Hospital Acquired Infections and Prevention

Introduction

“The physical environment of the hospital is similar in many respects to that of the industrial community and the potential environmental health problems are largely the same. Also, it may be said that the hospital is a community of ill people, many of whom harbor virulent bacterial or viral pathogens.” –John J. Perkins

Every year, patients in healthcare institutions across the country contract healthcare associated infections (HAI) that require extended hospital stays and increased use of antibiotics. Such infections can cause patients great discomfort and adversely impact the overall quality and cost of healthcare. Healthcare facilities strive to lower the incidence of HAI by implementing surveillance programs and policies and procedures that aid in breaking the chain of infection.

Learning Objectives:

- Define Hospital Acquired Infections
- Understand how Hospital Acquired Infections are Transmitted
- Review preventative steps and procedures to reduce Hospital Acquired Infections
- Identify the financial and moral responsibility of Infection prevention

Defining Hospital Acquired Infections:

The definition of a hospital acquired infection (HAI), also known as a 'Nosocomial' infection, is an infection acquired during hospital care which was not present or incubating at the time of admission. Infections which occur more than 48 hours after admission are also considered nosocomial.
In order to identify and define how we classify hospital acquired infections, it’s very important to understand how they are spread, multiply, and what hosts they target. Pathogenicity refers to the capacity of the infectious agent to cause disease or to produce progressive lesions in a susceptible host. Virulence refers to the degree of pathogenicity. Invasiveness refers to the ability to enter tissues of the host, multiply, and spread. Toxigenicity refers to the ability to produce toxic substances. Hospital acquired infections can be spread through direct contact, indirect contact, droplet spread, and alternative vehicles, such as blood plasma or food.

The number of surgical procedures performed continues to grow, and surgical instruments become more and more complex. Consequently, the risk that a surgical patient may come in contact with an unsterile or improperly cared for instrument continues to increase. Such contact may result in an unfavorable outcome for the patient and a financial burden for the institution. Hospital acquired infections are commonly transmitted when hospital officials become complacent and personnel do not practice correct hygiene regularly. Since medical staff move from patient to patient, the staff themselves serve as a means for spreading pathogens.

**Methods of Hospital Acquired Infection Transmission:**

The first method by which a hospital acquired infection may be transmitted is direct contact. Direct contact is physical or actual touching of the infected person, animal, or other reservoir of infection. Infections are most commonly transferred through hands that come into contact with the infection. The second method of transmission is indirect contact. The physical presence of the infected host doesn’t have to present for an infection to spread. The bedding, clothing, toys, handkerchiefs, and surgical instruments all can serve as vectors in the spread of infection. Another method of transmission is through droplet spread. An infected patient sneezing, coughing, singing, and sometimes even talking can spread the infection. Although these droplets typically don’t travel more than a few feet away from the source, they are still a method of infection transmission. Although they are far less common, airborne infections can remain suspended in the air for long periods of time. Inhalation of these infected particles can lead to a transmission. The last method of transmission is through vehicles, such as water, food, or biological products. This can occur through ingestion, inoculation, or by deposit on skin or of the mucous membrane. Part of the reason hospital acquired infections are very difficult to stop is because they have many mediums of being transferred. A hospital staff must be very diligent in the sterilization process to avoid complications.
**Hand Washing:**

Hand washing is a simple, yet effective measure in the fight against infection prevention. Statistically, hand washing is the single most important step in the fight against infection prevention. The most common way infections are spread is by staff members touching a patient or a contaminated piece of equipment with their hands, and then touching another patient without washing their hands. The Centers for Disease Control and Infection Prevention clearly mandates that all healthcare personnel decontaminate their hands as they enter a patient’s room, and as they leave a patient’s room. Having a high workload, wearing gloves, disagreeing with guidelines, and forgetfulness are not valid excuses. Hand washing is a mandatory step in the fight against infection prevention.

**Hygiene and Uniform**

Healthcare workers must also be conscious of their personal hygiene and what they wear to work as it could help spread infection within the hospital. For example, employees must have good personal hygiene, maintain short and clean nails, and keep hair worn short or pinned up. Also, employees should utilize proper protective equipment, such as head covers, marks, PPE, and must obey special uniform rules. Clothing must also be easy to decontaminate and cleaned daily to keep at optimum conditions. It is important that with any exposure to a possible pathogen, clothing should be changed and decontaminated as soon as possible. Shoes are another measure of safety in the healthcare system. Another important group of precautions to prevent the spread of infection is the use of barriers such as caps, masks, and gloves. In general, caps are suggested when in aseptic units, operating rooms, or when performing other invasive procedures. Masks that are made of synthetic material that can filter the air are considered good barriers against microorganisms. Masks made of other material such as wool, gauze, or paper are not considered effective. The use of masks is indicated for many situations and is present for both the protection of the patient and the healthcare worker. Gloves are another set of necessary barrier when working with patients with a communicable disease. Staff should wear non-sterile gloves when caring for this type of patient while when working in surgery or immuno-compromised patients, gloves used should be sterile. Again, gloves are used for protection of both the patient and healthcare provider.
**Equipment Safety**

Another common mode of transmission of infection is through equipment and environmental causes. Though it may appeal to common sense, it is necessary that the hospital environment is thoroughly cleaned often. These areas must be cleaned with a detergent or antiseptic solution and different cleaning equipment must be used for different rooms. Another significant method to keep the equipment and environment safe is to disinfect through the use of other compounds than those used for cleaning. These compounds are usually non-volatile, remain safe for the patient and staff, and should be effective for a short time frame. One last way to ensure equipment safety is sterilization, which is destruction of all microorganisms. Sterilization can be achieved through both mechanical and chemical processes. While equipment and device disinfection and sterilization is critical, it is also crucial that all personnel are trained properly in the use of the equipment, devices, and are aware of the appropriate contacts in case of any malfunctions in the equipment.

**Point-of-Use Care**

Effective instrument processing begins at the point of use, i.e., during the surgical procedure. To prevent blood, soil, or any protein-containing material from drying on instruments, and/or to soften and remove dried blood and soils, remove gross blood and debris from instruments immediately after use by wiping with a single use wipe that has been moistened with sterile water, or enzymatic solution. After wiping, separate delicate and sharp instruments, especially those used in eye and microsurgical procedures, from heavier items. Open all hinges and box locks and place instruments in trays or perforated baskets. Submerge the instruments in a soaking solution (tap water, enzymatic solution, mild neutral detergent solution, or disinfectant solution) or spray with an instrument presoak. Be sure to select a product that is safe and indicated for use on surgical instruments. Do not immerse or soak instruments in saline, which tends to corrode or pit instrument surfaces. When disposal at the point of use is not feasible, containing the solution will prevent spills. If items are soaked in water or an instrument cleaning solution at the point of use, the liquid should be contained or discarded before transport. Instruments may be covered with a moist towel for transportation.
**Transport**

Following any surgical procedure, all of the instruments opened for the case are considered contaminated. Therefore, they must be properly contained and properly labeled in leak-proof containers (i.e., plastic bags or closed containers/carts) for transfer from the operating suite to the decontamination area of the central services department, where they will be rendered safe for further handling. Do not allow instruments to dry during the transport process. Dried soils will adhere to surgical instruments, making them very difficult to clean. Soak instruments in an enzyme solution or spray with a presoak product before and/or during transport. If a cart system is used for transporting soiled instruments, cover or close the cart before transporting it to a central decontamination area. Clean the closed cart with a suitable disinfectant before taking it out of the OR suite. If possible, transport loaded carts through the outer corridor of the operating room suite.

**Cleaning/Decontamination**

To prevent transfer of microorganisms from personnel to items being processed, personnel working on the clean side of the reprocessing department should wear clean scrub attire, durable shoes with nonskid soles, and a surgical-type hair covering or hood; they should not wear jewelry. To protect themselves from pathogenic microorganisms that may be on the items they are processing, personnel who clean and decontaminate surgical instruments must wear protective attire appropriate for the tasks they are performing.

**Isolation**

While all of the infection control methods deal with physical objects, isolation of the patient also plays a critical role in infection control. The isolation of an infected patient can often prevent the spread of disease and also protect the patient from acquisition of other infections. Isolation policy may vary slightly between hospitals but patient are usually evaluated before being placed under isolation. Isolation prevents pathogens and germs from being spread throughout the hospital to multiple locations. It is important that healthcare personnel properly disinfect their clothing upon leaving the patient’s room, as well as properly disinfect the room upon the patient’s release.
Financial Burden

Every year 1.7 million Americans enter a hospital with one existing condition, only to leave with another. According to the federal Centers for Disease Control and Prevention (CDC), more than 250 Americans a day — up to 99,000 per year — die from infections they received as hospital patients. The cost to treat HAIs is staggering. U.S. taxpayers spend around $20 billion annually to treat HAIs among patients insured by Medicare and Medicaid, according to a 2005 study. That’s not surprising when you consider that patients who get HAIs spend nearly four times as long in the hospital as patients who do not get infections. Billions of dollars in HAI costs are passed on to consumers in the form of higher health insurance premiums and out-of-pocket co-pays. To encourage hospitals to place greater emphasis on infection prevention and rein in escalating healthcare costs, in October, 2008, Medicare stopped paying for 11 types of preventable HAIs and medical errors. It’s expected that Medicaid and some, if not all, private insurers will eventually do the same. Hospitals will have to absorb these costs.

Drug Resistant Strains

Hospital Acquired Infections have a very high mortality rate among infected patients. One of the reasons why it is such a dangerous epidemic is because many infections are drug resistant strains that are immune to antibiotics. These are typically the infections that can be fatal to an infected patient. Two of the most common strains of drug resistant bacteria are bacterial pneumonia and staph infections. A leading cause of these strains is that antibiotics are either improperly used without full completion of the cycle, but also that they are often prescribed too late in the infection’s course to be effective.

Alarming Statistics

Healthcare-associated infections (HAIs) are a major public health problem. According to the Centers for Disease Control and Prevention (CDC), there were an estimated 1.7 million Hospital acquired infections and 99,000 deaths from those infections in 2002. A recent CDC report estimated the annual medical costs of healthcare-associated infections in U.S. hospitals to be between $28 and $45 billion, adjusted to 2007 dollars. Many HAIs can be prevented by hospital personnel who are diligent and conscientious when carrying out their duties and responsibilities with regard to the care of surgical instrumentation.
Instrument care is an ongoing process that is repeated every time an instrument is used in surgery and returned for reprocessing. It begins with proper handling of instruments at the point of use and proceeds through pre-cleaning, transport to the decontamination area, cleaning, decontamination, inspection and repair, packaging (if appropriate), sterilization (or high-level disinfection), and sterile storage. In addition to that, healthcare personnel must be sure to clean the infected environment, and also decontaminate both themselves and their clothing.

**Summary**

Medical errors and hospital acquired infections are among the leading causes of death in the United States. Medical errors and hospital acquired infections account for more deaths than AIDS, breast cancer, and automobile accidents. Infections are an epidemic that can be prevented by implementing simple, yet preventative steps within a hospital or health center environment. HAIs are costly, detrimental to both the healthcare facility as well as the patient, and continue to be a major concern. Fortunately, if proper procedures and protocols are followed, the risk of the spread of infection can be dramatically reduced. Educating healthcare personnel as well as enforcing that they follow strict guidelines to decontamination and sterilization is a mandatory solution to a problem that will otherwise continue to get worse over time. With the amount of surgeries and invasive procedures continuing to grow, hospital acquired infections will only get worse unless proper surveillance, monitoring, decontamination, sterilization, and awareness is promoted.
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