



ENHANCING INFECTION CONTROL IN OPHTHALMOLOGY DEPARTMENTS THROUGH EFFECTIVE ARCHITECTURAL PLANNING

Ophthalmology

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ABSTRACT

With delicate ocular tissues and proximity to vulnerable mucous membranes, the eye is highly susceptible to infections that can lead to vision impairment or even blindness. The sensitive nature of ocular procedures, including surgeries and injections, further emphasizes the need for stringent infection control practices to prevent the introduction of pathogens. The high patient turnover in these departments amplifies the risk of cross-contamination, making proper infection control measures essential to safeguard both patients and healthcare personnel. Traditional infection control strategies often focus on medical procedures and personnel hygiene, while the role of architectural design remains underemphasized. This study investigates the potential of architectural planning to mitigate infection risks and improve patient safety in ophthalmology departments. The research combines principles of infection control, healthcare design, to propose innovative architectural strategies by analyzing ophthalmology department methods and literature related to infection control. After the study, it was found that infection control can be implemented through 7 methods which are segregation of spaces, Optimized Ventilation Systems, Seamless Surfaces and Materials, Hand Hygiene Stations, Dedicated Sterilization Areas, Enhanced Waste Management, Patient Privacy, and Physical Distancing which introduces a holistic approach to infection control in the ophthalmology department/center/hospital.

KEYWORDS

Infection Control, Ophthalmology Design, Ophthalmology layout, Ophthalmology architectural plan, Ophthalmology planning, Ophthalmology layout planning, Ophthalmology space design

INTRODUCTION

The importance of infection control within ophthalmology departments cannot be overstated. Infection control is a critical aspect of healthcare facilities, and ophthalmology departments are no exception. Due to the high volume of patient interactions and delicate eye procedures performed, the potential for serious eye infections, and the risk of cross-contamination is high, making it crucial to implement effective strategies to maintain a safe environment for patients and healthcare professionals prioritizing infection prevention. The design of ophthalmology departments are more focused on efficient planning aspect rather than infection control. Although, one of the most effective approaches to bolstering infection control is through thoughtful architectural planning. This article focuses on the architectural layout of the department with the aspect of infection control to ensure the safety of patients, staff, and visitors and reduce the risk of infections acquired in healthcare facilities.

METHODOLOGY

Preset literature on the subject of infection control in ophthalmology wards of hospitals was reviewed and qualitative research was performed along with unstructured interviews and discussions with 10 healthcare architects (who had designed ophthalmology departments/centers/hospitals with minimum experience of over 5 years in designing healthcare facilities) and 10 doctors (who have served in the ophthalmology department at any hospital for more than 5 years) to carry out results. Peer-reviewed research articles and books were considered indexed with Scopus, Web of Sciences, and Pubmed.

Findings

Segregation Of Patient Flow

An essential element of effective architectural planning in ophthalmology departments is the segregation of patient flow. The facility's layout should be designed in a way that minimizes contact between potentially infectious patients and those who are immunocompromised or undergoing surgical procedures. This can be achieved by an innovative approach gaining traction in the medical community: the segregation of patient flow within ophthalmology departments. Healthcare facilities can improve infection control measures and provide efficient and quality care by organizing patients based on their eye conditions, urgency of treatment, and infection risk. This can be achieved through the creation of separate waiting areas and examination rooms for patients with contagious eye conditions (Boon Lin Teh, 2020).

The Significance of Infection Control in Ophthalmology

Ophthalmology departments deal with a wide range of eye conditions, from routine eye exams to more complex procedures such as cataract surgeries and corneal transplants. With such diversity, the risk of infection transmission can be amplified if proper precautions are not in

place (Seewoodhary, 1999). Eye infections can lead to severe consequences, including vision loss and other complications, making infection control a top priority in these medical settings. Common sources of infection transmission in ophthalmology departments include contaminated equipment, surfaces, and the close proximity between patients in waiting areas. This necessitates the implementation of comprehensive infection control measures to minimize the spread of infectious agents and protect both patients and healthcare staff.

Understanding Segregation of Patient Flow

Segregation of patient flow involves categorizing patients into distinct streams based on various criteria, such as the type of eye condition, urgency of treatment, and infection risk. By organizing patients in this manner, ophthalmology departments can effectively manage patient traffic, reduce waiting times, and minimize the potential for cross-contamination (Pan, 2015).

Key Strategies for Enhancing Infection Control

1. **Triage and Pre-Screening:** Upon arrival, patients can be triaged and pre-screened based on their symptoms and risk factors. Those with potential infectious conditions can be immediately isolated from others to prevent transmission (Korobelnik, 2020) (Boon Lin Teh, 2020).
2. **Separate Waiting Areas:** Designated waiting areas for patients with contagious eye infections can prevent the spread of pathogens to healthy individuals. These areas should be equipped with proper ventilation and facilities for hand hygiene (Korobelnik, 2020).
3. **Timely Disinfection:** Frequent disinfection of high-touch surfaces, such as doorknobs, chairs, and examination equipment, is essential in reducing the risk of cross-contamination (Dart JKG, 2009).
4. **Personal Protective Equipment (PPE):** Healthcare professionals should wear appropriate PPE, including masks, gloves, and eye protection when interacting with patients, particularly those with infectious eye conditions (Tang, et al., 2020).
5. **Enhanced Hand Hygiene:** Encouraging patients and staff to practice thorough handwashing or use alcohol-based hand sanitizers can further decrease the likelihood of infection transmission.
6. **Isolation of High-Risk Patients:** Patients with severe eye infections or compromised immune systems should be isolated and treated in separate rooms or designated areas to prevent the spread of infections to others (Korobelnik, 2020).

Benefits of Implementing Segregation

7. By integrating the segregation of patients into their infection control protocols, ophthalmology departments can reap several

benefits:

8. Improved Patient Safety: Minimizing the risk of cross-contamination enhances patient safety, reducing the likelihood of acquiring secondary infections during treatment.
9. Enhanced Efficiency: Organizing patient flow enables ophthalmology departments to optimize resource allocation, leading to smoother operations and reduced waiting times.
10. Increased Patient Satisfaction: Patients will appreciate the additional safety measures implemented, resulting in heightened satisfaction with the care they receive.
11. Lower Staff Exposure: Segregation of patients with infectious conditions helps protect healthcare professionals, reducing their exposure to potentially harmful pathogens.

Optimized Ventilation Systems

Incorporating state-of-the-art ventilation systems is crucial for maintaining a clean and pathogen-free environment within the ophthalmology department. High-efficiency particulate air (HEPA) filters can help trap airborne particles, including viruses and bacteria, reducing the risk of airborne transmission. The strategic placement of air vents and exhaust systems can aid in removing potentially contaminated air from treatment areas, ensuring a constant flow of fresh, filtered air (Hiroshi Ueki, 2022).

Seamless Surfaces and Materials

Smooth and non-porous surfaces in architectural design are easier to clean and disinfect, helping to prevent the buildup of infectious agents. Using antimicrobial materials and coatings can provide an extra layer of protection against bacterial growth. Flooring choices are also important, with options like seamless vinyl or linoleum being preferable due to their ease of cleaning and maintenance.

Hand Hygiene Stations

Strategically placing hand hygiene stations throughout the ophthalmology department encourages regular hand washing and sanitizing among patients, staff, and visitors. Proper hand hygiene is one of the most effective ways to prevent the spread of infections, and architectural planning should ensure that these stations are easily accessible and conveniently located in high-traffic areas (Abbas, Lian, & Afshari, 2020).

Dedicated Sterilization Areas

Designating specific areas for sterilization of equipment and instruments is essential for maintaining a hygienic environment (Emmett F. Cappel, 2012). These spaces should be isolated from patient care areas to prevent cross-contamination. Integrating modern sterilization equipment and practices into the architectural plan can streamline the disinfection process, ensuring that ophthalmic instruments are always ready for safe use.

Enhanced Waste Management

Infection control efforts extend to waste management practices within the department. Architectural planning should include designated areas for the proper disposal of hazardous waste, such as used gloves, masks, and contaminated materials. These waste disposal areas must adhere to strict guidelines and regulations to ensure the safe removal and disposal of potentially infectious materials.

Patient Privacy and Physical Distancing

It is crucial to prioritize patient privacy not only for ethical reasons but also to control the spread of infections. To minimize the risk of transmission, private examination rooms and consultation spaces should be provided. Furthermore, architectural planning should consider physical distancing measures that may be necessary during outbreaks or pandemics. This will prevent overcrowding and close contact between patients (Williams, 2020).

CONCLUSION

Infection control is critical in healthcare, especially in ophthalmology departments where eye infections can lead to severe consequences. Healthcare facilities can greatly improve infection control measures and provide safe and efficient care to patients by segregating patient flow. When these strategies are combined with proper adherence to guidelines and protocols, patients, healthcare professionals, and visitors can enjoy a safer environment. This ultimately contributes to the success of ophthalmology departments in maintaining and restoring vision while maintaining the highest standards of care.

Effective architectural planning plays a pivotal role in enhancing infection control measures within ophthalmology departments. Healthcare facilities can create a safer and more hygienic environment by prioritizing patient flow segregation, optimizing ventilation systems, using seamless surfaces, providing hand hygiene stations, dedicating sterilization areas, and implementing enhanced waste management and patient privacy. These measures will help ensure the safety and well-being of patients in the facility. This proactive approach can significantly reduce the risk of infections, safeguarding the health of patients, healthcare workers, and visitors alike. Through thoughtful architectural design, ophthalmology departments can continue to provide exceptional care while minimizing the potential spread of infectious diseases.

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