



## **Infection Prevention During Healthcare Construction**

FCIA Conference

San Francisco, Ca.

April 29, 2010

UNIVERSITY of CALIFORNIA · IRVINE  
HEALTHCARE

# Objectives

Gain an understanding of:

- how an infection may occur during healthcare construction
- the infection risk assessment process
- design choices and means/methods of construction to help prevent infections

# Background

- 1.7 Million HAIs in U.S. hospitals each year
- 99,000 deaths caused by HAIs each year
- Infections & deaths linked to organisms transmitted due to construction and maintenance activity well documented in the medical literature

Centers for Disease Control and Prevention: The Direct Medical Costs of Healthcare-Associated

Infections in U.S. Hospitals and the Benefits of Prevention. March 2009

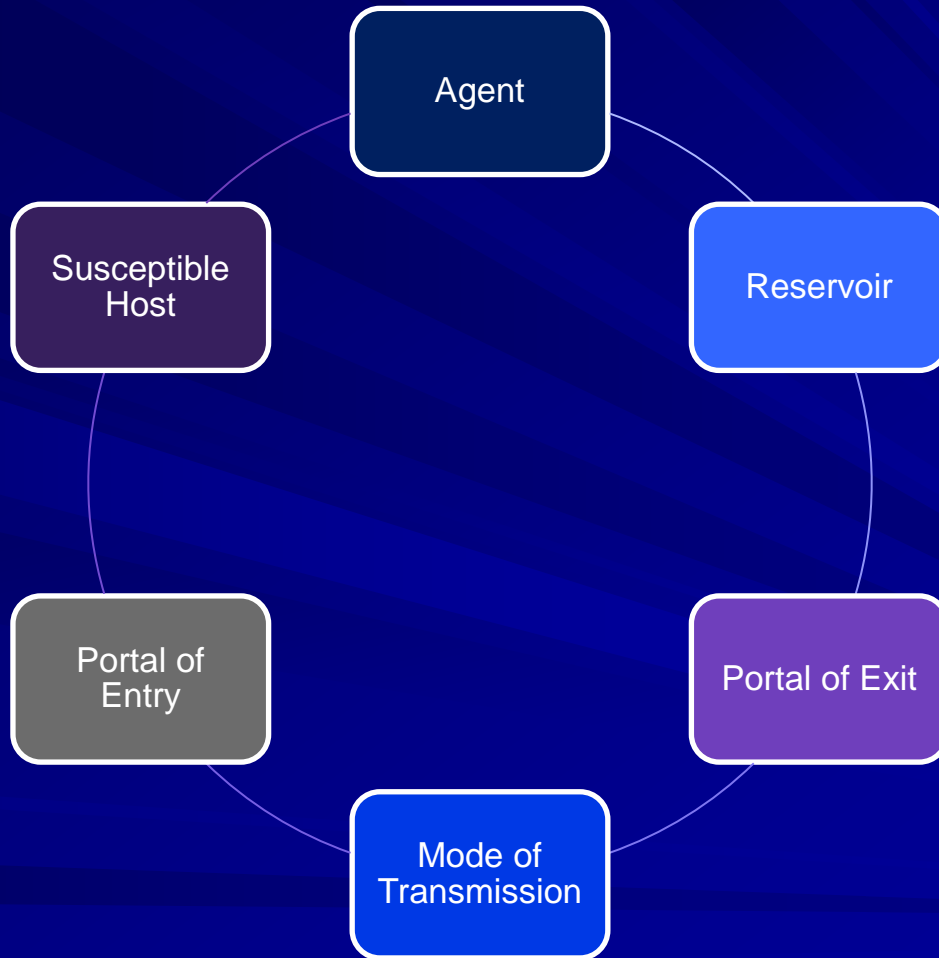
# Tampa Tribune: February 4, 2009

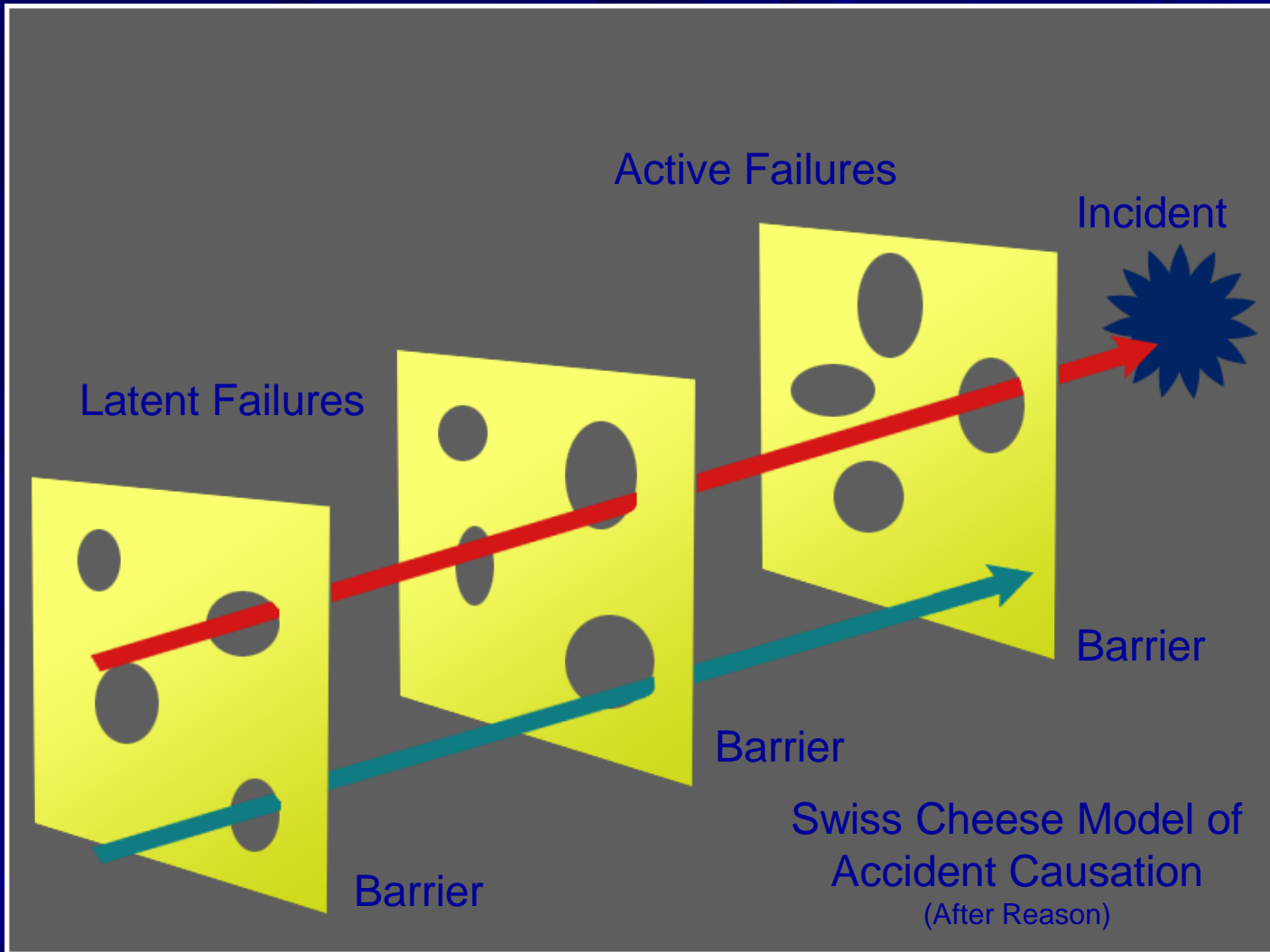
- 3 young leukemia patients die after stay at St. Joseph's Hospital in Tampa, FL.
- Children were on floor above location of construction work
- Lawsuit notes children were moved around the hospital campus for various treatments
- Claim the children were not protected from spores released during construction
- All 3 died from aspergillus infection



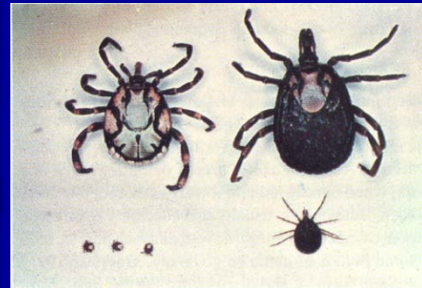
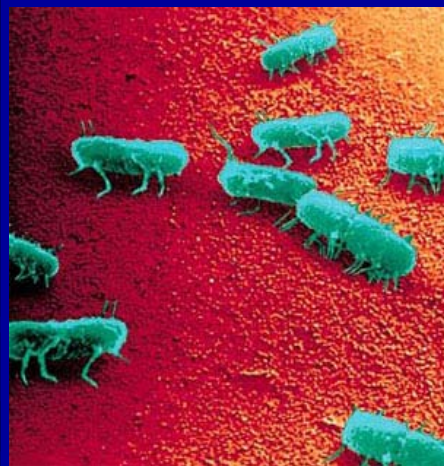
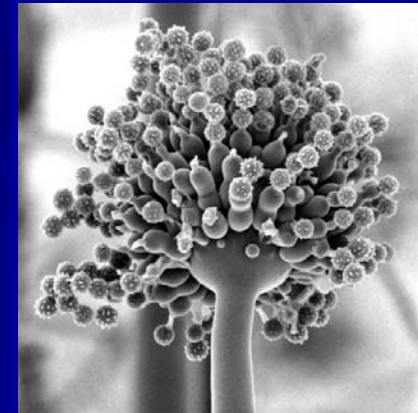
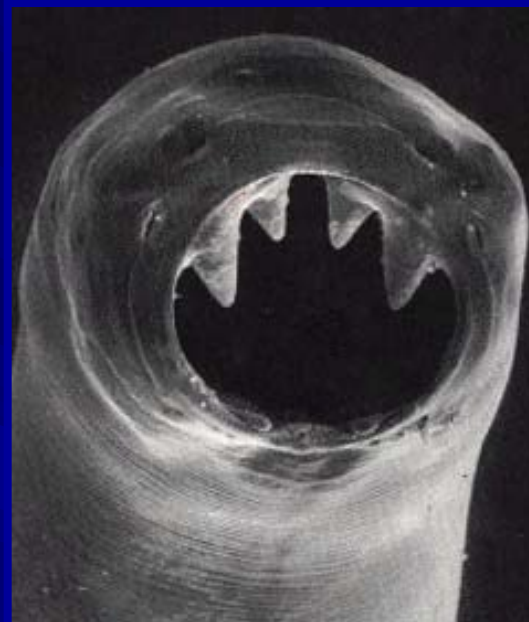
Mathew Gliddon, Age 5: Died April 16,

# The Chain of Infection





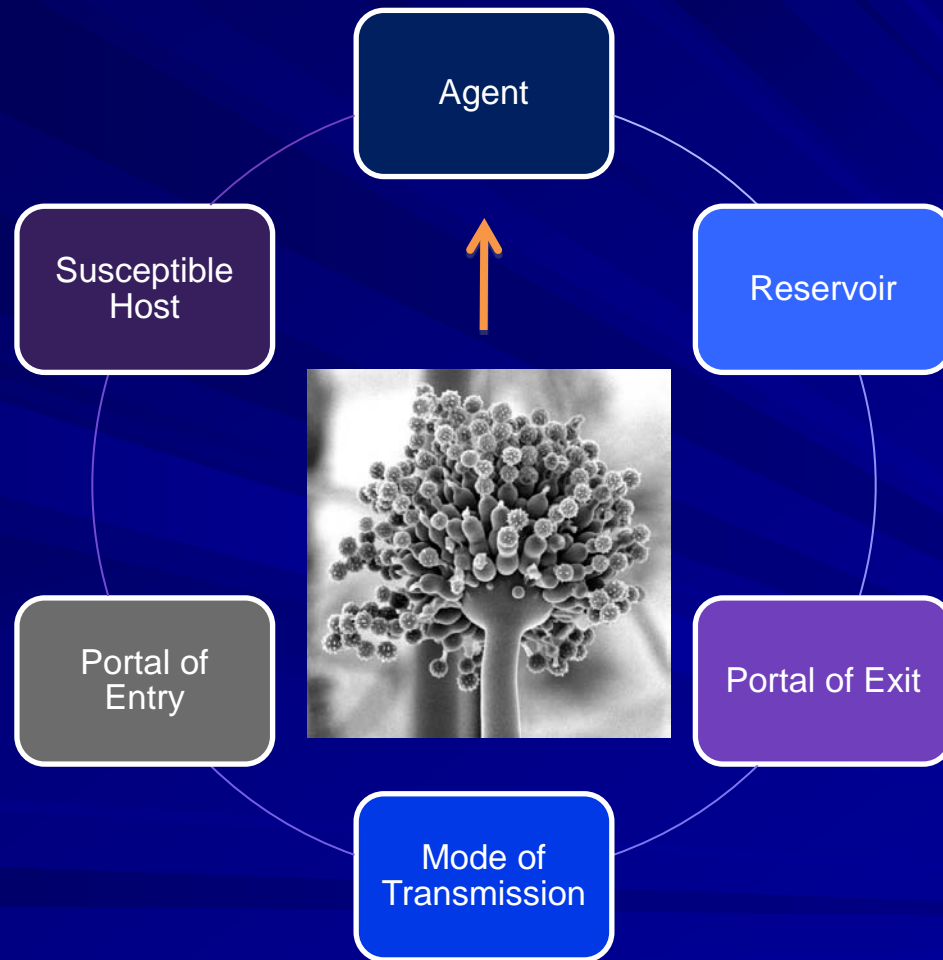
# Infectious Agents: The Culprit



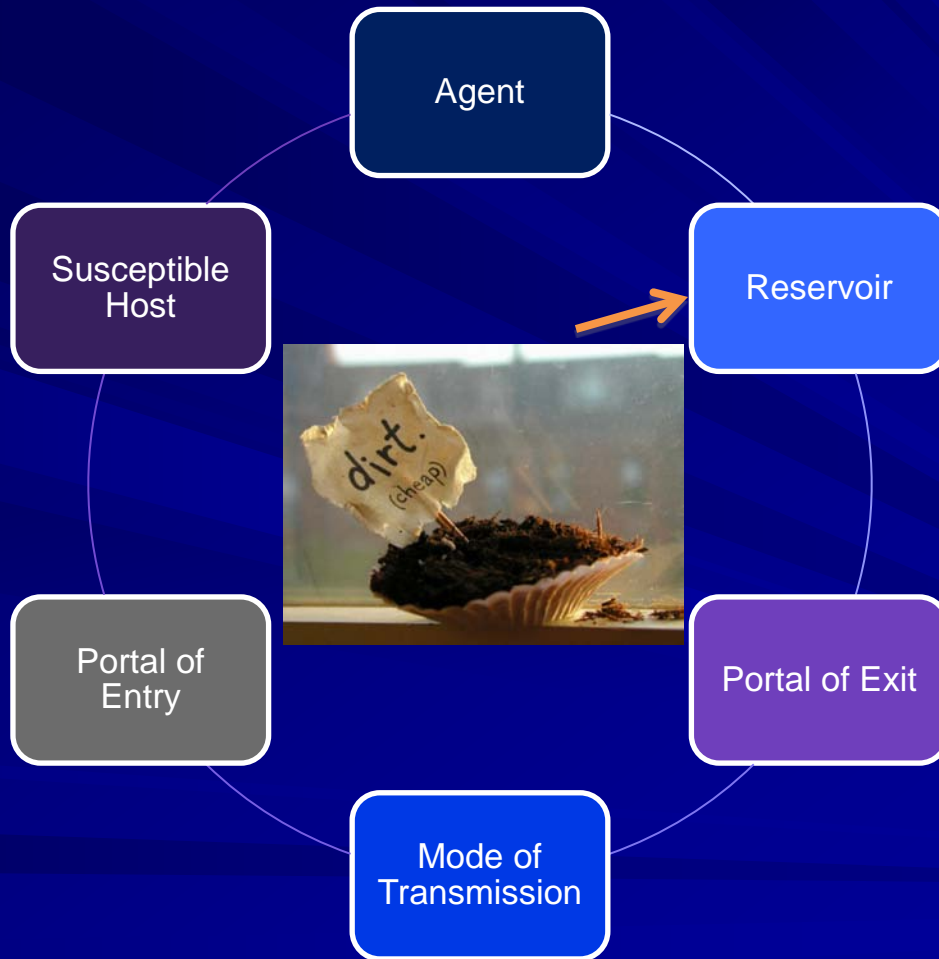
How might an infection occur during construction activity?



# The Chain of Infection: Agent



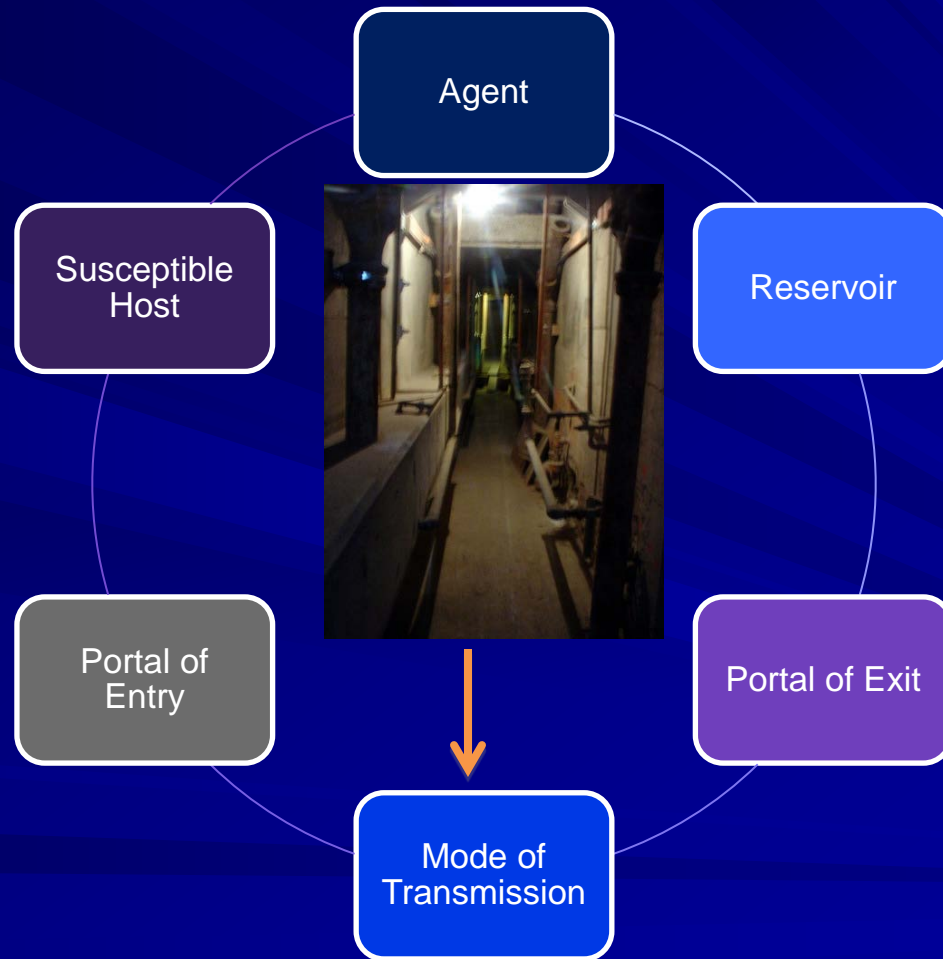
# The Chain of Infection: Reservoir



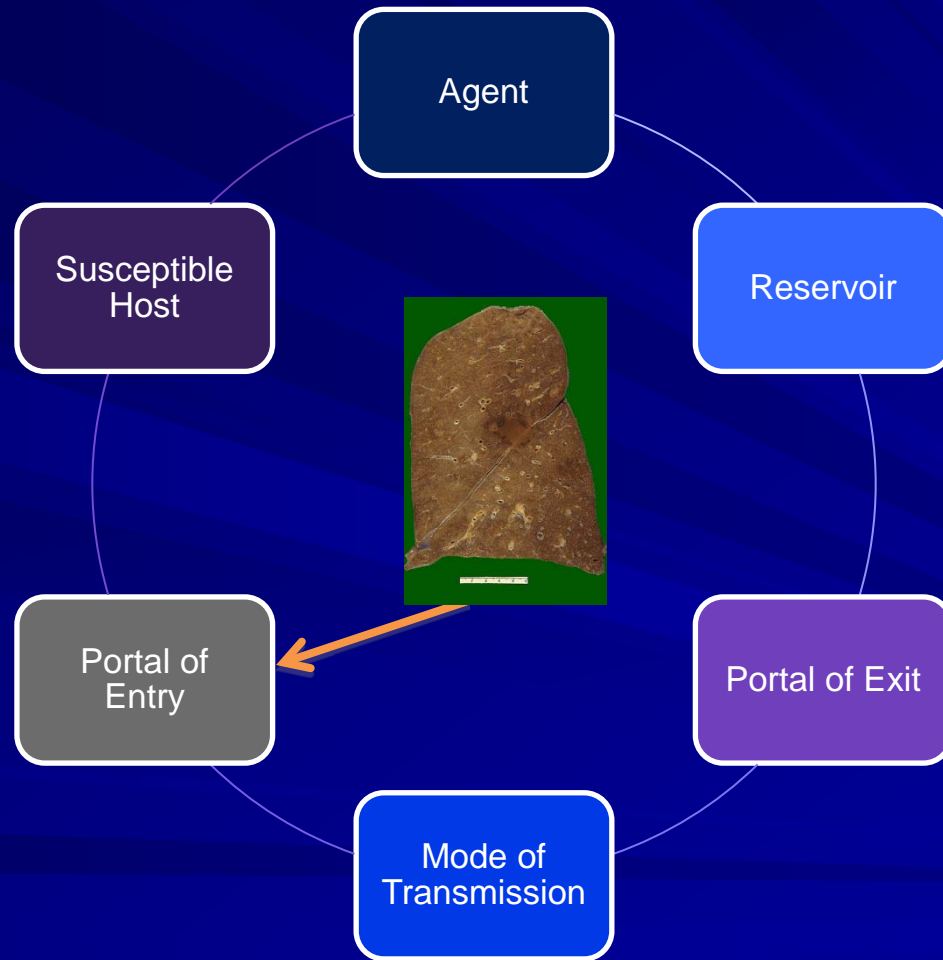
# The Chain of Infection: Portal of Exit



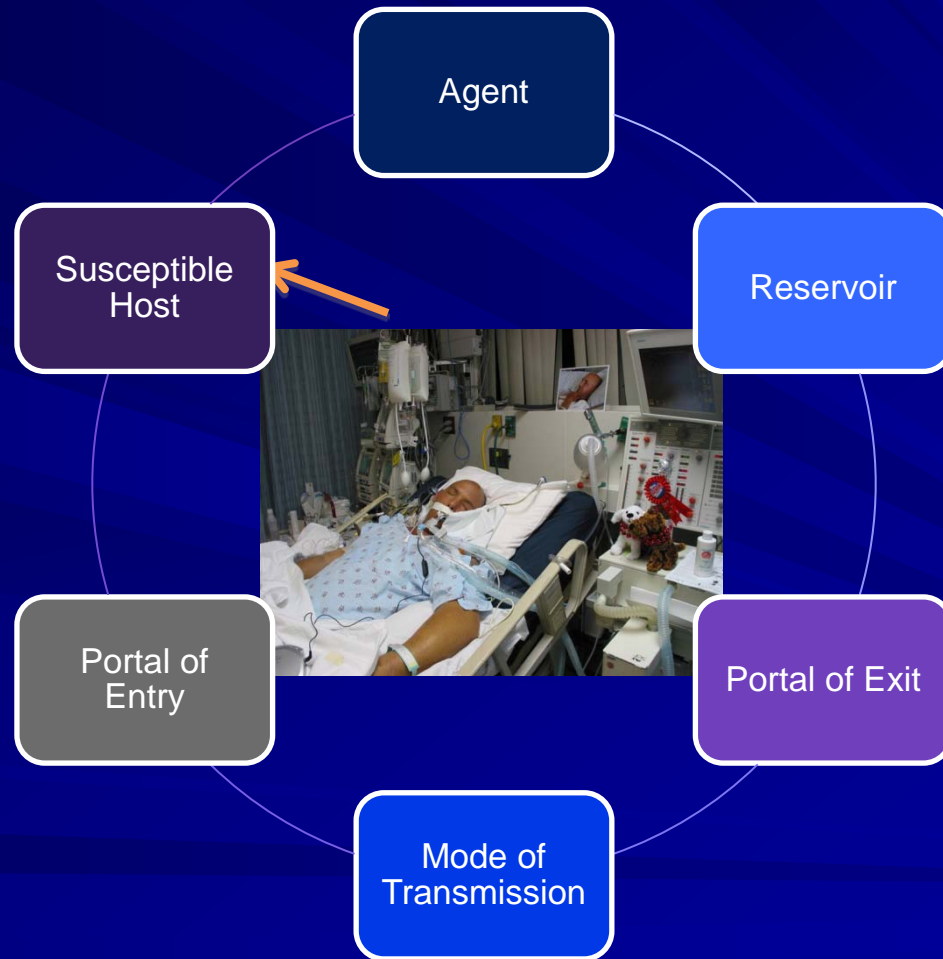
# The Chain of Infection: Mode of Transmission



# The Chain of Infection: Portal of Entry

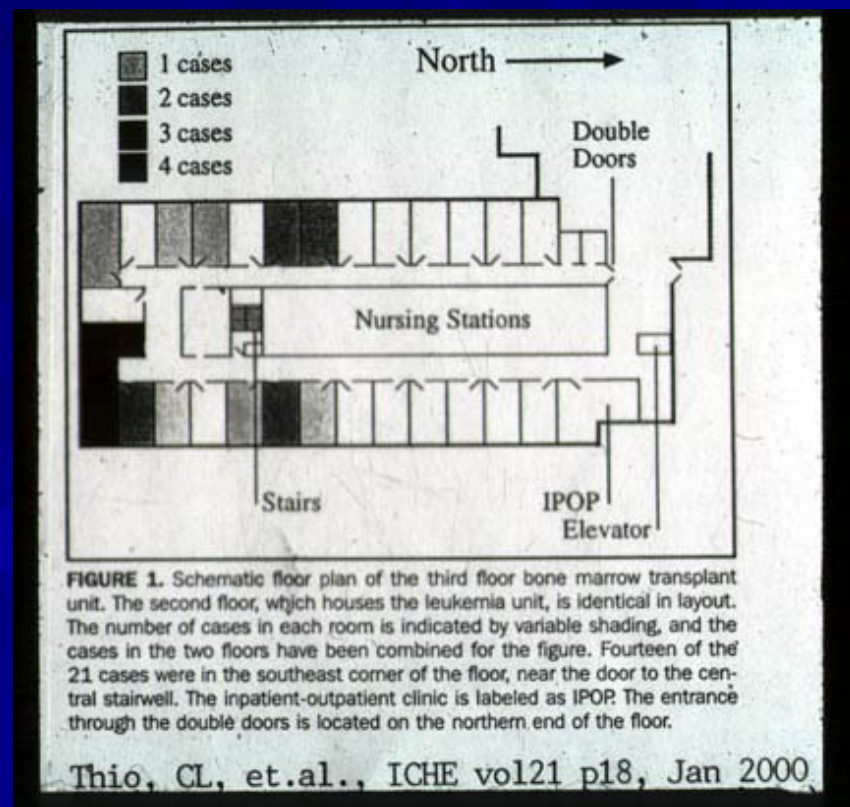


# The Chain of Infection: Susceptible Host



# 21 cases of Invasive Aspergillosis (IA)

- High-risk oncology unit
- Unit became depressurized
- Adjacent construction occurring
- Positive environmental samples matched patients
- Six patients died



Thio, CL, et al. Refinements of Environmental Assessment During an Outbreak Investigation of Invasive Aspergillosis in a Leukemia and Bone Marrow Transplant Unit. *Inf Control and Epidemiology*, Vol 121, Jan 2000, 18-23.

What process is used to assess risk during healthcare construction to help prevent infections?

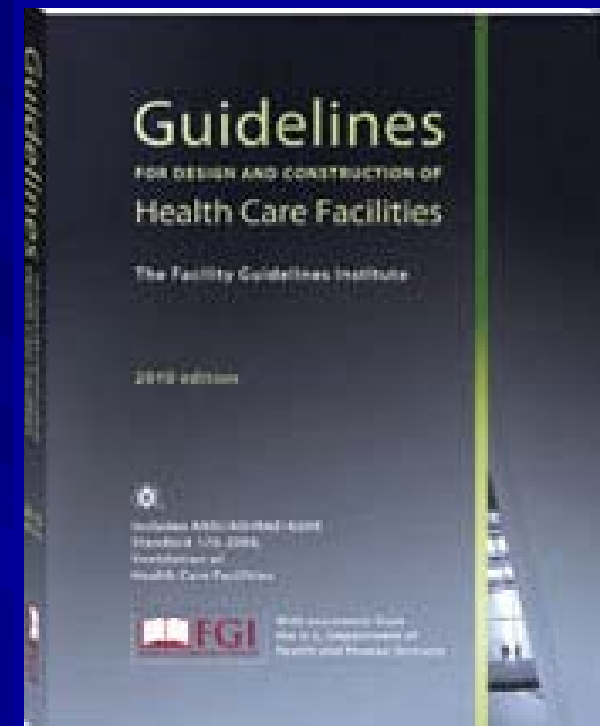


# Terms

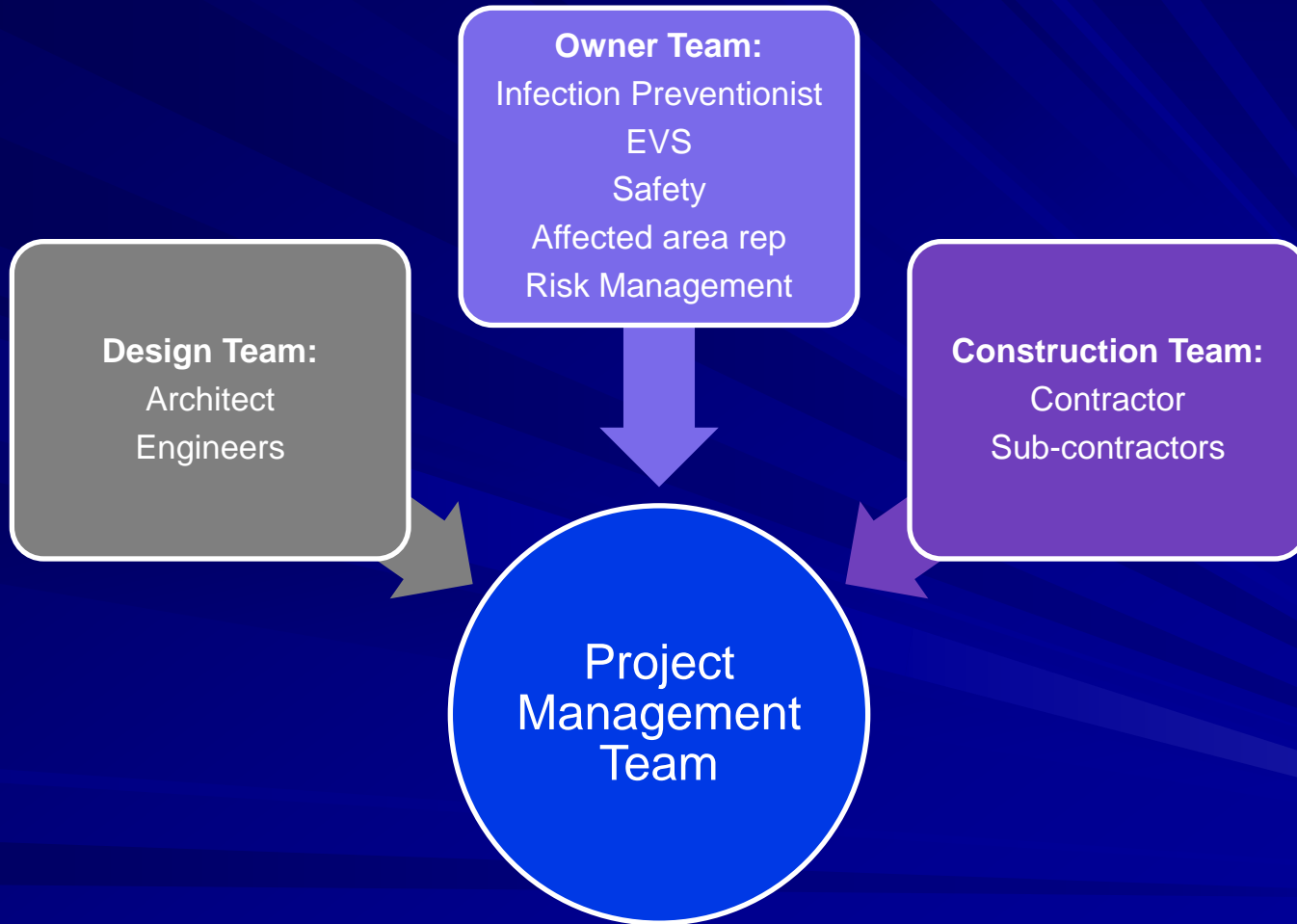
- ICRA: Infection Control Risk Assessment
- ICRMRs: Infection Control Risk Mitigation Measures

# Requirements

- ICRA and ICRMRs required by the Joint Commission
- Included in FGI Guidelines
- Recommended by CDC Environmental Guideline



# ICRA Team

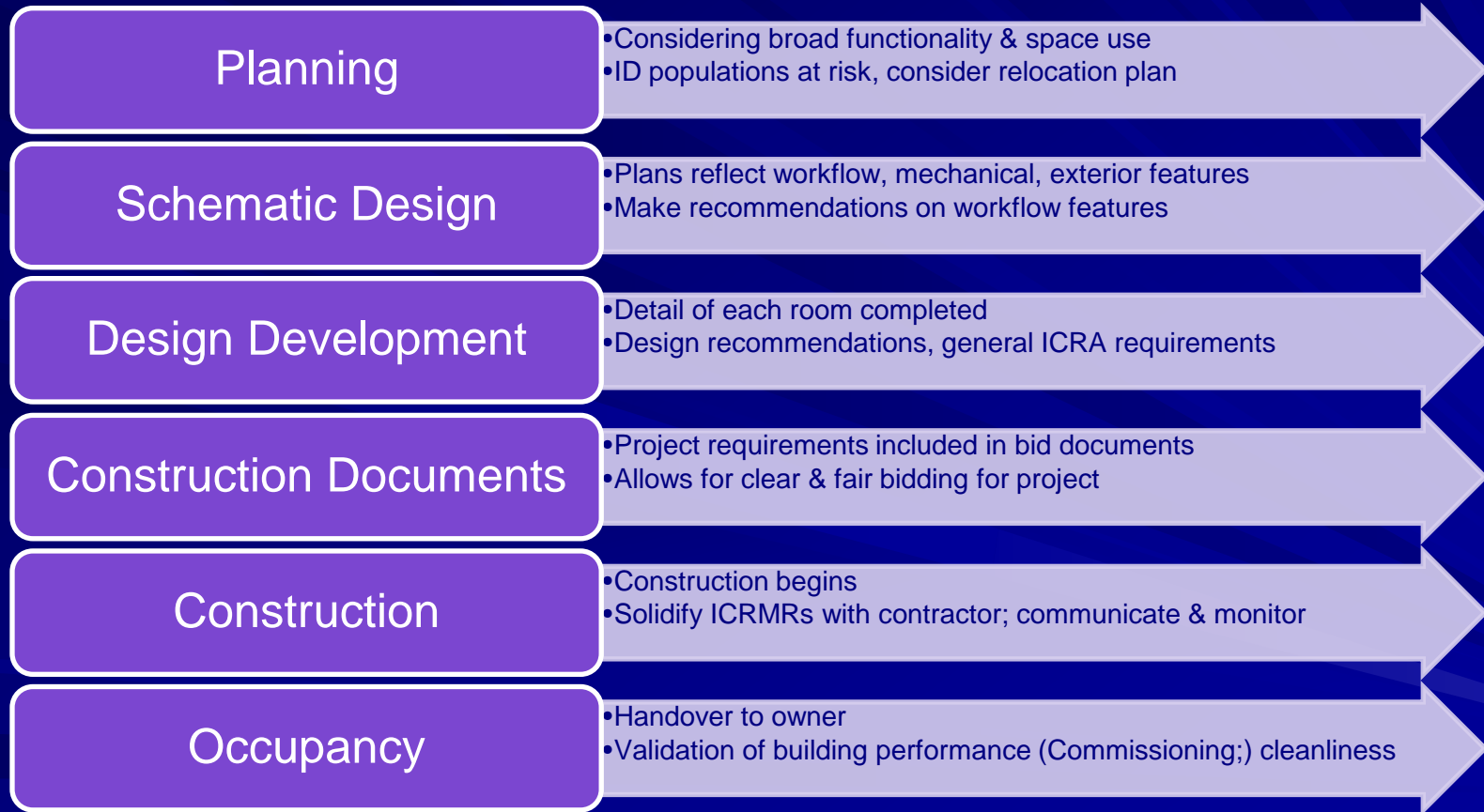


# Teamwork



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# ICRA During Project Phases



# FGI: ICRMR Planning

- Patient placement & relocation
- Required barriers & other protective measures for airborne contaminants
- Modifications to HVAC or water supply system
- Protection from demolition
- Training for hospital staff, visitors, construction personnel

# FGI: ICRMR Planning

- Planning for utility impacts
- Planning for debris removal, traffic flow, clean-up, elevator use, construction routes
- Provision of bathroom and food facilities for construction workers
- Protection of materials & installation of clean, dry materials

# ICRA Matrix

PATIENT Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III / IV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

Adapted from ICRA Matrix developed by J. Bartley - ECSI, Beverly Hills, MI; used with permission



# Type “A” activities

Inspections and Non-invasive activities



# Type "B" Activities



# Type "C" Activities



# Type "D" Activities



# Risk Groups 1 & 2



Group 1 Example:  
Office areas



Group 2 Example: Cafeteria

# Risk Type 3



# Risk Group 4



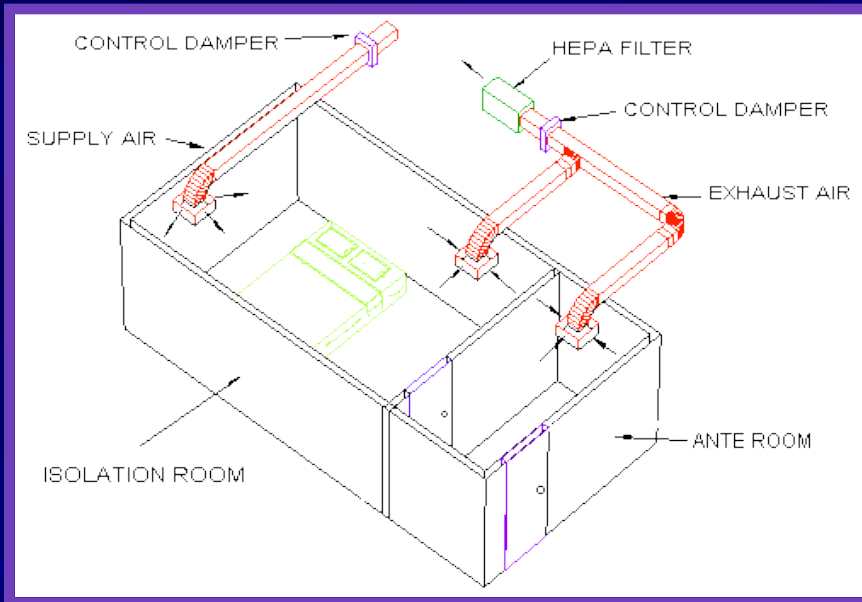
What design choices and means/methods of construction might help prevent infections in health care settings?



# FGI: Design Elements



# Airborne Infection Isolation Rooms



# FGI: Design Elements

- Specific HVAC needs to meet the functional program and accommodate services affected by the project
- Water systems to limit waterborne opportunistic pathogens
- Surfaces and finishes



# Building Materials

Mold-resistant fireproofing



Mold-resistant wallboard





A. Streifel, U. of Minn.

# Means & Methods

Materials delivered clean & dry



Storage off floor for water protection



Wallboard off floor & sealed



Exterior building materials sealed



# ICRMR Examples

## External work:

- Re-route pedestrian traffic
- Water dust plumes
- Contain excavation spoils
- Keep doors/windows closed in adjacent buildings



# ICRMR Examples

- Existing building performance during construction is critical

- Filters must perform & air flow direction verified





# ICRMR Examples

## Containment Barriers for dust control

Soft walls are used  
for short duration  
projects



# ICRMR Examples

## Containment Barriers for dust control

Hard (temporary)  
walls for longer  
duration or higher  
risk projects



# ICRMR Examples

## Containment Barriers for dust control

Combination walls are used when a sturdy lower section is needed but dust control still needed above



# ICRMR Examples

Air Flow direction must be controlled during construction

- Negative air pressure is often required
- “Tightness” of barriers, ceilings and walls helps construction zone negative



# ICRMR Examples

Air Flow direction must  
monitored during  
construction

- Many types available
- May wish to have  
audible or visual  
alarm



# ICRMR Examples

Dirt & dust through buildings must be controlled

- Demolition carts covered
- Wheels cleaned



# Protecting Patients is the Goal



Thank-you!