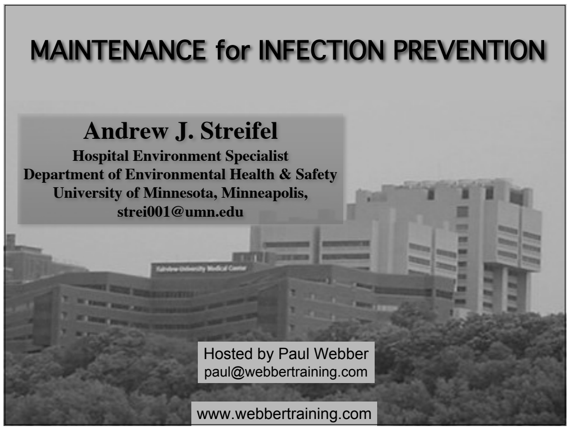
Maintenance for Infection Prevention
Andrew Streifel, University of Minnesota
A Webber Training Teleclass



Regulatory Resources to be Incorporated:
External Jurisdiction:
Includes all applicable building codes and:

- AIA Guidelines: 2006, AIA Guidelines for Design and Construction of Health Care Facilities. American Institute of Architects.
- CDC Guidelines for Environmental Infection Control
- MDH: Minnesota Department of Health also expects the facility to be aligned with current CDC and AIA standards.
- OSHA & NIOSH
- Association for the Advancement of Medical Instrumentation (AAMI)
- Association for Professionals in Infection Control and Epidemiology (APIC)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE): HVAC Design manual for Hospitals and Clinics
- Centers for Medicare and Medicaid Services (CMS)
- Health Care Resources Service Administration

Current Regulations and Guidelines

- Joint Commission on Accreditation of Heathcare Organizations
- Guidelines for the Design and Construction of Hospital and Health Care Facilities (mandated by state law)
- CDC -Guidelines on Environmental Infection Control
- State Licensure (in many states)
- HRSA - Healthcare Resource Services Administration
- NIOSH - Protecting Building Environments

The Joint Commission

- A Private Not-for-profit Organization
- Environment of Care Standards on Utilities Management EC.7.10
- Environment of Care Standards on Construction Risk Assessment EC8.30
- New in 2006, unannounced surveys
- Continued use of an engineering surveyor for all hospitals over 200 beds
- National Patient Safety Goal on Infection Control

The Joint Commission - EC.8.30

- Demolition, Construction, or Renovation
- Proactive Risk Assessment
- Identify hazards that could potentially compromise patient care
- Address impact on:
  - Air quality requirements
  - Infection control
  - Utility requirements
  - Noise and vibration
  - Emergency procedures

TJC-EC7.10

- Infection Control Systems
- Utilities
- Ventilation
- Plumbing
- Functionality

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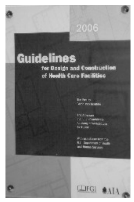
AIA 2006 Guidelines for Design And Construction of Hospitals & Health Care Facilities

- Latest in a 60-year series of guidelines specific for design and construction of hospital and other health care facilities
  - Nursing Facilities; Outpatient Facilities
  - Rehabilitation Facilities; Psychiatric Hospitals
  - Mobile, Transportable, and Relocatable Units
  - Hospice Care; Assisted Living
  - Adult Day Care Facilities
  - Glossary Tables

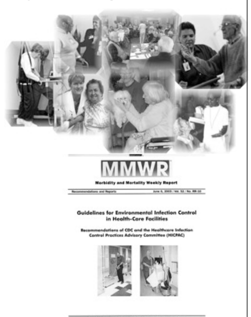


AIA 2006 Guidelines for Design and Construction of Hospital & Health Care Facilities

- Consensus document; developed by
  - Engineers, architects, clinicians
  - Representatives of professional organizations
  - e.g. AIA, ASHRAE, ASHE, APIC, JCAHO
  - 23 AHJs representatives [authorities having jurisdiction]
  - Dept Health and Human Services (HHS)
  - CDC and NIOSH
- Regulatory document
  - Over 40 states and local healthcare licensing agencies have adopted into their standards
  - JCAHO accreditation- references AIA
- 2006 version Infection Control Risk Mitigation Recommendation
  - 2010 comment period

Guidelines for Environmental Infection Control in HCF

- Seven major areas covered:
  - Air
  - Water
  - Environmental Services
  - Environmental Sampling
  - Laundry and Bedding
  - Animals in Healthcare Facilities
  - Regulated Medical Waste
- MMWR 6-03 was <u>partial</u> document
- 249 pg. with >1400 citations
- Appendices A – F



Old fashioned way of isolating patients

Complex ventilation systems for healthcare facilities

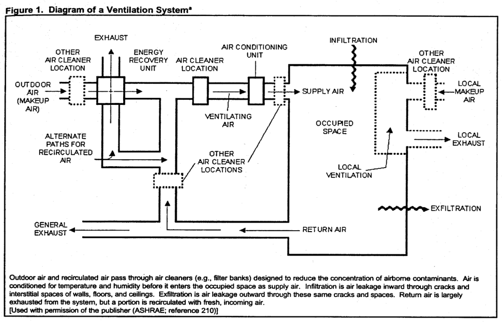
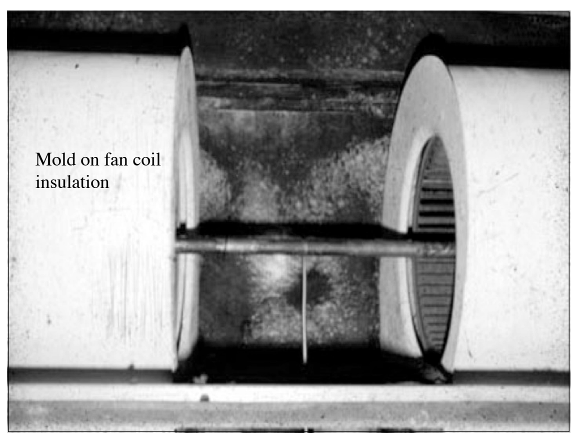


Figure 1. Diagram of a Ventilation System[a]

Outdoor air and recirculated air pass through air cleaners (e.g., filter banks) designed to reduce the concentration of airborne contaminants. Air is conditioned for temperature and humidity before it enters the occupied space as supply air. Infiltration is air leakage inward through cracks and interstitial spaces of walls, floors, and ceilings. Exfiltration is air leakage outward through these same cracks and spaces. Return air is largely exhausted from the system, but a portion is recirculated with fresh, incoming air.
[Used with permission of the publisher (ASHRAE; reference 210)]



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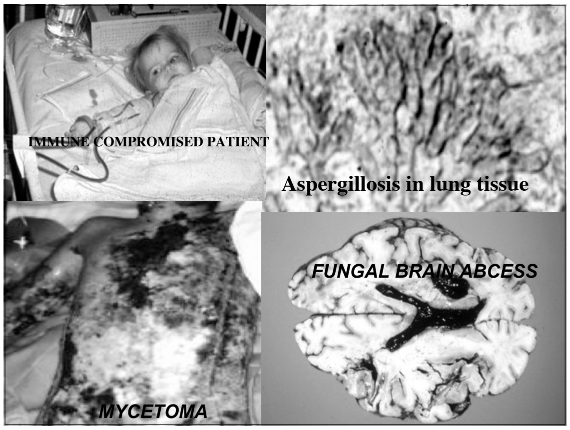

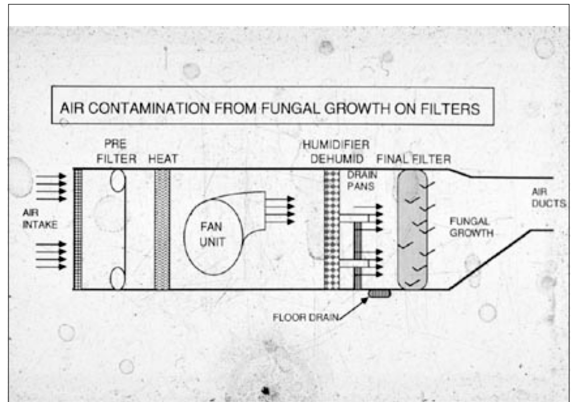

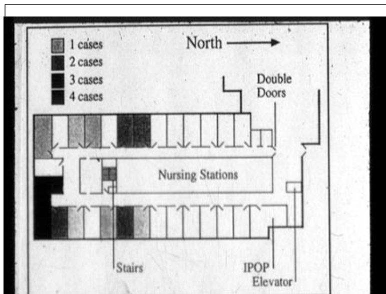

FIGURE 1. Schematic floor plan of the third floor bone marrow transplant unit. The second floor, which houses the leukemia unit, is identical in layout. The number of cases in each room is indicated by variable shading, and the cases in the two floors have been combined for the figure. Fourteen of the 21 cases were in the southeast corner of the floor, near the door to the central stairwell. The inpatient-outpatient clinic is labeled as IPOP. The entrance through the double doors is located on the northern end of the floor.

Thio, CL, et.al., ICHE vol21 p18, Jan 2000

Depressurized building and patient rooms
21 cases Aspergillosis

Summary of Outbreak Analysis

- Environmental disruption causes release of opportunistic microbes
- Lack of adequate ventilation
- Point source of microbial contamination
- Minimal protective measures
- Institution of protective measures reduces infection:construction management, masking, filtration, pressure control and procedural practice
- Infection Control Risk Assessment is necessary for patient risk reduction

Maintenance & Environmental Infection Control

- Air
- Water
- Hazardous items

Healthcare Air Quality

- Fungi
  - Common with body temperature incubation
- Bacteria
  - Human shed microbes
- Virus
  - Embedded virus in sputum droplet nuclei
- Particles
  - Surrogate real time measurement

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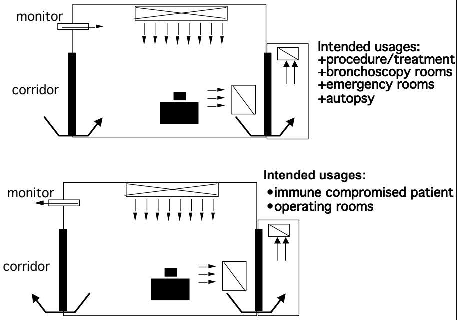
Negative Pressure Room for Airborne Infection Isolation



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Editorial

In With the Good Air

Andrew J. Streifel, MPH

Validation of ventilation parameters:
- -air exchanges
- -pressure (airflow direction & intensity)
- -filtration

Verification of Special Ventilation Rooms

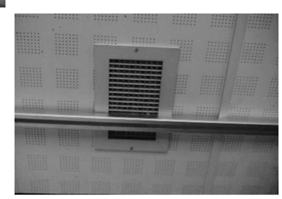
Commissioning Guidelines

Design Parameters	Airborne Infection	Protective Environment
•Air Changes per hour	>12	>12
•Filtration		
-supply	90% dust spot	99.97%@0.3um
-return	99.97%@0.3um or 100% exhaust	back through filter
-toilet	100% exhaust none	100% exhaust
•Supply vs exhaust offset	>125cfm	>125cfm
•Airflow direction	in	out
•Pressure differential	≥0.01" W.G.	≥0.01" W.G.
•Minimal room leakage	≤0.5sq.ft	≤0.5sq.ft.

Ventilation deficiencies can affect airflow direction

Flexible duct not properly installed caused condensation & mold

What is wrong with this picture??



Buildings age when the ventilation is turned on

Which duct moves more air?

What ways do we have to monitor airflow and pressure?

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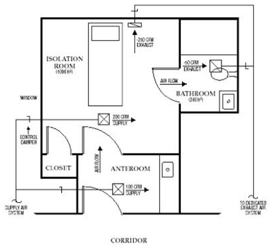
AIR BALANCE VALIDATION

Special Ventilation Rooms: AIIR, PE, OR & Procedure Rooms



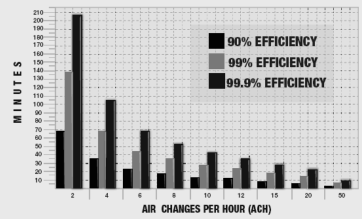
- -Supply and exhaust/return location
- -validate volumes
- -seal room for efficiency
- -validate pressure differential
- -assure filter installation
- -determine air exchanges/hour
- -if necessary; age of air for room particle removal

FIGURE 2 ACH AND TIME REQUIRED FOR REMOVAL EFFICIENCIES

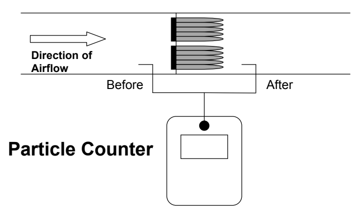
90%, 99% and 99.9% of Airborne-Contaminants Time (minutes) required for removal:

ACH	90% EFFICIENCY	99% EFFICIENCY	99.9% EFFICIENCY
2	69	138	204
4	35	69	104
6	23	46	69
8	17	35	52
10	14	28	41
12	12	23	35
15	9	18	28
20	7	14	21
50	3	6	8

Modified from Table B.1
CDC Guidelines for Environmental Infection Control in Health-Care Facilities, 2003[4]



Removal Efficiency In-Situ by Particle Size and Resistance to Flow



Depiction of particle counts before and after filtration in air handling system

---

Examples of data interpretation for particle reduction in various filtered efficiencies:

Condensation PC*	Outside PC	After filter PC	Percent reduction
MERV** 12 filters	55000	11000	80
MERV 14 filters	55000	5500	90
MERV 16 filters	55000	50	99.97

Note Condensation Particle Counts Are Reported As Particles Per Cubic Centimeter.
*PC = particle counts
**MERV = minimum efficiency rating value (current ASHRAE rating system).

Optical PC*	Outside PC	After filter PC	Percent reduction
MERV** 12 filters	120000	24000	80
MERV 14 filters	120000	12000	90
MERV 16 filters	120000	36	99.97

Note Optical Particle Counts Are Report As Particles Per Cubic Foot.
* PC = particle counts
**MERV = minimum efficiency rating value (current ASHRAE rating system).

June 2007 329

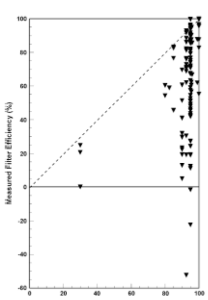
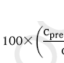


Fig 4. Triangles represent measured filter bank efficiency in air-handling units serving AIIRs versus dust spot efficiency reported by manufacturers. The dashed line is a 1:1 relationship between measured efficiency and manufacturer-reported efficiency.

Performance Evaluation Filtration in Air Handling Systems

•Filtration at 90% rating consider evaluation of filter bank when when the measured efficiency is below 80%.



$$\eta_{\text{filter}} = 100\times\left(\frac{c_{\text{pre}} - c_{\text{post}}}{c_{\text{pre}}}\right)$$

Saravia, et al, AJIC, June 2007

AIIR Maintenance Schedule APPENDIX B

Sample Preventive Maintenance Schedule for AIIRs

For each item, place an "X" in the appropriate box.
"Y" indicates "Yes. Room is in compliance." "N" indicates "No. Room does not comply" "NA" indicates "Not Applicable to this room"

DATE	ROOM	WINDOWS CLOSED/SEALED	DOORS SELF-CLOSING OPERATIONAL	ALARMS ELECTRONICS FUNCTIONING	MECHANICAL DEVICE ZEROS WHEN DOOR OPEN	PRESSURE READING* HAND-HELD	PRESSURE READING* ELECTRONIC	COMMENTS
		Y N	Y N NA	Y N NA	Y N NA			
		Y N	Y N NA	Y N NA	Y N NA			
		Y N	Y N NA	Y N NA	Y N NA			
		Y N	Y N NA	Y N NA	Y N NA			
		Y N	Y N NA	Y N NA	Y N NA			
		Y N	Y N NA	Y N NA	Y N NA			

Sample Log for Measuring Particle Counts APPENDIX I

This log can be used for testing portable HEPA filters as well as whole building air filters.

"PC INITIAL" and **"PC FINAL"** refer to the initial and final particle counts, respectively.
For **testing a HEPA filter,** PC INITIAL refers to the particle count at the air intake, and PC FINAL refers to the particle count at the air output of the HEPA filter.
When testing a **whole building air filtration system,** PC INITIAL can refer to either the particle count outside or before the filter, and PC FINAL can refer to the particle count inside or after the filter.

DATE	FAN	PC INITIAL (HEPA: *Filter Inlet*; Building Air Filter: *Outside/Before Filter*)	PC FINAL (HEPA: *Output of Filter*; Building Air Filter: *Inside/After Filter*)	EXPECTED PERCENT REDUCTION	ACTUAL PERCENT REDUCTION $= \frac{\text{"PC I"} - \text{"PC F"}}{\text{"PC I"}} \times 100\%$	COMMENTS

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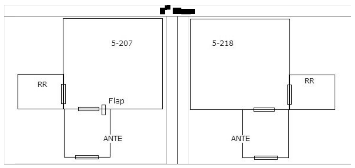
Schematic to match ventilation parameters in Airborne Isolation Rooms



Ward	Room	Monitor Type	Monitor	DPG A>R	DPG C>A	Supply (cfm)	Return (cfm)	Doors	Ceiling	RR?	ANTE?
5A/B	5-207	none	---	-1.9	-0.6			1 hinged	susp		yes
5A/B	5-218	none	---	-0.2	-0.2			1 hinged	susp	yes	yes

Airborne Infection Isolation Room Inventory
UMMC-Fairview

Ward	Room	Monitor Type	Monitor	DPG A>R	DPG C>A	Supply (cfm)	Return (cfm)	Doors	Ceiling	RR?	ANTE?
2A	9										
3C	C-14										
4A	4-213									yes	yes
4B	4-227									yes	yes
4C	4-304	TSI	-0.1	-0.7 (A to C)				double hinged	susp. w/gaskets		
4C	4-305	TSI	-0.4	-0.3 (A to C)				1 sliding door + 1 hinged door	susp. w/gaskets		
4C	4-407										
4C	4-313										
4D	4-512	TSI	-0.3	-0.3	0			2 sliding doors + 1 hinged door	susp		
4E	4-501A	TSI	-3.1	-3.9 (A to C)				1 sliding door + 1 hinged door	susp		
5A/B	5-207	none	---	-1.9	-0.6			1 hinged	susp		yes
5A/B	5-218	none	---	-0.2	-0.2			1 hinged	susp	yes	yes
5A/B	5-219	none	---	-1.1	-0.5			1 hinged	susp	yes	yes
5A/B	5-230	none	---	1.8	-2.6			1 hinged	susp	yes	yes

APPENDIX C

HVAC System Maintenance Schedule

Sample Preventive Maintenance Schedule for HVAC Systems

For each item, place an "X" in the appropriate box. "Y" indicates "Yes. Fan is in compliance." "N" indicates "No. Fan does not comply"

FAN ID/LOCATION:____________

INSPECTION DATE:____________

TASK	YES	NO	FOLLOW UP	COMMENTS
Inspect and clean exhaust grilles to prevent blockage & airflow retardation	Y	N	DATE / DATE	
Visually inspect filter housing for holes and proper filter seal	Y	N	DATE / DATE	
Clear outside air intake of debris	Y	N	DATE / DATE	
Check return/exhaust dampers move freely	Y	N	DATE / DATE	
Check filters for proper installation/spacers	Y	N	DATE / DATE	
Check pressure set points	Y	N	DATE / DATE	
Check steam/CW lines have no leaks	Y	N	DATE / DATE	
Check return/exhaust belts are tight	Y	N	DATE / DATE	
Check fan bearings/sheaves are lubricated	Y	N	DATE / DATE	
Check humidifier controls are in working order	Y	N	DATE / DATE	
Check fan lights are in working order	Y	N	DATE / DATE	
Check fan cleanliness	Y	N	DATE / DATE	

Objective analysis of critical environments:pressure and particles

Validation of ventilation air from a BMT room
-Low particle counts
-High pressure

Validation of filters at the point of use
-Particle count scan
-Check filter installation

EXISTING CONDITIONS ASSURANCE

Essential Surveillance Parameters

- **Room air exchanges per hour**
  - each air exchange reduces particles about 66%
  - AII and PE rooms at >12 ac/hr
- **Pressure control for AII & PE rooms**
  - air velocity to create 0.01 inch w.g. (2.5 Pascals)
  - air velocity 0.001"wg=120 lfpm, 0.01"wg=400 lfpm, 0.1"wg= 1300 lfpm
  - design for >125 cfm offset for supply versus exhaust
  - minimal leakage < $0.5ft^2$
- **Filtration supply to PE rooms & exhaust from AII rooms**
  - particle reduction to include both viable and nonviable particles
  - rank order reduction of particles from dirty to cleanest areas
  - non viable particles can be analyzed real time

Air Quality Surveillance
University of Minnesota Medical Center-Fairview

Airborne Fungi and Ventilation Parameters

Filtration local	cfu/m^3	Temp	% filtration
–U of MN 1962	**706**	**35C**	**none**
–U of MN 1982	**82**	**35C**	**40**
–U of MN 2002	**3.6**	**35C**	**90**

Infection Control Ventilation Parameters

•Air exchanges
•Pressure differential
•Airflow direction
•Particle management

BIOSECURITY AND BIOTERRORISM: BIODEFENSE STRATEGY, PRACTICE, AND SCIENCE
Volume 4, Number 1, 2006
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Improving Performance of HVAC Systems to Reduce Exposure to Aerosolized Infectious Agents in Buildings; Recommendations to Reduce Risks Posed by Biological Attacks

PENNY J. HITCHCOCK, MICHAEL MAIR, THOMAS V. INGLESBY, JONATHAN GROSS, D. A. HENDERSON, TARA O'TOOLE, JOA AHERN-SERONDE, WILLIAM P. BAHNFLETH, TERRY BRENNAN, H. E. BARNEY BURROUGHS, CLIFF DAVIDSON, WILLIAM DELP, DAVID S. ENSOR, RALPH GOMORY, PAULA OLSIEWSKI, JONATHAN M. SAMET, WILLIAM M. SMITH, ANDREW J. STREIFEL, RONALD H. WHITE, and JAMES E. WOODS

If facilities can demonstrate control will employees have confidence to come to work during infectious disease event?

Water Systems in Healthcare

- Drinking water
- Kidney dialysis
- Laboratory
- Therapeutic
- Cooling
- Fire management

Municipal Water Quality

- Debris & color
- Bacteria
- Fungi
- Virus
- Water Usage
  - Drinking
  - Dialysis
  - Laboratory
  - Process

Change out of Water treatment systems needs coordination and quality control.

- supply water quality
- water treatment system
- pre treatment
- piping
- disinfection
- sampling ports

CDC Environmental Infection Control-6/6/2003

Table 18. Microbiologic limits for hemodialysis fluids*

Hemodialysis fluid	Maximum total heterotrophs (CFU/mL)+	Maximum endotoxin level (EU/mL)§
Present standard		
Product water¶		
Used to prepare dialysate	200	No standard
Used to reprocess dialyzers	200	5
Dialysate	2,000	No standard
Proposed standard**		
Product water	200	2
Dialysate	200	2

* The material in this table was compiled from references 789 and 791 (ANSI/AAMI standards RD 5-1992 and ANSI/AAMI RD 47-1993).
+ Colony forming units per milliliter.
§ Endotoxin units per milliliter.
¶ Product water presently includes water used to prepare dialysate and water used to reprocess dialyzers.
** Dialysate for hemodialysis, RD 52, under development, American National Standards Institute, Association for the Advancement of Medical Instrumentation (AAMI).

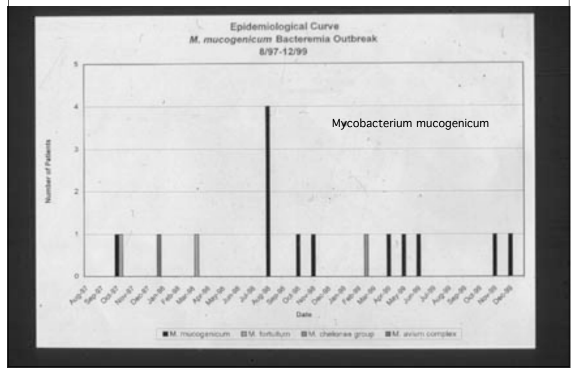
Non-Tuberculous Mycobacteria: Infections or Colonization

Implicated Environmental Vehicle	*Mycobacterium* spp.
Inadequately sterilized medical instruments	*M. abscessus, M. chelonae, M. fortunitum*
Potable water, ice	*M avium* complex (MAC), *M. fortuitum, M. ulcerans*
Hydrotherapy tanks and pools	*M. chelonae, M. fortuitum, M. marinum*
Reprocessed dialyzers	*M. chelonae*
Shower aerosols	*M. fortuitum*

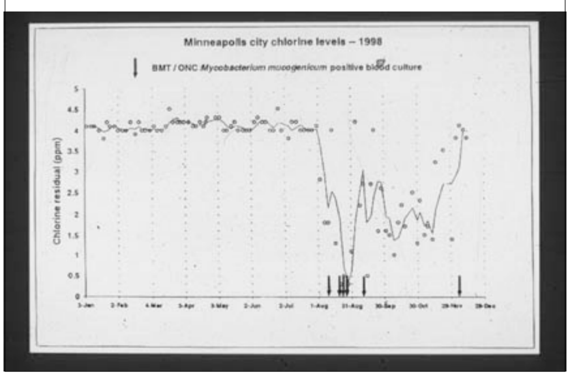
Non-Tuberculous Mycobacteria: Pseudo-Outbreaks

Implicated Environmental Vehicle	*Mycobacterium* Spp.
Potable water used during bronchoscopy, instrument reprocessing	*M. chelonae*
Potable water, ice	*M. fortuitum, M. gordonae, M. kansasii, M. terrae, M. xenopi*
Intrinsically-contaminated laboratory solution	*M. gordonae*

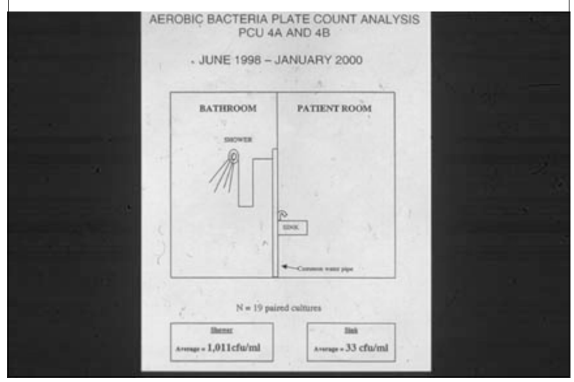
EPIDEMIOLOGICAL CURVE FOR BLOOD ISOLATES
RECOVERED FROM BONEMARROW TRANSPLANTS



Chloramine levels in Minneapolis near the hospital



Paired water samples from patient rooms



Bio-film on the inside of plumbing fixtures

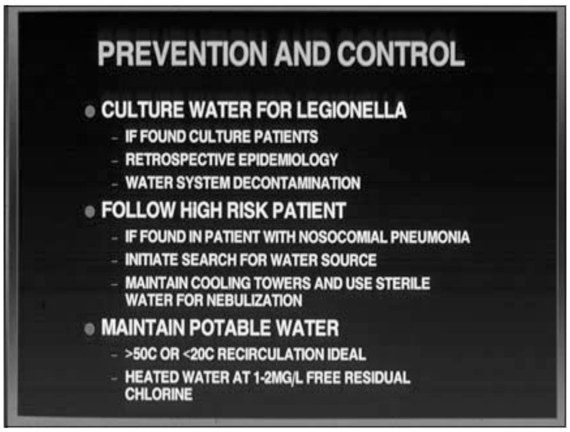
Showers can be sources of microbes avoid stagnant water by draining hoses and offering reminders.

Healthcare-associated Outbreaks of Legionellosis

- Contaminated aerosols
- Exposure to aerosols produced from:
  - Cooling towers
  - Showers, aerators
  - Faucets
  - Respiratory therapy equipment
  - Room-air humidifiers
  - Decorative fountains

Colonization of Man-made Aqueous Environments

- Temperatures of 25º - 42º C (77º - 107.6º F)
- Stagnation; dead legs
- Scale and sediment
- Presence of certain free-living aquatic amobae that can support intracellular growth of *Legionella*



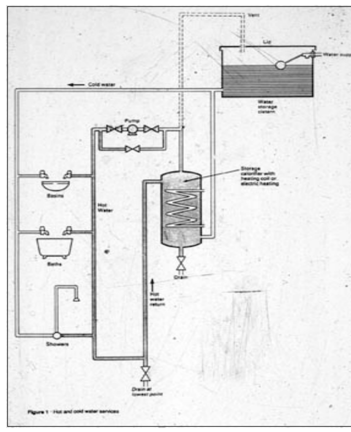
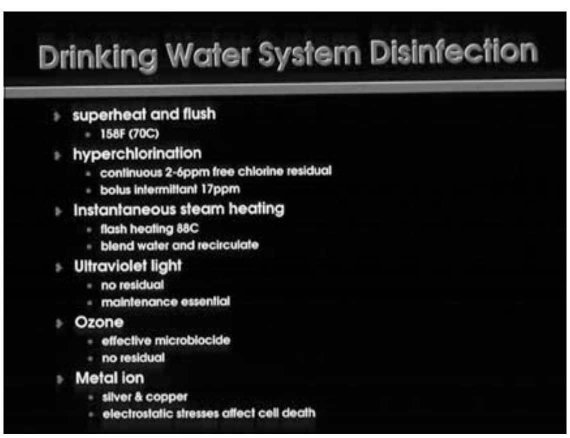


Figure 1 · Hot and cold water services

WATER DISTIBUTION SYSTEM BUILDING ISSUES RELATED TO DEAD END CONNECTIONS FROM DISCONTINUED LINES.



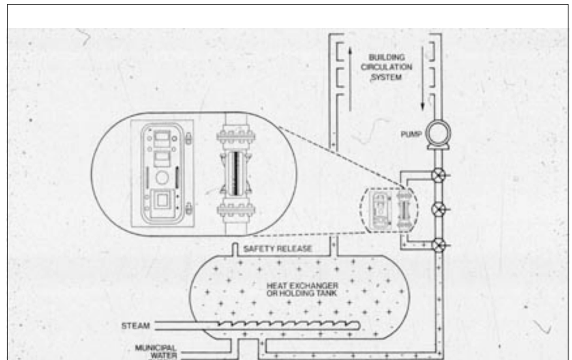


Figure 24.5. The copper-silver ionization system is controlled by a solid-state microcircuit system in a control box (left within inset). Electrodes composed of copper-silver alloys are housed in a flow through chamber (right within inset). Copper-silver ions are released into the recirculating hot water system. (Courtesy of Liquitech, Burr Ridge, IL.)

Chlorine dioxide is a stable water disinfectant that can be added to an existing water distribution system.

The methods of adding chemical to the water supply makes the hospital a secondary water treatment facility needing added sampling for residual and by product.

Legionella Control with Chlorination

- In 1990 - 23% of municipalities with >50,000 people used mono chloramine disinfection
- Advantages:
  - does not form trihalomethanes
  - heat stable
  - more effective at penetrating bio film

  Hospitals with outbreaks of Legionellosis predominately >200 beds
  •73% of those hospitals have a transplant program
  •31 outbreaks in hospitals with free available chlorine
  •only one outbreak with mono chloramine
- Chlorine dioxide
  local production for legionella management (PCU area or whole hospital?)
  long term disinfection Royal Infirmary Glasgow Scotland (10 years)

Cooling Tower Concerns

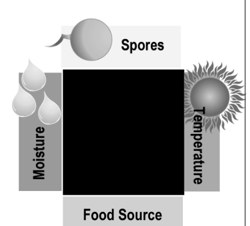
- Cooling towers provide ideal environments for *Legionella* spp. growth
- Locate cooling towers to minimize intake of drift aerosols into the ventilation system
- Perform maintenance cleaning and treatment as per manufacturer's instructions and other available guidance
- Clean and treat before seasonal start-up

CONTINUOUS TREATMENT OF TOWER WATER WITH CHEMICALS

-optimize chemical usage
-control biofilm to control legionella
-enhance efficiency
-precautions when cleaning

Water Damage Management

- Reactive
  - respond to water incident
  - determine extent of water damage
  - cut out or dry
- Proactive
  - water resistant material
  - preservative application
  - proper installation



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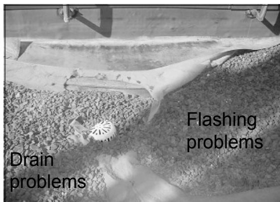
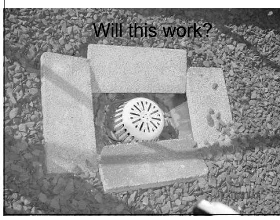




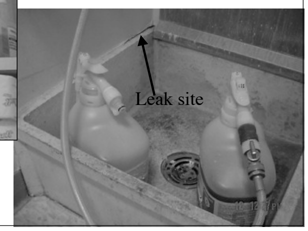
Flashing on the roof protects from water buildup.

Roof drain

Preventative Maintenance is Infection Control

Microbes recovered:

Water damage in relatively common in the janitor's closet. Water resistant materials will prove to be value added to construction and renovation. Inspections should evaluate these water damage issues.



MOLD SOURCES ARE COMMON CONTROL PREVENTS INFECTION & OTHER ISSUES

Water related incidences

At University of Minnesota Medical Center, Fairview from 11/21/06 to 11/20/07

1364 total water events

- 612 toilet plugged
- 47 showers plugged
- 41 shower leaking
- 32 sink leaking
- 22 water leaks

71 water events in Bone Marrow Transplant (BMT)

- 20 toilet plugged
- 20 sink plugged

Mold Growth Management

- Mold growth
  - about 4 hours with ideal conditions
  - Mycelial growth
  - Sporulation about 72 to 96 hours
  - Dissemination of spores
- Mold Growth Conditions
  - About 25% water content
  - Approximately 95% relative humidity
- Interrupt growth
  - Reduce moisture
  - Resistant substrate

Moisture meters are useful decision makers for water damage mold prevention

- Keep moisture content <20%
- Maintain air movement
- Remove moisture
  - physical
  - evaporation

- Know which moisture meter to use
- Dry it out <72 hrs
- Move occupants if possible

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Water leak in Peds Oncology
-Drips first noted
-Detection with IR camera
-Mold discovery
-Water source
-Drying assurance
-Remediation
-Cleanup

Process for Mold Remediation & Mitigation

-Recognize and identify mold by smell or sight
-Document the scope of the problem
-Find and eliminate source of moisture
-Dry and maintain an environment free of excess moisture
-Remove and replace saturated building materials
-Assess situation & evaluate if pesticide treatment is needed
-Wipe, scrape and clean visible mold from affected area
-Paint, coat or seal building material when conditions indicate
-Treat mold with labeled pesticide and/or
-Consult an expert for best practice

JCAHO ENVIRONMENT OF CARE
UTILITY MANAGEMENT

- **EC.7.10.15 – Management of Water Systems**
  - LAB, DIALYSIS, MUNICIPAL, PROCESS, EMERGENCY
- **EC.7.10.16 – Management of Ventilation Systems**
  - SUPPLY, RETURN, EXHAUST, LOCAL
- **EC.7.30.4 - Testing of Infection Control Support Equipment**
  - METHODS, PARAMETERS, LIMITS, CORRECTION

Hospital Maintenance for Infection Prevention

- Maintenance essential to the sustainability of the HCF.
- Maintenance of ventilation, water fixtures and water damage will help assure control of critical patient care facilities.
- "Out of sight: Out of mind" bad indicator of potential problems.
- Infection Prevention & Control must team with facilities management for environmental safety priorities.

The Next Few Teleclasses

	30 Oct. 08	LTC - How Maryland Increased ICP Presence in Long Term Care Facilities Speaker: Dr. Brenda Roup, Maryland Department of Health and Mental Health
Teleclass sponsored by Virox Technologies www.virox.com	11 Nov. 08	(British Teleclass) Clostridium difficile - Prevention is Better Than Cure Speaker: Prof Mark Wilcox, University of Leeds
	20 Nov. 08	Managing Indoor Air & Water Systems for Infection Control & Prevention Speaker: Andrew Striefel, University of Minnesota
	4 Dec. 08	Halting the Spread of MRSA Between Acute Care Facilities and Long Term Care Facilities Speaker: TBA

2009 Teleclass Schedule … Watch This Space

www.webbertraining.com.schedulep1.php

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