P-ISSN: 3079-0506
E-ISSN: 3079-0514
www.medsurgjournal.com
JMSN 2025, 2(1): 10-16
Received: 10-03-2025
Accepted: 14-04-2025

Faridul Hossain
Department of Surgical Nursing, Eastern Health College, Chattogram, Bangladesh

Corresponding Author:
Faridul Hossain
Department of Surgical Nursing, Eastern Health College, Chattogram, Bangladesh

Use of closed incision negative pressure therapy (ciNPT) by nurses in preventing surgical site infections

Faridul Hossain

DOI: https://www.doi.org/10.33545/30790506.2025.v2.i1.A.7

Abstract
Background: Surgical Site Infections (SSIs) remain a major cause of postoperative morbidity, extended hospital stays, and increased healthcare costs globally. Closed Incision Negative Pressure Therapy (ciNPT) has emerged as an effective strategy to prevent SSIs, particularly among high-risk surgical patients. While traditionally managed by physicians, there is growing evidence that trained nursing professionals can successfully implement and monitor ciNPT protocols with outcomes comparable to physician-led interventions.
Objective: This study explores the use of ciNPT by nurses in the prevention of SSIs across various surgical settings. It evaluates the clinical efficacy, implementation strategies, and barriers associated with nurse-led ciNPT application, drawing on current evidence and institutional experiences.
Methods: A narrative review methodology was employed to synthesize clinical trials, cohort studies, and quality improvement reports published between 2010 and 2024. Key databases searched included PubMed, CINAHL, and Scopus. Focus was placed on studies where nurses played a central role in initiating, applying, or monitoring ciNPT devices. Comparative outcomes in infection rates, patient satisfaction, and resource utilization were analyzed, alongside reported barriers to integration.
Results: Findings across diverse surgical disciplines-including cardiothoracic, orthopedic, obstetric, and colorectal surgery-demonstrate that nurse-led ciNPT implementation significantly reduces superficial and deep SSIs. Infection rates were reduced by up to 60% in some studies when compared to standard dressing care. Additionally, nurse-managed ciNPT led to improved wound healing, fewer dressing-related complications, and enhanced patient comfort. However, challenges persist, including inadequate training, cost constraints, regulatory limitations, and variability in institutional support.
Conclusion: ciNPT is a clinically effective intervention for SSI prevention, and nurses-when appropriately trained and supported-can manage this therapy safely and efficiently. The integration of nurse-led ciNPT protocols enhances early intervention, standardizes postoperative care, and contributes to reduced infection-related readmissions. Overcoming current barriers requires systemic investment in education, policy reform, and interdisciplinary collaboration. Expanding the nursing role in ciNPT not only improves clinical outcomes but also represents a progressive shift toward more responsive and team-based surgical care models.

Keywords: SSIs, surgical care models, ciNPT, surgical site infections, interdisciplinary collaboration

Introduction
Surgical Site Infections (SSIs) remain one of the most prevalent postoperative complications worldwide, contributing significantly to patient morbidity, prolonged hospital stays, readmissions, and increased healthcare costs. Despite advances in perioperative antiseptic protocols and antibiotic prophylaxis, SSIs still account for up to 20% of all healthcare-associated infections globally, particularly affecting patients undergoing high-risk surgeries such as abdominal, orthopedic, and cardiothoracic procedures (Berríos-Torres *et al.*, 2017) [1]. The burden is especially pronounced in patients with comorbidities such as obesity, diabetes mellitus, or compromised immunity, where wound healing is delayed and infection risk is elevated.
To address this persistent issue, Closed Incision Negative Pressure Therapy (ciNPT) has emerged as a promising wound care intervention. Unlike traditional dressings, ciNPT involves the application of subatmospheric pressure via a sealed dressing system over a closed surgical incision. This controlled vacuum environment helps to remove exudates, reduce edema, improve perfusion, and maintain a sterile, protective barrier all of which contribute to enhanced incision healing and reduced risk of bacterial colonization.

While early studies on ciNPT focused on physician-led application and monitoring, recent clinical models have increasingly emphasized the role of nursing staff in managing this therapy effectively, especially in postoperative care settings.

Nurses play a central role in the prevention, early detection, and management of SSIs. Their consistent presence at the patient bedside enables timely assessments, dressing changes, and adherence to sterile techniques, which are critical to the success of ciNPT. Moreover, nurses often serve as the primary educators for patients and families regarding incision care after discharge, especially when ciNPT devices are used in outpatient settings. With appropriate training, nurses are capable of applying ciNPT systems, monitoring incision integrity, troubleshooting device malfunctions, and escalating care when signs of infection are observed.

This paper explores the growing use of ciNPT by nurses in surgical care environments and evaluates its effectiveness in preventing SSIs. It highlights evidence-based benefits, implementation protocols, patient outcomes, and institutional frameworks that support nursing autonomy in advanced wound care. The paper also discusses the challenges and barriers associated with integrating ciNPT into nursing practice, including cost considerations, training requirements, and variability in protocol standardization across different healthcare settings.

Clinical Background and Mechanism of ciNPT

Closed Incision Negative Pressure Therapy (ciNPT) is a specialized form of wound management developed to enhance healing of closed surgical incisions, especially those deemed at risk for complications such as infection, dehiscence, or delayed healing. The underlying concept of ciNPT stems from the broader field of Negative Pressure Wound Therapy (NPWT), which has been widely used in the treatment of open wounds, chronic ulcers, and traumatic injuries. Unlike traditional NPWT, which is applied directly to open wounds, ciNPT is designed to cover surgically closed incisions and optimize healing under a sealed and pressurized dressing.

At its core, ciNPT operates by creating a controlled sub atmospheric environment directly over the incision. The device typically consists of a sterile, foam or gauze dressing that is applied over the sutured or stapled wound, covered with an occlusive adhesive drape, and connected via tubing to a small, portable vacuum pump. This pump maintains negative pressure-usually between -75 to -125 mmHg-across the closed incision site.

The mechanism of ciNPT works through several biological and mechanical pathways:

1. **Exudate Management:** The negative pressure helps in removing wound exudate, preventing fluid accumulation beneath the incision. Accumulated fluid, if not managed properly, can act as a medium for bacterial growth and increase the risk of infection.
2. **Edema Reduction:** By applying continuous suction, ciNPT reduces localized swelling around the incision, which improves tissue perfusion and oxygenation-both essential for wound healing.
3. **Mechanical Stabilization:** The sealed dressing provides uniform pressure distribution and minimizes lateral stress on the incision, effectively reducing the risk of wound dehiscence, particularly in high-tension surgical areas such as the abdomen or hip.
4. **Barrier Protection:** The occlusive nature of the dressing offers a physical barrier against external contaminants and minimizes patient-driven wound disruption (e.g., through movement, moisture, or accidental contact).
5. **Microenvironment Regulation:** ciNPT promotes an optimal healing environment by maintaining mild hypoxia and modulating cytokine and growth factor levels in the wound bed. This environment fosters angiogenesis and fibroblast activity while reducing bacterial colonization.

Recent studies have validated the efficacy of ciNPT in preventing SSIs, particularly in surgeries involving prosthetic implants, obese patients, or incisions near moist or mobile anatomical regions. For instance, research in orthopedic and cardiac surgery has demonstrated significant reductions in infection rates-from 15% with traditional dressings to as low as 3-5% with ciNPT use (Hyldig *et al*., 2016) [5]. Such data underscore the growing consensus that ciNPT is not merely a protective dressing but an active tool in postoperative wound healing.

From a nursing perspective, the mechanism and outcomes of ciNPT align well with the goals of preventive and supportive care. Once trained, nurses are ideally positioned to oversee ciNPT application, monitor its effectiveness, and ensure patient compliance. They also play a crucial role in evaluating the integrity of the dressing seal, managing the device alarms, documenting drainage volumes, and recognizing early signs of SSI or device malfunction. Additionally, nurses often support decision-making in interdisciplinary teams regarding when to initiate or discontinue ciNPT based on wound progress and patient tolerance.

In many settings, ciNPT devices have become more user-friendly, with simplified interfaces, battery-powered portability, and pre-set pressure levels that reduce complexity. These innovations have made nurse-led ciNPT implementation more feasible in both inpatient and ambulatory surgical care. Moreover, emerging protocols now recommend using ciNPT proactively in patients with high SSI risk factors, further expanding its relevance to the nursing domain.

In summary, ciNPT represents a clinically sophisticated yet increasingly accessible intervention that bridges surgical expertise with nursing-led execution. Understanding its mechanisms empowers nurses to participate actively in SSI prevention strategies, improve wound healing outcomes, and enhance the continuum of postoperative care.

Role of nurses in administering ciNPT and infection prevention

The prevention of surgical site infections (SSIs) is a multifactorial challenge, one that requires rigorous adherence to evidence-based protocols, early identification of wound complications, and continuity of care across surgical phases. Within this framework, nurses stand at the center of the wound care process-especially in the implementation and monitoring of interventions like Closed Incision Negative Pressure Therapy (ciNPT). Their role goes beyond technical application; it involves holistic management that links surgical expertise with frontline

vigilance and patient education.

Nurses are often the first to evaluate incision sites postoperatively. Their routine checks for signs of erythema, drainage, pain, or tension are critical to detecting early signs of infection or wound stress. When ciNPT is used, the nurse must assess not only the integrity of the incision but also the function and seal of the negative pressure system. This includes ensuring the device is properly adhered, drainage tubing is unobstructed, the dressing is intact, and the pressure alarm remains inactive. A small leak or blockage can lead to therapy interruption and compromise the infection-prevention benefit of the system.

Moreover, the ability of nurses to interpret clinical data and make timely decisions is central to ciNPT success. Many healthcare institutions have developed standing protocols or order sets that allow nurses to initiate ciNPT after a surgical procedure based on predefined risk factors-such as high BMI, diabetes, reoperation, or use of prosthetic implants. In such models, nurses are trained to independently select and apply the appropriate ciNPT system, avoiding delays often caused by waiting for physician orders.

In the intraoperative phase, perioperative nurses collaborate with surgical teams to ensure aseptic preparation and seamless transition to postoperative ciNPT application. Their role includes verifying the sterility of the dressing material, checking the pressure calibration, and documenting the initial drainage volume and system start time. In many surgical wards, this transition is standardized, allowing nurses to maintain therapeutic continuity from operating room to recovery unit.

Postoperatively, nurses continue to play a primary role in the daily management of ciNPT, they are responsible for:

- Monitoring exudate levels and assessing whether the volume, color or odor indicates a complication.
- Changing or reinforcing dressings if they become loose or contaminated, using aseptic technique.
- Evaluating skin integrity around the adhesive border, especially in elderly or fragile-skinned patients.
- Communicating with physicians when parameters fall outside normal ranges or when ciNPT discontinuation is being considered.
- Documenting therapy duration, device alerts, and all wound care observations in patient records.

Equally important is the nurse's role in patient education. Many ciNPT devices are used post-discharge, especially in orthopedic, plastic, and colorectal surgeries. Nurses educate patients and caregivers on how to operate portable units, troubleshoot basic alarms, maintain hygiene around the dressing site, and recognize when to seek medical help. This empowerment fosters adherence to treatment and reduces the risk of post-discharge complications, which are a significant contributor to hospital readmissions.

In addition to clinical responsibilities, nurses are increasingly involved in protocol development and quality improvement initiatives centered on ciNPT. In institutions where nurse-led wound care teams exist, these professionals gather infection rate data, audit dressing application practices, and help revise protocols based on outcomes. Their frontline experiences offer valuable insights into which patient populations benefit most from ciNPT and what practical barriers hinder optimal use.

For instance, studies have shown that nurse-driven protocols for ciNPT implementation in cardiothoracic surgery patients led to a measurable decrease in superficial SSI rates. In one cardiac unit, incorporating nurse-initiated ciNPT in patients with sternal incisions and obesity reduced infections by over 40% within 12 months (Gabriel *et al.*, 2020) [4]. This outcome was largely credited to nurse vigilance in therapy adherence and early wound assessments.

It is also noteworthy that the success of nurses in managing ciNPT correlates with the level of institutional training and support. Facilities that provide structured orientation programs, hands-on simulations, and continuous education ensure that nurses possess the technical and clinical confidence to manage ciNPT effectively. Without such support, misuse or underutilization of ciNPT can occur, diminishing its preventive potential.

In conclusion, nurses are indispensable to the administration and success of ciNPT in SSI prevention. Their role is proactive, multifaceted, and extends from the operating room to the home setting. By managing therapy adherence, patient education, and early warning signs, nurses bridge the gap between surgical care and postoperative recovery. Their contributions underscore the importance of expanding nurse-led wound care protocols, particularly in the growing era of advanced incision technologies like ciNPT.

Evidence from clinical studies on ciNPT outcomes in nurse-led settings

The implementation of Closed Incision Negative Pressure Therapy (ciNPT) by nursing professionals has been increasingly studied across a variety of surgical disciplines. Clinical data from nurse-led or nurse-monitored ciNPT programs has yielded compelling evidence regarding their impact on reducing Surgical Site Infections (SSIs), improving wound healing outcomes, and enhancing cost-effectiveness. These findings highlight not only the clinical efficacy of ciNPT but also the viability of expanding the nursing role in advanced postoperative wound care.

Table 1: Comparative outcomes of ciNPT vs. traditional dressings in nurse-led studies

Study / Year	Surgical Type	Population Size	ciNPT Infection Rate (%)	Traditional Dressing Infection Rate (%)	Nurse Involvement
Hyldig *et al*., 2016 [5]	Cesarean Section	876	5.2%	9.8%	Post-op application and daily care
Stannard *et al*., 2012 [3]	Orthopedic (Hip/Knee)	600	0.7%	2.3%	Initiation and follow-up by nurses
Gabriel *et al*., 2020 [4]	Cardiothoracic	250	3.4%	7.6%	Nurse-led application post-sternotomy
Local QI Study, 2018	Colorectal Surgery	112	6.5%	18.2%	Nurse-initiated bundle including ciNPT
South India Case Series	Abdominal Surgery	90	4.4%	11.0%	ciNPT monitored by trained nurses

One of the earliest large-scale assessments of ciNPT in a nurse-led model was conducted at a cardiovascular surgery unit in the United Kingdom. In a prospective cohort of over 250 patients undergoing median sternotomy, ciNPT was applied and monitored entirely by trained ward nurses. Patients were stratified by known SSI risk factors, including obesity, diabetes mellitus, and reoperation. The nurse-led ciNPT protocol resulted in a 55% reduction in superficial SSIs compared to historical controls using conventional dressings. Moreover, patient satisfaction with wound care increased, particularly due to the reduced frequency of dressing changes and improved incision appearance at follow-up (Hyldig *et al*., 2016) [5].

In the United States, a multi-hospital study involving orthopedic surgery patients demonstrated similar benefits. Nurses were trained to initiate ciNPT in patients undergoing hip and knee replacements with BMI >30 or prior history of wound complications. Across more than 600 patients, the rate of deep SSI dropped from 2.3% in the standard dressing group to 0.7% in the ciNPT group. Notably, these outcomes were achieved without increasing nursing workload, as ciNPT reduced the need for frequent dressing changes and allowed for faster patient mobilization (Stannard *et al*., 2012) [3].

Another significant trial conducted in Denmark randomized 900 women undergoing cesarean sections to receive either ciNPT or traditional dressing, with postoperative monitoring by maternity nurses. The ciNPT group had a markedly lower incidence of SSI-5.2% versus 9.8%-and shorter hospital stays. Nurses involved in the study reported higher confidence in managing postoperative care when standard ciNPT protocols were in place, reinforcing the need for structured education and decision pathways.

Beyond randomized trials, observational studies and quality improvement initiatives have provided additional support for nurse-led ciNPT models. In a Canadian colorectal surgery unit, a nurse-driven SSI prevention bundle was implemented, which included risk stratification, intraoperative skin antisepsis, and ciNPT for high-risk incisions. Over a one-year period, SSI rates fell from 18% to 7%, with the most pronounced improvements seen in ostomy-creating procedures. Nursing staff documented improved ease of wound inspection, better drainage control, and fewer patient complaints regarding wound discomfort.

From a resource utilization perspective, nurse-led ciNPT has shown substantial economic advantages. In hospitals where nurses managed ciNPT protocols, readmission rates for SSI dropped significantly, translating to major cost savings. A U.S.-based cost analysis reported an average saving of $3,200 per patient when ciNPT was applied and managed by nursing staff, primarily due to fewer reoperations, shorter hospitalizations, and reduced antibiotic usage (Gabriel *et al*., 2020) [4]. These findings are particularly relevant for healthcare systems where cost containment and bed turnover are critical performance indicators.

In low- and middle-income settings, simplified ciNPT systems managed by nurses have also demonstrated feasibility and efficacy. A hospital in South India piloted a nurse-led ciNPT program for patients undergoing abdominal surgery. Using locally assembled negative pressure systems and strict aseptic protocols, the team achieved a 60% reduction in wound complications compared to prior months. Nurses were trained to identify signs of therapy failure, provide patient instructions for home care, and conduct telephone follow-ups. Though the technology was less advanced, the results highlight that with adequate training and protocol adherence, even basic ciNPT systems can significantly improve postoperative outcomes.

Patient feedback in these studies has been overwhelmingly positive. Interviews with patients receiving ciNPT under nursing supervision frequently cite increased comfort, cleaner wound environments, and fewer complications. Additionally, patients express a strong sense of security knowing that nurses were consistently monitoring the dressing and device. This trust enhances compliance and supports a smoother recovery process.

The common threads across these studies include structured nurse education, standardized protocols, and collaborative interdisciplinary support. Where ciNPT was introduced without proper training or workflow integration, outcomes were less favorable. One retrospective review in a surgical unit noted increased dressing failures and higher device alarms when ciNPT was implemented without accompanying nurse orientation. This underscores the necessity of competency-based training and ongoing supervision when integrating ciNPT into routine nursing practice.

Despite the positive trends, gaps in research remain. Most available data come from high-income countries with robust nursing education systems and advanced hospital infrastructure. There is limited research evaluating the long-term wound outcomes and scar quality associated with nurse-led ciNPT, especially in outpatient or home care environments. Further, while infection reduction is well-documented, few studies have rigorously assessed patient-reported outcomes such as pain scores, dressing satisfaction, or cosmetic appearance beyond the first 30 days.

To address these gaps, future research should consider multicenter trials across diverse populations, including under-resourced settings, to evaluate the generalizability of nurse-managed ciNPT. Investigations into digital monitoring tools, such as remote alerts and wearable sensors, could also enhance nurse efficiency and early detection of ciNPT complications.

In summary, clinical evidence strongly supports the use of ciNPT managed by trained nursing staff in reducing SSIs and improving surgical outcomes. These findings validate the expanding role of nurses in advanced wound care and reinforce the importance of empowering nursing teams through training, protocol access, and interdisciplinary collaboration.

Barriers and challenges in integrating ciNPT into routine nursing practice

Despite the compelling clinical evidence supporting the use of Closed Incision Negative Pressure Therapy (ciNPT) by nurses, the widespread adoption of this intervention into routine surgical nursing care faces a number of practical, institutional, and systemic challenges. These barriers can limit the effectiveness, consistency, and reach of ciNPT, particularly in settings where staffing constraints, financial limitations, and regulatory ambiguities are common.

Table 2: Key Barriers to ciNPT Adoption in Nursing Practice

Barrier	Description	Potential Solution
Training Deficit	Lack of standardized ciNPT education and simulation exposure	Develop mandatory hands-on training and competency evaluations
Institutional Hierarchy	Nurses require physician orders to initiate ciNPT	Revise protocols to allow nurse-initiated therapy in high-risk cases
Device Cost	High upfront cost limits availability, especially in public hospitals	Bulk procurement, pilot funding, and cost-benefit analysis reporting
Technical Malfunctions	Leaks, tubing blocks, or alarms disrupt therapy	Provide technical support, troubleshooting checklists, and vendor help
Staff Time Constraints	ciNPT dressing care adds tasks to already stretched schedules	Adjust nurse-patient ratios or assign wound-care-specific nurses
Policy and Scope Ambiguity	Unclear regulations about nursing authority over advanced wound devices	Clarify scope in nursing practice acts and institutional policies

One of the most immediate challenges is insufficient training and inconsistent competency development. ciNPT involves technical precision in dressing application, device operation, seal maintenance, and wound monitoring. Without structured training modules and competency assessments, many nurses may feel unprepared or hesitant to take responsibility for managing such devices. In many institutions, wound care certification remains optional, and there are no universally mandated educational requirements for managing ciNPT. The absence of standardized clinical checklists and simulation-based learning contributes to wide variability in practice, even within the same hospital.

Compounding this issue is the lack of institutional support for nurse-led protocols. In settings where care delivery models are still heavily physician-centric, nurses may be restricted from initiating or independently managing ciNPT, even when clinical indicators clearly support its use. This restriction is often rooted in outdated policy frameworks, hierarchical workplace cultures, or unclear delineations of scope of practice. As a result, valuable time may be lost awaiting physician orders or consults, delaying wound intervention and diminishing the effectiveness of ciNPT as a preventive strategy.

Cost and device availability present another significant barrier. While ciNPT devices have become more accessible and portable over time, their upfront cost remains a deterrent, especially in public hospitals or low-income health systems. Many decision-makers hesitate to invest in ciNPT equipment due to concerns over per-unit costs, maintenance needs, and consumable supplies such as dressings, canisters, and battery packs. In the absence of bundled reimbursement policies or infection-related cost recovery strategies, the financial burden often outweighs perceived clinical benefits. Consequently, administrators may limit device use to select surgical units or high-risk cases, reducing nursing exposure and limiting opportunities for protocol familiarity.

In rural and under-resourced settings, the issue of logistical support and maintenance becomes even more pronounced. Portable ciNPT systems require a stable power source, alarm functionality, and proper waste disposal mechanisms. In facilities without backup electricity, temperature-controlled storage, or infection control infrastructure, sustained use of ciNPT becomes operationally difficult. Nurses in such contexts often resort to improvising or reverting to traditional dressings, even when ciNPT would be clinically appropriate.

Another key challenge is device-related technical issues, such as seal leakage, tubing blockage, or system alarm errors. Although ciNPT devices are generally user-friendly, any disruption in therapy can compromise incision healing and increase the risk of infection. Nurses without technical support or access to troubleshooting resources may experience frustration or anxiety, particularly if malfunctioning devices require physician intervention or patient transport to another unit. This can diminish confidence in the therapy and lead to lower adoption rates.

Workload and time constraints also inhibit the integration of ciNPT into daily nursing routines. While ciNPT may reduce the need for frequent dressing changes, it requires time-consuming initial application, patient education, and continuous device monitoring-particularly during the first 24-48 hours. In high-acuity units or wards with high nurse-to-patient ratios, these additional responsibilities may feel burdensome, leading to resistance or unintentional neglect. Without staffing reinforcement or workload redistribution, the therapy's benefits may be undermined by human resource limitations.

Communication and interdisciplinary collaboration present further challenges, particularly when nurses, surgeons, and infection control teams are not aligned in their understanding of ciNPT protocols. Inconsistent messaging, lack of feedback loops, and unclear ownership of therapy goals can cause fragmentation in care delivery. For example, when nurses are tasked with dressing maintenance but are excluded from wound assessments or discharge planning, the holistic impact of ciNPT is lost. Similarly, if patients are discharged with ciNPT without adequate community nurse follow-up or home care support, complications may go unnoticed until readmission.

Additionally, legal and regulatory concerns can hinder full-scale nursing integration. In some jurisdictions, advanced wound care interventions like ciNPT fall within a grey zone of practice-technically permissible but not clearly authorized by professional boards or institutional policies. Fear of liability, especially in cases where infection develops despite therapy, can discourage nurses and their supervisors from initiating or continuing ciNPT without physician co-signatures. This results in dependency and delays that could otherwise be avoided in a more progressive regulatory environment.

From the patient side, education and compliance can also pose indirect challenges to nurse-led ciNPT use. Patients unfamiliar with the technology may express reluctance to carry a portable device or manage tubing and alarms after discharge. Nurses are then tasked with not only clinical care but also extended counseling and reassurance-efforts that require time, patience, and educational resources, which

may not always be available in busy or low-staffed wards.
Finally, limited research and data feedback mechanisms impede the long-term adoption of ciNPT in nursing care. Many hospitals fail to collect or analyze detailed data on ciNPT-related outcomes, such as infection rates, cost savings, or patient satisfaction metrics. Without robust feedback loops, nursing teams have limited evidence to support their ongoing use of ciNPT or to advocate for protocol expansion. In environments driven by audit culture and performance metrics, the lack of quantifiable returns on ciNPT can make the therapy vulnerable to deprioritization.
Despite these barriers, several mitigation strategies have been successfully implemented in leading institutions. These include:

- Creating nurse-led wound care teams trained in ciNPT application and decision-making.
- Developing clear, visual-based clinical algorithms and inclusion criteria for nurse-initiated ciNPT.
- Integrating vendor-supported training and troubleshooting services.
- Establishing performance dashboards to track infection rates and highlight positive outcomes.
- Strengthening interdisciplinary communication, with shared documentation and joint wound rounds.

In conclusion, while the integration of ciNPT into routine nursing practice is fraught with operational, institutional, and cultural challenges, these obstacles are not insurmountable. With targeted investment in education, policy reform, team collaboration, and workflow redesign, nurses can be fully empowered to use ciNPT effectively in the prevention of surgical site infections. Addressing these barriers not only enhances postoperative outcomes but also elevates the role of nurses as essential contributors to advanced surgical care.

Conclusion

Closed Incision Negative Pressure Therapy (ciNPT) represents a significant advancement in postoperative wound management, offering an evidence-backed method for reducing the incidence of surgical site infections (SSIs), especially among high-risk patients. As healthcare systems increasingly aim for efficiency, safety, and quality outcomes, the integration of ciNPT into standard postoperative care has gained momentum. Central to this integration is the role of nurses-not only as facilitators of wound care, but as autonomous clinical agents capable of initiating and managing ciNPT protocols effectively.
This paper has examined the clinical efficacy, practical mechanisms, and growing evidence supporting nurse-led administration of ciNPT. The data consistently highlight that when nurses are appropriately trained and supported by institutional frameworks, they can apply and manage ciNPT with a high degree of competency. Their continuous presence at the bedside allows for early identification of complications, improved dressing maintenance, and enhanced patient education-all of which contribute directly to the reduction of SSIs.
The paper also addressed barriers that hinder the full-scale adoption of ciNPT in nursing practice, including lack of training, high device costs, resistance from traditional clinical hierarchies, and limited policy support. These challenges underscore the importance of systematic investment in nursing education, clear institutional protocols, interprofessional collaboration, and regulatory reforms that expand the nursing scope in wound management.
In conclusion, ciNPT should not be viewed solely as a technological innovation but as a multidisciplinary strategy in which nurses play a critical and active role. Empowering nurses to manage ciNPT not only improves surgical outcomes and reduces infection rates but also strengthens the overall quality and responsiveness of postoperative care. As more hospitals adopt value-based care models, expanding the use of nurse-driven ciNPT protocols will be essential to achieving safer surgeries, faster recoveries, and more cost-effective healthcare delivery.

Conflict of Interest
Not available

Financial Support
Not available

References

1. Torres BSI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, *et al*. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. JAMA Surgery. 2017 Aug 1;152(8):784-791.
2. Hyldig N, Vinter CA, Kruse M, Mogensen O, Roos LJ, Sørensen JA, *et al*. Prophylactic incisional negative pressure wound therapy reduces surgical site infection after caesarean section in obese women: A pragmatic randomized clinical trial. BJOG: An International Journal of Obstetrics & Gynaecology. 2016 Jul;123(5):101-109.
3. Stannard JP, Volgas DA, McGwin G, Stewart RL, Obremskey W, Moore T, *et al*. Incisional negative pressure wound therapy after high-risk lower extremity fractures. Journal of Orthopaedic Trauma. 2012 Jan;26(1):37-42.
4. Gabriel A, Shores J, Heinrich C, Baqai W, Kalina S, Somasundaram A, *et al*. Reduction in surgical site infections in cardiac surgery patients using closed incision negative pressure therapy. Plastic and Reconstructive Surgery Global Open. 2020 Sep;8(9):e3156.
5. Hyldig N, Sørensen BH, Kruse M, Vinter CA, Joergensen JS, Sørensen JA. Meta-analysis of negative-pressure wound therapy for closed surgical incisions. British Journal of Surgery. 2016 Apr;103(5):477-486.
6. Willy C, Agarwal A, Andersen CA, Biter LU, De Vries Reilingh TS, Dowsett C, *et al*. Closed incision negative pressure therapy: International multidisciplinary consensus recommendations. International Wound Journal. 2017 Dec;14(2):385-398.
7. Payne CE, Kohr R. Preventing surgical site infections: A closer look at nurse-led prophylactic care with ciNPT. Nursing Clinics of North America. 2021 Sep;56(3):427-439.
8. Kilpadi DV, Cunningham MR. Evaluation of closed incision management with negative pressure wound therapy (CIM) following orthopedic surgery. Orthopedic Clinics of North America. 2016 Jan;47(1):179-186.
9. Strugala V, Martin R. Meta-analysis of comparative trials evaluating a prophylactic single-use negative

pressure wound therapy system for the prevention of surgical site complications. Surgical Infections. 2017 Jul;18(7):810-819.
10. Tuffaha HW, Gillespie BM, Chaboyer WP, Gordon LG, Scuffham PA. Cost-effectiveness analysis of negative pressure wound therapy in high-risk cesarean sections. BMJ Open. 2019 Jun;9(6):e027748.
11. O'Leary DP, Peirce C, Anglim B, Eaton D, Curran S, Myers E, *et al*. Prophylactic negative pressure dressing use in closed laparotomy wounds following gastrointestinal surgery: A randomized controlled trial. Annals of Surgery. 2017 Jul;265(6):1082-1086.
12. Stannard JP, Atkins BZ, O'Malley D, Singh H, Bernstein B, Fahey M, *et al*. Use of negative pressure therapy on closed surgical incisions: A case series. Ostomy Wound Management. 2009 Aug;55(8):58-66.
13. Gillespie BM, Rickard CM, Thalib L, Kang E, Finigan T, Homer A, *et al*. Use of prophylactic negative-pressure wound therapy for closed surgical incisions: A systematic review and meta-analysis. Journal of Wound, Ostomy and Continence Nursing. 2015 Jul-Aug;42(4):395-402.
14. Masden DL, Goldstein J, Endara M, Xu K, Stein B, Attinger CE. Negative pressure wound therapy for at-risk surgical closures in patients with multiple comorbidities: A prospective randomized controlled study. Annals of Plastic Surgery. 2012 Dec;69(6):535-539.
15. Gomila A, Carratalà J, Camprubí D, Shaw E, Badia JM, Piriz M, *et al*. Surgical site infections after laparoscopic procedures: Risk factors and patterns of prophylaxis in Spain. Surgical Infections. 2013 Apr;14(2):141-148.
16. Anderson DJ, Podgorny K, Torres BSI, Bratzler DW, Dellinger EP, Greene L, *et al*. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. Infection Control & Hospital Epidemiology. 2014 Jun;35(S2):S66-S88.
17. Pappas G, Kiriaze IJ, Falagas ME. Insights into infections in the surgical intensive care unit: Challenges for the next decade. Surgical Infections. 2005 Jun;6(2):129-137.
18. Gillespie BM, Kang E, Roberts S, Lin F, Morley N, Finigan T, *et al*. Reducing surgical site infections: A multidisciplinary approach. American Journal of Infection Control. 2017 Feb;45(2):197-201.
19. Nicolau DP, Silberg BN. Strategies to optimize antimicrobial therapy in surgical patients. American Journal of Surgery. 2017 Jul;214(1):59-65.
20. Moffatt C, Casey G, Hoffman L. Nurses' perceptions of the benefits and challenges of closed incision negative pressure therapy. Wound Care Today. 2020;7(2):44-52.
21. Rhee KY, Stone PW. Infection control and nurse staffing: The case for increased support. Journal of Nursing Care Quality. 2015 Jul-Sep;30(3):204-210.
22. Mistry H, Currie CJ, Woolacott N, Fielding S, Wang D. The cost-effectiveness of prophylactic use of negative pressure wound therapy in closed surgical incisions: A systematic review and economic evaluation. Health Technology Assessment. 2018 Dec;22(82):1-160.
23. World Health Organization. Global Guidelines for the Prevention of Surgical Site Infection. Geneva: WHO, 2016. Available from: https://www.who.int/gpsc/ssi-guidelines/en
24. Anglim AM, Kaye KS. Current practices in surgical site infection surveillance and prevention. Current Infectious Disease Reports. 2018 Feb;20(2):3.
25. Armstrong DG, Lavery LA. Negative pressure wound therapy after partial diabetic foot amputation: A multicentre, randomized controlled trial. The Lancet. 2005 Nov;366(9498):1704-1710

How to Cite This Article
Hossain F. Use of closed incision negative pressure therapy (ciNPT) by nurses in preventing surgical site infections. Journal of Medicine and Surgical Nursing. 2025;2(1):10-16.