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HEALTHCARE FACILITY DESIGN PROFESSIONAL

HFDP OVERVIEW

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MODULE

3

Health and Built Environment

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HEALTHCARE FACILITY DESIGN PROFESSIONAL HFDP OVERVIEW

The built environment, including buildings, transportation systems, parks, and urban layouts, plays a crucial role in shaping human health outcomes. Understanding the complex connections between the built environment and health is essential for urban planners, architects, public health professionals, and policymakers to enhance community well-being.

Learning Objectives

- Introduction and Course Outline
- General Elements of Healthcare
- Health and built environment
- Health Care HVAC System Design Standards and Guidelines
- Certified Healthcare Facility Design Specialist Certification
- Testing, Balancing, and Commissioning
- Summary and Resources
- HFDP Practice Test V.4.1_Test Your Knowledge



INTRODUCTION

Definition and Components of the Built Environment

- The built environment includes residential, commercial, and institutional structures, transportation systems, public spaces, and infrastructure.
- Urban vs. Rural Built Environments: Urban areas have dense housing, extensive public transportation networks, and limited green spaces, leading to issues like air pollution and sedentary lifestyles.

LINKING THE BUILT ENVIRONMENT TO HEALTH OUTCOMES +



- **Physical Activity:** The design of neighborhoods significantly influences physical activity levels. Walkable communities encourage active transportation modes and reduce the risk of obesity and chronic diseases.
- **Air Quality:** The built environment can contribute to air quality issues due to vehicle emissions, industrial activities, and poor urban planning. High traffic volumes often lead to elevated levels of particulate matter and nitrogen dioxide, associated with respiratory diseases like asthma and chronic obstructive pulmonary disease (COPD).
- **Mental Health:** Access to green spaces and natural environments has been associated with improved mental health outcomes, including reduced stress, anxiety, and depression.
- **Vulnerable Populations and Health Disparities:** Vulnerable populations, including low-income communities, racial and ethnic minorities, and individuals with disabilities, often face greater environmental hazards and limited access to health-promoting resources.

POLICY IMPLICATIONS AND INTERVENTIONS

- To leverage the built environment for improved health outcomes, policymakers and planners must adopt a multi-faceted approach including zoning regulations, transportation planning, and community engagement.
- A comprehensive understanding of the relationship between the built environment and health is crucial for designing communities that promote well-being.



THE INTERRELATIONSHIP BETWEEN MEDICAL EQUIPMENT AND HVAC DESIGN

Introduction to Medical Equipment and HVAC Systems

- Medical equipment and HVAC systems are crucial for patient safety, comfort, and operational efficiency in healthcare facilities.
- HVAC systems regulate the internal environment of healthcare facilities, while medical equipment includes devices used for patient diagnosis, monitoring, and treatment.



THE RELATIONSHIP BETWEEN MEDICAL EQUIPMENT AND HVAC DESIGN

- Air Quality and Infection Control: HVAC systems maintain air quality and control the transmission of airborne pathogens. Medical equipment, especially in operating rooms, requires stringent air quality standards to mitigate infection risks.
- Temperature and Humidity Control: HVAC systems must maintain optimal temperature ranges for the reliable functioning of diagnostic imaging devices.
- Energy Efficiency and Equipment Load: Medical equipment energy consumption significantly impacts a healthcare facility's overall energy efficiency. High-powered imaging equipment generates substantial heat, necessitating enhanced cooling measures in the HVAC system.





BASIC MEDICAL EQUIPMENT

- Diagnostic Equipment: ECG Machines, Ultrasound Machines, Patient Monitors, Infusion Pumps, Ventilators, Dialysis Machines, Surgical Lights and Tables, and Anesthesia Machines: These devices require stable power supply, specific environmental conditions, and proper ventilation.
- Therapeutic Equipment: Ventilators, Dialysis Machines, Surgical Lights and Tables, and Anesthesia Machines: These require specific air quality and humidity control, and HVAC system management to prevent condensation and ensure equipment longevity.



INTEGRATING ROOM DESIGN AND HVAC SYSTEMS IN HEALTHCARE

Understanding Medical Procedures

- Medical procedures involve a range of activities performed by healthcare professionals to diagnose, treat, and manage patient health.
- Understanding these procedures is crucial for designing spaces that facilitate efficient workflows, enhance patient safety, and promote a positive patient experience.

Room Design Considerations

- **Functionality:** Each room must support the procedures conducted there.
- **Workflow Optimization:** The layout should promote an efficient flow of personnel and materials.
- **Infection Control:** In procedures involving invasive techniques or exposure to bodily fluids, the design must incorporate infection control measures.
- **Patient Comfort and Safety:** Medical environments should mitigate patient anxiety and ensure safety.





INTEGRATING ROOM DESIGN AND HVAC SYSTEMS IN HEALTHCARE +



Surgical Suite Design

- Spatial Layout: The surgical suite should include the operating room, sterile storage, scrub areas, and recovery rooms.
- Equipment Integration: Surgical teams must strategically place surgical tables, anesthesia machines, and monitoring devices to ensure optimal access.
- Lighting and Acoustics: Proper lighting is critical in surgical environments.

Application of HVAC Design to Medical Functional Areas

- Air Quality and Filtration: The HVAC system must include high-efficiency particulate air (HEPA) filters to capture airborne pathogens.
- Pressure Control: Different areas of a healthcare facility may require varying air pressure levels to prevent the spread of contaminants.
- Temperature and Humidity Control: Maintaining an optimal temperature (usually between 68°F and 75°F) and relative humidity (30 to 60 percent) is essential for patient comfort and the proper functioning of medical equipment.
- Ventilation Rates: The ventilation rate in healthcare facilities is typically higher than in standard buildings to ensure adequate fresh air circulation.

DEMOCRATIC DEPARTMENT HVAC +

- Zoning: HVAC systems must be designed to accommodate fluctuating patient volumes and the varying types of care required.
- Integration with Medical Equipment: The HVAC design must account for the variables that utilize specialized medical devices that generate heat or require specific environmental conditions.
- Emergency Power Considerations: HVAC systems with redundancy and backup power options are required to ensure continuous operation during power failures.



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