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Awareness on Infection Control of the Bio-Safety Laboratory Workers in Tertiary Level Private Hospital in Dhaka City of Bangladesh

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Abstract

This study was conducted among laboratory workers employed at Appolo Hospital and United Hospital, the tertiary-level private hospital in Dhaka City to explore their level of knowledge about infection control guidelines and to assess infection prevention practices. The respondents reported facing several challenges, including non-cooperation, lack of proper cleanliness, improper waste disposal, shortage of equipment, overcrowding, and the use of non-sterile techniques. The findings highlight the urgent need to ensure proper hygiene, health practices, and strict adherence to infection prevention and control measures. These steps are essential not only to protect patients from an unhealthy environment but also to safeguard laboratory professionals who are routinely at risk of cross-infection while providing health care.

Keywords: Awareness of infection control, tertiary-level hospital, biosafety, laboratory.

INTRODUCTION

Infection in hospitals is a serious concern. One of the main principles of hospital care is that hospital stays should not cause any harm to patients. However, many patients acquire infections during their hospital stay due to several contributing factors. Many invasive procedures are performed on patients, which make the targeted organs more prone to invasion by microorganisms. Many hospital-admitted patients are immune compromised, which increases their vulnerability to infections. The hospital environment also serves as a significant source of infection. Post-operative patients are particularly at risk due to the operative procedure itself and the nature of post-operative care. The term infection refers to the successful invasion, establishment, and multiplication of microorganisms in the living tissue of a host, producing signs and symptoms of disease. Hospital-acquired infection (HAI) refers to infections acquired by a patient during their hospital stay.[1]

In hospitals, surgical procedures combined with inadequate infection control practices present a major challenge for national healthcare delivery systems worldwide. Infectious diseases remain one of the leading causes of death globally, with viral pathogens such as HIV, HBV, and HCV playing a significant role[2,3] Biosafety laboratory workers are at risk of exposure to a variety of microorganisms present in the blood and saliva of patients, including tuberculosis, hepatitis B virus, staphylococci, streptococci, cytomegalovirus, and herpes simplex virus types I and II.[4,5]

Infections in nursing practices may be transmitted via blood, saliva, direct contact, droplets, and aerosols. Additionally, indirect contact transmission through contaminated instruments is also possible.[6,7] Biosafety laboratory workers, hospital staff, and patients all have the potential to transmit infections to one another. As such, infection control in nursing practice has become a global concern. Several life-threatening diseases can be transmitted through the hematogenous route, including hepatitis B, C, and AIDS. Consequently, various international regulatory bodies have developed infection control guidelines for healthcare professionals.[8,910]

The procedures of infection control can be categorized into eight major areas:

1. Hand washing and gloving – Protect health personnel from infection.
2. Protection against aerosols and spatter – Involves pre-procedure mouth rinses, saliva ejection, masks, protective eyewear, and protective clothing.
3. Instrument processing – Ensures that instruments are safe for patient use.
4. Surface asepsis – Prevents environmental surfaces from contributing to disease transmission.
5. Management of sharps and other regulated waste – Minimizes the risk of sharp injuries and contact with infectious materials.
6. Aseptic techniques – Includes the aseptic retrieval of supplies, minimizing contamination during surgical procedures, radiographic practices, proper disposal use, and ward hygiene maintenance.[4,5,11,12,13]
7. Personal hygiene – Individuals should

wash their hands after contact with bodily fluids, using the restroom, or blowing the nose. Covering the mouth and nose while sneezing or coughing should become a routine habit.

8. Environmental and interpersonal infection control – Involves measures to prevent the spread of infections from patient to patient, from patient to staff, from staff to patient, and among staff members.[14,1516]

Theoretical Framework

This study is grounded in the Health Belief Model (HBM) and concepts from Infection Control Theory, both of which offer a strong foundation for understanding how knowledge, perception, and behavior influence infection prevention practices among biosafety laboratory workers.[1,2,3,4]

Health Belief Model (HBM): The HBM explains how individual beliefs about health problems, perceived benefits of action, and barriers to action can predict health-related behaviors—such as infection control practices.[1,5]

The model includes the following constructs:

Perceived Susceptibility: Lab workers' beliefs about their risk of being exposed to infectious agents (e.g., blood borne pathogens, airborne microbes).[1,6]

Perceived Severity: Their understanding of the seriousness of infections, especially hospital-acquired infections (HAIs), and the complications, which can cause for both staff and patients.[2,4,7]

Perceived Benefits: Beliefs in the effectiveness of preventive actions, such as hand hygiene, PPE use, and waste disposal practices, in reducing the risk of infection.[8,9,10]

Perceived Barriers: Practical and organizational obstacles (e.g., lack of monitoring, non-cooperation, insufficient equipment, overcrowding) that hinder the implementation of proper infection control.[13]

Cues to Action: Institutional triggers such as training programs, reminders, or the presence of visible guidelines that prompt safer practices.[14,15]

Self-Efficacy: Confidence among workers in their ability to perform correct infection control procedures consistently.[16,18,19]

METHODOLOGY:

It was a descriptive cross sectional study, which was carried out at Appolo Hospital And United Hospital, the tertiary level private hospitals in Dhaka city of Bangladesh. 120 respondents were selected purposively, as the study population or the sample size for the study. The respondents were selected randomly from a tertiary level private hospital in Dhaka city of Bangladesh. The study respondents were the Persons who used to work at Bio –safety laboratory at the Tertiary level private hospital.

Method of data collection:

Data was collected through a structured questionnaire prepared by the interviewer. Baseline information on socio-demographics, knowledge, attitude, and practice of infection control was obtained from the study participants through interviewer-interviews. Questions were asked about the methods and types of infection control. After explaining the purpose of the study to the respondents, data was gathered using an English-language structured questionnaire. The interviewer collected data from selected

areas of the hospital.

Data Processing and analysis: The data entry was started immediately after the completion of data collection. The collected data were checked, verified, and then entered into the computer. Only complete datasheet were entered into the computer for the final analysis. The analysis was carried out with the help of SPSS (Statistical Package for Social Science).

RESULTS:

This study revealed several important insights into the awareness, preparedness, and professional background of biosafety laboratory workers in a tertiary-level private hospital in Dhaka City, Bangladesh:

1. Balanced Demographics: The gender distribution among respondents was nearly equal, with 50% male and 50% female participants. Additionally, the majority (55%) were young professionals aged between 21–30 years. This indicates a youthful workforce with the potential to adapt to evolving infection control protocols.

2. Professional Background and Supervision: Most respondents were laboratory technologists (60%), and a substantial portion held medical-related degrees. A large number (78%) reported directly to clinic managers, suggesting a centralized supervisory structure for infection control implementation.

3. Work Experience and Training Gaps: Although 75% of respondents had 1–5 years of work experience, only 40% had received formal job-related training. Among those trained, 60% received only verbal instructions. This highlights a critical gap in structured, standardized training—potentially compromising effective infection control practices

4. Workload and Scheduling: A majority (70%) of the respondents reported working 8 hours per day, six days a week. This continuous workload underlines the necessity for regular reinforcement of infection control strategies and periodic refresher training to prevent protocol fatigue.

5. Infection Prevention Awareness: Respondents recommended several key infection prevention measures, including:

Proper Waste Disposal (35%)

Sterilization (20%

Use of Antiseptics and Hand washing (16%)

6. Training and Resource Needs: While 65% had pursued higher education beyond their basic qualifications, 60% lacked any on-the-job training, indicating a gap between academic knowledge and applied biosafety practice.

Despite having an educated and young workforce, infection prevention and control measures remain suboptimal due to inadequate training, lack of structured supervision, and resource limitations. Therefore, greater emphasis must be placed on continuous professional development, provision of essential protective equipment, and strong policy enforcement to ensure biosafety and reduce risk of healthcare-associated infections. Each chart represents a key area of study, such as gender, age distribution, occupation, education, training, and recommendations for infection

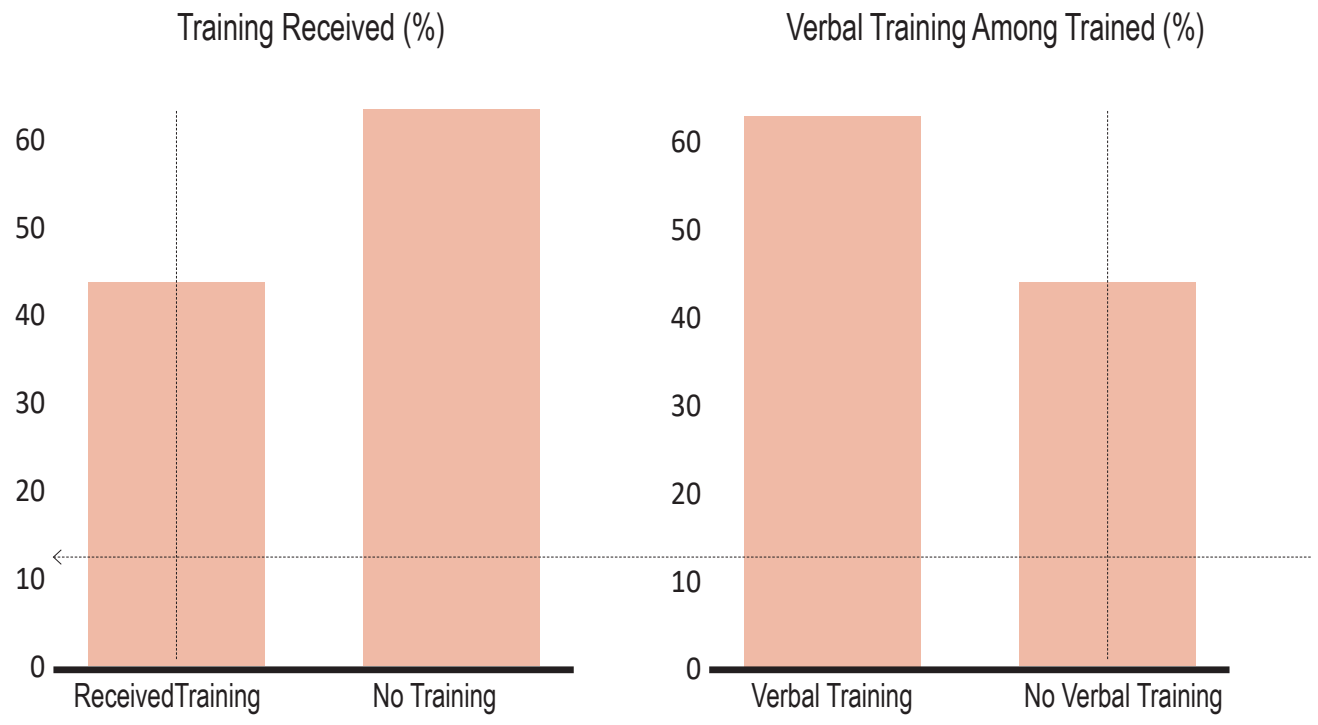

Fig 1: *Training received and Verbal Training among trained.*

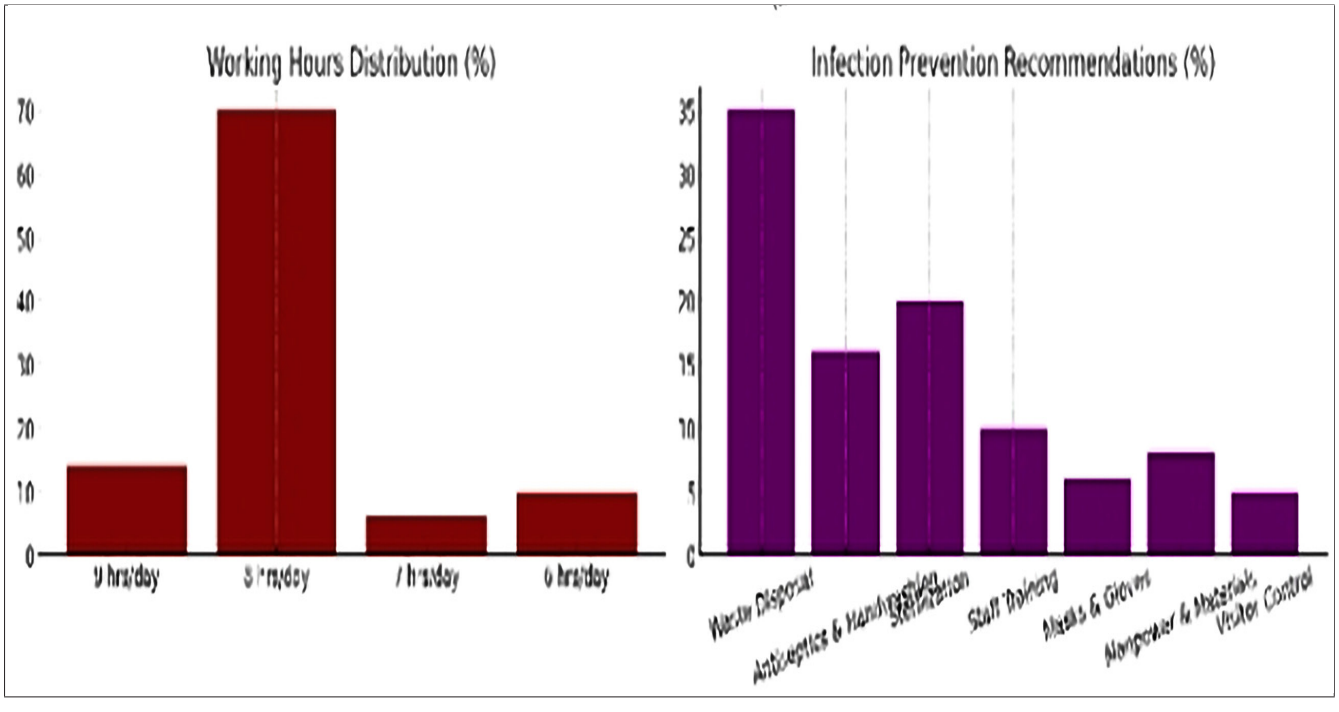

Fig-2: *Working hours distribution and Infection prevention recommendation*

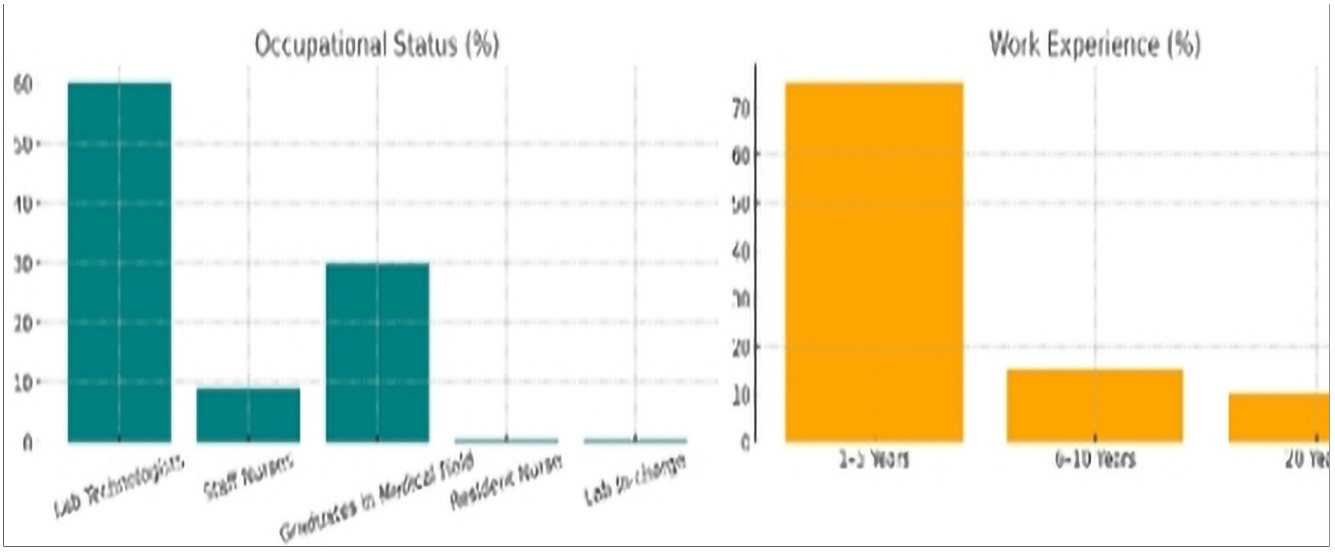

Fig-3: *Gender distrbution and Age Distribution*

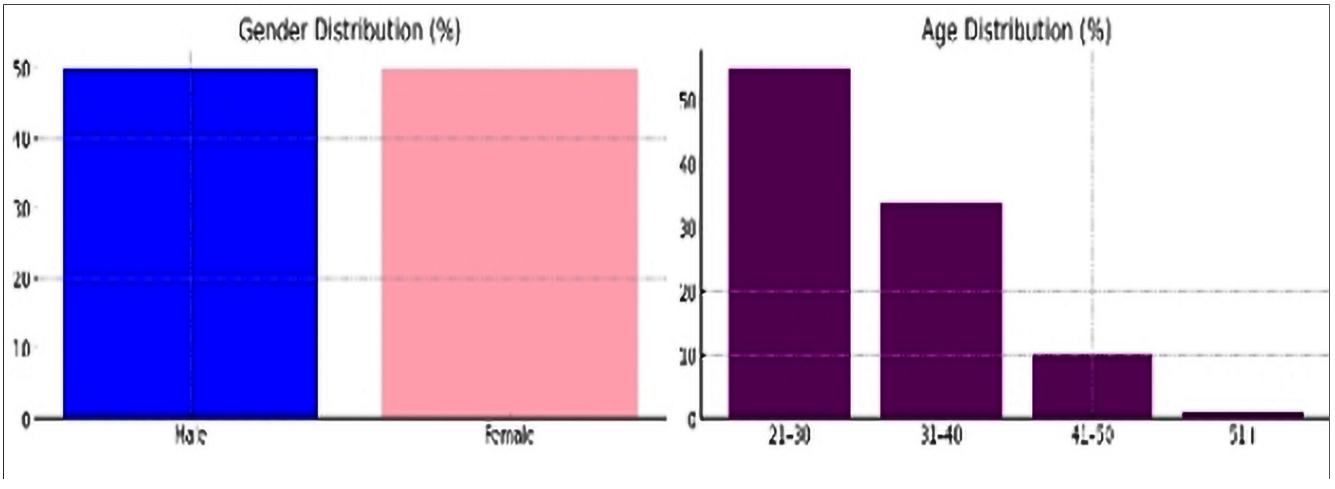

Fig-4: *Occupational status and Work experience*

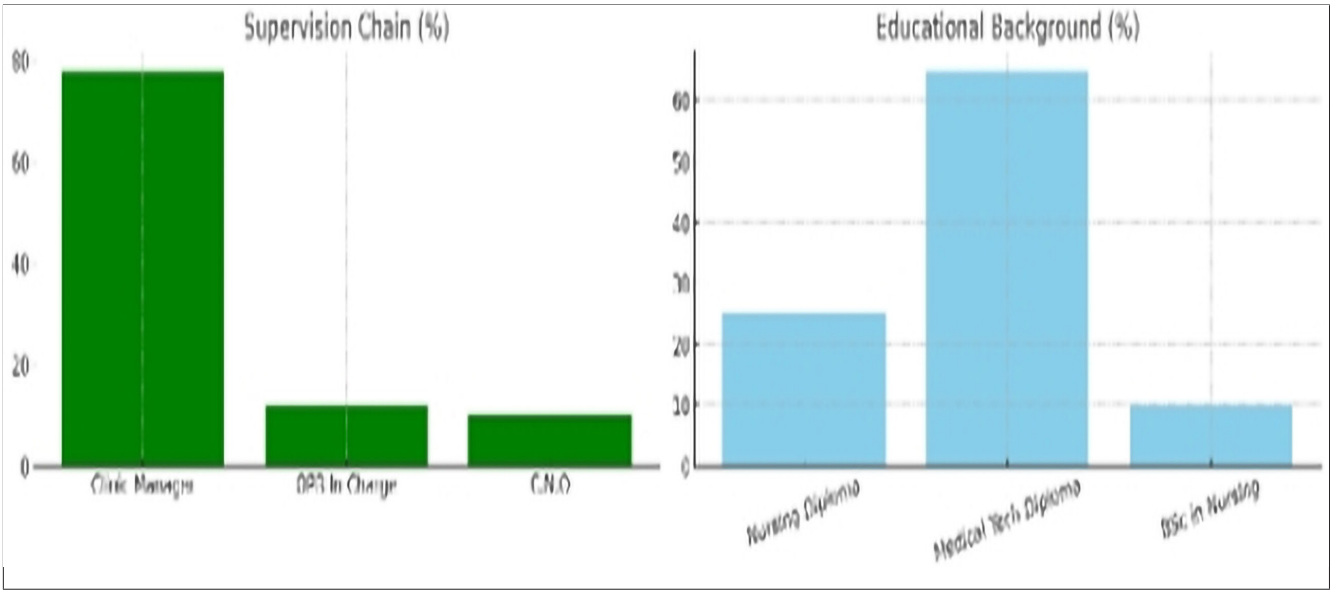

Fig-5: *Supervision chain and Educational background*

DISCUSSION:

The findings highlight both the potential and the challenges in infection prevention and control among biosafety lab workers in private healthcare facilities in Dhaka.

The presence of a younger, educated workforce offers promise, but the lack of structured training and protocol reinforcement undermines infection control effectiveness. Studies show that age and educational level positively impact infection control compliance when reinforced with consistent training and resources.[1,3,5]

The absence of structured training for more than half of the respondents supports the broader literature, which indicates that without institutionalized infection control education, even qualified staff may fail to implement essential procedures effectively.[4,6,9]

The over-reliance on verbal instruction is a major weakness. Infection control procedures require hands-on, practical training using standardized protocols to be effective—especially for procedures like sterilization, PPE use, and waste handling.[7,10,12] International guidelines emphasize the importance of training healthcare personnel with updated, scenario-based approaches.[13,14]

The workload reported (8 hours/day, 6 days/week) creates a risk of protocol fatigue, which may lead to lapses in hand hygiene, PPE adherence, or equipment sterilization [15,19]. Previous studies have shown that high workload correlates with increased hospital-acquired infections due to inconsistent protocol application.20,21 The centralized supervision model with 78% of workers reporting directly to clinic managers could provide a framework for efficient implementation. However, if supervisory staff themselves lack current training or adequate time, the intended benefits are negated. WHO emphasizes managerial accountability and regular refresher courses as core strategies for hospital infection control success [22,23,24]

Respondents' recommendations for infection prevention, especially proper waste disposal and hand hygiene, align with global findings that these practices are among the most effective in reducing HAIs.[8,11,16] However, their effectiveness depends heavily on resource availability and supportive infrastructure which appears limited in the studied facility. Furthermore, inadequate PPE supply, overcrowding, and lack of monitoring mechanisms commonly cited barriers in developing countries were echoed in this study, consistent with regional and international assessments.[9, 18, 25]

CONCLUSION

The study concludes that infection prevention and control still require significant attention. Biosafety laboratory workers are at high risk of cross-infection due to frequent exposure to infectious agents. Therefore, adherence to standard infection control practices is crucial to protect both healthcare workers and patients. Motivational efforts must be implemented across all levels to strengthen infection control measures in healthcare settings.

Recommendations:

1. The gap between the policymakers and the personnel involved in healthcare waste management should be narrowed.
2. The healthcare waste management legislations should be reviewed and re-

modeled in the context of Bangladesh to align with international standards.

3. There is a lack of adequate and effective waste management facilities and infection control mechanisms. Therefore, a specific amount of budgetary allocation must be ensured for the safe disposal of healthcare waste, sterilization, and cleanliness for infection control or prevention.
4. Specialized training in infection control and healthcare epidemiology should be offered to professionals working in biosafety laboratories. Administrators, doctors, nurses, and other healthcare workers must be given adequate training to understand various aspects of healthcare waste management and the consequences of poor infection control practices.
5. Short training manuals should be prepared for various groups of actors involved in biosafety and cleanliness for infection prevention.
6. Health education regarding the safe disposal of waste, the dangers of healthcare-associated infections due to poor infection control practices, and environmental pollution should be provided to patients, visitors, and outpatients.

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