Scientific Summary
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Scientific Summary: CDC/HICPAC Guidelines for Environmental Infection Control in Health-Care Facilities & Sterybox Report

Background & Scope

Airborne transmission of pathogens in healthcare settings—particularly *Mycobacterium tuberculosis*, varicella-zoster virus, influenza, and opportunistic fungi such as *Aspergillus* spp.—poses a significant risk for nosocomial respiratory infections. Environmental infection-control guidelines issued by the U.S. CDC (Centers for Disease Control and Prevention) and HICPAC (Centers for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee) emphasize engineering controls (ventilation, filtration, and supplemental air-cleaning) to prevent these infections in both airborne infection isolation (AII) and protective environment (PE) rooms.

CDC Guidelines for Air Disinfection

1. Ventilation & Filtration
    - Air Changes per Hour (ACH): New-construction AII and PE rooms require ≥12 ACH; existing rooms ≥6 ACH.
    - HEPA Filtration: Use fixed or portable HEPA units to achieve ≥12 ACH equivalent when augmenting HVAC systems; maintain filters per manufacturer recommendations and replace when differential pressure indicates loading.

2. Ultraviolet Germicidal Irradiation (UVGI)
    - Applications:
        - Duct Irradiation: UV lamps within return-air ducts inactivate bacteria and viruses before air recirculation.
        - Upper-Room Irradiation: Ceiling- or wall-mounted fixtures create an irradiated upper-air zone, relying on convective air mixing to expose pathogens to germicidal UV–C (253.7 nm).
    - Efficacy: UVGI can provide an equivalent of 10–39 ACH against bacteria and viruses, though its fungicidal effect on spores is limited; optimal performance depends on adequate air mixing and regular lamp maintenance.
    - Limitations: UVGI is not a substitute for HEPA filtration or negative-pressure isolation; it serves strictly as a supplemental control.

Sterybox UV-CHRIS Air Disinfection Technology

1. Design & Mechanism
    - UV-CHRIS Coil System: A patented spiral (coil) labyrinth in mirrored stainless steel reflects and amplifies UV-C irradiation fourfold, ensuring near-complete exposure of passing air to 254 nm germicidal light.
    - Filterless Operation: By eliminating filters, Sterybox avoids microbial retention and growth on filter media.
2. Microbiological Efficacy
    - Laboratory Chamber Tests:

        - Bacterial/spore aerosols reduced by 80 % within 10 min, 95 % within 20 min, and 99.99 % within 30 min.
    - Pathogen-Specific Challenges:
        - 100 % inactivation of *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Salmonella*, *Listeria*, *Aspergillus niger*, and *Candida albicans* within 12 min.
    - Clinical Validation: In busy hospital and dental clinic environments, airborne bacterial loads decreased > 95 % within 30 min of operation.
3. Safety & Operational Parameters
    - Ozone Emissions: < 100 µg/m³ at outlet and 5 m distance—well below harmful thresholds cite turn1file19.
    - Noise Levels: 52.4 dB at 1 m and 37.7 dB at 5 m, suitable for patient-care environments.
    - Maintenance: UV-C lamps replaced every 8,000 hours; safety interlocks prevent operator exposure.

Complementarity with CDC Guidelines

- Supplemental Role: Sterybox's UV-CHRIS system aligns with CDC recommendations for UVGI as an adjunct to ventilation and HEPA filtration, providing equivalent germicidal air changes (10–39 ACH) without recirculation of untreated air.
- Integration: Wall-mounted or mobile Sterybox units can be deployed in corridors, anterooms, or patient-care areas lacking sufficient UVGI

infrastructure, augmenting central HVAC controls and reducing airborne pathogen burden.

- Nosocomial Infection Prevention: By inactivating bacteria, viruses, and spores in the breathing zone, Sterybox directly addresses guidelines' objectives to prevent airborne nosocomial infections, including ventilator-associated pneumonia and invasive fungal disease in immunocompromised patients.

Conclusion

Sterybox's patented UV-CHRIS air disinfection device provides a scientifically validated, safe, and maintenance-friendly UVGI solution that complements existing engineering controls. Its performance meets or exceeds CDC-specified supplemental UVGI criteria—and thereby aligns with best practices for the prevention and reduction of airborne nosocomial respiratory infections in hospital settings.

References

- https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf (Updated: July 2019)
- http://tissimedica.com/wp-content/uploads/2025/02/SCIENTIFIC-REPORT-SUMMARY-ON-STERYBOX-2025.pdf