

RESEARCH PAPER.

PREVALENCE OF NOSOCOMIAL INFECTIONS AND ASSOCIATED FACTORS AMONG PATIENTS IN THE INTENSIVE CARE SETTING OF THE COLOMBO NORTH TEACHING HOSPITAL, SRI LANKA

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ABSTRACT

Background: A Nosocomial infection is an infection which was not present or was in the incubation period at the time the patient is admitted to the hospital, but occurs within 72 hours after admission. They are potentially caused by organisms that are resistant to antibiotics. Highest prevalence of nosocomial infections is found in intensive care units and also it is one of the leading causes of death in intensive care units.

Aims: To describe the prevalence of nosocomial infections and describe the types and distribution of associated factors of nosocomial infections in the intensive care setting of Colombo North Teaching Hospital, Sri Lanka.

Methods: A descriptive cross sectional study was conducted among patients admitted to the Intensive Care Unit of Colombo North Teaching Hospital for one year duration from August 2015. Patients who did not have fever spikes 48 hours before the admission were included. Systematic random sampling technique was applied. Data collection was done by using an Interviewer Administered questionnaire and analyzed by SPSS 23.0 statistical software. 95% confidence interval was taken for statistical significance.

Results: Prevalence of nosocomial infections in the study sample was 41.58% (N= 42). This male predominant study sample (51.6%), showed a normal distribution of age which ranged from 9 years to 83 years (Mean=51.17; SD=17.98). Acquiring infections did not depend on the sex of the patient. (OR=0.767; 95% CI=0.347-1.695). Mechanical ventilation was identified as a risk factor for acquiring nosocomial infections (OR=1.97; 95 CI%= 0.847-4.58). Using dedicated instruments was identified as a protective measure for nosocomial infections (OR=0.903;95%: CI=0.409-1.994). Risks identified for acquiring nosocomial infections include age above 50 years (OR=1.947;95%: CI=0.838-4.42) and more than three days stay at the intensive care unit (OR=1.335;95%: CI=0.82-2.173).

Conclusion: Except using dedicated instruments all the associated factors considered in the study were identified as risk factors for nosocomial infections. Using dedicated

instruments was recognized as a protective factor for nosocomial infections. Duration of intensive care unit stay and the treatment procedures directly affected the spreading of nosocomial infections. As morbidity and mortality trends of the patients are remarkably increased with nosocomial infections, it is essential to suppress the associated factors and minimize the spread of nosocomial infections.

Key Words: Infections, Nosocomial, Intensive Care

Introduction

The term "Nosocomial" comes from two Greek words; "nosus" meaning "disease" and "komeion" meaning "to take care of." Hence, "Nosocomial" is applied to any disease contacted by a patient while under medical care. However, the term hospital-acquired is used synonymous with the word "Nosocomial"(1). A Nosocomial infection is an infection which was not present or was in the incubation period at the time the patient is admitted to the hospital, but occurs within 72 hours after admitting to the hospital. They are potentially caused by organisms that are resistant to antibiotics(2).

Despite the rapid progress in facilities and hospital care, infections continue to develop in hospitalized patients, and may also affect the hospital staff. Many factors promote infection among hospitalized patients. These will be include pathophysiological conditions of the patient and poorly maintained hospital environment which facilitates transmission of infection.

Most frequently identified Nosocomial infections are infections of surgical wounds, urinary tract infections and lower respiratory tract infections. The WHO study and other studies have shown that the highest prevalence of Nosocomial infections is found in

intensive care units and in acute surgical and orthopaedic wards.

Hospital-acquired infections add to functional disability and emotional stress of the patient and in some cases may lead to disabling conditions that reduce the quality of life. Nosocomial infections are also one of the leading causes of death. The economic cost is also important. Increased length of stay of the infected patient contributes mainly to increased cost. In 2014, there were 707 deaths and death rate in ICU was 13.5(IMMR 2012) Cause of death in ICU patients were not among published data. Detailed investigation of Nosocomial infections and its causative factors are essential for future planning as well as for resource allocation to minimize the burden of Nosocomial infections to the country. Teaching hospitals have a large turnover of patients as most of the critical patients are transferred to them from peripheries and relatively large number of ICU beds are available at teaching hospitals(3).

Objectives of the study were to describe the prevalence of Nosocomial infections and describe the types and distribution of associated factors of nosocomial infections in the Intensive Care setting of Colombo North Teaching Hospital, Sri Lanka.

Methodology

A descriptive Cross sectional study was conducted among patients admitted to Intensive Care Unit of Colombo North Teaching Hospital for one year duration. Patients admitted to the ICU for more than 24 hrs and patients who did not have fever spikes 48 hrs before the admission were included to the study. Patients who developed fever spikes within 48 hrs of admission were excluded. Sample size was calculated by using Lwanga and Lemeshow equation and it was 101(4). Systematic random sampling technique was applied for sample selection.

Data collection was done by using an Interviewer Administered data sheet at the Intensive Care Unit. Data were collected at an interview with the patient and extracts from BHTs. Data were analysed by SPSS 22.0 statistical software. 95% confidence interval was taken for statistical significance. Administrative clearance was obtained from the Director of the Hospital and the Consultants in charge of the ICU. This project was ethically cleared by ERC faculty of Medicine Ragama, Sri Lanka.

Results

Prevalence of Nosocomial infections in the study sample was 41.58% (N= 42). There were 51.55 (N=52) of males and 47.5% (N=48) of females in the study sample. Age showed a normal distribution which ranged from 9 years to 83 years (Mean=51.17: SD=17.98). Patients admitted to Intensive Care Unit were treated for 24 hours to 408 hours.

(Mean 92.5hrs:SD=66.9hrs) Acquiring Infections did not depend on sex of the patient. (OR=0.767:95% CI =0.347-1.695).

Although mechanical ventilation was identified as a risk factor for acquiring Nosocomial infections (OR=1.97), it did not show a significant effect (95 CI%=0.847-4.58). Using dedicated instruments was identified as a protective measure for preventing Nosocomial Infections (OR=0.903). But it did not show significant figures(95% CI=0.409-1.994).Age above 50 years is considered as a risk factor for nosocomial infections (OR=1.947:95% CI=0.838-4.42). A high risk of acquiring nosocomial infections was identified in patients who had an Intensive Care Unit stay for more than three days (OR=1.335:95%CI=0.82-2.173).

Urinary catheterization (OR=1.017:95% CI=0.984-1.052), nasogastric feeding (OR=2.016:95% CI=0.872-4.66), and Ambu ventilation (OR=1.252:95% CI=0.566-2.769) were identified as positive contributors for Nosocomial Infections. Out of all associated factors, nasogastric feeding showed the highest odds ratio (2.016). Except using dedicated instruments all the associated factors considered in the study were identified as risk factors for nosocomial infections. Using dedicated instruments was recognized as a protective factor for preventing nosocomial infections.

Table 1. Characteristics of the study sample

	Mean	SD
Age	51.17 years	17.98 years
Duration of stay	92.5 hours	66.9 hours
	Male	Female
Gender distribution	53(51.6%)	48(47.5%)
Nosocomial Infections	20(38.4%)	22(45.8%)

Table 2. Associated factors for Nosocomial infections

	Odds Ratio (OR)	95% CI	P value
Female Gender	1.145	0.767-1.708	>.05
Ventilator used	1.97	0.847-4.58	>.05
Dedicated Instruments	0.903	0.409-1.994	>.05
Age > 50years	1.947	0.838-4.42	>.05
Duration of stay > 3 days	1.335	0.821-2.173	>.05
Urinary Catheter	1.017	0.984-1.052	>.05
Nasogastric Feeding	2.016	0.872-4.66	>.05
Ambu Ventilation	1.252	0.566-2.769	>.05

Discussion

Predominant risk factors identified for acquiring nosocomial infections during an Intensive care unit stay are mechanical ventilation, Naso Gastric feeding, central venous line insertion and age above 50years. Although the risk of spreading nosocomial infections can be minimized by using dedicated

instruments for each and every patient, it is not practical to practice such isolation in a very busy Intensive Care setup. But dedicated instruments can be used with minimum expenses when a single set of instruments are used for a single patient until the patient is discharged from the Intensive Care Unit. Several confounding factors such as low immunity, medical comorbidities and

nutritional imbalances could affect the increased risk of acquiring Nosocomial Infections among patients with a higher age. Exposure to microorganisms is significantly high and immunity status is diminished in prolonged Intensive Care Unit stay. Therefore risk of acquiring infection is increased with increased Intensive Care Unit stay, especially the instruments can be easily contaminated with biological secretions. Therefore using dedicated instruments during prolonged Intensive Care Unit stay helps to minimize microorganism transmission.

Possibility of developing nosocomial infections at critical care settings in developed countries is 30% (5). But this value is expected to be doubled among the developing countries. Age above 65 years is identified as a risk factor for nosocomial infections. Nasogastric nutrition, Central Venous line insertion and urinary catheterization are identified and proven risk factors for nosocomial infections by several studies. Prolonged Intensive Care Unit stay more than ten days is identified as a risk factor for nosocomial infections in developed countries(6). But during this present study, Intensive Care Unit stay more than three days was observed as a risk factor for nosocomial infections.

Association of sociodemographic factors was not studied during the study and ethnic and religious factors, occupational and social status should be considered as well. Reasons for Intensive Care Unit admission and the confounding effects created by comorbidities of the participants were not addressed during the study.

Outcome variable which was used in the study was the incidence of nosocomial infections and it was defined by recording the fever episodes above

normal body temperature. They were not confirmed by culture studies. Raised body temperature could be a result of many other pathologies apart from nosocomial infections. Reliability of the study becomes questionable due to above reasons and it causes reduction of internal and external validity.

A patient is admitted to an Intensive Care Unit when his life is in a critical stage and the aim is to make necessary treatment methods and minimize the risk and discharge from the Intensive Care Unit as soon as possible. If a patient happens to acquire new infections from an Intensive Care Unit it will prolong his ICU stay and will aggravate his critical situation.

Conclusions/Recommendations

Anyhow the associated risk factors and protective features identified in this study should be studied in detail especially with a larger sample size and with a study design that minimizes confounding effects. A well-defined matched case control study design can be recommended for future studies.

It is essential to implement new practical methods to minimize Nosocomial Infections which generate many adverse effects. So practical implementation procedures for using dedicated instruments should be established and their feasibility has to be studied in detail.

Intensive Care Unit admitted patients acquire Nosocomial Infections more frequently. Duration of Intensive Care Unit stay and the treatment procedures done at the Intensive care unit directly affect the spreading of Hospital Acquired Infections. As patients' morbidity and mortality trends are remarkably increased with Nosocomial Infections it is essential to suppress the associated

factors and minimize the spread of Nosocomial Infections. Feasibility of low cost methods in minimizing Nosocomial Infections should be studied in detail.

REFERENCES

1. Kouchak F, Askarian M. Nosocomial Infections: The Definition Criteria. Iran J Med Sci [Internet]. 2012 Jun;37(2):72–3. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3470069/>
2. G. Ducel, J. Fabry LN. Prevention of hospital-acquired infections. World Heal Organ [Internet]. 2002;1–64. Available from: <http://www.who.int/csr/resources/publications/drugresist/en/whocdscsreph200212.pdf?ua=1>
3. Ministry of Health Sri Lanka. Anual Health Bulleting 2015. 2015.
4. Lwanga SK LS 1991. Sample size determination in health studies: A practical manual. Geneva.: World Health Organization; 1991.
5. Yesilbağ Z, Karadeniz A, Başaran S, Kaya FÖ. Nosocomial infections and risk factors in intensive care unit of a university hospital. J Clin Exp Investig [Internet]. 2015;6(3):233–9. Available from: <http://dergipark.gov.tr/doi/10.5799/ahinjs.01.2015.03.0525>
6. WHO. Practical Guidelines for Infection Control in Health Care Facilities Practical Guidelines for Infection Control in Health Care Facilities. World Heal Organ [Internet]. 2004;110. Available from: http://www.wpro.who.int/publications/docs/practical_guidelines_infection_control.pdf