Hospital-Acquired Infections

Introduction and aim of work

The United States (US) center for disease control and prevention (CDC) recognizes Hospital acquired infections (HAI) as one of the 10 leading causes of deaths affecting hospitalized patients in the US. HAIs affect nearly 1.7 million hospitalized patients in the US, with 98,000 of those eventually dying (Haque, 2018). This reflects how severe HAIs are and how important hospital infection control measures are to prevent unnecessary infections that might have severe outcomes. According to the CDC, HAIs can be divided into 4 categories; Catheter-associated urinary tract infection (CAUTI), Ventilator associated pneumonia (VAP), Central line-associated blood stream infections (CLABSI), surgical wound infection. Our aim in this paper is to discuss each of them further and whether there are measures that could be taken to reduce their incidence.

Aim of work

- To give an overview about the significance of Hospital Acquired infections.
- Discuss Catheter-associated urinary tract infection (CAUTI).
- Discuss Ventilator associated pneumonia (VAP).
- Discuss Central line-associated blood stream infections (CLABSI).
- Discuss surgical wound infection.

Abstract

Around 2 million Patients develop Hospital Acquired Infection in the United States of America each year, making it one of the leading causes of death. The rising numbers of antibiotic resistant organisms makes the topic an important subject for research. Hospital acquired infection can be classified into four categories; Catheter-associated urinary tract infection (CAUTI), Ventilator associated pneumonia (VAP), Central line-associated blood stream infections (CLABSI), surgical wound infection. Though the CAUTI are the most common cause of HAI with a mortality rate of 1-4%, the VAP are the most serious with mortality rate ranging from 24 to 50% which may even go up to 76% according to the invading organism. The use of proper antibiotics in treatment and the suitable aseptic techniques when dealing of the catheters can greatly reduce the infection rate. Of all HAI, CLABSI are greatly cost burden, costing around $46,000 per patient. The use of aseptic techniques can greatly reduce the infection rate. Surgical wound infections are generally caused by organisms from infected loci. A wide range of predisposing factors can increase the risk of surgical wound infections. A number of measures can be taken to decrease the inevitable risk of HAI which will be discussed in the article.

Coreright

Since UTIs account for most of HAIs, it is only fitting to start with them. 70-80% of these infections are caused using an indwelling catheter causing a CA-UTI. Increased incidence is associated with a longer use of the catheter since a biofilm production is inevitable (Nicolle,

2014). Even though the incidence of symptomatic bacteriuric CA-UTIs have dropped significantly they are still a major cause of concern HAI wise.

They are not likely to disappear unless a major advancement in catheter material technology occurs preventing biofilm formation that cultivates bacterial growth. However, some measures can be taken to reduce their incidence. These include the use of catheters only when necessary, proper hand hygiene measures by the acting healthcare worker, cleaning genitalia if soiling is present, insertion of the catheter in completely aseptic conditions and the proper removal of the catheter when it is no longer needed as soon as possible.

As for VAPs, they are considered one of the most severe HAIs with the worst prognosis and highest mortality rate. They occur in approximately 8-28% of intubated patients requiring the use of a ventilator with a mortality rate of 24-50% that may go as high as 76% according to the invading microorganism as opposed to the considerably lower HAIs of other organ systems such as Skin or urinary tract that typically have a mortality rate ranging from 1-4% (Chastre,2002). Most VAPs cases start being symptomatic after 48 hours of intubation with multiple isolated responsible pathogens.

Gram-positive staphylococcus aureus is responsible for most of cases (44%), with several other Gram-negative bacteria involved such as Acinetobacter Baumanii, Pseudomonas Aeruginosa and several Enterobacteriaceae like Klebsiella Pneumoniae (Chi, 2012). The optimal scenario involved the proper isolation of the involving organism through a bronchoalveolar lavage and treat accordingly with a narrow spectrum antibiotic. However, if that is not possible a clinical diagnosis should be made according to the involving symptoms and the most common causing agent in the admitted hospital.

Bloodstream HAIs in general are quite dangerous. One of the more serious ones can occur via insertion of a central line (A special type of catheter with a larger diameter inserted into a large vein to deliver a larger amount of fluid volume, stays in place for a longer amount of time and allows the quick withdrawal of blood from the patient). Gram- positive infection are the most common including Staphylococcus coagulase-negative organisms, Enterococci, Staph Aureus followed by Gram-negative bacteria such as Klebsiella, Enterobacter, Pseudomonas and some fungi like Candida species (Haddadin, 2020). Due to the severity of this infection and the dire complications that could occur if left untreated a blood culture must be taken immediately and the attending physician should start empiric therapy with a broad-spectrum antibiotic covering both gram-positive and gram-negative organisms, and an antifungal if there’s a prevalence of fungal infections is present. As soon as the culture and sensitivity results are obtained the patient should be treated accordingly with the narrowest spectrum antibiotic available.

As for surgical wound infections, they can be caused from organisms from multiple infected loci such as flora of the skin, germs inside deep tissue or organ involved in the surgery or contaminated environment or surgical utensils used. Most of them appear within 30 days of surgery. Some of the symptoms include but are not limited to Pus or drainage, fever, chills, the wound being hot to touch, hyperemia, pain.

Some predisposing factors may increase your risk of Surgical wound infections and those include long standing diabetes, immunodeficiency of any kind, corticosteroid therapy, obesity, smoking and if the surgery lasted longer than 2 hours (Kulaylat, Ch.12, 2017).

Treatment includes antibiotic therapy to which the invading pathogen is sensitive. However, it may require another surgical intervention if there is no improvement.

Conclusion

Despite all the efforts to decrease the risk of HAI, they are still considered a significant risk factor for morbidity and mortality, causing a continuous increase in health care cost. Emerging antibiotic resistance is a great concern as well. The microbiology should have a greater role in all of the infection control measures, to provide laboratory services and the proper surveillance.

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