing variety of medical and invasive procedures creating possible means of infection, and the transmission of drug-resistant bacteria in crowded hospital populations; where poor infection control practices may assist transmission [3-10]. The three most common sites of the infection were related blood stream catheter (32%), Mechanical Ventilator (MV) with patient complain of respiratory diseases such as pneumonia (25%), and urine catheter-associated Urinary Tract Infection (UTI) (23%) [11].

Nosocomial infection not only affects the general health of patient [12-26], but they have also a huge financially burden. At any time, over 1.4 million people worldwide suffer from infection complication acquired in hospital [12-26]. Nosocomial infection increases the

cost of health care in the countries least able to afford them through increased length of hospitalization treatment with expensive medication and use other services [27].

According to figures, the risk of death is 2.48 times higher in patients with hospital infections than in other patients. And, the common nosocomial infection was ventilator nosocomial infection in intensive care unit (ICU), it was related to poor hygiene hand washing [27].

The global acceleration in both community and hospital acquired antimicrobial resistant bacteria is threatening the ability to effectively treat patients. The treatment option is severely limited because these bacteria frequently display multi drug resistance [28].

Aim of the Study

The current paper was aimed to discuss the past literature regarding the of nosocomial infections in ICU.

Methods

Search strategy

The electronic search was conducted in the databases: EBSCO, CINHAI and PubMed. The searching keywords were: "nosocomial infections", "intensive care unit", and "Mortality Rate".

Studies published in the English language in 2000 and more, discuss the topic of nosocomial infections and mortality rate in intensive care unit were included in the review.

Search outcome

Examining of the literature resulted in 200 titles for review. The final examination resulted in 68 studies, not including studies consisting merely of abstracts, and unrelated studies.

Results and Discussion

Risk factors for nosocomial infection included older age, immunosuppressant, longer hospital stays, multiple underlying chronic illnesses, frequent encounters with health care facilities, recent invasive procedures, MV support, indwelling devices and stay in a CCU with increased risk of hospital acquired infection [3]. In Turkey, a study followed patients treated for more than 24h in the neurology ICU of the training and research hospital until death or two days after discharge. The results indicated that the total rate of ICU-acquired nosocomial infection was 88.9 out of 100 patients. The mortality among patients with nosocomial infections was 69%, comparing with 60% the overall mortality rate. The risk factors for mortality were infection (nosocomial and community-acquired), nosocomial infection, mechanical ventilation, presence of two or more underlying diseases, parenteral nutrition, steroid treatment and a low Glasgow Coma Scale (GCS) score [29]. Similarly, a recent study European indicated that the rates of hospital-acquired infections in ICU were very high, and rates of antimicrobial resistance were > 50% for the most antimicrobial sets. Invasive devices and a viral CNS infection were associated with hospital-acquired infections acquisition. While Intubation and diabetes mellitus increased mortality in patients who acquired hospital-acquired infections [30].

It was noticed that nosocomial infection UTI developed during indwelling urine catheter contaminated with microorganisms; about 40% of nosocomial infections in the world are UTI [31]. Nosocomial infection is a significant problem in pediatric intensive care unit (PICU). The common nosocomial infections in PICU were blood stream infection (20 - 30%), lower tract infection (20 - 35%), UTI (15 - 20%). While the common pathogens involved *Staphylococcus*, *E. coli* *Pseudomonas*, *Klebsiella* and *Candida* [32]. With respect to the role

played, invasive devices in contributing to nosocomial infection, present by a study showed that 62.5% of UTI and 60% of pneumonia associated with mechanical ventilation and 100% of blood stream infection [33]. Likewise, a study conducted in the Respiratory Intensive Care Unit (RICU) of a teaching hospital in Northwest China, confirmed that the lower respiratory tract (43.1%), urinary tract (26.5%) and bloodstream (20.6%) infections signify the majority of nosocomial infections. The *Staphylococcus aureus* (20.9%), *Klebsiella pneumoniae* (16.4%) and *Pseudomonas aeruginosa* (10.7%) were the most frequently isolated pathogens. Whereas the infection rates of device-associated were urinary catheter (9.8), central catheter (7.4) and ventilator [34].

In Iran, in a more recent retrospective study, the findings revealed that the hospital-acquired infections in ICU were ventilator-associated events, UTI, and pneumonia events and lower respiratory tract infection. While the most predominant hospital-acquired infections were bloodstream infections, pneumonia events and lower respiratory tract infection and eye, ear, nose, throat, or mouth (EENT) infections in the neonatal ICU [35].

The prevalence of nosocomial infections can be reduced by adopting policies including hand washing and reducing antibiotic resistance. Studies have been conducted in South America and Asia urban hospitals, confirmed that hand hygiene was the strongest effective intervention in reducing nosocomial infection rates [36].

The majority of health care-associated infections can be prevented by adequate, yet not necessarily sophisticated, surveillance and control procedures [37-49]. However, the challenges and barriers to the formulation and implementation of infection control policy were complex and related to, suboptimal knowledge and attitudes, poor funding and insufficient management [50-57].

The reducing of hospital infection will reduce the rate of spending on treating patients from complications of the spread of hospital infection and reduce the rate of deaths resulting from hospital infection [58-68].

Conclusion

According to literature, the rates of nosocomial infections in ICU were high. Mostly, the current infection control system in hospitals is likely to continue ineffective unless the principal barriers and challenges are sufficiently addressed. Multidimensional interventions particular to local settings are needed to be planned and implemented in hospitals. Hand washing and strategies to control antibiotic resistance in hospital have an important role in controlling of nosocomial infection.

Recommendation

- There is a need for urgent revision of infection control policies and their implementation.
- There is a need for Interventions that are specific to local conditions need to be planned and implemented in hospitals.
- There is a need for strategies to control antibiotic resistance hospital.
- There is a need for education program for health teams about correct rout of hand washing.

Bibliography

1. Michels HT, et al. "From laboratory research to a clinical trial: copper alloy surfaces kill bacteria and reduce hospital-acquired infections". *HERD: Health Environments Research and Design Journal* 9.1 (2015): 64-79.
2. McLaws ML, et al. "The prevalence of nosocomial and community-acquired infections in Australian hospitals". *Medical Journal of Australia* 149.11-12 (1988): 582-590.

3. Monegro AF, *et al.* "Hospital acquired infections". (2020).
4. Abdul-Monim B, *et al.* "Exploring the Competency of the Jordanian Intensive Care Nurses towards Endotracheal Tube and Oral Care Practices for Mechanically Ventilated Patients: An Observational Study". *Global Journal of Health Science* 5.1 (2013): 203-213.
5. Aloush S, *et al.* "Compliance of Nurses and Hospitals with Ventilator Associated Pneumonia Prevention Guidelines: A Middle Eastern Survey". *Journal of Nursing Care Quality* (2017): 8-14.
6. Suliman M, *et al.* "Knowledge and practices of isolation precautions among nurses in Jordan". *American Journal of Infection Control* 46.6 (2018): 680-684.
7. Aloush SM, *et al.* "Compliance of Middle Eastern hospitals with the central line associated bloodstream infection prevention guidelines". *Applied Nursing Research* 43 (2018): 56-60.
8. Shudaifat Y, *et al.* "The Role of Nursing Practice to Prevent Ventilator-associated Pneumonia in the Intensive Care Units". *Medico Legal Update* 21.3 (2021): 270-273.¹
9. Tawalbeh LL, *et al.* "The most and the least performed self-care behaviors among patients with heart failure in Jordan". *Clinical Nursing Research* 29.2 (2020): 108-116.¹
10. Al saraireh FA, *et al.* "The Effectiveness of Cognitive Behavioral Therapy versus Psychoeducation in the Management of Depression among Patients Undergoing Haemodialysis". *Issues in Mental Health Nursing* 39.6 (2018): 514-518.
11. Rosenthal VD, *et al.* "Nosocomial infections in medical-surgical intensive care units in Argentina: attributable mortality and length of stay". *American Journal of Infection Control* 31.5 (2003): 291-295.
12. Zong Z, *et al.* "Infection Control in the Era of Antimicrobial Resistance in China: Progress, Challenges, and Opportunities". *Clinical Infectious Diseases* 71.4 (2020): S372-S378.
13. Mansi K, *et al.* "Biochemical Factors Relevant to Kidney Functions among Jordanian Children with Beta-thalassemia Major Treated with Deferoxamine". *International Journal of Medicine and Medical Sciences* 5.8 (2013): 374-379.
14. Abu obead k, *et al.* "Impact of radiotherapy treatment on Jordanian cancer patients' quality of life and fatigue". *International Journal of Advanced Nursing Studie* 3.1 (2013): 6-12.
15. Tawalbeh L, *et al.* "The Relationship between Social Support and Adherence to Healthy Lifestyle among Patients with Coronary Artery Disease in the North of Jordan". *Clinical Nursing Research* 24.2 (2015): 121-138.
16. Batiha AM, *et al.* "The Relationship between Hypertension and Anthropometric Indices in a Jordanian Population". *Advanced Studies in Biology* 7.5 (2015): 233-243.
17. Hamadneh SH, *et al.* "Sudden Infant Death Syndrome in the Middle East: An Exploration of the Literature on Rates, Risk Factors, High Risk Groups and Intervention Programs". *Research Journal of Medical Sciences* 10 (2016): 199-204.
18. Alkhalwaldeh A, *et al.* "Long-term conditions associated with primary health care service use among older adults". *Primary Health Car* 26.2 (2016): 31-35.
19. ALBashtawy M, *et al.* "The Health Belief Model's Impacts on the Use of Complementary and Alternative Medicine by Parents or Guardians of Children with Cancer". *Iran Journal Public Health* 45.5 (2016): 708-709.
20. ALBashtawy M, *et al.* "Epidemiology of Nonfatal Injuries among Schoolchildren". *The Journal of School Nursing* 32.5 (2016:) 329-336.
21. Sulaiman M, *et al.* "Exploring Safety Culture in Jordanian Hospitals: A Baseline Study". *Journal of Nursing Care Quality* 32.3 (2107): E1-E7.

22. Qaddumi J., *et al.* "Prevalence of Hypertension and Pre-hypertension among Secondary School Students". *International Journal of Advanced Nursing Studies* 5.2 (2016): 240-245.
23. Alazzam M., *et al.* "Pattern of interaction and relationships between family members". *International Journal of Health* 5.1 (2017): 45-47.
24. Freij M., *et al.* "Awareness and knowledge of ovarian cancer symptoms and risk factors: A survey of Jordanian women". *Clinical Nursing Research* 27.7 (2018): 826-840.]
25. Aloush S., *et al.* "The Effectiveness of Cognitive Behavioral Therapy versus Psycho-education in the Management of Depression among Patients Undergoing Haemodialysis". *Issues of Mental Health Nursing* 39.4 (2017): 1-5.
26. Gharaibeh H., *et al.* "Clinical burdens of β -thalassemia major in affected children". *Journal of Pediatric Hematology/Oncology* 40.3 (2018): 182-187.]
27. Mandoh I., *et al.* "WHO Multimodal Hand Hygiene Strategy and Alcohol Hand Rub Use is Effective in Reducing Hais and Antimicrobes in Developing Countries". *International Archives of Nursing and Health Care* 4 (2018): 097.
28. Agaba P., *et al.* "Nosocomial bacterial infections and their antimicrobial susceptibility patterns among patients in Ugandan intensive care units: a cross sectional study". *BMC Research Notes* 10.1 (2017), 1-12.
29. Cevik MA., *et al.* "Relationship between nosocomial infection and mortality in a neurology intensive care unit in Turkey". *Journal of Hospital Infection* 59.4 (2005): 324-330.]
30. Despotovic A., *et al.* "Hospital-acquired infections in the adult intensive care unit—Epidemiology, antimicrobial resistance patterns, and risk factors for acquisition and mortality". *American Journal of Infection Control* 48.10 (2020): 1211-1215.]
31. Devrim F., *et al.* "The emerging resistance in nosocomial urinary tract infections: from the pediatrics perspective". *Mediterranean Journal of Hematology and Infectious Diseases* 10.1 (2018).
32. Abramczyk ML. *et al.* "Nosocomial infection in a pediatric intensive care unit in a developing country". *Brazilian Journal of Infectious Disease* 6.7(2003): 375-380.
33. Davoudi AR., *et al.* "Frequency of bacterial agents isolated from patients with nosocomial infection in teaching hospitals of Mazandaran University of Medical Sciences in 2012". *Caspian Journal of Internal Medicin* 5.4 (2014): 227.
34. Wang L., *et al.* "Epidemiology and risk factors for nosocomial infection in the respiratory intensive care unit of a teaching hospital in China: A prospective surveillance during 2013 and 2015". *BMC Infectious Diseases* 19.1 (2019): 1-9.
35. Izadi N., *et al.* "The national rate of intensive care units-acquired infections, one-year retrospective study in Iran". *BMC Public Health* 21.1 (2021): 1-8.]
36. Murni I., *et al.* "Prevention of nosocomial infections in developing countries, a systematic review". *Paediatrics and International Child Health* 33.2 (2013): 61-78.
37. Harbarth S., *et al.* "The preventable proportion of nosocomial infections: an overview of published reports". *Journal of Hospital Infection* 54 (2003): 258-266.
38. Shudaifat Y., *et al.* "Managing Pain in Acute Myocardial Infarction Patients". *Journal of Pulmonary and Respiratory Medicine* 10.4 (2021): 1-6.
39. Raya G., *et al.* "The Impact of Early Palliative Care for Cancer Patients: A Literature Review". *EC Psychology and Psychiatry* 10.4 (2021).

40. Rahma A., *et al.* "Intensive Care Units Nurse's Knowledge and Practice Regarding the Endotracheal Tube Suctioning". *EC Pulmonology and Respiratory Medicine* 10.5 (2021): 29-35.
41. Faisal O., *et al.* "Effectiveness of Exercise to Reduce Cancer Related Fatigue: A Literature Review". *EC Emergency Medicine and Critical Care* 5.5 (2021): 29-35.
42. Alzyoud B., *et al.* "Nurses Knowledge Regarding Prevention Protocol of COVID-19 in Emergency Departments". *Medico Legal Update* 21.3 (2021): 168-170.]
43. Al-Khazalleh B., *et al.* "Pre-Operative Depilatory Cream Hair Removal to Reduce Surgical Site Infection in Patients Undergoing Elective Surgery". *Medico Legal Update* 21.3 (2021): 177-180.]
44. Al-masaeed R., *et al.* "Effect of Mirror Therapy on Motor Function in Extremities and Daily Activities in Stroke Patients". *Medico Legal Update* 21.3 (2021): 260-262.]
45. Khader WF., *et al.* "COVID-19 and Its Relation to Takotsubo Cardiomyopathy". *Medico Legal Update* 21.3 (2021): 263-266.]
46. Olimat Y., *et al.* "Knowledge and Attitudes Regarding Pain Management among ICU Nurse's". *Medico Legal Update* 21.3 (2021): 267-269.]
47. Alrimawi I., *et al.* "Child Home Injury Hazards: Observations from Palestine". *Health Science Journal* 11.6 (2017): 1-7.]
48. Khatatbeh MM., *et al.* "Factors Associated with Colorectal Cancer Among Jordanians: a Case-Control Study". *Asian Pacific Journal of Cancer Prevention: APJCP* 19.2 (2018): 577.]
49. Al Qadire M., *et al.* "Predictors of anxiety and depression among parents of children with cancer in Jordan". *Psycho-Oncology* 1.3 (2018).]
50. Ider B-E., *et al.* "Perceptions of healthcare professionals regarding the main challenges and barriers to effective hospital infection control in Mongolia: a qualitative study". *BMC Infectious Diseases* 12.1 (2012): 1-10.]
51. Omari O., *et al.* "A Review of the Short Form Health Survey - Version 2". *Journal of Nursing Measurement* 27.1 (2019): 76-85.
52. Al Qadire M., *et al.* "Lifestyle and Dietary Factors and Prostate Cancer Risk: A Multicentre Case-Control Study". *Clinical Nursing Research* 28.8 (2019): 992-1008.]
53. Aloush SM., *et al.* "Cardiopulmonary resuscitation training for undergraduates from nonmedical majors: Effectiveness of the three tiers model". *Nursing Forum* 53.4 (2018).]
54. Alrimawi IA., *et al.* "Palestinian managers' views and practices regarding the prevention of home injuries: An explorative qualitative study". *The International Journal of Health Planning and Management* 34.4 (2019): 1133-1143.]
55. Mansi K., *et al.* "Biochemical factors relevant to kidney functions among Jordanian children with beta-thalassemia major treated with deferoxamine". *International Journal of Medicine and Medical Sciences* 5.8 (2013): 374-379.]
56. Khatatbeh MM., *et al.* "Prevalence of nicotine dependence among university students in Jordan: a cross-sectional study". *Epidemiology, Biostatistics and Public Health* 16.2 (2019).]
57. Khraisat O., *et al.* "Shared governance: a children's hospital journey to clinical nursing excellence". *Journal of Research in Nursing* 25.4 (2020): 347-358.]
58. Srinivasan M., *et al.* "Comparison of the Nosocomial Pneumonia Mortality Prediction (NPMP) model with standard mortality prediction tools". *Journal of Hospital Infection* 96.3 (2017): 250-255.

59. Al Kazaleh A, and AL Bashtawy M. "Therapeutic Communication Skills in Nursing Education and Practice". *EC Psychology and Psychiatry* 8.12 (2019): 01-04.
60. Suliman M., et al. "The incidence of peripheral intravenous catheter phlebitis and risk factors among pediatric patients". *Journal of Pediatric Nursing* 27.50 (2019): 89-93.
61. Howeri NM and AL Bashtawy M. "Workplace Stress among Nurses in Intensive Care Units". *EC Psychology and Psychiatry* 9.3 (2020): 01-03.
62. Al-zubi., et al. "Barriers to Reporting Medication Errors among Nurses: A Review Paper". *EC Psychology and Psychiatry* 9.8 (2020): 01-03.
63. Alkhalwaldeh A., et al. "Assessment of self-medication use among university students". *International Journal of Nursing Studies* 7 (2020): 1-7]
64. Howeri NM., et al. "The Role of Ketogenic Diet in the Treatment of Cancer: A Review Paper". *EC Psychology and Psychiatry* 9.10 (2020): 01-03.
65. Al Kazaleh A., et al. "Effects of Deep Breathing Exercise on Patient with Chronic Obstructive Pulmonary Disease". *EC Pulmonology and Respiratory Medicine* 9.11 (2020): 114-117.
66. Al Qadire M., et al. "Public Attitudes toward Cancer and Cancer Patients: A Jordanian National Online Survey". *Middle East Journal of Cancer* (2020)]
67. Howeri NM., et al. "Nurses' Knowledge Regarding Care Provided to Patients with Angina". *EC Pulmonary and Respiratory Medicine* 10.1 (2020): 01-04.
68. AL-rawashdeh, N., et al. "Nurses Roles in Providing Care for Patient with COVID-19". *EC Emergency Medicine and Critical Care* 5.1 (2020).

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