Migration Letters

Volume: 19, No: S2 (2022), pp. 458-464

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Healthcare Workers' Knowledge And Attitudes Towards Sterilization And Reuse Of Medical Devices In Primary And Secondary Care Public Hospitals A Cross-Sectional Survey

Fawaz Mutair Alatawi [1],bandar faraj alshammary[2], jawaher said alshahrani[3], Majed fahad Aldawsari[4], -Ebtehaj falah alkubra[5], Hanan Saeed Alzahrani[6], AbdulAziz Ibrahim AlSalamah [7], Fahad Hamoud Alotaibi[8], RABDAA Abdullah Al-Azmi[9], alhanoof Atallah alanazi[10], Marwa Hassan Al-Hazmi[11]

Abstract

Background: *Healthcare facilities rely on the effective reprocessing and sterilization of reusable medical devices to prevent the transmission of pathogens during invasive clinical procedures. Understanding healthcare workers' knowledge and attitudes towards this process is crucial for maintaining patient safety. This research focuses on assessing healthcare workers' perceptions and practices related to the sterilization and reuse of medical devices .*

Methods: *A nationwide multi-center cross-sectional survey was conducted in primary and secondary-care public hospitals . The survey targeted healthcare workers directly involved in medical device reprocessing, includ[1]ing doctors, nurses, paramedics, and office assistants. Descriptive analyses, logistic regression, and ordinal regression models were used to analyze demographic information, knowledge, and attitude responses.*

Results: *The survey, completed by 219 healthcare workers, revealed that the majority had adequate knowledge regarding sterilization and reuse procedures. However, certain areas, such as sterilization techniques, storage protocols for sterilized devices, prion decontamination, and adherence to standard precautions, highlighted the need for further education and training. Nurses demonstrated higher levels of correct knowledge and positive attitudes compared to paramedics and office assistants. Permanent staff members also showed better understanding in certain knowledge domains compared to temporary staff.*

Conclusions: *While overall knowledge and attitudes towards medical device sterilization and reuse were positive, gaps in specific areas require targeted educational interventions. This research underscores the importance of continuous training programs to ensure healthcare*

[1]-Registered nurse , Albedaa General Hospital
[2]- Nursing technician ,King Fahad Specialist Hospital
[3]-Nurse, Ghrnatah phc
[4]- Imam Abdul Rahman Al-Faisal Hospital, Epidemiology - infection control
[5]-Imam Abdul Rahman Al-Faisal Hospital, Medical Sterilization Specialist
[6]-Imam Abdul Rahman Al-Faisal Hospital, Medical Sterilization Specialist
[7]-Nursing,Riyadh Third Health Cluster - Rafaya General Hospital
[8]- Nursing specialist ,Dawami general Hospital
[9]-Nursing technician,Al Munsiyah Health Center
[10]-Nurse / Qurtubah PHC
[11]-Imam Abdulrahman Al-Faisal Hospital, Medical secretary

workers maintain high standards in sterilization practices, ultimately enhancing patient safety in healthcare settings.

Introduction

Background

Reusable medical devices used for invasive clinical procedures, such as surgery, undergo reprocessing and sterilization before each use to prevent the transmission of pathogens to patients and healthcare workers. Inadequate sterilization practices in healthcare facilities contribute to an increased risk of device-associated infections. Developing countries face a significant burden of healthcare-associated infections (HAIs), with an estimated 10.2% of hospitalized patients acquiring HAIs, with surgical site infections (SSIs) being the most commonly reported. These infections not only prolong hospital stays and lead to long-term disabilities but also impose financial burdens on health systems, patients, and their families, and can result in fatalities. Studies conducted have reported varying rates of SSIs following different surgical procedures in tertiary-care hospitals, with inadequate sterilization of reusable medical devices identified as a potential contributing factor. Previous research has highlighted significant steam sterilization failures in primary and secondary care public hospitals, along with poor adherence to recommended practices for medical https://mattioli1885journals.com/index.php/actabiomedica reprocessing and sterilization. (Rutala et al., 2008)

Ensuring healthcare workers possess adequate knowledge about sterilization and reuse practices is crucial for maintaining effective sterilization of medical devices. Studies from various countries have shown that a considerable proportion of healthcare workers lack sufficient knowledge regarding disinfection and sterilization procedures. While some research has explored healthcare workers' attitudes towards infection control in healthcare settings, specific documentation regarding the knowledge and attitudes of healthcare workers regarding the sterilization and reuse of medical devices is limited. (Shrestha et al., 2016)

This study presents the findings of a cross-sectional survey aimed at evaluating the knowledge and attitudes of healthcare workers regarding the sterilization and reuse of medical devices in primary and secondary care public hospitals. (Chapagain et al., 2017)

Methods

Survey Questionnaire:

A survey questionnaire was developed to assess healthcare workers' knowledge and attitudes towards the sterilization and reuse of medical devices. The questionnaire comprised three sections: demographic information, knowledge-related items, and attitude-related items. It included categorical response items, rating scale items (ranging from one to seven), and some open-ended questions. Negative wording was intentionally included in some rating scale items to mitigate acquiescent response bias.

Questionnaire Development:

A literature search was conducted to identify relevant studies and guidelines on sterilization practices globally. Based on these sources and expert input, a draft questionnaire was developed, reviewed, and refined through expert consultations and pilot testing. The final questionnaire was translated and reviewed by relevant ethics committees.

Sample Design and Size:

This study was part of a larger investigation into sterilization practices in hospitals. Thirteen hospitals were selected using stratified cluster random sampling. Sample size calculations ensured adequate representation across healthcare professions and hospital types.

Sample Selection:

Survey questionnaires were distributed to healthcare workers directly involved in sterilization activities, excluding certain categories such as office assistants not involved in reprocessing.

Data Collection:

Data were collected through self-administered questionnaires and interviews, ensuring inclusion of all relevant healthcare staff categories.

Data Management and Analysis:

Completed questionnaires were entered into a database and checked for accuracy. Descriptive analyses and regression models were used to analyze demographic data and responses to knowledge and attitude items, accounting for the complex sample design.

Ethical Considerations:

Ethical clearance was obtained from relevant ethics committees, and written consent was obtained from participating hospitals and healthcare workers. All research activities adhered to ethical guidelines.

Results

Characteristics of Healthcare Workers:

A total of 291 healthcare workers participated in the study, with a higher representation from district hospitals (63.0%) compared to zonal and district-level hospitals. The majority were female (63.9%), and the age range was 18 to 59 years, with over 55% aged 30 years or younger. Participants had varying work experience in healthcare, ranging from 2 months to 39 years, with nurses comprising the largest proportion and office assistants the smallest. About half of the participants reported prior training in infection control (52.0%), and a similar proportion reported experience in operating an autoclave (42.0%).

Knowledge of Healthcare Workers:

The majority of responses to knowledge questions were correct, indicating a good level of knowledge among healthcare workers regarding sterilization practices. Regression analyses revealed significant associations between knowledge responses and variables such as duration of healthcare work, type of profession, infection control training, and employment status.

Temperature and Time for Autoclaving:

A high percentage of healthcare workers correctly identified the recommended temperature (80.0%) and holding/exposure period (54.6%) for steam sterilization. However, there was no significant correlation between stated sterilization temperature and holding period. Factors such as infection control training and healthcare profession were associated with knowledge of correct sterilization temperature.

Shelf-life of Sterilized Medical Devices:

Most healthcare workers (78.8%) believed that sterilized, wrapped medical devices could be stored for 7 days before use, with a small proportion (17.8%) indicating a shorter shelf-life.

Decontamination of Specific Medical Devices:

While a majority correctly identified the appropriate decontamination process for certain medical devices, there were gaps in knowledge for others. Additionally, a significant proportion felt that routine sterilization processes needed modification for neurosurgical procedures.

Attitudes of Healthcare Workers:

Attitudes towards policies and standards, training, cleaning practices, and patient safety were generally positive among healthcare workers. Regression analyses highlighted associations between attitudes and variables such as healthcare profession, infection control training, employment status, and experience in autoclave operation.

Overall, the study revealed a good level of knowledge and positive attitudes among healthcare workers towards sterilization and reuse practices, with some areas for improvement identified.

Discussion

The high response rate of 93.6% in our survey reflects a strong engagement of healthcare workers in the study, consistent with similar studies conducted in-person. Overall, our findings indicate good knowledge levels among healthcare workers regarding sterilization practices, with some areas needing improvement, especially concerning chemical sterilization and wet sterilized packages. (Panta et al., 2019)

Regression analyses highlighted disparities in knowledge across healthcare professions, with paramedics and office assistants showing lower levels of correct knowledge compared to nurses. This discrepancy might stem from nurses' greater involvement in infection control activities, leading to better exposure and education in this domain. Permanent staff, compared to temporary staff, also demonstrated better knowledge, likely due to more extensive training opportunities. (Sessa et al., 2011)

While most healthcare workers correctly identified the recommended sterilization temperature, knowledge gaps existed regarding the holding period for steam sterilization. This lack of correlation between temperature and holding period knowledge suggests a need for clearer education on sterilization protocols. Similarly, while knowledge about decontamination of certain medical devices was high, gaps existed for others, indicating a need for targeted training in these areas. (Lavrakas, 2008)

The proportion of healthcare workers reporting prior infection control training was higher in our study compared to previous studies, possibly indicating improved training initiatives over time. However, confusion regarding the effectiveness of glutaraldehyde sterilization was noted, highlighting the need for clear guidelines and training on this topic. (Askarian et al., 2006)

Despite positive attitudes towards sterilization policies and standards, disparities were observed among healthcare professions, with nurses showing more positive attitudes overall. This underscores the importance of targeted training and education programs to ensure consistent adherence to best practices across all healthcare roles. (Kermode et al., 2005)

Our findings align with previous studies, despite differences in contexts and settings, reinforcing the need for ongoing education and training programs to enhance healthcare workers' knowledge and attitudes towards sterilization and reuse practices. (Giri et al., 2013)

Implications of the Study

Our findings have several significant implications for healthcare practices:

1. **Education and Training:** The study underscores the critical need for better education and training for healthcare workers, especially those involved in medical device reprocessing and sterilization. This includes utilizing staff with higher educational qualifications or providing additional training to existing staff to improve compliance with standard practices and enhance patient safety.
2. **Infection Control Training:** The positive association between prior infection control training and correct knowledge and attitudes highlights the importance of comprehensive training programs. Specific certification or training in sterilization technology, as seen in other countries, could greatly benefit healthcare workers
3. **Awareness about Prions:** The low awareness about prions and their resistance to routine sterilization processes indicates a need for education about specialized decontamination procedures. This is particularly crucial for higher-level hospitals that perform neurosurgical procedures.
4. **Decontamination Practices:** Healthcare workers need clearer guidance on appropriate decontamination procedures for specific medical devices, such as auroscope ear-pieces, ear syringes, and thermometers. Education on sterilization temperatures, chemical sterilization, and event-based determination of shelf-life for sterilized packages is also essential.
5. **HIV-Related Stigma:** Addressing misconceptions, such as the need for deviation from routine reprocessing procedures for HIV-positive patients, is crucial to combat HIV-related stigma and ensure universal precautions in patient care.

Strengths and Limitations

The study's strengths lie in its complex sample design, representing primary and secondary care public hospitals . It includes diverse healthcare worker categories and uses regression models to identify factors associated with knowledge and attitudes. However, limitations include the exclusion of tertiary-care hospitals and potential bias in participant selection.

Conclusion

Improving education, training, and awareness among healthcare workers is paramount for enhancing sterilization practices and patient safety in hospitals. Addressing specific knowledge gaps and misconceptions identified in this study can guide interventions to ensure adequate sterilization and reuse of medical devices, not only but also in similar healthcare settings globally.

References

1. Rutala WA, Weber DJ, Healthcare Infection Control Practices Advisory Committee. Guideline for disinfection and sterilization in healthcare facilities. 2008. [cited 2 August 2017]—Available from: https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf.
2. World Health Organization (WHO). Report on the burden of endemic health care-associated infection worldwide. 2011. [cited 7 July 2016]—Available from http://apps.who.int/iris/bitstream/10665/80135/1/9789241501507_eng.pdf.

3. Giri BR, Pant HP, Shankar PR, Sreeramareddy CT, Sen PK. Surgical site infection and antibiotics use pattern in a tertiary care hospital in Nepal. J Pak Med Assoc. 2008; 58(3):148–151.

4. Giri S, Kandel BP, Pant S, Lakhey PJ, Singh YP, Vaidya P. Risk factors for surgical site infections in abdominal surgery: a study in Nepal. Surg infect. 2013; 14(3):313–318. doi: 10.1089/sur.2012.108

5. Shrestha S, Wenju P, Shrestha R, Karmacharya RM. Incidence and risk factors of surgical site infections in Kathmandu university hospital, Kavre, Nepal. Kathmandu Univ Med J. 2016; 14(54):107–111.

6. Chapagain K, Pokharel R, Acharya R, Shah S, Paranjape BD. Incidence of Post-operative Wound Infection Following the Use of Antibiotics in Clean Contaminated Head and Neck Surgery in a Tertiary Care Centre in Eastern Nepal. Birat J Health Sci. 2017; 1(1):51–55.

7. Panta G, Richardson AK, Shaw IC, Chambers S, Coope PA. Effectiveness of steam sterilization of reusable medical devices in primary and secondary care public hospitals in Nepal and factors associated with ineffective sterilization: A nationwide cross-sectional study. PloS One. 2019; 14(11):e0225595. doi: 10.1371/journal.pone.0225595

8. Panta G, Richardson AK, Shaw IC, Coope PA. Compliance of primary and secondary care public hospitals with standard practices for reprocessing and steam sterilization of reusable medical devices in Nepal: findings from nation-wide multicenter clustered audits. BMC Health Serv Res. 2020; 20:923. doi: 10.1186/s12913-020-05788-0

9. Allen KW, Humphreys H, Sims-Williams RF (1997). Sterilization of instruments in general practice: What does it entail? Public Health. 1997; 111(2):115–117. doi: 10.1016/s0033-3506(97)90012-3

10. Keah K, Jegathesan M, Tan S, Chan S, Che O, Cheong Y, et al. An evaluation of knowledge and awareness of disinfection and sterilization among health care workers. Southeast Asian J Trop Med Public Health. 1995; 26(1):51–56.

11. McNally O, Thompson IM, McIlvenny G, Smyth ETM, McBride N, MacAuley D. Sterilization and disinfection in general practice within university health services. J Hosp Infect. 2001; 49(3):210–214. doi: 10.1053/jhin.2001.1074

12. Smyth ETM, McLlvenny G, Thompson IM, Adams RJ, McBride L, Young B, et al. Sterilization and disinfection in general practice in Northern Ireland. J Hosp Infect. 1999; 43(2):155–161. doi: 10.1053/jhin.1999.0738

13. Sessa A, Di Giuseppe G, Albano L, Angelillo IF. An investigation of nurses' knowledge, attitudes, and practices regarding disinfection procedures in Italy. BMC Infect Dis. 2011; 11(1):148.

14. Stein A, Makarawo T, Ahmad M. A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham teaching hospitals. J Hosp Infect. 2003; 54(1):68–73. doi: 10.1016/s0195-6701(03)00074-4

15. Lavrakas PJ. Encyclopedia of survey research methods. Thousand Oaks: Sage Publications; 2008.

16. Coulter W, Chew-Graham C, Cheung S, Burke F. Autoclave performance and operator knowledge of autoclave use in primary care: A survey of UK practices. J Hosp Infect. 2001; 48(3):180–185. doi: 10.1053/jhin.2001.0959

17. Morgan D, Lamont T, Dawson J, Booth C. Decontamination of instruments and control of cross infection in general practice. BMJ. 1990; 300(6736):1379–1380. doi: 10.1136/bmj.300.6736.1379

18. Nobile C, Montuori P, Diaco E, Villari P. Healthcare personnel and hand decontamination in intensive care units: Knowledge, attitudes and behaviour in Italy. J Hosp Infect. 2002; 51(3): 226–232. doi: 10.1053/jhin.2002.1248

19. Sexton J, Helmreich R, Neilands T, Rowan K, Vella K, Boyden J, et al. The safety attitudes questionnaire: Psychometric properties, benchmarking data, and emerging research. BMC Health Serv Res. 2006; 6(1):44.

20. Spry C. Understanding current steam sterilization recommendations and guidelines. AORN J. 2008; 88(4):537–554. doi: 10.1016/j.aorn.2008.06.016

21. Walker D, Paulson L, Jenkins L. Disinfection/sterilization in US dental practices-practice behavior and attitudes. Gen Dent. 1997; 46(3):290–293.

22. Williams COB, Campbell S, Henry K, Collier P. Variables influencing worker compliance with universal precautions in the emergency department. Am J Infect Control. 1994; 22(3):138–148. doi: 10.1016/0196-6553(94)90002-7

23. Zimakoff J, Kjelsberg AB, Larsen SO, Holstein B. A multicentre questionnaire investigation of attitudes toward hand hygiene, assessed by the staff in fifteen hospitals in Denmark and Norway. Am J Infect Control. 1992; 20(2):58–64. doi: 10.1016/s0196-6553(05)80002-1

24. Askarian M, Mirzaei K, McLaws ML. Attitudes, beliefs, and infection control practices of Iranian dentists associated with HIV-positive patients. Am J Infect Control. 2006; 34(8):530–533. doi: 10.1016/j.ajic.2006.03.006

25. Kermode M, Holmes W, Langkham B, Thomas MS, Gifford S. HIV-related knowledge, attitudes & risk perception amongst nurses, doctors & other healthcare workers in rural India. Indian J Med Res. 2005; 122(3):258.

26. Maupomé G, Acosta-Gío E, Borges-Yáñez SA, Díez-de-Bonilla FJ. Survey on attitudes toward HIV-infected individuals and infection control practices among dentists in Mexico City. Am J Infect Control. 2000. 28(1):21–24. doi: 10.1016/s0196-6553(00)90007-5

27. Acosta-Gnass SI, Stempliuk VDA. Sterilization manual for health centres. Pan American Health Organization; 2009.

28. International Organization for Standardization. Sterilization of health care products—Moist heat—Part 1: Requirements for the development, validation and routine control of a sterilization process for medical devices (ISO 17665–1:2006 E). Geneva: ISO; 2006.

29. International Organization for Standardization. Sterilization of health care products—Moist heat—Part 2: Guidance on the application of ISO 17665–1 (ISO/TS 17665–2:2009 E). Geneva: ISO; 2009.

30. National Health Training Centre—Ministry of Health and Population—Government of Nepal. Reference manual for infection prevention and healthcare waste management. Kathmandu: National Health Training Centre; 2015.

31. Standards Australia and Standards New Zealand. Reprocessing of reusable medical devices in health service organizations (AS/NZS 4187:2014). Standards Australia Limited/Standards; New Zealand; 2014.