Prevention of Health Care Associated Infections (HAIs) - 10 year study from a tertiary care hospital in Mumbai

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Background:

Healthcare associated infections (HAI) are among the major complications of modern medical treatment. The most important HAIs related to invasive devices are central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP) as well as related to invasive procedure which is called surgical site infections (SSI). These are associated with significant morbidity, mortality and healthcare costs. This is a prospective study of the outcomes of introducing preventive strategies at different time intervals based on our surveillance and audits observations over a 10 year period to prevent infectious complications associated with invasive devices & procedures in our hospital.

Objective:

To identify Healthcare associated infections due to invasive devices & procedures.

Analyse microbiological aetiology causing these HAIs.

To implement Infection Control Guidelines and to assess its impact on preventing infectious complications associated with invasive devices & & procedures.

Methodology:

This study was conducted from January 2012 to December 2021. We formulated an Infection Control Policy based on current standards with annual review to include protocols for care of invasive devices & procedures. Surveillance & annual audit plan was prepared to determine compliance to existing protocol. Regular and new joinee training was an integral part of this program. Prospective observational surveillance & audit data was captured by the Infection Control Team based on international recommendations. Laboratory diagnosis & calculation of HAIs rate was as per National Healthcare Safety Network (NHSN) USA surveillance system. Interventions were introduced after analysing the HAIs.

Results:

Over a period of 10 years, 466 device associated & procedure associated infections (DAIs) were identified among 400 patients with mortality 17% (77/466). With the interventions made over the last 10 years, the incidence of catheter related blood stream infection (CRBSI) was reduced from 3.7/1000 device days to 3.2/1000 device days, incidence of catheter associated urinary tract infections (CAUTI) was reduced from 1.4/1000 device days to 0.3/1000 device days whereas incidence of ventilator associated pneumonia (VAP) reduced from 3.4/1000 device days to 0.4 /1000 device days. Surgical site infections have increased from 0.33% to 0.58% which is within benchmark.

Received: March 17, 2022; Accepted: March 18, 2021; Published: May 26, 2022

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Discussion:

Amongst HAIs SSI was most common HAI identified followed by CLABSI, CAUTI and VAP. However the mortality was highest with VAP (50%) followed by CLABSI (28%), SSI (9%) & CAUTI (5%). Klebsiella pneumoniae was the most common pathogen responsible for HAIs followed by Fungi.

The common interventions being practiced to reduce HAIs were:

Hand hygiene,

Maintaining a safe, clean, hygienic hospital environment

Screening and categorizing patients into cohorts

Antibiotic stewardship

Following patient safety guidelines

Training :

dummy arm practices and simulation exercises for health care workers on insertion and maintenance of devices

Introduced research methodologies to understand the clinical impact of our technology based practices.

Over a period of time following specific interventions were introduced from time to time while actively monitoring HAIs.

For prevention of CLABSI:

CLABSI care bundle

Closed IV system Collapsible bags

Flushing IV catheters 1) Prefilled saline syringes 2) Flushing protocol

Scrub the hub

Split septum device

Safe Infusion Practices-Multi Dose Vial Use policy

Use of sterile gloves for care of Central Venous Catheter in Covid patients.

For prevention of CAUTI:

CAUTI care bundle Stopped use of antimicrobials for meatal hygiene.

Video demonstration of accurate securement of catheter to avoid pulling of catheter during changing position

Video demonstration of bathing with sponging wipes especially for bedridden patients.

For prevention of VAP:

VAP care bundle

Cleaning and disinfection of nebulizer machine

Bed side Risk Assessment for Aspiration Pneumonia

Encouraged subglottic suctioning

Encouraged trained nurses feeding vulnerable patients for aspiration after assessing their gag reflex.

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For prevention of SSI:

SSI care bundle including Pre , Intra & Post-operative care assessment.

Surgical site surveillance form designed to have real-time monitoring compliance from Ward, OTs and Infection control team.

Conclusion:

The overall incidence of HAIs reduced from 2.21/1000 device days to 1.18 /1000 device days. The mortality due to DAIs & procedure associated infections was 17%. Amongst them maximum mortality was due to VAP (50%) & CLABSI (28%). On-going surveillance & audits were very essential to understand the real time compliance to care bundle. And further corrective & preventive strategies were adopted from time to time along with technological interventions to check with compliance to Infection Control. This was supported by strong training needs of the staff by a multidisciplinary team comprising of doctors, nurses and infection control team which helped to bring HAIs rates within benchmark.

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