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The Effect of Occupational Protection Training on Disinfection Supply Center Personnel on Reducing the Risk of Nosocomial Infection

Fengjuan Wang[1], Na Zhao[2]*

[1]Disinfection Supply Center, Affiliated Hospital of Hebei University, Baoding 071000, Hebei, China
[2]Endoscopic Diagnosis and Treatment Center, Affiliated Hospital of Hebei University, Baoding 071000, Hebei, China

**Author to whom correspondence should be addressed.*

Abstract: As the core department in medical institutions responsible for cleaning, disinfecting, sterilizing, and supplying reusable medical devices, instruments, and items, the quality of work in the disinfection supply center directly impacts medical safety and infection control effectiveness. Professional protective training for personnel is crucial to ensure operational quality in this department. Systematic training enhances staff awareness of occupational exposure risks, standardizes protective measures in procedures, reduces cross-infection risks caused by improper operations, and ultimately lowers infection transmission risks. This paper analyzes the core content, implementation approaches, and practical role of professional protective training for disinfection supply center personnel in infection control. It aims to clarify the significant value of such training, providing references for medical institutions to optimize disinfection center management and strengthen infection control systems, thereby contributing to improved overall medical safety standards.

Keywords: Disinfection supply center; Occupational protection training; Hospital infection risk; Medical safety; Operation specification

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1. Introduction

Hospital infection control serves as the cornerstone of medical quality and safety. As the central hub for sterile medical supplies, the disinfection supply center must manage critical processes including equipment recycling, cleaning, sterilization, storage, distribution, and efficacy monitoring, making it a key department in infection prevention. However, inspections at various hospital levels reveal persistent weaknesses: inadequate maintenance of disinfection equipment, improper management of medical devices, insufficient hand hygiene protocols, and substandard handling of disposable instruments. Additionally, challenges remain in managing third-party service providers. Strengthening occupational protection training for disinfection staff has become crucial to address these

gaps, reduce infection risks, and ensure both healthcare safety and patient well-being.

2. The core content of occupational protection training for personnel in disinfection supply center

2.1. Occupational exposure risk awareness training

Understanding occupational exposure risks forms the cornerstone of workplace protection. Training programs for disinfection supply centers should focus on typical exposure scenarios in daily operations, helping staff fully grasp risk categories, potential harm, and underlying mechanisms. The training must incorporate biological risks, such as infections caused by pathogenic microorganisms attached to medical devices through skin breaks or mucosal contact; chemical risks from chlorine-based disinfectants and enzyme-based cleaning agents used during sanitization, which may cause skin burns and respiratory discomfort; and physical risks including high-temperature and high-pressure conditions during sterilization equipment operation, as well as collisions or scratches during device handling. By analyzing real-world case studies, staff can identify key risk recognition points: assessing medical device contamination levels helps determine biological risk tiers, consulting chemical safety data clarifies risk attributes, while monitoring equipment parameters detects early signs of physical risks. This approach enables precise risk assessment during practice, providing actionable support for implementing protective measures.

2.2. Standardized operation and protection skills training

Standardized operational protocols and protective measures form the cornerstone of reducing occupational exposure risks. Training programs in disinfection supply centers should strictly adhere to operational guidelines across all work processes, helping staff master proper procedures and protective skills. During cleaning and disinfection phases, training must follow the principle of "categorized cleaning and standardized disinfection", ensuring personnel understand distinct medical device cleaning protocols. For instance, precision instruments require manual cleaning to prevent mechanical damage, while emphasizing proper use of protective equipment like waterproof aprons, goggles, and double-layer gloves during cleaning to avoid chemical or biological exposure from splashes. In sterilization phases, staff must master equipment operation procedures, including pressure steam sterilizer parameter settings, sterilization effectiveness monitoring methods, and post-sterilization item handling standards to prevent operational errors leading to sterilization failures or high-temperature burns. During item distribution and recovery phases, staff should learn sterile transfer techniques. The use of sterile transfer windows is crucial to prevent contact between sterile and non-sterile items. When recovering contaminated medical devices, standardized procedures must be followed, and the use of dedicated sealed containers can effectively prevent pathogen spread [1].

3. Effective implementation path of occupational protection training for personnel in disinfection supply center

3.1. Build a hierarchical training system

Standardized operational protocols and protective measures form the cornerstone of reducing occupational exposure risks. Training programs in disinfection supply centers should strictly adhere to operational guidelines across all work processes, helping staff master proper procedures and protective skills. During cleaning and disinfection phases, training must follow the "categorized cleaning, standardized disinfection" principle, ensuring personnel understand specific protocols for different medical devices. For instance, precision instruments require

manual cleaning to prevent mechanical damage, while emphasizing the proper use of protective equipment like waterproof aprons, goggles, and double-layer gloves during cleaning to avoid chemical or biological exposures from splashes. In sterilization phases, staff must become proficient in equipment operation procedures, including pressure steam sterilizer parameter settings, sterilization effectiveness monitoring methods, and post-sterilization item handling standards to prevent sterilization failures or high-temperature burns. During item distribution and recovery phases, staff should learn sterile transfer techniques. The use of sterile transfer windows is crucial to prevent contact between sterile and non-sterile items. When recovering contaminated medical devices, standardized procedures must be followed, and dedicated sealed containers should be used to prevent pathogen spread.

3.2. Innovative training methods

Traditional theoretical teaching models fail to meet the practical demands of occupational protection training for disinfection supply center personnel, making it imperative to innovate training methods and approaches to enhance precision and effectiveness. An integrated model combining "theory + hands-on practice + simulation drills" proves particularly valuable. Theoretical components utilize multimedia courseware and video tutorials to visually demonstrate operational protocols and risk scenarios. Practical sessions are conducted in simulated workrooms equipped with equipment matching real-world operational environments, where staff members personally participate in cleaning, disinfection, and sterilization processes under instructors' on-site guidance to correct improper techniques. Simulation drills simulate emergency scenarios, enabling staff to practice crisis management and improve response capabilities [2]. Digital platforms facilitate online training by uploading course materials and operational videos for self-paced learning. Real-time tracking of learning outcomes through online assessment modules ensures effective knowledge retention.

3.3. Improve the training assessment and feedback mechanism

Training assessment and feedback serve as crucial mechanisms for ensuring training quality. A comprehensive evaluation system should be established to assess staff training outcomes, covering both theoretical knowledge and practical skills. Theoretical assessments are conducted through closed-book exams focusing on staff's understanding of occupational exposure risks and operational protocols, while practical assessments employ on-site evaluations where professional examiners score staff performance in cleaning disinfection, sterilization, emergency response, and other procedures according to predefined standards. Timely feedback on results is essential to identify areas needing improvement, such as weak theoretical foundations or insufficient practical skills, enabling the development of customized remedial training plans. Additionally, a training effectiveness tracking mechanism should be implemented. Regular spot checks of staff performance should monitor compliance with operational protocols and protective measures, analyze the actual application of training content, and adjust training programs accordingly. This closed-loop management approach ensures continuous improvement in training quality.

4. The effect of occupational protection training on disinfection supply center personnel on reducing the risk of nosocomial infection

4.1. Improve the protection awareness of staff and reduce human operation errors

The systematic implementation of occupational protection training has expanded healthcare professionals' understanding of occupational exposure risks, significantly enhancing their protective awareness. This cognitive

shift has established proper prioritization of safety measures, enabling proactive risk mitigation [3]. In practice, medical staff strictly adhere to operational protocols to prevent human error caused by complacency or carelessness. Standardized protective equipment usage effectively eliminates mucosal infections from cleaning solution splashes without goggles, while rigorous sterilization procedures ensure optimal efficacy through accurate parameter settings. These measures block substandard medical devices from entering clinical use, effectively reducing cross-infection risks through minimized human error. By preventing direct contact between contaminated instruments and sterile items, the system reduces microbial transmission pathways in healthcare environments, thereby establishing a fundamental safety barrier for infection control in medical institutions.

4.2. Standardize the operation process and ensure the quality of medical device processing

Occupational safety training is closely integrated with standardized operational protocols across all stages of the disinfection supply center. After training, staff members can skillfully apply correct procedures and handle medical devices according to standardized workflows, ensuring quality control throughout the processing phase. During cleaning and disinfection, operations strictly follow the basic principle of classified cleaning to thoroughly remove contaminants from medical device surfaces, minimizing pathogen residues. Sterilization processes involve precise control of equipment operation modes and monitoring parameters to ensure compliance with established standards, ultimately achieving qualified sterilization results. For sterile item storage and distribution, strict adherence to management regulations prevents external contamination [4]. The improvement in medical device handling quality directly enhances clinical safety, effectively reducing hospital-acquired infections caused by pathogen-carrying devices. Incidents such as surgical site infections from substandard instrument sterilization or related infections from contaminated infusion sets are significantly controlled, establishing robust safeguards for patient care.

4.3. Strengthening emergency response capacity and reducing the risk of post-exposure infection

Occupational safety training equips healthcare workers with emergency response skills to swiftly implement protective measures during occupational exposure. This systemically reduces infection risks through standardized protocols: When skin contact occurs with contaminated medical devices, immediately rinse wounds with running water and disinfect using antiseptics like povidone-iodine. Following proper reporting procedures, staff receive medical interventions including vaccinations and prophylactic medications. In chemical incidents, immediate isolation measures prevent spill dispersal while containing contaminants through regulated decontamination methods to minimize harm. Enhanced emergency preparedness not only lowers infection risks for workers but also prevents pathogen spread through improper post-exposure management. For example, it stops healthcare workers from becoming virus carriers who might transmit infections to colleagues or patients, effectively cutting off potential hospital-acquired infection transmission chains at its source.

5. Conclusion

Occupational protection training for disinfection supply center personnel is a critical component of hospital infection control initiatives. By clarifying core training objectives and optimizing implementation pathways, this program plays a pivotal role in enhancing staff awareness of protective measures, standardizing operational procedures, and improving emergency response capabilities. These efforts effectively reduce infection risks.

Medical institutions must fully recognize the significance of such training, establish scientifically sound frameworks tailored to their operational realities, innovate training formats, strengthen assessment mechanisms, and continuously improve outcomes. High-quality occupational protection training elevates the overall performance of disinfection centers, reinforces the critical barrier against hospital infections, safeguards patient and healthcare worker safety, and lays a solid foundation for sustainable institutional development. Moving forward, deeper integration between occupational protection training and infection control measures should be pursued, with continuous refinement of training content and methodologies to meet evolving demands in medical practice and infection prevention.

Disclosure statement

The authors declare no conflict of interest.

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