Infrastructure Design for Reduced Patient Readmissions

Smart infrastructure investments to improve patient health and safety.
Introductions

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Healthcare-associated Infections (HAIs) increase frequency of patient readmission

Readmissions cost healthcare providers out of their own pockets

Length of stay may increase 2-3 weeks

65% of the cost of Medicare readmissions annually is considered “avoidable”

Top 5 HAIs combined cost $9.8 billion annually

Background
Air Flow Design to Reduce HAIs

Settings:
- Operating Rooms
- Emergency Departments
- Protective Isolation Rooms

Requirements:
- Minimum air changes (ACH)
- Laminar flow design - ORs
- Space pressurization

Solutions:
- “Right-sizing” of flow rate and space footprint
- Integrated Ceiling Systems - ORs
- Flexible suite layout
Look beyond standard filtration designs

MERV ratings vs. efficiency percentage

Alternatives:
- Zone based filtration
- Electrostatic filtration
- UV/UVC light
- Gas phase air filtration (activated carbon)

Considerations:
- Energy impact
- Maintenance
Sterile Operations

- Guidelines:
  - ASHRAE 170
  - USP 795 / 797 / 800
- Pressurization:
  - Supply and return air volume control
  - Room layout and construction
  - Energy Considerations
- Staff Interface:
  - Materials and program
  - Monitoring
  - Training
  - Temporary Operations

Providing unoccupied airflow setback capability can reduce HVAC energy costs in operating suites by as much as 60% to 70% during off-hours.
Water Treatment

- At the source
  - UV light disinfection
  - Copper-silver ionization
  - Ultrafiltration
- Point-of-Use
  - Instantaneous Water Heaters
- ASHRAE 188 - Legionella management
- Humidification

A minor reduction in water quality, or minimal contamination at the source, can impact an entire facility.
Improved Patient Healing Environments

Length of stay directly correlates to HAI risk

- Supportive healing environments

Lighting

- Natural
- Customizable and adjustable LED systems

Noise

- Isolation
- Consistency

Illustration 6: Example of a patient room utilizing a combination of natural and artificial light (Source: Baylor Medical Center at McKinney)
Infrastructure improvements can be localized (opportunistic) or part of a major upgrade

- Careful planning required
- Leverage concurrent energy savings opportunities
- Similar concepts apply to ambulatory settings
- Improved environments *improve patient experience*

**Final thought...consider that:**
*One surgical site infection costs a hospital $20,800 in net earnings or $267,000 in lost revenue, which is equivalent to income from 22 baby delivery procedures!*