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Review Article

Central Line-Associated Bloodstream Infections: Prevention Strategies and the Role of Nursing Education among Staff Nurses

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Abstract

Globally, central line-associated bloodstream infections (CLABSIs) continue to be a major contributor to morbidity, mortality, and higher medical expenses. CLABSIs still happen in clinical settings, especially in critical care units, in spite of evidence-based guidelines. Through stringent aseptic procedures, ongoing professional development, and adherence to infection control policies, nurses play a critical role in the prevention of CLABSI. With an emphasis on the value of structured nursing education programs for staff nurses, this review paper addresses CLABSI preventive techniques. The review emphasizes nursing duties, evidence-based therapies, and the role that training plays in enhancing patient outcomes.

Keywords: Central Line-Associated Bloodstream Infections, CLABSI, Nursing Education, Staff Nurses, Prevention Strategies, Infection Control

Introduction

One of the most dangerous healthcare-associated infections (HAIs) that are reported worldwide is central line-associated bloodstream infection (CLABSI), which has a major impact on hospital expenses, patient morbidity, and mortality[1]. A central line, sometimes referred to as a central venous catheter (CVC), offers vital access for blood collection, medicine delivery, fluid administration, and hemodynamic monitoring. However, if appropriate measures are not taken, there is a risk of bloodstream infection[2].

Bloodstream infections linked to central lines are a significant problem in critical care units (ICUs), where infection rates are disproportionately greater than in other hospital wards, according to the World Health Organization (WHO)[3]. According to estimates from the Centers for Disease Control and Prevention (CDC), hundreds of CLABSI cases happen each year in the US alone. Each occurrence results in high treatment expenses and prolonged hospital stays[4].

Research indicates that following evidence-based procedures, including as hand cleanliness, maximal sterile barrier measures during insertion, appropriate catheter site selection, and routine maintenance protocols, will help prevent the majority of CLABSIs[5]. Staff nurses play a crucial role in infection prevention since they are the healthcare professionals who offer catheter care on the front lines[6].

One important element in lowering the incidence of CLABSI has been found to be nursing education. In clinical practice, structured educational programs foster a culture of safety, increase nurses' expertise, and improve adherence to procedures[7]. Sustained adherence to infection prevention techniques requires frequent reinforcement training and ongoing

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professional development[8].

The purpose of this review is to examine CLABSI preventive tactics and assess how nursing education might enhance staff nurses' understanding and practice in order to lower infection rates.

Epidemiology and Burden of CLABSI

Globally, case fatality rates for CLABSIs range from 12% to 25%, and they are linked to higher patient morbidity and mortality[9]. Furthermore, each infection is thought to result in a 7–14 day longer hospital stay and a large rise in treatment expenses[10]. Lack of access to infection prevention equipment makes the issue worse in environments with limited resources[11].

Evidence-Based Prevention Strategies

The CDC and WHO recommend several evidence-based practices for CLABSI prevention:

- **Hand Hygiene** – Maintaining strict hand cleanliness both before and after handling a catheter lowers the chance of infection[12].
- **Maximal Sterile Barrier Precautions** – Infection rates are reduced when sterile gowns, gloves, masks, and drapes are used during catheter insertion[13].
- **Chlorhexidine Skin Antisepsis** – When it comes to preventing colonization, an antiseptic preparation containing 2% chlorhexidine works better than povidone-iodine[14].
- **Optimal Site Selection** – To reduce the risk of infection, subclavian sites are typically used over femoral or jugular[15].
- **Catheter Maintenance** – Timely removal, appropriate dressing changes, and daily line need evaluation continue to be crucial elements of prevention[16].

Role of Staff Nurses in CLABSI Prevention

Central line maintenance, including site care, line flushing, dressing changes, and patient monitoring, is mostly the responsibility of nurses. Teaching patients and their families about catheter care and early infection signs[16] is another aspect of their job. Research indicates that when nurses have organized support and monitoring, they are more likely to comply with catheter care bundles.

Nursing Education and Its Impact

Nurses' knowledge, attitudes, and adherence to infection prevention practices have shown notable changes as a result of educational programs[20]. Workshops, competency checklists, and simulation-based training have all been successful in maintaining compliance. Evidence-based procedures continue to be a standard component of nursing care[22] thanks to a culture of ongoing education.

Challenges and Opportunities

Despite progress, several barriers remain, including staff shortages, high workload, limited resources, and lack of regular training. Addressing these challenges requires hospital administrators to prioritize infection prevention policies, provide adequate supplies, and implement audit-feedback mechanisms. Incorporating CLABSI prevention modules into nursing curricula and continuing education programs represents a sustainable opportunity to reduce infection rates.

Conclusion

CLABSIs remain a preventable yet persistent healthcare challenge. Staff nurses play a central role in implementing infection prevention strategies, and their education directly influences patient outcomes. Structured, ongoing nursing education programs enhance knowledge, strengthen adherence to protocols, and ultimately reduce infection rates. Investing in staff nurse training is not only cost-effective but also crucial for patient safety and quality of care.

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