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Efficacy of Intermittent Hydrogen Peroxide Irrigation for Surgical Site Infections without Implant Removal

[*]Dr. Md. Aminur Rahman[1], Dr. Md. Ziaul Hasan[2], Dr. Md. Abdur Rahim[3], Dr. Md. Anisur Rahman[4], Dr. Farzana Khondoker[5]

[1]Senior Consultant, Department of Orthopaedic Surgery, Sadar Hospital, Lalmonirhat, Bangladesh

[2]Medical Officer, Department of Orthopaedic, Sadar Hospital, Lalmonirhat, Bangladesh

[3]Registrar, Department of Orthopaedic Surgery, Rangpur Medical College Hospital, Rangpur, Bangladesh

[4]Junior Consultant, Department of Orthopaedic Surgery, Upazila Health Complex, Gangachara, Rangpur, Bangladesh

[5]Associate Professor and Head, Department of Physiology, Army Medical College, Rangpur, Bangladesh

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Corresponding Author:** ***Dr. Md. Aminur Rahman, *Senior Consultant, Department of Orthopaedic Surgery, Sadar Hospital, Lalmonirhat, Bangladesh.*

Abstract

Background: *Deep surgical site infections are challenging in orthopaedics, and evidence on intermittent hydrogen peroxide irrigation with implant retention is limited. This study aims to evaluate its efficacy in managing SSIs without implant removal.*

Methods: *This retrospective study at the Department of Orthopaedic Surgery, Lalmonirhat District Hospital and Rangpur Evercare Specialized Hospital (June 2019–June 2025) included 30 patients (18–55 years) with postoperative SSIs (Southampton III–V). All received intermittent H_2O_2 irrigation with systemic antibiotics; severe wounds (IIIC–V) underwent repeated debridement. Outcomes were infection resolution without implant removal, recurrence, and time to healing. Data were analyzed with SPSS v25, $p < 0.05$.*

Results: *Among 30 SSI patients (mean age 39.3 ± 10.0 years; 60% male), diabetes and hypertension were present in 26.7% and 16.7%, respectively. Wounds were Southampton grade III–V, with grade III (A, B) in 33.3%. Cultures were positive in 63.3%, predominantly S. aureus (40%). Most patients received ≥3 H_2O_2 irrigations (63.3%), repeated debridement occurred in 40%, and culture-guided antibiotics in 70%. Infection resolved without implant removal in 90%, while 10% required removal. Recurrence, non-union, and implant failure each occurred in 16.7%. Median wound healing was 14 days (IQR 11–18), and severe wounds (IIIC–V) were significantly linked to treatment failure ($p = 0.024$).*

Conclusion: *Intermittent hydrogen peroxide irrigation, combined with antibiotics and selective debridement, is an effective and safe strategy for managing surgical site infections while preserving implants.*

Keywords: *Hydrogen Peroxide Irrigation, Surgical Site Infection, Implant Retention.*

1. INTRODUCTION

Deep surgical site infections (SSIs) continue to represent one of the most difficult and severe complications encountered in orthopaedic practice. When hardware implants are involved, these infections become even harder to manage, often requiring multiple surgical procedures and extended courses of antibiotic treatment [1, 2].

Implant-associated infections (IAIs) may lead to functional impairment of the limbs and joints, compromise spinal stability, and contribute significantly to patient morbidity and, in severe cases, mortality [3-6]. The financial and logistical burden of treating IAIs is substantial, placing considerable strain on healthcare systems. Periprosthetic joint infection (PJI), although relatively uncommon, is regarded as one of the most devastating outcomes following total joint arthroplasty (TJA) or partial joint arthroplasty (PJA) [7, 8]. Current estimates indicate that approximately 1% of knee arthroplasty patients and 1%–2% of hip arthroplasty recipients develop PJI [9, 10].

While complete removal of implanted hardware and necrotic tissue is generally accepted as the most definitive method for eradicating infection, certain early or acute infections may still respond to intensive irrigation and debridement, modular component exchange, and attempts to retain the implant before the bacterial glycocalyx becomes firmly established. Reducing bacterial bioburden through surgery can help tip the balance toward successful immune and antibiotic control, avoiding the additional risks associated with hardware removal [11]. IAIs arising after procedures such as joint arthroplasty, spinal fixation, or fracture stabilization present persistent management challenges. Effective infection clearance often requires implant exchange, prolonged intravenous antimicrobial therapy, and repeated debridement to remove colonized tissue and bone [12].

The DAIR approach has demonstrated favorable outcomes in early acute infections caused by multidrug-sensitive organisms, though its success is limited when resistant bacteria are involved. For immunocompetent patients with adequate soft-tissue condition, mild to moderate bone loss, and clearly identified pathogens with known antibiotic sensitivity, a one-stage revision may be feasible. Nevertheless, two-stage revision surgery remains the standard approach for managing PJI [13]. These complexities collectively contribute to the difficulty associated with PJI treatment, which typically involves surgical intervention through two-stage revision arthroplasty or a DAIR procedure combined with appropriate antibiotic therapy.

A key surgical method for lowering microbial contamination is the use of antiseptic solutions for irrigation [14, 15]. However, many of these agents are associated with cytotoxic effects on healthy tissues [16, 17]. During debridement, wound lavage allows delivery of antimicrobial solutions capable of targeting microorganisms in soft tissue, bone, joints, and even within endosteal spaces [18, 19].

Effective irrigants must be capable of acting against bacteria in both their planktonic form and within structured biofilms [20, 21]. Prior research has emphasized that meticulous irrigation is an essential component of both acute and chronic PJI surgeries and plays a pivotal role in eliminating infectious pathogens [22, 23]. Commonly used antiseptic irrigants include diluted povidone-iodine, hydrogen peroxide, and acetic acid, which remain among the most widely implemented options in clinical practice [24].

Despite the widespread use of various antiseptic solutions, there is still no consensus regarding the optimal irrigation agent, concentration, timing, or frequency for managing implant-related infections. Most available studies have evaluated single irrigation episodes, focused on limited microorganisms, or offered inconsistent results regarding cytotoxicity and biofilm disruption. Moreover, while hydrogen peroxide is commonly used as an adjunct irrigant, evidence on its intermittent intraoperative or postoperative application, especially in cases where implants are retained, remains scarce. The lack of standardized protocols and limited clinical data create a significant gap in understanding how irrigation strategies can be optimized to support implant retention while effectively controlling infection. To address this gap, the purpose of the study is to evaluate the efficacy of intermittent hydrogen peroxide irrigation in managing surgical site infections without implant removal.

2. Objective

- To evaluate the efficacy of intermittent hydrogen peroxide irrigation in managing surgical site infections without implant removal.

3. Methodology & Materials

This retrospective observational study was conducted at the Department of Orthopaedic Surgery, Lalmonirhat District Hospital and Rangpur Evercare Specialized Hospital, Rangpur, Bangladesh, from June 2019 to June 2025. A total of 30 patients with postoperative surgical site infections (SSIs) were included, selected based on predefined inclusion criteria. Data were collected on patient demographics, comorbidities, wound severity, microbiological profile, and treatment characteristics to evaluate the efficacy of intermittent hydrogen peroxide (H_2O_2) irrigation in managing SSIs without implant removal.

3.1. Inclusion Criteria

- Age 18–55 years
- Postoperative SSIs classified as Southampton wound grades III to V
- Postoperative surgical site infection with implant in situ
- Patients with relevant comorbidities (e.g., diabetes mellitus, hypertension, COPD)
- Patients who provided informed consent for this treatment

3.2. Exclusion Criteria

- Wounds below Southampton grade III
- Patients who had implant removal prior to study treatment
- Patients <18 or >55 years
- SSI in spine surgery
- Non-compliant patients

Demographic data (age, sex) and comorbidities (diabetes mellitus, hypertension) were recorded. Wound severity was assessed using the Southampton wound grading system, and wound swabs were collected for microbiological culture and sensitivity. All patients received intermittent hydrogen peroxide (H_2O_2) irrigation combined with systemic antibiotic therapy, with culture-guided antibiotics administered in 21 cases (70.0%). Patients with severe wounds (IIIC–V) underwent repeated surgical debridement as indicated, and irrigation sessions were repeated until clinical resolution of infection. The primary outcome was infection resolution without implant removal, while secondary outcomes included recurrence within six months and time to wound healing. Treatment success was compared with failures to identify clinical or microbiological factors associated with poor response. Data were entered and analyzed using IBM SPSS Statistics version 25. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean ± standard deviation or median with interquartile range. Associations between treatment outcomes and clinical or microbiological variables were analyzed using Fisher's exact test, with $p < 0.05$ considered statistically significant.

4. Results

Table 1. *Demographic and Clinical Characteristics of Study Patients (n = 30)*

Variable		Frequency	Percentage (%)
Age group	18–25	4	13.3
	26–35	6	20.0
	36–45	10	33.3
	46–55	10	33.3
	Mean ± SD	39.3 ± 10.0	
Sex	Male	18	60.0
	Female	12	40.0
Comorbidities	Diabetes mellitus	8	26.7
	Hypertension	5	16.7
Southampton wound grade	III (A,B)	10	33.3
	IIIC	8	26.7
	IV	7	23.3
	V	5	16.7
Culture positive cases		19	63.3
Most common organism	*S. aureus*	12	40.0

A total of 30 patients with postoperative surgical site infections were included. The most common age groups were 36–45 years and 46–55 years (33.3% each), with a mean age of 39.3 ± 10.0 years. Males comprised 18 cases (60.0%), and females 12 cases (40.0%).

Comorbidities included diabetes mellitus in 8 patients (26.7%) and hypertension in 5 patients (16.7%). Grade III (A,B) infections were observed in 10 patients (33.3%), while more severe grades IIIC, IV, and V accounted for 26.7%, 23.3%, and 16.7%, respectively. Culture positivity was noted in 19 cases (63.3%), with Staphylococcus aureus being the most commonly isolated organism (12 patients, 40.0%).

Most patients (19, 63.3%) received ≥3 intermittent hydrogen peroxide (H_2O_2) irrigation sessions. Repeated surgical debridement was performed in 12 patients (40.0%), predominantly among those with severe Southampton grades (IIIC–V). All patients were treated with adjunct systemic antibiotics, and culture-guided antibiotic selection was utilized in 21 cases (70.0%).

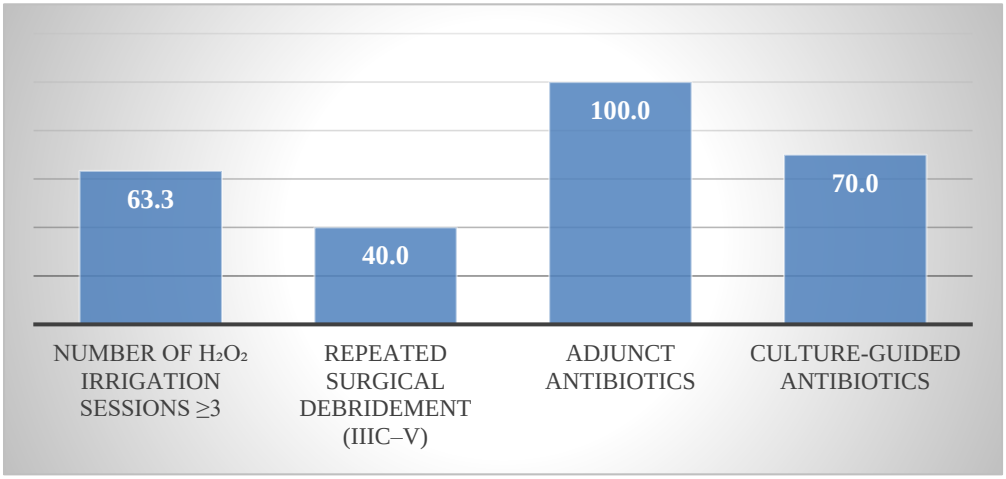

Figure 1. *Treatment Characteristics of Study Patients (n = 30)*

Table 2. *Primary Outcomes of Surgical Site Infection Management Using Intermittent Hydrogen Peroxide Irrigation (n = 30)*

Outcome	Frequency	Percentage (%)
Infection resolved without implant removal	27	90.0
Required implant removal	3	10.0
Recurrence within 6 months	5	16.7
Non-union	5	16.7
Implant failure	5	16.7
Median time to wound healing, days (IQR)	14 (11–18)	

Among the 30 patients, infection resolution without implant removal was achieved in 27 cases (90.0%), while 3 patients (10.0%) required implant removal due to treatment failure. Recurrence within six months occurred in 5 patients (16.7%). Non-union and implant failure were each observed in 5 patients (16.7%).

The median time to complete wound healing was 14 days, with an interquartile range of 11–18 day.

Table 3. *Microbiological Profile of Surgical Site Infections in Study Patients (n = 30)*

Organism	Frequency	Percentage (%)
Staphylococcus aureus	12	40.0
Staphylococcus epidermidis	3	10.0
Pseudomonas aeruginosa	4	13.3
Polymicrobial growth	0	0.0
No growth	11	36.7

Staphylococcus aureus was the most frequently isolated organism, identified in 12 patients (40.0%), followed by Pseudomonas aeruginosa in 4 patients (13.3%) and Staphylococcus epidermidis in 3 patients (10.0%). No polymicrobial growth was observed, while 11 patients (36.7%) had negative cultures.

Table 4. *Comparison of Clinical and Treatment Factors Between Successful and Failed SSI Management Outcomes (n = 30)*

Variable	Success (n = 24)	Failure (n = 6)	p-value
Diabetes mellitus	5 (20.8%)	3 (50.0%)	0.300
Southampton grade IIIC–V	10 (41.7%)	6 (100.0%)	0.024
≥3 H_2O_2 irrigation sessions	16 (66.7%)	3 (50.0%)	0.613
S. aureus infection	9 (37.5%)	3 (50.0%)	0.633
Repeated debridement	8 (33.3%)	4 (66.7%)	0.184

Among patients with successful treatment, diabetes mellitus was present in 5 cases (20.8%) compared with 3 cases (50.0%) in the failure group (p = 0.300). Severe wound grades

(Southampton IIIC–V) were significantly more common in the failure group (100.0%) compared with the success group (41.7%) (p = 0.024).

The number of irrigation sessions (≥3) did not differ significantly between groups (66.7% vs. 50.0%, p = 0.613). Similarly, *S. aureus* infections (37.5% vs. 50.0%, p = 0.633) and repeated debridement (33.3% vs. 66.7%, p = 0.184) showed no statistically significant association with treatment failure.

5. Discussion

Surgical site infections (SSIs) represent a significant complication in orthopaedic practice, particularly when implants are involved, as they can lead to prolonged hospital stays, repeated surgeries, and increased morbidity. Implant-associated infections (IAIs) compromise limb and joint function, may affect spinal stability, and impose substantial healthcare burdens. The findings of this study demonstrate that intermittent hydrogen peroxide (H_2O_2) irrigation can effectively manage SSIs in most patients without necessitating implant removal, with high rates of infection resolution and low recurrence. These results highlight the potential role of H_2O_2 irrigation as a practical adjunct in the management of implant-associated SSIs, supporting implant preservation while promoting wound healing.

The demographic and clinical characteristics of patients in this study broadly reflect patterns reported in previous SSI cohorts. The mean age was 39.3 ± 10.0 years, with the majority of patients between 36 and 55 years, similar to findings by Das et al.[25] (mean age 37.1 ± 15.9 years) and Ramesh et al.[26] (most patients 31–50 years). Male predominance (60%) aligns with previous reports by Das et al. [25] (≈87.6% male) and Suranigi et al. [27], suggesting that males may be disproportionately affected by postoperative SSIs. Comorbidities such as diabetes mellitus (26.7%) and hypertension (16.7%) were comparable to Ramesh et al. [26] (31.4% and 25.7%, respectively), highlighting the role of metabolic disorders in SSI risk. In terms of wound severity, Southampton grade III (A,B) infections were observed in 33.3% of cases, with more severe grades IIIC–V comprising the remaining 66.7%, reflecting the typical distribution of moderate-to-severe implant-associated SSIs. Culture positivity was observed in 63.3% of patients, with Staphylococcus aureus being the most frequently isolated organism (40%), consistent with previous findings by Das et al.[25] and underscoring the ongoing clinical importance of S. aureus in postoperative wound infections.

The treatment characteristics also reflect established principles in managing SSIs while attempting implant preservation. Most patients (63.3%) underwent three or more sessions of intermittent hydrogen peroxide irrigation, and 40.0% required repeated surgical debridement, particularly in higher-grade infections. Adjunct antibiotics were universally administered, and culture-guided therapy was used in 70% of cases. These approaches closely parallel the DAIR (debridement, irrigation, antibiotics, and implant retention) strategy described by Manet et al. [28], who demonstrated infection control in approximately 76% of patients undergoing this protocol for deep SSI after instrumented surgery. Likewise, evidence from Filardi et al. [29] supports the role of irrigation—especially with antiseptic or antimicrobial solutions—in reducing bacterial load, as their meta-analysis showed significantly lower SSI rates with intraoperative irrigation. Collectively, these comparisons indicate that the multimodal treatment employed in our cohort is consistent with, and supported by, existing literature.

The primary outcomes further support the effectiveness of intermittent hydrogen peroxide irrigation in managing SSIs while preserving implants. Infection resolved without implant removal in 27 patients (90.0%), whereas 3 patients (10.0%) required implant removal. Recurrence within six months occurred in 5 cases (16.7%), and non-union and implant failure were each observed in 5 patients (16.7%). The median wound-healing time was 14 days (IQR 11–18). These results are broadly consistent with prior studies; Manet et al. [28] reported approximately 84% infection resolution without implant removal using a modified DAIR protocol, while Hickmann et al. [30] documented an 82.7% implant preservation rate with a low recurrence of 5.1%. The alignment of our findings with these studies underscores that combining intermittent hydrogen peroxide irrigation with targeted debridement and adjunct antibiotics is an effective strategy for controlling infection and retaining implants in appropriately selected patients.

The microbiological profile in this cohort aligns with prior reports, with Staphylococcus aureus being the most frequently isolated pathogen (12 patients, 40.0%), followed by Pseudomonas aeruginosa (4 patients, 13.3%) and Staphylococcus epidermidis (3 patients, 10.0%). No polymicrobial

growth was observed, and 11 patients (36.7%) had negative cultures. Birhanu et al. [31] similarly reported S. aureus as the predominant SSI pathogen (≈30.1%), alongside gram-negative organisms such as Klebsiella spp. and Pseudomonas aeruginosa, reflecting our findings. Mehta et al. [32] also identified S. aureus, Klebsiella pneumoniae, and Escherichia coli as common SSI pathogens, highlighting the ongoing clinical relevance of both gram-positive and gram-negative bacteria. The high proportion of culture-negative cases in our study likely reflects prior antibiotic therapy or sampling limitations, which is consistent with previous literature.

Comparative analysis between successful and failed treatment outcomes highlights that wound severity is a major determinant of prognosis. All treatment failures occurred in patients with severe Southampton grades (IIIC–V), demonstrating a statistically significant association between higher wound grade and poor outcome. This observation parallels results from Maruo et al. [33], who found substantially lower success rates in late, complex, or polymicrobial infections and in cases involving extensive instrumentation. Although variables such as diabetes mellitus, S. aureus infection, repeated debridement, and the number of irrigation sessions did not reach statistical significance, higher proportions of diabetes and repeated debridement in the failure group suggest a trend toward worse outcomes in patients with more complicated disease or impaired wound healing. The overall success rate of 80% in our cohort remains consistent with the implant-retaining success rates reported by Manet et al.[28] (≈84%), reinforcing that while hydrogen peroxide irrigation may enhance infection control, the intrinsic severity and complexity of the SSI fundamentally shape treatment outcomes.

5.1. Limitations of the study

The study had a few limitations:

- The small sample size may limit the generalizability of the findings.
- Follow-up limited to six months, restricting assessment of long-term outcomes.

6. Conclusion

Surgical site infections following implant-associated procedures remain challenging, particularly when preserving implants is desired. In this study, intermittent hydrogen peroxide irrigation combined with adjunct antibiotics and selective debridement successfully controlled infections without implant removal in most patients. Severe wound grade (IIIC–V) was significantly associated with treatment failure, while diabetes, S. aureus infection, repeated debridement, and number of irrigation sessions were not. These results suggest that intermittent hydrogen peroxide irrigation is a safe and effective adjunct for managing SSIs while facilitating implant retention in appropriately selected patients.

References

[1] Moyad TF, Thornhill T, Estok D. Evaluation and management of the infected total hip and knee. Orthopedics (Online). 2008 Jun 1; 31(6):581.

[2] Zimmerli W, Trampuz A, Ochsner PE. Prosthetic-joint infections. New England journal of medicine. 2004 Oct 14; 351(16):1645-54.

[3] Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. Jbjs. 2007 Apr 1; 89(4):780-5.

[4] Sousa A, Carvalho A, Pereira C, Reis E, Santos AC, Abreu M, Soares D, Fragoso R, Ferreira S, Reis M, Sousa R. Economic impact of prosthetic joint infection-an evaluation within the Portuguese National Health System. Journal of Bone and Joint Infection. 2018 Sep 8; 3(4):197-202.

[5] Alp E, Cevahir F, Ersoy S, Guney A. Incidence and economic burden of prosthetic joint infections in a university hospital: a report from a middle-income country. Journal of infection and public health. 2016 Jul 1; 9(4):494-8.

[6] Schwartz AM, Farley KX, Guild GN, Bradbury Jr TL. Projections and epidemiology of revision hip and knee arthroplasty in the United States to 2030. The Journal of arthroplasty. 2020 Jun 1; 35(6):S79-85.

[7] Blanco JF, Díaz A, Melchor FR, da Casa C, Pescador D. Risk factors for periprosthetic joint infection after total knee arthroplasty. Archives of Orthopaedic and Trauma surgery. 2020 Feb; 140(2):239-45.

[8] Tande AJ, Patel R. Prosthetic joint infection. Clinical microbiology reviews. 2014 Apr; 27(2): 302-45.

[9] Ahmed SS, Begum F, Kayani B, Haddad FS. Risk factors, diagnosis and management of prosthetic joint infection after total hip arthroplasty. Expert review of medical devices. 2019 Dec 2; 16(12):1063-70.

[10] Buchalter DB, Kirby DJ, Teo GM, Iorio R, Aggarwal VK, Long WJ. Topical vancomycin powder and dilute povidone-iodine lavage reduce the rate of early periprosthetic joint infection after primary total knee arthroplasty.

The Journal of Arthroplasty. 2021 Jan 1; 36(1): 286-90.

[11] Lu M, Hansen EN. Hydrogen peroxide wound irrigation in orthopaedic surgery. Journal of bone and joint infection. 2017 Jan 1; 2(1):3-9.

[12] Gehrke T, Alijanipour P, Parvizi JA. The management of an infected total knee arthroplasty. The bone & joint journal. 2015 Oct 1; 97(10_Supple_A):20-9.

[13] Pangaud C, Ollivier M, Argenson JN. Outcome of single-stage versus two-stage exchange for revision knee arthroplasty for chronic periprosthetic infection. EFORT open reviews. 2019 Aug 2; 4(8):495-502.

[14] Brown NM, Cipriano CA, Moric M, Sporer SM, Della Valle CJ. Dilute betadine lavage before closure for the prevention of acute postoperative deep periprosthetic joint infection. The Journal of arthroplasty. 2012 Jan 1; 27(1):27-30.

[15] Cheng MT, Chang MC, Wang ST, Yu WK, Liu CL, Chen TH. Efficacy of dilute betadine solution irrigation in the prevention of postoperative infection of spinal surgery.

[16] Müller G, Kramer A. Biocompatibility index of antiseptic agents by parallel assessment of antimicrobial activity and cellular cytotoxicity. Journal of Antimicrobial Chemotherapy. 2008 Jun 1; 61(6):1281-7.

[17] Thomas GW, Rael LT, Bar-Or R, Shimonkevitz R, Mains CW, Slone DS, Craun ML, Bar-Or D. Mechanisms of delayed wound healing by commonly used antiseptics. Journal of Trauma and Acute Care Surgery. 2009 Jan 1; 66(1):82-91.

[18] de Mesy Bentley KL, Trombetta R, Nishitani K, Bello-Irizarry SN, Ninomiya M, Zhang L, Chung HL, McGrath JL, Daiss JL, Awad HA, Kates SL. Evidence of Staphylococcus aureus deformation, proliferation, and migration in canaliculi of live cortical bone in murine models of osteomyelitis.

[19] Zoller SD, Hegde V, Burke ZD, Park HY, Ishmael CR, Blumstein GW, Sheppard W, Hamad C, Loftin AH, Johansen DO, Smith RA. Evading the host response: Staphylococcus “hiding” in cortical bone canalicular system causes increased bacterial burden. Bone Research. 2020 Dec 10; 8(1):43.

[20] Costerton JW, Stewart PS, Greenberg EP. Bacterial biofilms: a common cause of persistent infections. Science. 1999 May 21; 284(5418):1318-22.

[21] Joo HS, Otto M. Molecular basis of in vivo biofilm formation by bacterial pathogens. Chemistry & biology. 2012 Dec 21; 19(12): 1503-13.

[22] Vahedi H, Aali-Rezaie A, Shahi A, Conway JD. Irrigation, débridement, and implant retention for recurrence of periprosthetic joint infection following two-stage revision total knee arthroplasty: a matched cohort study. The Journal of arthroplasty. 2019 Aug 1; 34(8):1772-5.

[23] Kuiper JW, Vos SJ, Saouti R, Vergroesen DA, Graat HC, Debets-Ossenkopp YJ, Peters EJ, Nolte PA. Prosthetic joint-associated infections treated with DAIR (debridement, antibiotics, irrigation, and retention) analysis of risk factors and local antibiotic carriers in 91 patients. Acta orthopaedica. 2013 Aug 1; 84(4):380-6.

[24] Siddiqi A, Abdo ZE, Rossman SR, Kelly MA, Piuzzi NS, Higuera CA, Schwarzkopf R, Springer BD, Chen AF, Parvizi J. What is the optimal irrigation solution in the management of periprosthetic hip and knee joint infections?. The Journal of Arthroplasty. 2021 Oct 1; 36(10): 3570-83.

[25] Das A, Tripathy SK, Mohapatra I, Poddar N, Pattnaik D, S S, Panigrahi K. Microbiological Profile and Outcome of Surgical Site Infections Following Orthopedic Surgeries in a Tertiary Care Hospital. Cureus. 2025 Jan 3; 17(1): e76874.

[26] Ramesh G, Rj M, N J, Selvaraj K, P S. Surgical Site Infection After Abdominal Surgery: Distribution and Determinants From a Cross-Sectional Study. Cureus. 2025 Aug 27; 17(8):e91124.

[27] Suranigi SM, Ramya SR, Sheela Devi C, Kanungo R, Najimudeen S. Risk factors, bacteriological profile and outcome of surgical site infections following orthopaedic surgery. Iran J Microbiol. 2021 Apr; 13(2):171-177.

[28] Manet R, Ferry T, Castelain JE, Bracho GP, Freitas-Olim E, Grando J, Barrey C. Relevance of modified debridement-irrigation, antibiotic therapy and implant retention protocol for the management of surgical site infections: a series of 1694 instrumented spinal surgery. Journal of bone and joint infection. 2018 Dec 24; 3(5):266-72.

[29] Filardi KFXC, Wegner GRM, Dos Santos AB, Filardi RGM, Vasques LF, Massoni MC, Da Costa MPC. Intraoperative wound irrigation to prevent surgical site infection: A systematic review and meta-analysis. World J Surg. 2024 Oct; 48(10):2400-2412.

[30] Hickmann AK, Bratelj D, Pirvu T, Loibl M, Mannion AF, O'Riordan D, Fekete T, Jeszenszky D, Eberhard N, Vogt M, Achermann Y, Haschtmann D. Management and outcome of spinal implant-associated surgical site infections in patients with posterior instrumentation: analysis of 176 cases. Eur Spine J. 2022 Feb; 31(2):489-499.

[31] Birhanu Y, Endalamaw A. Surgical site infection and pathogens in Ethiopia: a systematic review and meta-analysis. Patient safety in surgery. 2020 Feb 21; 14(1):7.

[32] Mehta KD, Patel LP, Shingala HK. Bacteriological profile of surgical site infections and their antimicrobial susceptibility pattern at a tertiary care hospital, Western Gujarat. IP Int J Med Microbiol Trop Dis. 2024; 10(2):174–81.

[33] Maruo K, Berven SH. Outcome and treatment of postoperative spine surgical site infections: predictors of treatment success and failure. J Orthop Sci. 2014 May; 19(3):398-404.

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