

**PREDICTORS OF SURGICAL SITE INFECTIONS (SSIs) AMONG PATIENTS
UNDERGOING MAJOR SURGERY AT GENERAL HOSPITAL FUNTUA, KATSINA
STATE, NIGERIA**

BY

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DEDICATION

This research work was dedicated to Almighty Allah (SAW) and unborn children who may per chance be nurses of the future generation.

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ABSTRACT

Infection has always been a feature of human life, and sepsis in modern surgery continues to be a significant problem for health care practitioners across the globe. Surgical site infection (SSI) continues to be a major source of morbidity and mortality in developing countries despite recent advances in aseptic techniques: Yet, there is paucity from secondary health care centers. This study therefore examines the incidence of SSI, bacteriological pathogens implicated and predictors of surgical site infection at General Hospital Funtua, Katsina State, Nigeria.

A cross sectional prospective study was used involving all subjects who underwent major surgery in surgical wards. A non-probabilistic purposive sampling technique was employed to recruit the total sample size of one hundred and twenty seven. After informed written consent for the study, all subjects who met inclusion criteria were consecutively enrolled in to the study. Pre-operative, intra-operative and postoperative data were collected using standardized data collection form based on CDC/WHO criteria. Wound specimens were collected and processed as per standard operative procedure. Data were analyzed using SPSS and STATA.

Surgical site infection (SSI) was detected in 28 (22.05%) subjects of whom all had superficial SSI and no evidence of deep/ organ space. Among the 28 subjects with surgical site infection based on clinical criteria, 25 (19.6%) had positive aerobic culture giving rise to 19.6% based on bacteriological criteria. *Pseudomonas spp* was the predominant organism 11 (39.28%), followed by *Staphylococcus spp*. 5 (17.85%), and *Klbsiella spp*. in a decreasing frequency.

Results from odds ratio analysis confirmed that, inadequate operating room ventilation and surgical hand scrub for < 2 minutes were found to have an increased risk for SSI by 34, fold. Subjects within the age limit between 21-30 years have increased risk for SSI by 2 fold, and subjects with co-existing illness (fever), have an increased risk for SSI by 4 fold, OR(3.9). Sterilization technique by the use of high level disinfectant and pre morbidity has been found to be an independent predictor of SSI, P-value < 0.05.

The study concluded that predictors for surgical site infections are associated with modifiable risk factors that the surgeons, nursing staffs and hospital management can deal with in a greater details. Prevention strategies focusing on factors associated with surgical site infection is necessary in order to reduce the rate of SSI in our setting.

CHAPTER ONE

1.0 INTRODUCTION

Health-care associated infection (HAI) is a major global safety concern for both patients and health-care professional World Health Organization (Sepideh, Bagheri & Nesad 2011). HAI is defined as an infection occurring in a patient during the process of care in a hospital or other health-care facilities that does not manifest or incubate at the time of admission (Nejad, et al., 2011). These include infections acquired in the hospital and any other settings where patients receive health care and may appear even after discharge (Nejad, et al.,2011). HAI also includes occupational infections among facility staffs. These infections often caused by multi-resistant pathogens, take a heavy toll on patients and their families causing illness, excess costs and sometimes death (Pittet, & Donaldson, 2005; Archibald & Jarvis 2007; Allegranzi & Pittet, 2008). The burden of HAI is already substantial in developed countries, where it attains 5% to 15% of hospitalized patients in regular wards and as many as 50% or more of patients in Intensive Care Units ICUs (WHO 2009; Vincet,Rello, Marshall, Silva, Anzueto &Martin 2009), and surgical site infection is a good index of health- care associated infection (Allegranzi & Pittet 2008).

Attempts at reducing the rate of surgical site infections (SSIs) date to the early nineteenth century with the study of the epidemiology and prevention of surgical fever by James Young Hamilton (Selwyn,1991). Thereafter, Joseph Lister pioneered his use of antiseptics for the prevention of orthopedic SSIs in 1865. Fortunately, many other advances have been made in surgery and infection control over the past 150 years (Deverick & Anderson 2011). However, as

medicine has advanced, new types of infection risks have developed. For example, over the past 50 years, the frequency of surgical procedures has increased, procedures have become more invasive, a greater proportion of operative procedures include insertion of foreign objects, and procedures are performed on an increasingly morbid patient population. As a result, SSIs remain a leading cause of morbidity and mortality in modern health care (Deverick & Anderson 2011).

According to Betty Neuman system model (2002), a total client approach to solving problem of an individual is surrounded by the basic core structure which is a concentric circles which includes the lines of defense and the line of resistance which represents the internal factors of a person's that help defend against a stressor (for example an increased in white blood cell to fight an infection). Attempt to stabilize the person and encourage a return to the normal line of defense. Betty Neuman in discussing the basic core; refers to the individual variables to include physiologic and external stressors. The physiologic structure is the skin which covers the body surfaces and contribute to about 15% of total body weight and is highly vascularized and to protect the body surfaces from invasion of pathogenic micro-organism (primary line of defense). Wound healing is achieved by the collagen formation and the degree of neovascularization at surgical incision site. Failure of the skin to provide adequate protection as a first line of defense results with SSI. External stressor i.e. external factors are contaminations from outside environment (exogenous cause). While endogenous cause of SSI is related to body's defense mechanism secondary to displacement of body normal flora and immune system level which is also influenced by the external factors such as nutritional level, cigarette smoking, and steroid drug which could either enhance wound healing or make it susceptible to breakdown. In developing countries, the magnitude of SSI remains underestimated or even unknown largely because HAI diagnosis is complex and surveillance activities to guide interventions require

expertise and resources (Allegranzi & Pittet 2008). Surveillance systems exist in some developed countries and provide regular reports on national trends of endemic HAI, such as the National Health Care Safety Network of United State of America or the German Hospital Infection Surveillance System (Nejad, et al. 2011). This is not the case in most developing countries because of social and health care system deficiencies that are aggravated by economic problems (WHO, 2010). Moreover, in developing countries where resources are limited, even basic life-saving operations, such as appendectomies and caesarean sections, are associated with high infection rates and mortality (Gaynes, Culvar, Edwards, Richards & Telson 2007).

In addition, overcrowding and understaffing in hospitals results in inadequate infection control practices and a lack of infection control policies, guidelines and trained professional also adds to the extent of the problem (Nejad, et al., 2011). Surgical site infections (SSIs) have been reported to be one of the most common causes of nosocomial infections; accounting for 20 to 25% of all nosocomial infections worldwide (Martone & Nicholas 2001). SSIs have been responsible for increasing cost; morbidity and mortality related to surgical operations and continue to be a major problem worldwide (Yalcin, Bakic, Dokmetas & Sabir 1995). Globally, SSI rates have been reported to range from 2.5% to 41.9% (Brown, Kurtsikahvi, Alanso, Aha, Bonchoindex & Shushtakashi 2007). In the United States, approximately 2% to 5% of the 16 million patients undergoing surgical procedures each year have postoperative SSIs (Gaynes, et al., 2007). In Tanzania, surgical site infections are still one of the leading causes of morbidity and mortality among patients undergoing major surgery (Mawalla, et al., 2011). Previous studies conducted in a district and a tertiary hospital in Tanzania reported the surgical site infections rate of 24% and 19.4% respectively (Jan, 2006).

SSI is one of the most common preventable complications following major surgery and represents a significant burden in terms of patient morbidity, mortality and hospital costs (Mawalla, et al., 2011). Despite improvements in operating room practices, instrument

sterilization methods, better surgical technique and the best efforts of infection prevention strategies, surgical site infections remain a major cause of hospital-acquired infections and rates

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