ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 07 | July - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

BOTTLE NECKS, RECOMMENDATION, & SPECIFIC INTERVENTION ON BUNDLE CARE

Medical Surgical Nursing

Mrs. Mathivathani M Assistant Professor, LPS Institute Of Cardiology & Cardio Vascular Thoracic Surgery, G.S.V.M Medical College, Kanpur, UP.

Mr. Suresh Singh Assistant Professor, College Of Nursing, G.S.V.M Medical College, Kanpur, UP.

Mrs. Soniya Sankhla Assistant Professor, College Of Nursing, G.S.V.M Medical College, Kanpur, UP.

ABSTRACT

Health care-associated infection (HCAI) is one of the most common threats to patient safety and is associated with a significant mortality and morbidity. Evidence-based practices can be adopted to prevent HCAI. Care bundle is one of the prevention strategies designed to ensure uniform application of best practices to all patients

KEYWORDS

Health Care Associate infection, Evidence -based Practice, Urinary tract Infection, ventilator Associated Pneumonia, Surgical Site infection, Bundle care.

INTRODUCTION

Health care-associated infection (HCAI) is one of the most common threats to patient safety and is associated with a significant mortality and morbidity.[3] Recent analysis by the WHO found that HCAIs are more frequent in resource-limited settings than in developed countries, with a prevalence rate between 5.7% and 19.1%.[4] Annually 12 million deaths are reported in low- and middle-income countries due to poor infection prevention and control protocols. One-thirds of these deaths can be prevented in health-care facilities by surveillance and implementation of evidence-based guidelines for the prevention of infections.[5] HCAI can be prevented by adhering to easy, cost-effective evidence-based practices that can be incorporated in routine patient care.[6]

A bundle is a set of three to five evidence-based interventions designed to improve the quality and outcomes of care processes. Numerous international studies have evaluated the effectiveness of Bundles/Care Bundles (BCB) in reducing morbidity and mortality. The Institute for Healthcare Improvement (IHI) has defined the concept of a bundle but has not outlined the development process[7]

Need Of Bundle Care

Adel Yousif Ayed AL-Moutiwty, Adel Yousif Ayed AL-Moutiwty (2023) conducted a descriptive study to assess the knowledge levels and skills regarding care bundle guidelines among nurses in Mosul hospitals. A purposive sample of 60 nurses working in pediatric teaching hospitals was selected for the study. Data was collected by questionnaire. The study finding revealed the knowledge results for nurses' understanding of care bundle guidelines indicated that 53.3% (32) of them had an unacceptable level of knowledge regarding infection prevention and control. There were no significant relationships between knowledge results and demographic variables, except for the general employment period ($p \leq 0.05$). the study concluded that the recommended to provide training courses and workshops for nurses in the pediatric departments of Mosul hospitals regarding care bundle guidelines.

Potential bottlenecks for implementing care bundles in hospitals

Clinical bottlenecks

1. **Resistance To Change -** Healthcare professionals may be hesitant to adopt new practices or protocols.
2. **Lack Of Standardization -** Variability in care processes and protocols can hinder implementation.
3. **Insufficient Resources-** Limited availability of necessary equipment, supplies, or personnel.

Operational Bottlenecks

1. **Inefficient Workflows -** Care bundle implementation may require changes to existing workflows, which can be time-consuming and challenging.
2. **Communication Breakdowns -**Poor communication among healthcare teams can lead to misunderstandings and errors.
3. **Documentation Challenges-** Accurate and efficient documentation of care bundle implementation can be difficult.

Cultural And Behavioral Bottlenecks

1. **Lack Of Buy-in-** Healthcare professionals may not be fully invested in the care bundle initiative.
2. **Cultural Barriers -** Organizational culture may not support innovation or quality improvement.
3. **Behavioral Change -** Encouraging healthcare professionals to adopt new behaviors and practices can be challenging.

Technological Bottlenecks

1. **Electronic Health Record (EHR) Limitations -** EHR systems may not be optimized to support care bundle implementation.
2. **Data Analytics Challenges -** Collecting and analyzing data to evaluate care bundle effectiveness can be difficult.
3. **Technology Integration -** Integrating new technologies or tools with existing systems can be complex.

Financial Bottlenecks

1. **Resource Constraints-** Implementing care bundles may require significant investments in personnel, equipment, or technology.
2. **Reimbursement Challenges -** Changes in reimbursement models or policies can impact care bundle implementation.
3. **Cost-benefit Analysis-** Demonstrating the cost-effectiveness of care bundles can be essential for sustainability.

By understanding these potential bottlenecks, hospitals can develop strategies to overcome them and successfully implement care bundles.

Recommendations

- A multi-disciplinary approach, coupled with an institution-wide multi- modal strategy including: will-building, awareness, training, education, measurement, and feedback are required to optimally promote and sustain the implementation of care bundles in hospital settings.
- The development of "how-to guidelines," and the provision of standardized data collection tools that calculate bundle compliance are advised to ensure healthcare team members are clear on the elements of each bundle, the actions required and, how compliance is measured and tracked for feedback.
- Should elements of a bundle require particular supplies or products, these should be appropriately procured prior to bundle roll-out and implementation.
- The elements of a bundle are measured in an "all or nothing" manner to simplify assessment of compliance for feedback to providers and to emphasize the completion of every component.[7]
- This measurement is different from an average compliance score.
- A bundle compliance percentage goal should be set for the healthcare team to work toward achieving (95% bundle compliance is the recommended best practice).[8]

Bundlle Care- Specific Interventions

General Principles

- The implementation of care bundles can assist in enhancing compliance to evidence-based quality process measures to improve patient care.[8]
- Care bundles include a set of evidence-based measures (where possible, level 1, randomized controlled trial evidence) that when implemented together have shown to produce better outcomes and have a greater impact than that of the isolated implementation of individual measures.[8]
- Bundles also help to create reliable and consistent care systems in hospital settings since they are simple (three to five elements), clear, and concise.[8]
- In addition to creating safer patient care environments, the implementation of bundles also promotes multi-disciplinary collaboration, since they should be developed collaboratively and consensus obtained with strong clinician engagement and endorsement.[8,9]
- In order for bundle implementation to be successful, each element of the bundle must be implemented collectively with complete consistency to achieve the most favourable outcomes ("all or none" approach).[8]
- The effective implementation of a care bundle requires that the measures be adapted to the local setting; appropriately followed; entrenched in the patient care culture and; recorded and evaluated to ensure compliance by all members of the healthcare team involved.[9]
- Healthcare providers are advised to follow each bundle element for every patient, always. This aims to develop and promote a positive habit- forming behaviour among providers and ultimately a reliable care processes.[9]
- Bundled interventions are an effective way to implement change and improve the "culture" of patient safety by promoting teamwork, measuring compliance and providing feedback and accountability to frontline teams and hospital leadership to improve care.[8,9]

Bundles For The Prevention Of Central Line-associated Bloodstream Infections (CLABSI)

Central lines are used commonly in intensive care units (ICUs) and in non- ICU populations such as dialysis units, intraoperatively, and oncology patients. Most hospital-acquired bloodstream infections are associated with a central line (including peripherally-inserted central catheters, PICCs), and CLABSIs are responsible for excess mortality and morbidity, prolonged hospital stays, and increased costs. CLABSI incidence is higher in low- income countries. Implementation of central line insertion and maintenance bundles reduces the incidence of CLABSI in ICUs[8] and non- ICU settings[9,10], including in low-income countries.

1. Insertion Bundle:

- Maximal sterile barrier precautions (surgical mask, sterile gloves, cap, sterile gown, and large sterile drape).
- Skin cleaning with alcohol-based chlorhexidine (rather than iodine).
- Avoidance of the femoral vein for central venous access in adult patients; use of subclavian rather than jugular veins
- Dedicated staff for central line insertion, and competency training/assessment.
- Standardized insertion packs.
- Availability of insertion guidelines (including indications for central line use) and use of checklists with trained observers.
- Use of ultrasound guidance for insertion of internal jugular lines.[12,13]

2. Maintenance Bundle:

- Daily review of central line necessity.
- Prompt removal of unnecessary lines.
- Disinfection prior to manipulation of the line.
- Daily chlorhexidine washes (in ICU, patients > 2 months).
- Disinfect catheter hubs, ports, connectors, etc., before using the catheter.
- Change dressings and disinfect site with alcohol-based chlorhexidine every 5-7 days (change earlier if soiled).
- Replace administration sets within 96 hours (immediately if used for blood products or lipids).
- Ensure appropriate nurse-to-patient ratio in ICU (1:2 or 1:1).
- These activities need to be integrated in a multi-modal approach including hand hygiene, clinician and nurse education, and performance of surveillance and feedback of CLABSI rates. [15,16]

Important Practical Point

- When adherence to aseptic technique cannot be ensured (for example when CVCs are inserted during a medical emergency), consider replacing CVC where possible
- Remember IV to PO switch where appropriate – clinical staff to review IV and antibiotic therapy daily

Bundle For The Prevention Of Catheter-associated Urinary Tract Infections (CAUTI)

CAUTI is defined as a urinary tract infection (significant bacteriuria plus symptoms and/or signs attributable to the urinary tract with no other identifiable source) in a patient with current urinary tract catheterization or who has been catheterized in the past 48 hours. It is the most common healthcare associated infection worldwide,resulting in increased costs, hospital stays, and substantial morbidity. The majority of cases are considered to be avoidable with the implementation of infection prevention bundles of care. There are a number of strategies with varying levels of evidence to prevent CAUTI before and after placement of urinary catheters.

Strategies To Prevent CAUTI
These Generally Include Appropriate Use,

- aseptic insertion and maintenance,
- early removal and hand hygiene.

CAUTI Bundle

- Urinary catheter maintenance bundle
- Daily assessment for the need of urinary catheter
- Maintenance of closed drainage system
- Emptying the urosac bag when 3/4th full into a separate clean container
- Metal hygiene
- Hand hygiene
- Observation/inspection of urine flow, urine clarity and patient discomfort.[17,18]

Bundle For The Prevention Of Ventilator Associated Pneumonia (VAP)

VAP, defined as a new pneumonia occurring > 48 hours after endotracheal intubation, is a common and serious hospital-acquired infection. It occurs in up to 20% of patients receiving mechanical ventilation[19], and is associated with increased antibiotic use, length of hospitalization, and healthcare costs. The mortality associated with VAP ranges from 20% to 50%, and the attributable mortality is estimated at 13%.[20]It has been estimated that over half the cases of VAP may be preventable with evidence-based strategies, with an impact on mortality.[16] The following bundle of ventilator care processes have been shown to substantially reduce VAP rates,and are recommended in international guidelines.

VAP Care Bundle

- Elevate the head of the bed to between 30 and 45 degrees.
- Daily "sedation interruption" and daily assessment of readiness to extubate.
- Daily oral care with chlorhexidine.
- Prophylaxis for peptic ulcer disease.
- Prophylaxis for deep venous thrombosis.
- These interventions should be implemented together with standard precautions (hand hygiene and use of gloves when handling respiratory secretions) as well as adequate disinfection and maintenance of equipment and devices. Other components of the VAP bundle may include:
- Utilization of endotracheal tubes with subglottic secretion drainage (only for patients ventilated for longer than 24 hours)
- Initiation of safe enteral nutrition within 24-48 hours of ICU admission .

Bundle For The Prevention Of Surgical Site Infection (SSI)

SSIs are infections of the incision or organ or space that occur after surgery. It has been estimated that approximately half of SSIs are preventable.[16] The following evidence based interventions should be provided as part of a bundle of care to prevent SSI:

- Administration of parenteral antibiotic prophylaxis.
- Antibiotic prophylaxis should be administered within 60 minutes prior to incision, including for Caesarean section
- Re-dosing is recommended for prolonged procedures and in patients with major blood loss or excessive burns.
- Patients should be washed with soap or an antiseptic agent within a

night prior to surgery.
- Avoid hair removal: use electric clippers if necessary.
- Use alcohol-based disinfectant for skin preparation in the operating room.
- Maintain intraoperative glycaemic control with target blood glucose levels < 200 mg/dL (in patients with and without diabetes).
- Maintain perioperative normothermia.
- Administer increased fraction of inspired oxygen during surgery and after extubation in the immediate postoperative period in patients with normal pulmonary function.

The interventions above should be implemented with a multimodal package of infection prevention including hand hygiene, sterilization of surgical equipment, the use of appropriate surgical attire, and staff education and feedback. [20]

CONCLUSION

Depending on the local hospital setting these evidence-based infection prevention bundles can be implemented individually following identification of a gap in best practice, or increased prevalence of poor outcomes in a particular area or, multiple bundles can be adopted for implementation at once.

Bundles are not '**silver bullet**' solutions for all infection risks and should be implemented in a targeted group of patients, in a health care settings.

REFERENCES

1. Bhandary, Roopa; Marla, Amitha[1]; Anita, K B Care bundles A boon to prevent health care-associated infections.
2. World Alliance for Patient Safety. . Global Patient Safety Challenge 2005 – 2006 Clean Care is Safer Care.Last accessed on 2021 Nov 02 Available from: https://www.who.int/patientsafety/events/05/GPSC_Launch_ENGLISH_FINAL.pdf Cited Here
3. World Health Organisation. The Burden of Health Care Associated Infection Worldwide 2008Last accessed on 2018 Dec 26 Available from: https://www.who.int/gpsc/country_work/burden_hcai/en/ Cited Here
4. Pittet D, Allegranzi B, Storr J, Bagheri Nejad S, Dziekan G, Leotsakos A, et al Infection control as a major World Health Organization priority for developing countries J Hosp Infect. 2008;68:285–92 Cited Here | PubMed | CrossRef
5. McFee RB. Nosocomial or hospital acquired infections. An overview Dis Mon. 2009;55:422–38 Cited Here | PubMed | CrossRef
6. Haley RW, Quade D, Freeman HE, Bennett JV. The SENIC project. Study on the efficacy of nosocomial infection control (SENIC project). Summary of study design Am J Epidemiol. 1980;111(5):472–85 Cited Here | PubMed | CrossRef
7. Identifying the Bundle/Care Development Process in Clinical Risk Management: A Systematic Review
8. Emanuele Sebastiani [1,2,*], Marina Scacchetti [3], Manuele Cesare [4], Massimo Maurici [1], Michele Tancredi Loiudice[2]https://pmc.ncbi.nlm.nih.gov/articles/PMC11593500/
9. Haraden C. Institute for Healthcare Improvement Website: http://www.ihi.org/knowledge/Pages/ImprovementStories/WhatIsaB undle.aspx. Accessed October 14, 2013.
10. Initiative Focusing on Teamwork and Culture Change. Qual Saf Health Care. 2006; 15(4):235–9. 11.Ashtekar DR, Costa-Periera R, Shrinivasan T, et al. Oxazolidinones, a New Class of Synthetic Antituberculosis Agent. In vitro and in vivo activities of DuP-721 against Mycobacterium tuberculosis. Diagn Microbiol Infect Dis. 1991; 14(6):465–71.
12. Marwick C, Davey P. Care Bundles: The Holy Grail of Infectious Risk Management in Hospital? Curr Opin Infect Dis. 2009; 22(4):364-9. doi: 10.1097/QCO.0b013e32832e0736.
13. Ista E, van der Hoven B, Kornelisse RF, et al. Effectiveness of Insertion and Maintenance Bundles to Prevent Central-Line-Associated Bloodstream Infections in Critically Ill Patients of All Ages: a Systematic Review and Meta-Analysis. Lancet Infect Dis. 2016; 16(6):724–34. doi: 10.1016/S1473-3099(15)00409-0.
14. Dumyati G, Concannon C, van Wijngaarden E, et al. Sustained Reduction of Central Line-Associated Bloodstream Infections Outside the Intensive Care Unit with a Multimodal Intervention Focusing on Central Line Maintenance. Am J Infect Control. 2014; 42(7):723–30. doi: 10.1016/j.ajic.2014.03.353.
15. Klintworth G, Stafford J, O'Connor M, et al. Beyond the Intensive Care Unit Bundle: Implementation of a Successful Hospital-Wide Initiative to Reduce Central Line-Associated Bloodstream Infections. Am J Infect Control. 2014; 42(6):685–7. doi: 10.1016/j.ajic.2014.02.026.
16. Marschall J, Mermel LA, Fakih M, et al. Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update. Infect Control Hosp Epidemiol. 2014; 35(7):753–71. doi: 10.1086/676533.
17. Mimoz O, Lucet JC, Kerforne T, et al. Skin Antisepsis with Chlorhexidine-Alcohol Versus Povidone Iodine-Alcohol, with and without Skin Scrubbing, for Prevention of Intravascular-Catheter- Related Infection (CLEAN): an Open-Label, Multicentre, Randomised, Controlled, Two-By-Two Factorial Trial. Lancet. 2015; 386(10008): 2069–2077. doi: 10.1016/S0140-6736(15)00244-5.
18. Parienti JJ, Mongardon N, Megarbane B, et al. Intravascular Complications of Central Venous Catheterization by Insertion Site. N Engl J Med. 2015; 373(13):1220–9. World Health Organization. Report on the Burden of Endemic Health Care-Associated Infection Worldwide: a Systematic Review of the Literature. Geneva, 2011.
19. Hooton TM, Bradley SF, Cardenas DD, et al. Diagnosis, Prevention, and Treatment of Catheter-Associated Urinary Tract Infection in Adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. Clin Infect Dis. 2010; 50(5): 625-627
20. Umscheid CA, Mitchell MD, Doshi JA, et al. Estimating the Proportion of Healthcare-Associated Infections that are Reasonably Preventable and the Related Mortality and Costs. Infect Control Hosp Epidemiol. 2011; 32(2):101–14. doi: 10.1086/657912. on of Surgical Site Infection, 2017. JAMA Surg. 2017; 152(8):784–91.