Original Article

Point-Prevalence Survey for the Hospital-Acquired Infections and Infection Prevention and Control Status of Different Wards of Rajshahi Medical College Hospital

Md. Jawadul Haque,[1] Farhana Yasmin,[2] Md. Ashfaq Arif,[3] Nahreen Rahman,[4] Rehana Parven,[5] Md. Asaduzzaman,[6] Muhammad Zubayer Alam [7]

Abstract

Introduction: Healthcare-associated infections represent significant obstacles to providing high-quality healthcare and have been directly linked to ineffective infection control procedures. There is currently a shortage of trustworthy data in Bangladesh describing the epidemiology of hospital-acquired infections (HAIs), which is necessary for the development of effective infection prevention and control measures. This study's goal was to assess the frequency, nature, and risk factors of HAIs in acute care hospitals in Northern Bangladesh.

Methods: This was a pilot point prevalent survey conducted in the medicine, surgery, gynecology, and obstetrics departments of Rajshahi Medical College Hospital between August 2022 to September 2022. Data were collected by two questionnaires for disease profile and hospital-acquired infection. In addition, a checklist was used for the observation of the infection prevention and control (IPC) status of different wards.

Result: Approximately 900 patients' data were collected during this time period. The overall prevalence of HAI was found to be 3.7%. The prevalence of HAI, especially surgical site Infection (SSI), in the obstetrics ward, was 4.2%, and the Medicine ward was 3.9%, respectively. The prevalence of hospital-acquired infection in the surgery ward is 7.7%. Approximately 41.7% of patients developed SSI on the 6th post operative day (POD). The Infection prevention and control status of different wards was similar, which was not satisfactory.

Conclusion: This surveillance might help concerned authorities and policymakers by making some crucial steps to monitor and reduce hospital-acquired infections and HAIs in hospitals.

Keywords: Hospital acquired infections, nosocomial infections, hand washing, IPC, waste disposal, surgical site Infection, surveillance.

Introduction

A negative shift in the balance in favor of microbial invasion that overwhelms the host defense mechanism is what infection signifies. Regardless of the resources available, according to the World Health Organization, HAI is the most common adverse event in any hospital system.` Practically speaking, community-acquired infections and nosocomial/hospital-acquired

[1] Professor (PRL), Department of Community Medicine, Rajshahi Medical College, Rajshahi, Bangladesh.
[2] Assistant Professor and Head, Department of Community Medicine, Rajshahi Medical College, Rajshahi, Bangladesh.
[3] Assistant Profssor, Vascular Surgery, Rajshahi Medical College, Rajshahi, Bangladesh.
[4] Assistant Professor, Microbiology, Rajshahi Medical College, Rajshahi, Bangladesh.
[5] IMO, Gynae & Obs, Rajshahi Medical College Hospital, Rajshahi, Bangladesh.
[6] Assisant. Registrar, Medicine, Rajshahi Medical College Hospital, Rajshahi, Bangladesh.
[7] Medical Officer, Central Jail Hospital Rajshahi, Rajshahi, Bangladesh.

infections are the appropriate categories to use when describing infections in patients. Infections that appeared ٤٨ hours or longer after hospital admission or within ٣٠ days of obtaining medical care are categorized as hospital-acquired nosocomial or healthcare-associated infections (HAI). The four primary forms of HAIs include catheter-related bloodstream infections, ventilator-related pneumonia, surgical site infections, and catheter-associated urinary tract infections. The US Centers for Disease Control and Prevention claims that more than ٩٨,٠٠٠ of the almost ١.٧ million hospitalized patients who contract HAIs yearly die from them (one in every ١٧ of these patients).[٦] The frequency of HCAIs across all hospitals in Europe ranges from ٤.٦٪ to ٩.٣٪.[٣-٥] ٦.٥٪ to ٣٣٪ of patients in lower-income nations have an infection picked up in the hospital. This percentage is estimated to range between ٦.٨٪ to ٣٠٪ in Bangladesh (in fact, there is no pooled prevalence data). Out of every ١٠٠ hospitalized patients, seven in developed countries and ten in developing nations develop an HCAI.[٦] HAI can be used as a quality indicator for evaluating hospital care in general.[٧] Immunocompromised patients, low virulence organisms, and even commensals that are generally not considered pathogenic can obtain a foothold and cause serious infections. Risk factors for hospital-acquired infection are extremes of age, severe acute or chronic illness, and immunosuppression. Multiple factors are associated with a higher risk of colonization of surgical sites with pathogenic bacteria and a higher risk of infection. In Bangladesh, there are structural flaws in healthcare facilities, such as an inadequate number of sinks, bedside hand-rub dispensers, and patient isolation areas. Another issue that is overlooked is the management of hospital trash. 8 The indiscriminate use of antibiotics also contributes to very high infections in developing countries.[9] The prevention of hospital-acquired infections might be hampered by additional variables like individual behavior and a lack of awareness of infection control issues. Surgical infections and hospital-transmitted nonsurgical infections make up the majority of the reports' scant data on infection rates. The type of operation and the kind of hospital where it was done have an impact on the surgical infection rates that have been recorded in Bangladesh. The fatality rate from infection was reported as 21 per 100,000 sterilizations in an early report on Bangladesh.[10] The effectiveness of infection prevention and control programs is evaluated using infection surveillance data, which is also used to pinpoint problem areas, comply with reporting requirements for the public, and achieve pay-for-performance objectives. HAI surveillance continues to be crucial to efforts to prevent and manage infections. In order for infection control systems in healthcare organizations to be effective, surveillance activities have been deemed to be of utmost relevance. This study was carried out for the identification of the disease profile, estimations of the rate of HAIs, and observation of the IPC status of the different wards in selected hospitals.

Materials and Methods

This point-prevalence study was carried out in the medicine, surgery, gynecology, and obstetrics wards of Rajshahi Medical College from August 2022 to September 2022. A pre-tested semi-structured questionnaire and a checklist for IPC status were used. Data were collected by every member of team RMCH as per their assigned wards. The investigator collected data for hospital-acquired infections (HAIs) 3 days weekly. They collected data every Sunday, Tuesday, and Thursday of the week. Infection prevention and control (IPC) measures-related data were collected twice monthly from the same wards. Before gathering data, the respondents were informed of the study's objectives, and their willingness was ensured. For the questionnaire, data were collected through face-to-face interviews. Data collection via checklist was done by observation only. Data were processed using Microsoft Excel and presented by graphs and charts.

Results

Figure I: Residence of the Respondents of HAI patients of the Gynecology and Obstetrics Department of Rajshahi Medical College from ١st August to ١٥th September ٢٠٢٢
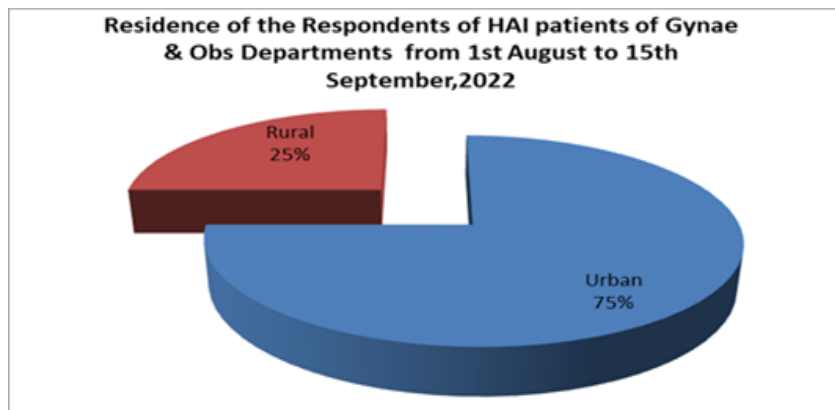

Figure I shows that majorities of the respondents of HAI patients of the Gynecology & Obstetrics department were urban residents (٧٥٪).

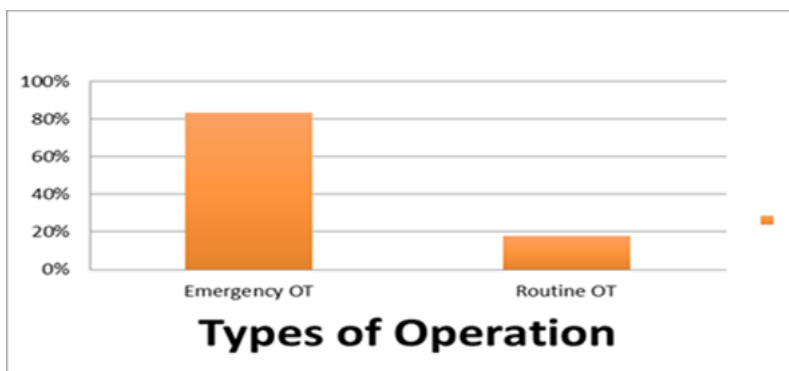**Figure II: Types of Operation of Gynaecology & Obstetrics Wards of RMCH.**

Figure II shows that most (٨٠٪) respondents underwent emergency OT while the rest (٢٠٪) underwent routine OT.

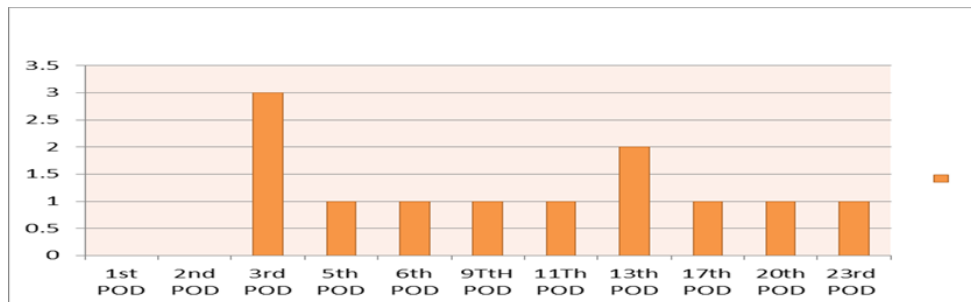**Figure III: Postoperative Day of Development of HAI in RMCH from 1st August to September ٢٠٢٢**

Figure III shows that most respondents developed HAI on the 3rd POD.

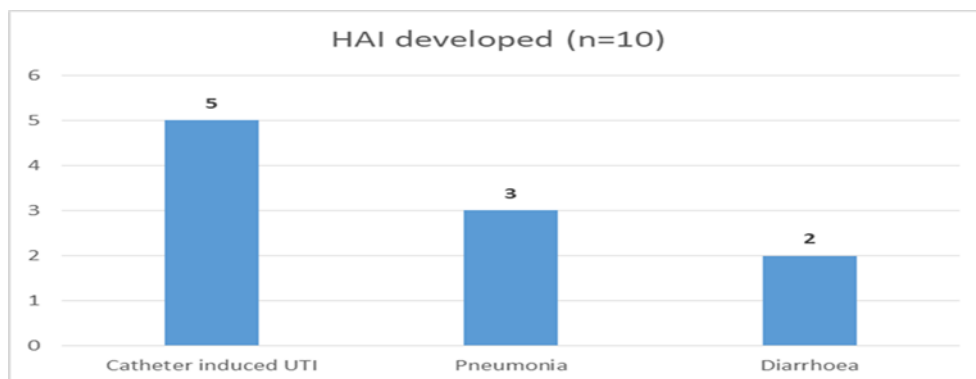**Figure- IV: Pattern of HAI developed in the Medicine ward of RMCH from 1st August to September 2022 (n=10)**

Figure IV shows that out of ١٠ patients with Hospital Acquired infection, most were suffering from Urinary Tract Infection.

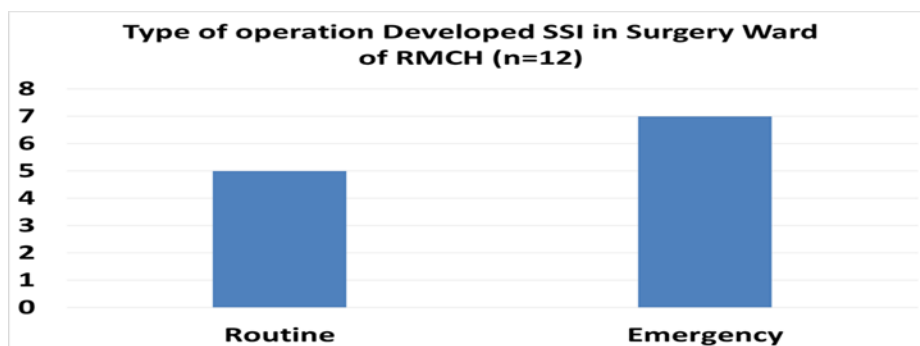**Figure V: Type of Operation (n=١٢) (١st August - Sept ٢٠٢٢)**

Figure V shows that most surgeries were emergency (٥٨٪).
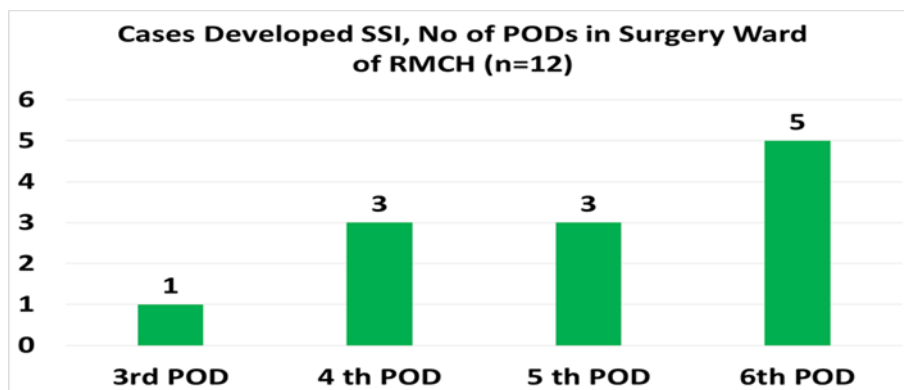
Figure VI: No of POD of Developed SSI (n=١٢)

Figure VI shows that most surgical site infections developed on the sixth postoperative day (٤١.٧٪).

Figure- VII: Major Symptoms during SSI Development (١st August - Sept ٢٠٢٢).
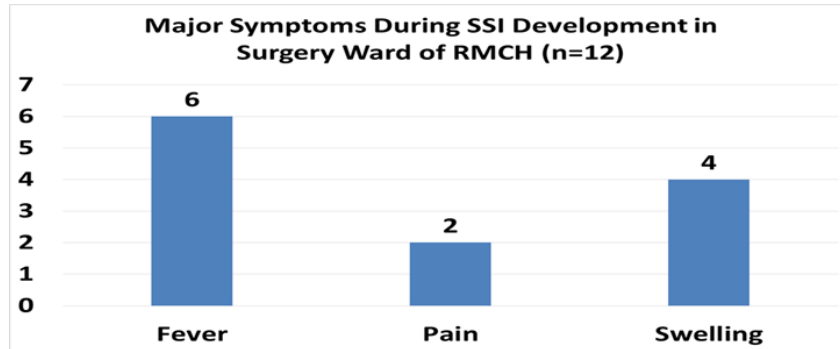

Figure – VII shows that a primary symptom of patients developing SSI was fever (٥٠٪).

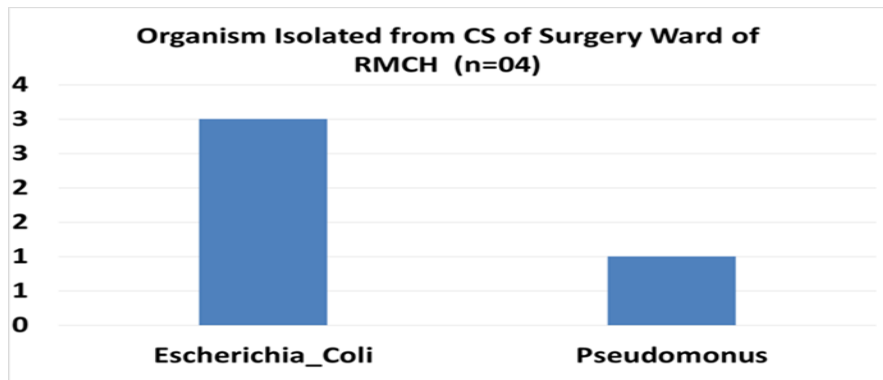**Figure - VIII: Organism Isolated from CS (n=٠٤) from ١st August - Sept ٢٠٢٢.**

Figure - VIII shows that The most common organism was Escherichia Coli (75%).

IPC scenarios were the same for all Surgery, Gynaecology & Obstetrics wards, Medicine Department, and RMCH. Functioning basins, soaps, and hand sanitizer were present for healthcare workers but not for patients . Posters regarding hand washing were absent near the basins of the respective wards. Four color-coded bins were present, and waste disposal was maintained as per guidelines. Daily changes of pillow covers and bed sheets of patients' beds were not done due to lack of cleaning availability. Ward floor sweeping is done once a day with phenyl. Surgical and other instruments are sterilized by autoclaving and boiling. Patients stay on the floor, and the distance between patients is less than 3 feet.

Figure- IX: IPC in Surgery, Gynecology & Obstetrics, Medicine Department, RMCH
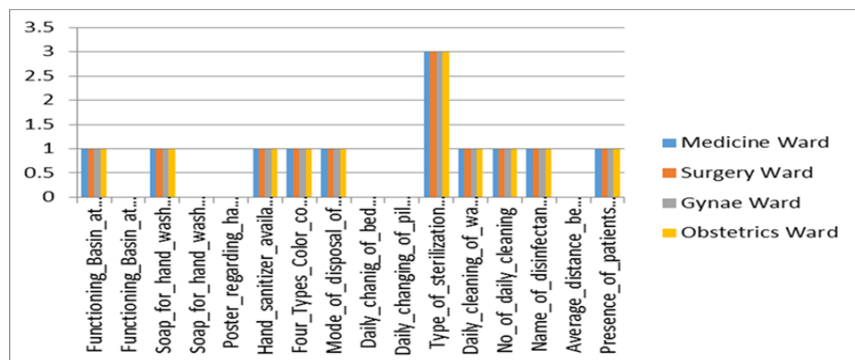
Discussion

The point-prevalence of HAI in the current study was 3.8%, higher than the 2.6–6.3% reported in earlier retrospective investigations carried out in Nigeria[11,12,13] It is significant to highlight that methodological variations across these studies affect the results and may account for the discrepancies. As overcrowding was present in chosen hospitals, HAI rates were high in hospitals. Many variables may be to blame for this, including a lack of a national infection control policy and guidelines, subpar infection control procedures, a lack of surveillance, poor clinical waste management, and a shortage of infection control personnel in hospitals. The most frequent HAIs in the current study were surgical site infection and pneumonia, similar to results from earlier studies[14,15] but consistent with data from an Iranian study[16] About 50% of patients were infected by urinary tract infection in the medicine ward, which is more than the reported rates of 31.6% in Accra, Ghana,[17] and 32.2% in Uganda. 18 About 58% of patients developed SSI in emergency surgery which is similar to other studies.[19] The incidence and complications of wound infection can be decreased by properly monitoring patients who had surgery and had risk factors.[20] Staphylococcus aureus was the predominant cause of SSI found in some studies.[21] We found Escherichia Coli (75%) as the causative organism of SSI, which is dissimilar from other studies. Using the IPCAF technique to evaluate the IPC condition in tertiary care facilities, very little research has been undertaken in South Asian nations, including Bangladesh. Our understanding of the actual situation of crucial IPC structures, implementation, and processes in specific healthcare settings has been greatly aided by this assessment. Several researchers have shown that adherence to appropriate IPC procedures can lower the frequency of HAIs in healthcare settings by up to 70%.[22] IPC scenarios were the same for all wards of Surgery, Gynaecology & Obstetrics, Medicine Department, RMCH. Posters regarding hand washing were absent near the basins of the respective wards. Four color-coded bins were present, and the disposal of waste was maintained as per guidelines. Daily changes of pillow covers and bed sheets of patients' beds were not done due to lack of cleaning availability. Instruments are sterilized by autoclaving and boiling. Patients stay on the floor, and the distance between patients is less than 3 feet. In environments with limited resources, the prevalence of HAI and MDR microbes is significant. Since the danger of HAI directly relates to how long a device is left in place, every effort must be made to shorten its use. The rates of hospital-acquired infections may be decreased with an effective hospital infection control and monitoring system, an appropriate supply of well-trained personnel, and ongoing staff education on the significance of hand cleanliness.

Conclusion

Due to the growing arsenal of antimicrobial resistance, the healthcare industry must return to the fundamentals of hospital infection control, develop, evaluate, and put into practice bundles of prevention. They are reasonably priced and simple to modify to address the rise in HCAIs and MDR infections in LMICs. IPC programs are an essential tool in the prevention of HAIs. In order to be practical, measures for IPC programs should be simple, cost-effective, and designed to suit local needs and circumstances. Evidence-based measures should be used, along with achievable goals and a plan for short-term, medium-term, and long-term actions.

Conflict of interest: None declared.

References

1. World Health Organization. Report on the burden of endemic health care-associated infection worldwide. Geneva: WHO; 2011. Available at: http://apps.who.int/iris/handle/10665/80135

2. Klevens RM, Edwards JR, Richards CL. Estimating health care-associated infections and deaths in US hospitals, 2002. Public Health Rep. 2007;122(2):160–166.

3. Klavs I, Bufon Lužnik T, Skerl M, et al. Prevalence of and risk factors for hospital-acquired infections in Slovenia-results of the first national survey, 2001. J Hosp Infect. 2003;54(2):149–157.

4. Eriksen HM, Iversen BG, Aavitsland P. Prevalence of nosocomial infections in hospitals in Norway, 2002 and 2003. The French Prevalence Survey Study Group. J Hosp Infect. 2005;60(1):40–45.

5. Prevalence of nosocomial infections in France: results of the nationwide survey in 1996 J Hosp Infect. 2000;46(3):186–193.

6. Danasekaran R, Mani G, Annadurai K. Prevention of healthcare-associated infections: protecting patients, saving lives. Int J Community Med Public Health. 2014;1(1):67–68.

7. Groeneveld AB. Risk factors for increased mortality from hospital-acquired versus community-acquired infections in febrile medical patients. American Journal of Infection Control, 2009, 37:35–42.

8. Zerin, S.A. and Ahmed, M.B. Hospital Waste Management in Dhaka: A Threat. Bangladesh Research Publications Journal.2009;3:796-811.

9. Usluer, G., Ozgunes, I., Leblebicioglu, H. The Turkish Antibiotic Utilization Study Group. A Multicenter Point-Prevalence Study: Antimicrobial Prescription Frequencies in Hospitalized Patients in Turkey. Annals of Clinical Microbiology and Antimicrobials. 2005; 4: 16: 4-16.

10. Western, KA, St John, R., Shearer, L.A. Hospital Infection Control and International Perspectives. Infection Control. 1982; 3: 453-445.

11. Dayyab FM, Iliyasu G, Aminu A, et al.. A prospective study of hospital-acquired infections among adults in a tertiary hospital in North-Western Nigeria. Trans R SocTrop Med Hyg. 2018;112(1):36–42.

12. Ige OK, Adesanmi AA, Asuzu MC. Hospital-acquired infections in a Nigerian tertiary health facility: an audit of surveillance reports. Nigerian Medical Journal: Journal of the Nigeria Medical Association. 2011;52(4):239.

13. Afolabi OT, Onipede AO, Omotayo SK et al.. Hospital acquired infection in Obafemi Awolowo university teaching hospital, Ile-Ife, southwest, Nigeria: a ten-year review (2000-2009).Sierra Leone J Biomed Res. 2011;3(2):110–5.

14. Magill SS, Edwards JR, Bamberg W et al. Multistate point-prevalence survey of health care–associated infections. N Engl J Med.2014;370(13):1198–208.

15. Suetens C, Latour K, Kärki T et al. Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: results from two European point prevalence surveys, 2016 to 2017. Eurosurveillance. 2018; 23(46).

16. Askarian M, Yadollahi M, Assadian O. Point prevalence and risk factors of hospital-acquired infections in a cluster of university-affiliated hospitals in Shiraz, Iran. J Infection Public Health. 2012;5(2):169–76.

17. Gyansa-Lutterodt M, Afriyie D, Asare G, Amponsah S, Abutiate H, Darko D. Antimicrobial use and susceptibility pattern of uropathogens associated with urinary tract infections at the Ghana Police Hospital. Glob J Pharmacol. 2014;8:306-315.

18. Odoki M, Almustapha Aliero A, Tibyangye J et al. Prevalence of bacterial urinary tract infections and associated factors among patients attending hospitals in Bushenyi District, Uganda. Int J Microbiol. 2019;2019:4246780.

19. Bibi S, Channa GA, Siddiqui TR, Ahmed W. Frequency and risk factors of surgical site infections in general surgery ward of a tertiary care hospital of Karachi, Pakistan. International Journal of Infection Control. 2011; 7(3): 1-5. doi: 10.3396/ijic.V7i3.019.11

20. S. Bärwolff, D. Sohr, C. Geffers, et al., "Reduction of surgical site infections after Caesarean delivery using surveillance," Journal of Hospital Infection, vol. 64, no. 2, pp. 156–161, 2006.

21. Lilani SP, Jangale N, Chowdhary A, Daver GB. Surgical site infection in clean and clean-contaminated cases. Indian J Med Microbiol 2005;23:249-52

22. Evans S, Agnew E, Vynnycky E et al. The impact of testing and infection prevention and control strategies on within-hospital transmission dynamics of COVID-19 in English hospitals. Philos Trans R Soc B. 2021;376(1829):20200268.

All correspondence to-
Md. Jawadul Haque
Professor (PRL),
Community Medicine
Rajshahi Medical College
Email: mjhaque61@gmail.com