شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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Environmental risk factors of nosocomial infection in neurological intensive care unit

Thesis

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Abstract

Object: To evaluate risk factors and methods of infection control in surgical site infections in postoperative neurosurgical patients.

Methods: This study was prospective, uncontrolled and observational study conducted on patients with postoperative neurosurgical operation and admitted to ICU postoperatively. The study was done in Al-Azhar university hospitals from March 2017-March 2018. The study aim was to evaluate risk factors and methods of infection control in surgical site infections in postoperative neurosurgical patients. Analysis of data was done by IBM computer using SPSS (statistical program for social science version 25).

Results: The mean age and standard deviation (SD) were 42.5 years ±19.1. Female patients were about 40%. Most male patient were above median age of the sample (37.8 years). The overall admission period includes pre-ICU admission, ICU admission and post-ICU admission. The mean and standard deviation of overall admission was 43.7 day±5.5. From the whole study sample, nosocomial infection was estimated to be 88.4% of cases (69 patients). Postoperative mortality among cases was 36%. The rest of cases were either referred or discharged to ward. Comorbid conditions may present as single factor or multiple factors in the same patient. Patients with nosocomial infections were found to have 2 or more comorbid conditions while infection-free cases were found to have no or at least one factor in a statistically significant association. It has been found that most cases with traumatic brain injury and hemorrhagic stroke had nosocomial infection (74%). Both types mentioned previously had had longer ICU stay. It has been found that nosocomial infection is commonly predominant in TBI and ICH cases with statistically significant value (p=0.00005).

Nosocomial infections were found to be either single or multiple infections in the same person. Most of infections were; respiratory tract infection, urinary tract infection or septicemia. When the entire study population was subjected to logistic regression analysis, age, diagnosis and hospital stay, necessity for ventilation, low GCS, high temperature, high humidity and low karnofsky were found to be significantly independently predictive of postoperative nosocomial infection. Among these patients, type and timing of operative intervention and environmental factors did not significantly affect outcome.

Conclusion: There are many risk factors of nosocomial infection in hospitalized neurosurgical treated, which requires strict monitor, including the development of various effective prevention measures and check of their implementation as well as effectiveness, to reduce the incidence of hospital infection.

Keywords: nosocomial infection, environmental factors

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ABG	:	**Arterial blood gas**
AED	:	**Antiepileptic drugs**
ASDH	:	**Acute subdural hematoma**
BBB	:	**Blood brain barrier**
CBF	:	**Cerebral blood flow**
CBV	:	**Cerebral blood volume**
CPP	:	**Cerebral perfusion pressure**
CSF		**Cerebrospinal fluid**
DIC	:	**Disseminated intravascular coagulopathy**
EDH	:	**Epidural hematoma**
GCS	:	**Glasgow coma score**
GOS	:	**Glasgow outcome scale**
ICH	:	**Intracranial hemorrhage**
ICP	:	**Intracranial pressure**
MRI	:	**Magnetic resonance imaging**
TBI	:	**Traumatic brain injury**

Introduction

There have been a number of breakthroughs in the healthcare system with many patients being cured of both acute and chronic illnesses. However, this success has been accompanied by failures in patient safety issues. The risk of acquiring a nosocomial infection is one of the patient safety issues that cause a challenge for hospitals (DeLemos, Abi-Nader and Akins, 2011).

The term “nosocomial infection” can be used interchangeably with “Hospital Acquired Infection.” The Centers of Disease Control (CDC) defines a Hospital Acquired Infection (HAI) as a localized or systemic condition resulting from an adverse reaction to an infectious agent (s) or toxin(s). An infection is considered HAI if it develops in a patient who has been hospitalized for 48 to 72 hours and no evidence that the infection was incubating at the time of admission. The CDC estimates that 2 million patients develop HAIs annually and as many as 88,000 die as a result, adding an estimated $5 billion to the annual national health care costs (Abulhasan et al., 2018).

Nosocomial infections arise from either an exogenous or an endogenous source (Beer, Pfausler and Schmutzhard, 2010).

For the purpose of this research, we would refer to the transfer of infection either exogenously or endogenously as traditional means of spreading infections. Exogenous infections are from sources that are external to the patient. Exogenous infections can be spread by person-toperson contact or by indirect contact with an inanimate object (Lewis, Czeisler and Lord, 2017).

For example, if the health care providers are not practicing hand hygiene practices properly, such as washing hands between patients, they could be a source of infection. Exogenous infections could also be spread by airborne means, droplets, or a common vehicle- such as contaminated food, water, medical equipment and devices. Endogenous sources are body sites, such as skin, nose, mouth, gastrointestinal tract or vagina, that are normally inhabited by microorganisms (Badjatia et al., 2015).

The spread of nosocomial infections by traditional means such as lack of hand hygiene compliance goes as far back as the 1800s. The epidemiological findings of Dr. Ignaz Semmelweis helped to shed light on ways of controlling infections in a health care setting (Cardoso et al., 2015).

By reviewing maternal deaths in two divisions of the maternity department in Vienna, Semmelweis noted that more than 10% of women died following childbirth when the baby was delivered by a physician or

student in the first division, compared to a lower rate of 3% of maternal death when babies were delivered by a midwife. These differences in death rates could be explained by the fact that medical students and physicians performed autopsies without disinfecting their hands before attending to the next patient. In other words, the physicians were the source of infection to the patients. The midwives did not have any contact with cadavers (Rivera-Lara, Ziai and Nyquist, 2017).

On May 15, 1847, Semmelweis posted an order that all physicians and students scrub their hands in chlorinated lime before attending to the next patient. The results of this intervention were dramatic, with mortality rates decreasing from 18.3% in April to 2.4% in June (Dayts, 2014).

One of the ways in which nosocomial infections have been reduced in health care setting was through the introduction of the infection control practitioner. The first infection control practitioner (ICP) was appointed in 1959 to control for hospital acquired *staphylococcus* infections. By 1968, the CDC began training Infection Control Practitioners (ICPs) in surveillance, prevention and control of nosocomial infections (Muehlschlegel et al., 2013).

Aim of the study

To evaluate risk factors and methods of infection control in surgical site infections in postoperative neurosurgical patients.

Review of Literature

Patients admitted to the intensive care unit are at risk of developing life-threatening nosocomial infections (NI), especially with organisms resistant to commonly used antibiotics (Abulhasan *et al.*, 2018). Neurosurgical patients are particularly vulnerable because of the serious nature of their illness, the frequency of associated trauma and the presence of invasive devices. Generally, definition of NI is same for all hospital units; however the incidence, severity, risk factors, pathogens and type of the infection can be different (Badjatia *et al.*, 2015).

Nosocomial infections are directly related with the patient' morbidity and mortality and hospital costs. This review focuses on the definition, clinical features, and prevention to this distinct complication of neurocritical care (Muehlschlegel *et al.*, 2013).

1. Definition

Infections which do not exist in incubation period before the hospitalization but gained at the hospital are defined as nosocomial infection by Centers for Diseases Control (CDC) (L. Rivera-Lara, Ziai and Nyquist, 2017). Symptoms of the disease can either appear 48-72 hours after hospitalization or within 10 days after coming out of hospital. However, diseases having long incubation period are not included in this definition (Kenna *et al.*, 2016).

Incidence: The incidence of the nosocomial infection is 5-10 times higher than the other services in NICU. Neuro problems are life treating pathologies, invasive manipulations are often in NICU, cross infections are often in neurosystems, and antibiotic usage are common for trauma and surgical patients, and for these type of reasons neurointensive care patients have relatively higher incidence and severity of the nosocomial infection (L Rivera-Lara, Ziai and Nyquist, 2017).

European Prevalence of Infection in Intensive Care" (EPIIC) reported that the 45 percent of the ICU patients infected with the