From Bedside to Safety: Nursing Approaches to Healthcare associated Infection Control

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INTRODUCTION

Nursing care plays a crucial role in preventing hospital-acquired infections (HAIs). HAI stands for Hospital-Acquired Infection. As per The Centres for Disease Control and Prevention (CDC,2004) HAIs were defined as those infections that develop during hospitalization but are neither present nor incubating upon the patient's admission to the hospital; generally for those infections that occur more than 48 to 72 hours after admission and within 10 days after hospital discharge. These are infections that patients acquire while receiving treatment for other conditions within a healthcare setting. Common types of HAIs include:

- Ventilator-Associated Pneumonia (VAP)
- Surgical Site Infections (SSIs)
- Catheter-Associated Urinary Tract Infections (CAUTIs)
- Central Line-Associated Bloodstream Infections (CLABSIs)

HAIs are a significant concern for patient safety and can lead to prolonged hospital stays, increased medical costs, and higher morbidity and mortality rates. Preventative measures often involve strict hygiene practices, appropriate use of antibiotics, and careful monitoring of patients. Nurses play very important role in Healthcare associated infection control by setting infection control protocols, following infection control measures, educating other staff, monitoring patients and assess early signs of HAIs, administering antibiotics, maintain asepsis while caring for patients under their care, following proper bio medical waste management and surveillance of HAIs on daily basis.

REVIEW OF LITERATURE

Burden of HAI worldwide

A worldwide overall estimate indicates that more than 1.4 million patients worldwide are affected due to Healthcare associated infection at any given time. Although data on the burden of diseases worldwide that are published in WHO's *World Health Reports* inform HCWs, policy-makers, and the public of the most important diseases in terms of morbidity and mortality, Healthcare associated infection does not appear on the list of the 136 diseases evaluated. The most likely reason is that the diagnosis of Healthcare associated infection is complex as it rely on multiple criteria and not on a single laboratory test. In addition, although national surveillance systems exist in many developed countries, like the National Nosocomial Infection Surveillance (NNIS) system in the United States of America (USA), they often use different diagnostic criteria and methods, which render international comparisons difficult due to benchmarking obstacles. In developing countries on other hand such systems are seldom in place. Therefore, in many settings, from hospitals to ambulatory and long-term care, Healthcare associated infections appears to be a hidden, cross-cutting concern that no institution or country can claim to have solved as yet[1].

While surveillance of Healthcare associated infection is already a challenging task in highly resourced settings, it may often appear an unrealistic goal in everyday care in developing countries. The difficulties to define the diagnosis of Healthcare associated infection becomes more challenging due to the paucity and unreliability of laboratory data, lack of standardized information from medical records, and scarce access to radiological facilities. Limited data on Healthcare associated infections from these settings are available from the literature. This is well demonstrated by an electronic search of the period 1995–2008, which allowed the retrieval of around 200 scientific papers published in English and approximately 100 in other languages. Overall, no more than 80 of these papers featured rigorous, high quality, methodological characteristics on Healthcare associated infection[2].

The scope of the problem due to Healthcare associated infections is especially important in environments where even the most basic infection control practices are essentially non-existent. This is the outcome of a number of unfavourable variables, nearly all of which may be linked to limited financial resources, including understaffing, poor hygiene and sanitation, a lack of basic equipment, inadequate structures, and overcrowding. A population that is heavily impacted by starvation, various infections, and/or diseases, in addition to these particular conditions, raises the risk of healthcare-associated infections in poor nations. In these circumstances, thousands of illnesses are still contracted from patients as well as from healthcare workers through the use of hazardous materials, including from the hepatitis B and C viruses and the transfer of the HIV virus[3].

Many research carried out in underdeveloped nations indicate greater hospital wide incidence of endemic healthcare-associated infections (HCAIs) than in wealthy nations. It is crucial to remember, though, that the majority of these studies focus on specific institutions and could not be reflective of the issue nationwide[1].

With general infection rates—particularly those related to devices—that are several times higher than in industrialized nations, the burden of healthcare-associated infections (HCAIs) is also far more severe in high-risk populations, such as individuals kept in intensive care units and neonates. For instance, the USA NNIS system rates and device-associated infection rates from multicentre studies carried out in adult and paediatric intensive care. Neonatal infections among hospital-born babies in underdeveloped nations have been reported to be 3–20 times greater than in industrialized countries, according to a systematic assessment of the literature.[2]

Only a small number of research from developing nations used multivariate analysis to evaluate risk factors connected to Healthcare associated infections. The most common ones were surgery, intravascular and urinary catheters, extended hospital stays, and sedative drugs.

The extent and size of the global burden of Healthcare associated infections seem to be significantly underestimated and of utmost importance. There are techniques to evaluate the scope and character of the issue, and they can help with accurate tracking and resolution. However, in environments with limited resources and data sources, nurses worldwide can be the game changer, by following and ensuring preventive measures for Healthcare associated infections.

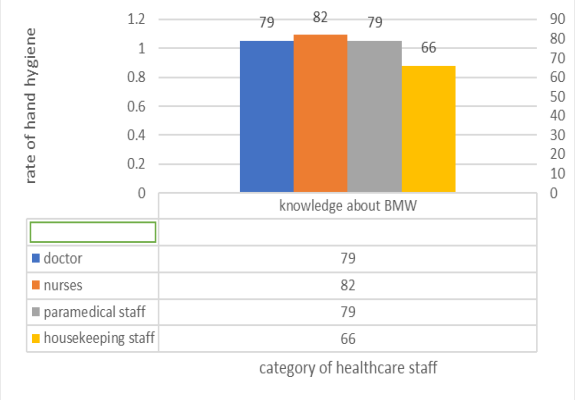
METHODS

Aim

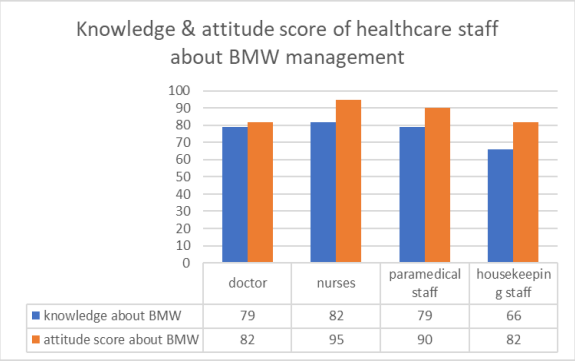
1. Compare hand hand hygiene rates among various Health care workers- doctors, nurses, paramedics.
2. Explore the role of nurse as administrator, educator, clinician, researcher in HAI prevention
3. Evaluate the current practices related to infection control in a tertiary care hospital to identify strengths and areas for improvement.
4. Assess the knowledge and attitude of various health care staff towards biomedical waste management.

RESULTS

Hand hygiene practice rates



Knowledge and attitude of HCW towards bio medical waste management



Role of Nurses in preventing Healthcare associated infections

Nurses are the only interdisciplinary healthcare professionals who regularly give patients bedside care and have intimate contact with them. This could also

indicate that there's a greater chance that patients will contract HAIs from them. Conversely, nurses possess a special chance to lower the risk of HAIs in their medical facility. Meaning that they may promote patient recovery while reducing infection-related problems by applying the abilities and information they have gained from nursing practice. The following are the five primary areas of nursing practice where nurses can assist and monitor control and prevention of HAIs, among other instruments at their disposal to help patients feel safe:

Role of Nurse as administrator- Ensuring ideal nurse patient ratio, supply of PPE and other logistics, conducting daily rounds, resolving issues related to human resource management of grade IV employees, planning and conducting teaching learning activities for nurses on regular basis are few of the tasks performed by administrative wing of Nursing force. Nurses advocate for policies and practices that promote infection prevention, including staffing ratios and resources needed for effective infection control.

Role of Nurse as clinician- are often the frontline implementers of infection control measures, such as hand hygiene, use of personal protective equipment (PPE), and proper cleaning and disinfection of equipment and surfaces, educate patients and their families about infection prevention strategies, closely monitoring patients for signs of infection & early detection of potential infections, giving medications, including antibiotics, and ensure they are used appropriately to reduce the risk of HAIs, especially in surgical patients or those with indwelling devices. Following aseptic techniques: In procedures such as catheter insertions, wound care, and IV placements, nurses apply aseptic techniques to minimize the risk of introducing pathogens.

Role of Nurse as educator-planning and conducting classes for nursing students, interns, paramedics, and other staff on time to time basis focusing on hospital infection control measures like hand hygiene, Biomedical waste management, spill management, use of Personal protective equipment, sterilization and disinfection techniques and antibiotic policy are few of the jobs a nurse educator performs routinely.

Role of nurse as researcher- nursing as a profession is based on evidence based practice hence conducting researches and generating evidences for best practices are essential work that a nurse researcher performs. In context of hospital infection control, conducting audits on hand hygiene, bio medical waste management and filling checklists on various device related checklist provides shift in infection pattern and idea for revision of antibiotic policy. Nurses play a role in collecting data on infection rates and trends, which can help in evaluating the effectiveness of infection prevention measures and policies.

hence, the proactive involvement of nurses in infection prevention is vital to safeguarding patient health and improving outcomes in healthcare settings.

ROLE OF INFECTION CONTROL NURSE

A registered nurse (RN) who uses best practices to stop the transmission of bacteria and viruses while providing the highest quality of care to patients who have contracted infectious diseases is known as an infection control nurse. Strong attention to detail, the capacity to function well under pressure, and outstanding communication abilities are essential in this line of employment. To safeguard the public's and individuals' health, infection control nurses collaborate with scientists, public health specialists, and governmental organizations in addition to patients and doctors.

Hence this paper identifies role of nurses in various capacities for infection prevention in hospital like many previous researches done, however not much importance iis still given to this in daytoday routine at any healthcare setup.

ROLES OF NURSES IN VARIOUS SETTINGS INCLUDE

Nursing practices to control hospital-acquired infections (HAIs) in wards:

1. Hand Hygiene:
   - Regular Hand washing: Nurses should practice regular hand washing with soap and water or use alcohol-based hand sanitizers before and after patient contact.

- Teach Patients: Educate patients and their families about the importance of hand hygiene.

2. Aseptic Technique:
   - Sterile Procedures: Utilize sterile techniques during invasive procedures, such as catheter insertions and wound care, to minimize infection risk.
   - Maintain Clean Field: Keep the environment and work surfaces clean and organized.
3. Personal Protective Equipment (PPE):
   - Appropriate Use of PPE: Ensure proper use of gloves, masks, gowns, and eye protection when caring for patients, especially those with known infections.
   - Change PPE Between Patients: Change PPE between patients to prevent cross-contamination.
4. Environmental Cleaning:
   - Regular Disinfection: Perform regular cleaning and disinfection of surfaces, equipment, and high-touch areas in the ward.
   - Proper Waste Disposal: Follow protocols for the safe disposal of bio hazardous and general waste.
5. Patient Education:
   - Infection Prevention: Educate patients about infection prevention measures, including the importance of adhering to treatment plans and reporting any signs of infection.
   - Post-Discharge Instructions: Provide clear instructions for care after discharge, including how to recognize symptoms of infection.
6. Monitoring and Surveillance:
   - Routine Monitoring: Regularly assess patients for signs and symptoms of infection, including fever, redness, or discharge from surgical sites.
   - Data Tracking: Track infection rates and trends within the ward to identify and respond to potential outbreaks.
7. Antibiotic Stewardship:
   - Judicious Use of Antibiotics: Administer antibiotics only when necessary and according to protocols to reduce the risk of antibiotic resistance.
   - Educate Staff: Ensure nursing staff is knowledgeable about appropriate antibiotic use and resistance issues.
8. Care for Invasive Devices:
   - Maintenance Protocols: Follow strict protocols for the care and maintenance of catheters, IV lines, and other invasive devices.
   - Timely Removal: Remove unnecessary invasive devices as soon as they are no longer needed to reduce infection risk.
9. Vaccination:
   - Encourage Vaccinations: Promote vaccinations for healthcare workers and patients to protect against preventable infections, such as influenza and pneumococcal infections.
10. Team Collaboration:
    - Interprofessional Collaboration: Work closely with infection control teams, physicians, and other healthcare staff to implement best practices and protocols effectively.
    - Regular Training: Participate in on-going training and workshops related to infection control to stay updated on the latest guidelines and practices.

Nursing practices for preventing hospital-acquired infections (HAIs) in the operating theatre (OT):

1. Strict Aseptic Technique:
   - Surgical Preparation: Ensure that all instruments and materials are sterile and ready before surgery. Use aseptic techniques during the preparation and handling of surgical instruments.
   - Draping: Properly drape the surgical site to create a sterile field and minimize contamination.
2. Hand Hygiene:
   - Surgical Hand Scrub: Perform a thorough surgical hand scrub before entering the operating room. This includes cleaning under fingernails and between fingers.
   - Use of Hand Sanitizers: Apply alcohol-based hand sanitizers when appropriate and follow up with a surgical scrub when necessary.
3. Personal Protective Equipment (PPE):
   - Wear Appropriate PPE: Use sterile gowns, gloves, masks, and eye protection during all

surgical procedures to minimize exposure to pathogens.
   - Change PPE as Needed: Change gloves and other protective gear between procedures or when they become contaminated.
4. Environmental Controls:
   - Maintain a Sterile Environment: Ensure that the operating room is clean and sterile, including surfaces, equipment, and air quality. Regularly clean and disinfect surfaces and equipment.
   - Controlled Traffic: Limit the number of personnel in the operating room to reduce the risk of contamination and maintain a sterile environment.
5. Infection Surveillance:
   - Monitor Surgical Site Infections (SSIs): Regularly monitor patients post-surgery for signs of infection, such as fever, redness, or discharge at the surgical site.
   - Data Collection: Collect and analyse data on infection rates to identify trends and areas for improvement.
6. Proper Handling of Instruments:
   - Sterile Handling: Handle all surgical instruments and materials in a manner that maintains their sterility, avoiding contact with non-sterile surfaces.
   - Immediate Cleaning: Clean and sterilize instruments immediately after use to prevent contamination and ensure readiness for future procedures.
7. Antibiotic Prophylaxis:
   - Administer Prophylactic Antibiotics: Follow guidelines for the appropriate use of prophylactic antibiotics before surgical procedures to reduce the risk of SSIs.
   - Timing and Dosage: Ensure that antibiotics are administered within the recommended timeframe and dosage for maximum effectiveness.
8. Temperature and Humidity Control:
   - Optimize OT Conditions: Maintain optimal temperature and humidity levels in the operating room to reduce the risk of infections and enhance the effectiveness of sterilization processes.
9. Patient Education:
   - Preoperative Instructions: Educate patients about the importance of following preoperative instructions, including bathing with antiseptic solutions and avoiding food and drink as directed.
   - Postoperative Care: Provide clear instructions for postoperative care and signs of infection that patients should watch for after discharge.
10. Collaborative Practice:

- Interdisciplinary Communication: Work closely with surgeons, anaesthetists, and other healthcare professionals to ensure that infection prevention protocols are consistently followed.
- Regular Training: Participate in on-going education and training on infection control practices and updates on guidelines related to surgical care.

Preventing hospital-acquired infections (HAIs) in the Neonatal Intensive Care Unit (NICU) is vital for protecting vulnerable new-borns. Here are specific nursing practices aimed at preventing HAIs in the NICU:

1. Strict Hand Hygiene

- Frequent Hand washing: Nurses must perform hand hygiene before and after each patient contact, using soap and water or alcohol-based hand sanitizers.
- Educate Families: Instruct families and visitors on proper hand washing techniques and the importance of hand hygiene.

2. Aseptic Technique

- Use Sterile Procedures: Follow strict aseptic techniques for all invasive procedures, such as IV placements, catheter insertions, and wound care.
- Maintain a Sterile Field: Ensure all equipment and surfaces are sterile before starting procedures to minimize contamination.

3. Infection Control Protocols

- Follow Standard Precautions: Adhere to infection control protocols, including the use of gloves, masks, and gowns as appropriate.
- Implement Isolation Practices: Use isolation precautions for infants with confirmed or suspected infections to prevent the spread of pathogens.

4. Environmental Cleaning

- Regular Disinfection: Clean and disinfect the NICU environment frequently, focusing on high-touch surfaces and shared equipment.
- Equipment Maintenance: Ensure that all medical equipment is cleaned and sterilized according to hospital protocols.

5. Monitoring and Surveillance

- Routine Infection Surveillance: Monitor for signs of infection in neonates, such as temperature changes, feeding intolerance, and abnormal laboratory results.
- Report Infections Promptly: Ensure timely reporting of HAIs to infection control teams to initiate appropriate interventions.

6. Proper Handling of Invasive Devices

- Catheter Care Protocols: Follow strict protocols for insertion, maintenance, and timely removal of central lines, urinary catheters, and other invasive devices.
- Monitor Insertion Sites: Regularly assess insertion sites for signs of infection, such as redness, swelling, or discharge.

7. Nutrition and Feeding Practices

- Use of Pasteurized Donor Milk: When breastfeeding is not possible, use pasteurized donor human milk to reduce infection risk compared to formula.
- Safe Feeding Techniques: Follow proper techniques for feeding, ensuring equipment used for feeding is clean and sterile.

8. Education and Training

- Staff Training: Provide on-going education and training for nursing staff on infection prevention practices, including updates on best practices and protocols.
- Family Education: Educate families on infection prevention strategies, including recognizing early signs of infection and understanding hygiene practices.

9. Surveillance of Antibiotic Use

- Antibiotic Stewardship: Monitor antibiotic use in the NICU to prevent overuse and resistance. Administer antibiotics judiciously according to protocols.
- Review Cultures: Ensure appropriate cultures are taken to guide antibiotic therapy effectively.

10. Developmental Care

- Minimize Stress and Disturbance: Implement developmentally supportive care practices to reduce stress on infants, which can compromise their immune systems.
- Positioning and Comfort: Use appropriate positioning techniques to promote comfort and physiological stability, reducing the risk of complications.

DISCUSSION

SWOT analysis of hospital infection control measures by ICN

STRENGTH	Weakness
Positive attitude	Infrastructure barrier
Administrative support	Insufficient supplies
Human resource	Time constraints
Nurse patient ratio	Heavy workload
Opportunity	Threat
Education and training	Heavy work load
Awareness among staff	Limited resources
Policy and protocols	Multiple drug resistance
National surveillance	Cost cutting

CONCLUSION

The study "From Bedside to Safety: Nursing Approaches to Infection Control" underscores the vital role that nursing practice plays in preventing hospital-acquired infections (HAIs) across healthcare settings. The findings highlight that effective infection control requires a multifaceted approach involving stringent

adherence to aseptic techniques, comprehensive hand hygiene practices, and the implementation of evidence-based protocols tailored to specific patient populations.

Nurses, as frontline caregivers, are uniquely positioned to identify potential infection risks and intervene promptly. The integration of patient and family education into nursing care not only empowers patients but also fosters a collaborative environment that enhances overall infection prevention efforts. Furthermore, on-going training and education for nursing staff are essential to keep abreast of the latest infection control guidelines and best practices.

The study also emphasizes the importance of inter professional collaboration in infection control. By working closely with infection control specialists and other healthcare providers, nurses can contribute to a culture of safety and vigilance that prioritizes patient well-being.

Ultimately, this research reinforces that through dedicated nursing practices, rigorous adherence to infection control protocols, and a commitment to patient-centred care, healthcare institutions can significantly reduce the incidence of HAIs. As the healthcare landscape continues to evolve, it is imperative that nursing practices adapt and innovate to meet the challenges of infection prevention, ensuring safer environments for patients and promoting better health outcomes.

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