CLABSI DURING NEUTROPENIA AMONG ONCOLOGY ADULTS POST CHEMOTHERAPY

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Abstract

Introduction: Central line associated bloodstream infection (CLABSI) is a laboratory-confirmed bloodstream infection where central line (CL) was in place for more than 2 calendar days on the date of event, with day of device placement being Day 1. In 2009 it was estimated that about 23,000 CLABSI in the inpatient setting in the United States would increase mortality and morbidity for patients and the health care burden for the institutions as a whole.

Method: To critically examine and explore the body of knowledge regarding CLABSI among the neutropenic patients, a comprehensive literature review was conducted using the electronic databases PUBMED, OVID, Science Direct, and Springer. The following key words were used to search the electronic databases: Neutropenia, CLABSI, oncology patients.

Results: Despite advancements in the treatment and supportive care of patients with cancer, neutropenia remains the major side effect of most anticancer regimens. Infections occur frequently in neutropenic patients and are associated with considerable morbidity and mortality. The most common sites of infection encountered in patients with neutropenia are: Respiratory tract infections occur most often followed by bacteremia. The most common organisms isolated from CLABSI are coagulase negative staphylococci (CoNS), and S. aureus. Other common organisms include Bacillus spp., Corynebacterium spp., Pseudomonas aeruginosa, Enterobacter spp., Acinetobacter spp., and Candida spp.

Conclusion: CLABSI is still a major problem facing health care workers worldwide, especially among cancer neutropenic patients. Methods to decrease incidence, and prophylactic management are promising although good methods are available, the reduction in CLABSI rates will lead to decreased mortality and morbidity among the affected patients, also it will thus decrease the burden among the health institutions treating this type of hospital acquired infection.

Key words: CLABSI, Neutropenia, Oncology patients, post chemotherapy
Introduction

Central line associated blood stream infection (CLABSI): is a laboratory-confirmed bloodstream infection where central line (CL) was in place for more than 2 calendar days prior to or after the date of event, with day of device placement being Day 1. (CDC, 2013) In 2009 it was estimated there was about 23,000 CLABSI in the inpatient setting in the United States (MMWR, 2011) which increased mortality and morbidity for patients and the health care burden for the institutions as a whole (MMWR, 2011). In the United States catheter-related bloodstream infections are 1 of the top 4 causes of HAIs (hospital acquired infections) (Cardo, et al. 2010); around half of the bloodstream infections among the neutropenic patients were reported as catheter related infections. The most causative microorganism for bloodstream infection was Escherichia coli (Lima, 2013).

A central line is a long, thin hollow tube that is inserted into a vein in the patient’s chest, (CDC, 2013). Colonization of the catheter occurs via two main pathways: the extra luminal route and the intraluminal route. Colonization of short-term CVCs (< 15-20 days) occurs predominantly from the skin puncture site, whereas colonization of long-term CVCs is usually related to intraluminal bacterial spread from a contaminated hub (Mermel, et al 2011). Intravascular devices are available in different types based on their purposes and the anticipated duration of catheterization and can be classified into short-term versus long-term catheters, with the latter requiring surgery for insertion. Mostly the central venous catheters (CVC) are encountered in intensive-care units (ICUs); on the other hand CVCs are increasingly used in non-ICU wards and inpatient floor and outpatient settings like the outpatient clinics (Mermel, et al 2011). A central line is a long, thin hollow tube that is inserted into a vein in the patient’s chest (CDC, 2013). The majority of literature focuses on CLABSI among patients in nononcology settings and few studies focus on patients in the oncology setting especially those who are neutropenic post chemotherapy. The aim of this review is to explore the literature regarding CLABSI incidence, During Neutropenia among Oncology Adults Post Chemotherapy and methods used for prevention and management.

Methods

To critically examine and explore the body of knowledge regarding CLABSI among the neutropenic oncology patients, a comprehensive literature review was conducted using the electronic databases PUBMED, OVID, Science Direct, and Springer. The following key words were used to search the electronic databases: Neutropenia, CLABSI, oncology patients.

Searching the above mentioned databases about 56 articles were allocated. All were obtained and reviewed based on a specific inclusion criteria:

1- Research based study.
2- Focused on CLABSI among oncology patients.

3- The entire population are adults.
4- Investigate CLABSI during the state of neutropenia.

Based on the inclusion criteria a total of 10 articles published between 2009 to 2013, were selected and formed the basic skeleton for the review, except one article that was published in 2007; most articles were published in nursing and medical journals. The articles included in the study focused on the methods of management, setting of infection incidence, and types of infection incidence. Countries in which the selected articles were conducted are United States of America, Australia, Japan, Netherlands, and Italy.

Methodological Characteristics

The 10 studies which composed the body of this integrative research review were quantitative; 4 studies were clinical trials, 4 descriptive correlational studies, and 2 reviews. Although only 10 studies were used in this review, they cover a wide range of problematic aspects and mention the people who are most at risk and preventive measures to handle the problem. Almost none of the studies were based on a theoretical model rather the authors define the concepts they addressed into conceptual and operational definitions.

Sample Characteristics

The sample sizes in the 10 studies in this review ranged from 120 to 1076 patients adults with cancer between ages of 16 to 85. Cancer types in the majority of the studies were not mentioned except in 2 studies which classify them as hematological and non hematological malignancies and one study mention the status of neutropenia among the patients. The studies were conducted among patients with cancer either with hematological malignancies or no hematological malignancies and also address patients who were not cancer patients regarding CLABSI, such as patients who underwent bone marrow transplant.

Results

Despite advancements in the treatment and supportive care of patients with cancer, neutropenia remains the major side effect of most anticancer regimens. Infections occur frequently in neutropenic patients and are associated with considerable morbidity and mortality. The most common sites of infection encountered in patients with neutropenia are: Respiratory tract infections occur most often followed by bacteremia (including central line associated bloodstream infection-CLABSI). (Nesher, et al 2013). There was no apparent association between number of hospital beds and infection rates (Crystal et al 2012).

The most common organisms isolated from CLABSI are coagulase negative staphylococci (CoNS), and S. aureus. Other common organisms include Bacillus spp., Corynebacterium spp., Pseudomonas aeruginosa, Enterobacter spp., Acinetobacter spp., and Candida spp. (Nesher, et al 2013) (Isaac, et al 2013).
Factors associated with CLABSI included: type of CVAD, greatest for non-tunneled lines and tunneled lines, compared to peripherally inserted central venous catheter (PICC) lines and CLABSI was greatest for aggressive hematological malignancies and least for esophageal, colon and rectal cancer tumors; side of insertion, greatest for right-sided lines and number of prior line insertions (Mollee, et al 2011).

In patients with aggressive hematological malignancies there was significantly more CLABSI with non-tunneled lines and a trend to more CLABSI with tunneled lines compared to patients with PICC lines, as well as increased CLABSI for right-sided insertions (Mollee, et al 2011).

The highest CLABSI rates were originated from the lumen used for blood product administration and for parenteral nutrition (Krause, et al 2013).

Patients who underwent allergenic bone marrow transplant (BMT) CLABSI were mostly associated with the status of neutropenia; it was higher in the neutropenic patients in general (Isaac, et al 2013).

Patients who underwent BMT infusion of doxycyclin were significantly associated with decrease in CLABSI rates, and didn’t alter the time for the neutrophil engraftment (Okaily, et al 2013). On the other hand the use of ethanol lock in patients with tunneled catheters decreased the intraluminal infections, but this decrease was not significant (Slobbe, et al 2010).

The Exchange of the infected catheter with monoclolines and rifampin coated catheters were significantly associated with no disease recurrence or infection related deaths compared with removal of the catheter (Chaftari, et al 2011), and the use of ports for patients with cancer appear to be safe because it is associated with low incidence of complications like pocket infections, cutaneous infections, and occlusions. (Mollee, et al 2011).

Conclusion

CLABSI is still a major problem facing health care workers worldwide, especially among cancer neutropenic patients. Methods to decrease incidence, and prophylactic management are promising although good methods are available, the reduction in CLABSI rates will lead to decreased mortality and morbidity among the affected patients, which also will decrease the burden among the health institutions treating this type of hospital acquired infection.

References

July 2013 CDC/NHSN Protocol Clarifications.

