

Infection Control and Emerging Pathogens

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Financial Disclosures

Michael Bell, MD

- No financial relationships to disclose



Emerging Pathogens:

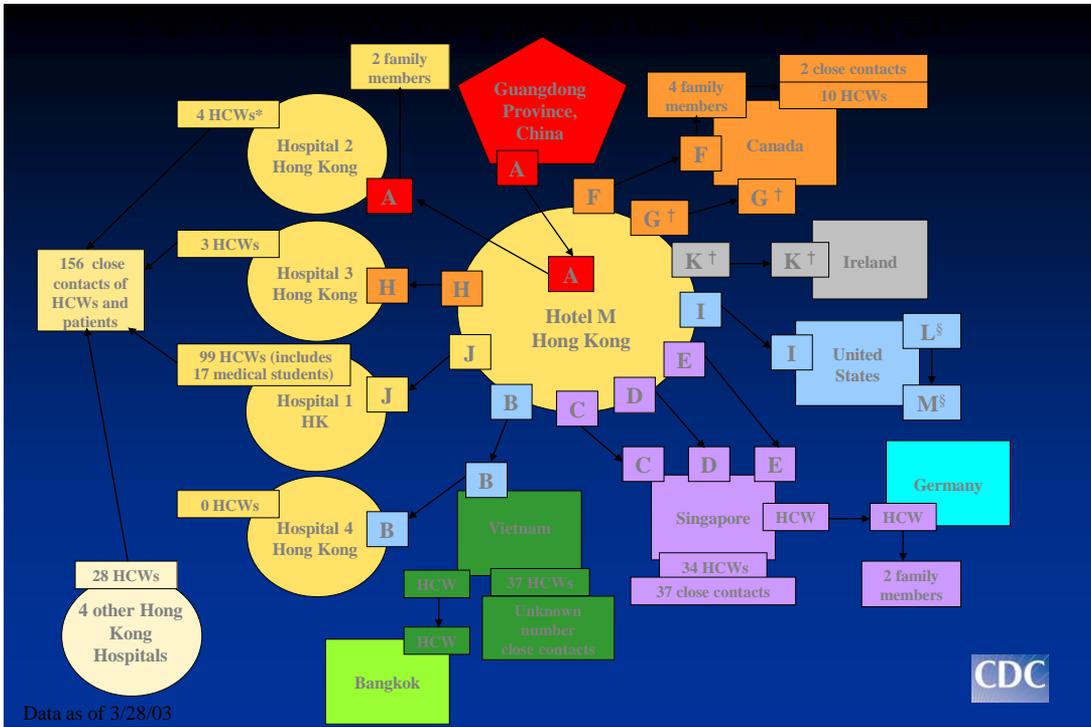
- Human exposure to new environments
- Changes in animal or vector exposure
- New procedures (e.g., medical, cosmetic)
- New populations at risk
- New social factors (e.g., crowding, nursing homes)



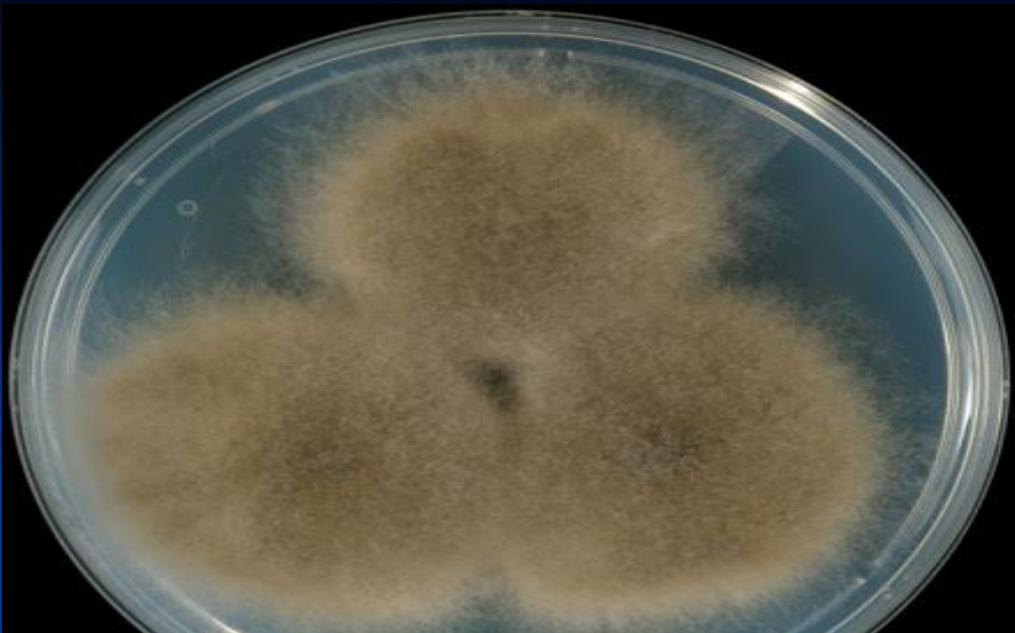
Recent examples:

- Monkeypox
- Nipah-virus encephalitis
- Ebola hemorrhagic fever
- MERS



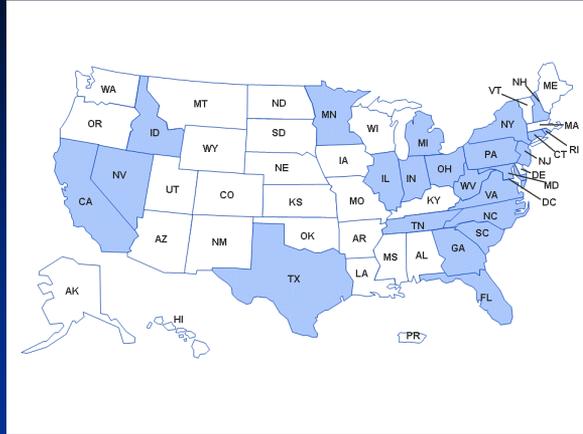


Exserohilum rostratum



Methylprednisolone Acetate (MPA) from NECC

- Three lots associated with infections (all preservative-free)
- Implicated lots distributed to 75 facilities in 23 states
- ~ 14,000 patients exposed
- 257 cases of infection (3 joints)
- 20 Deaths



States that received implicated MPA



- Sentinel detection
- Fast action
 - Notification
 - Remediation
 - Regulation





**Non-tuberculous Mycobacterium (NTM) Infections and Heater-Cooler Devices
Interim Practical Guidance: Updated October 27, 2015**

Purpose:

CDC has identified a need for increased vigilance for NTM infections by health departments, healthcare facilities, and individual healthcare providers. [FDA recently issued a Safety Communication on Nontuberculous Mycobacterium Infections Associated with Heater-Cooler Devices](#) that addresses issues regarding the proper use and maintenance of these devices. CDC has been working with the FDA and local and state health departments to investigate heater-cooler units associated with NTM infections and/or found to be contaminated with NTM. This CDC communication is to (a) raise awareness among health departments, healthcare facilities, and healthcare providers of the possible association between NTM infections and use of heater-cooler devices and (b) to provide guidance on identifying patients with infection.





CDC



CDC



- Risk recognition
 - Materials management
 - Purchasing



Imported pathogens

- Unexpected
 - Unfamiliar
 - Undiagnosed
-
- Reactive responses – late
 - Routine practices - essential



Routine practices

- Arrival assessment
 - Triage and waiting area placement
- History taking
 - Syndromic routing
 - Diagnostic evaluation



Routine practices

- Standard Precautions
 - Based on risk assessment
 - Prevention of anticipated exposures
 - Combination of procedures and protective equipment



Routine practices

- Personal hygiene
 - Work habits and reflexes
 - Attention to manipulating equipment and removing PPE
- Environmental hygiene
- Occupational health



Infection Transmission

To cause an infection, a pathogenic organism must:

Leave original host



Survive in transit



Be delivered...



...to a susceptible part of a host



Escape host defenses

Multiply and cause tissue damage



Infection Transmission

- Symptoms (cough, bleeding, diarrhea)
- Clinical specimens
- Incubation period

Leave original host



Survive in transit



Be delivered...



...to a susceptible part of a host



Escape host defenses

Multiply and cause tissue damage



CDC

Infection Transmission

Organism-specific:

- *viral envelopes*
- *spore formation*
- *metabolic factors*

Environmental:

- *humidity*
- *temperature*
- *surface type*

Leave original host



Survive in transit



Be delivered...



...to a susceptible part of a host



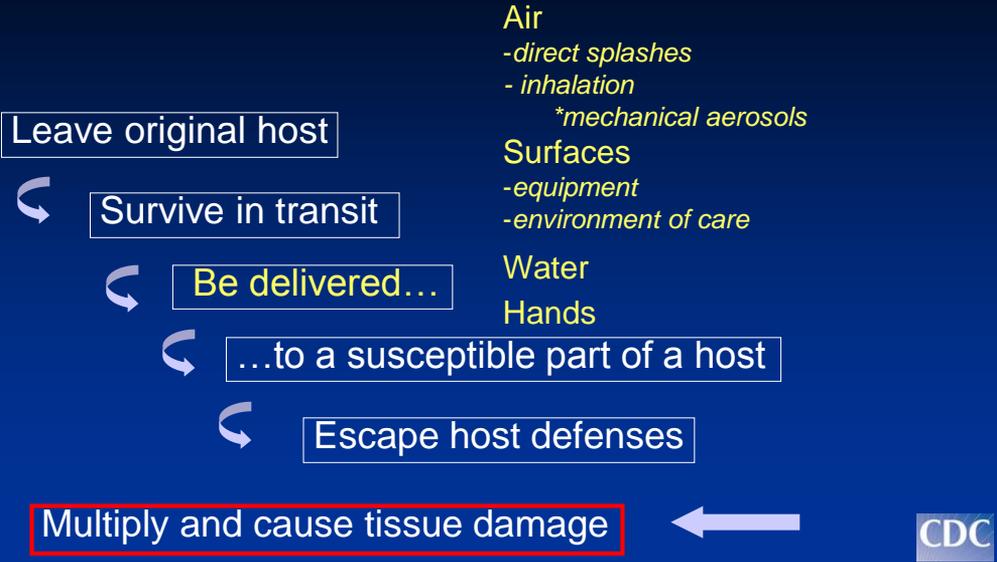
Escape host defenses

Multiply and cause tissue damage

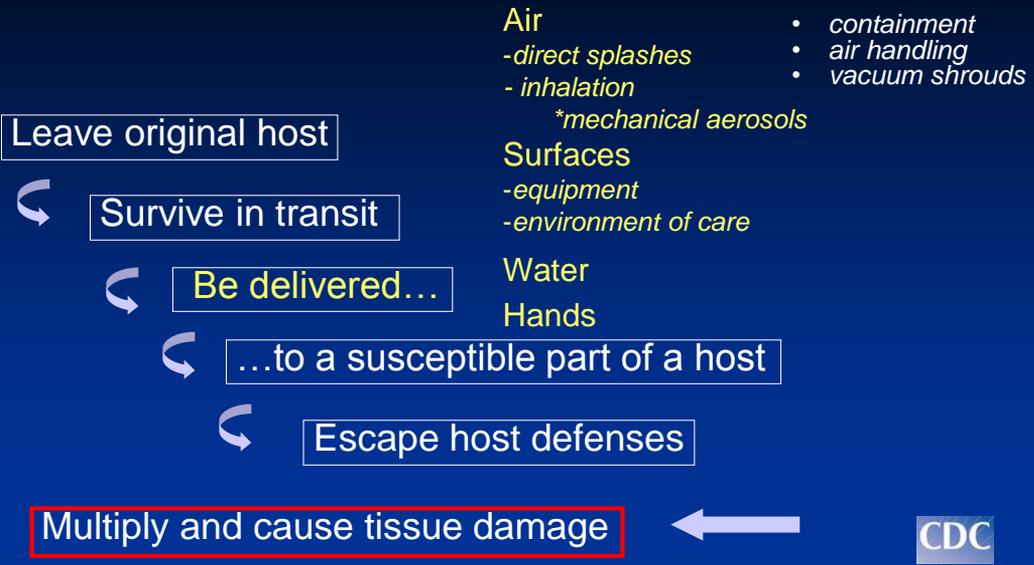


CDC

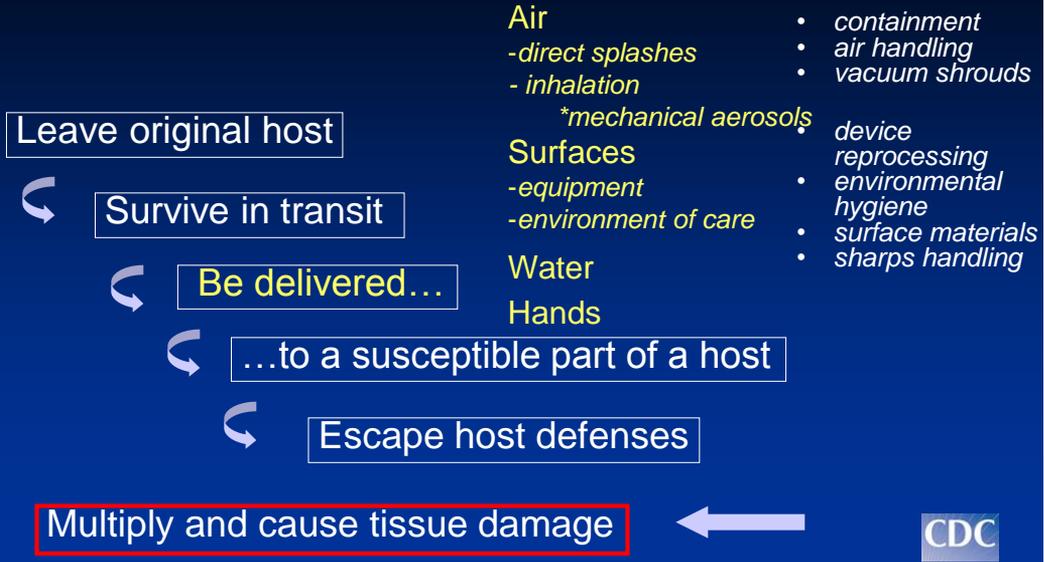
Infection Transmission



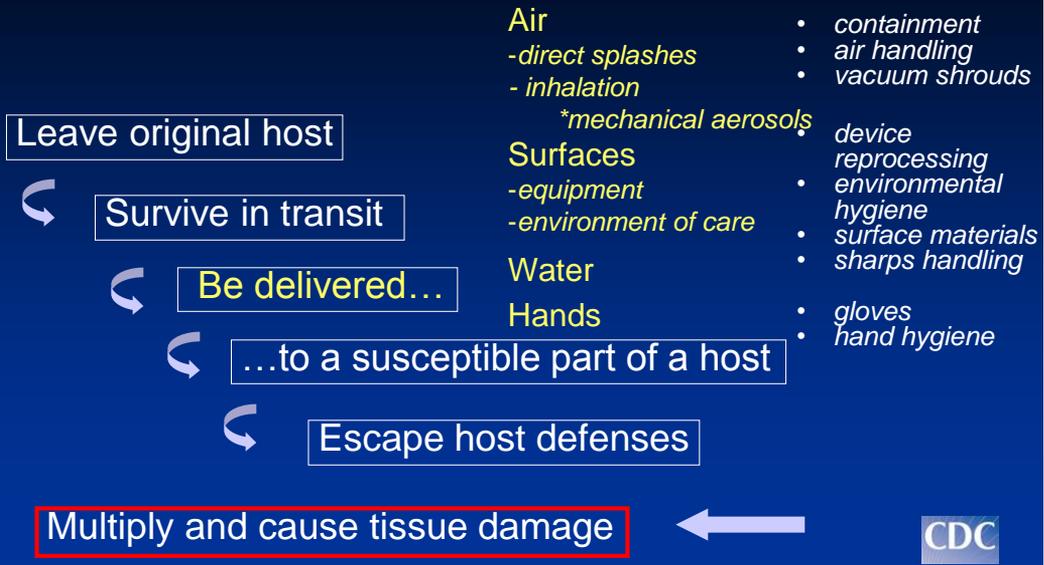
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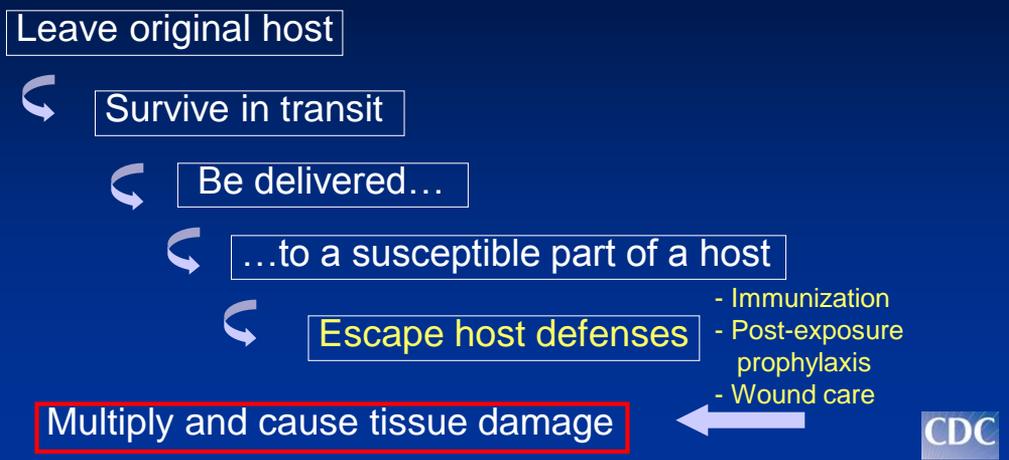
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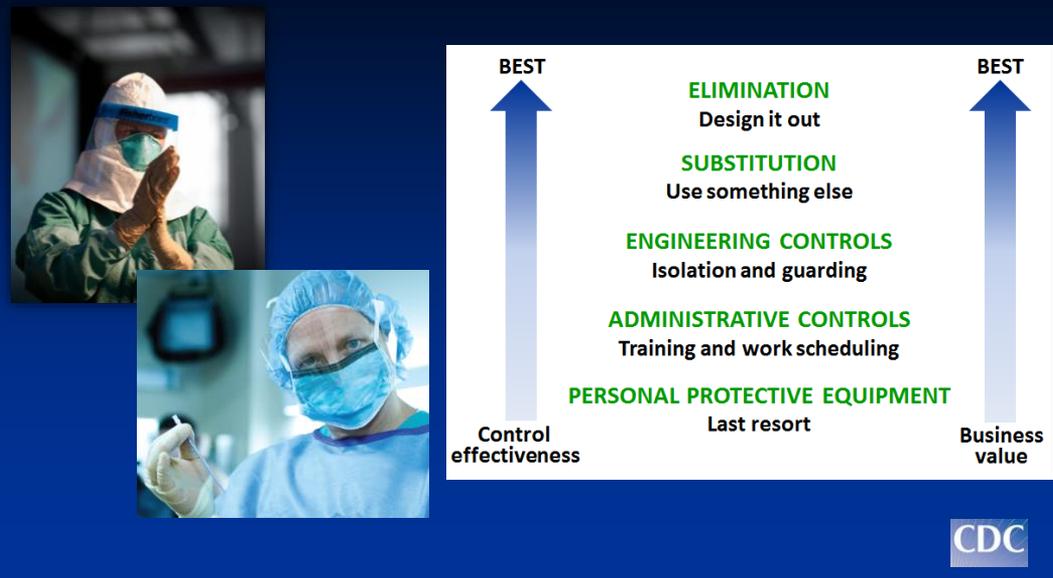
CDC

- Hands
- PPE

Infection Transmission



“Hierarchy of Controls”



How do we choose...?



PPE rationale

- Targeted to susceptible body parts
- Optimized for real-world utility
 - Efficacy
 - Availability
 - Comfort
 - Ease and Safety



**Acceptance
Adherence**



Effectiveness



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Effectiveness



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**Acceptance
Adherence**



Effectiveness



Understanding

+

Sustainability



Essential Elements of Training

- Mandated
 - blood borne pathogens
- Onboarding
- Group-specific (*nursing, environmental services, respiratory therapy, physicians, radiology techs, dialysis techs, LPN...*)
- Assessing competency
- Targeted refresher training



Essential Elements of Training

- Mandated
 - blood borne pathogens
- Onboarding
- Group-specific [Instilling risk-assessment](#)
- Assessing competency
- Targeted refresher training



Human *factors* vs Human *errors*

- People want to do a good job.



Human *factors* vs Human *errors*

- People want to do a good job.
- Facility and equipment design
- Work processes
- Social networks



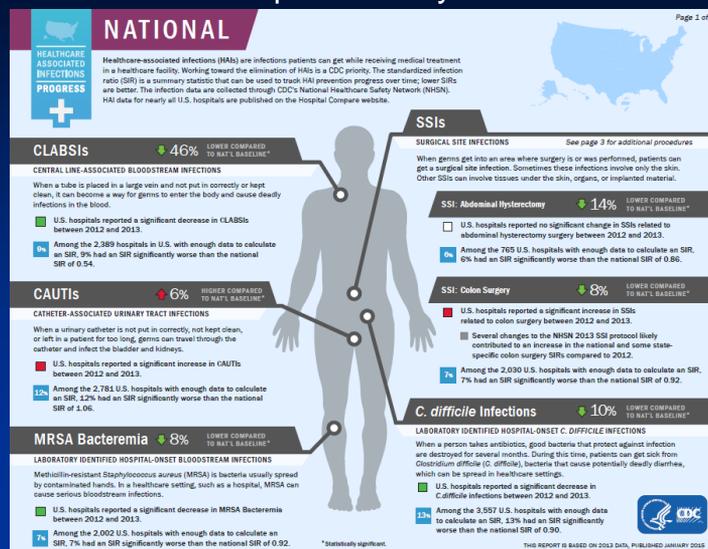
Human factors vs Human errors

- People want to do a good job.
- Facility and equipment design
- Work processes
- Social networks
- Adaptive systems using feedback



Healthcare-associated Infections

- 1 in 25 hospital patients
- > 700,000 HAIs in U.S acute care hospitals each year
- > 70,000 deaths



ANTIBIOTIC RESISTANCE THREATS in the United States, 2013

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least  **2,049,442** illnesses,
 **23,000** deaths

**bacteria and fungus included in this report*

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Thank you

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

