



Surface Cleaning in Schools: Basic Principles, Focus on Influenza Prevention

Lynne Schulster, PhD, M(ASCP)

Division of Healthcare Quality
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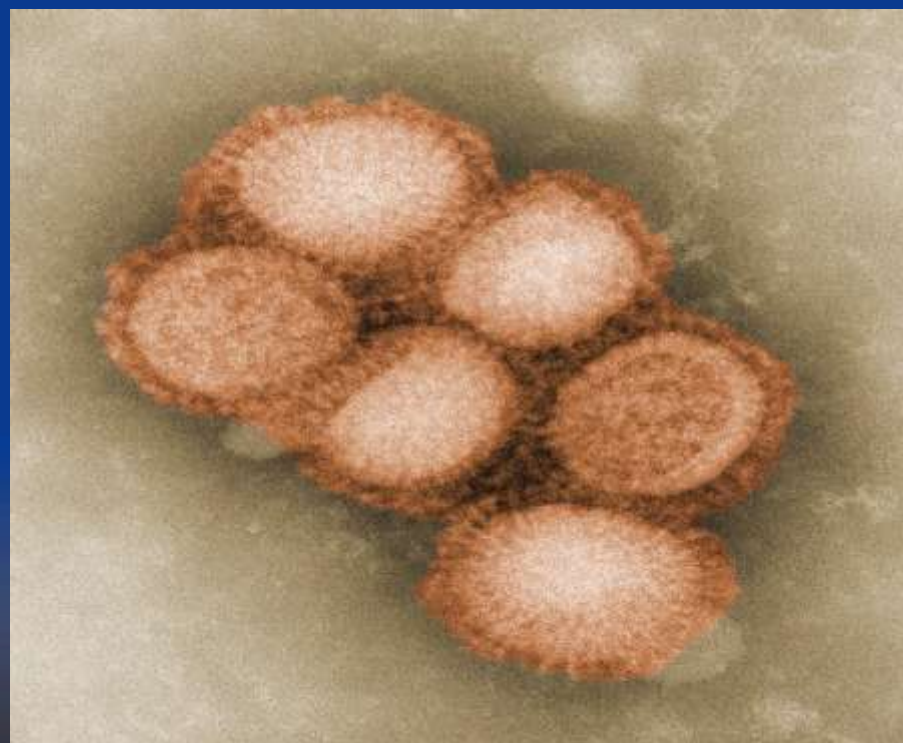
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H1N1 Virus



Points of Discussion

- Provide basic principles of cleaning and disinfection
- Describe infection prevention principles to break the transmission of infection
- Examine modes of transmission of influenza virus
- Elements for environmental infection control
- Lesson learned: Use cleaners and disinfectants wisely and appropriately



The most important step in
environmental surface
management is....

Cleaning!!



Cleaning

A process that:

- Reduces levels of soil, organic/inorganic contamination, and microbes on environmental surfaces making these surfaces safe to touch or handle
- Prepares a surface for effective disinfection
- Water and soaps, detergents, surfactants
- **Cleaning is principally a removal process**



Disinfection

- Disinfection: inactivation of microorganisms, usually with the use of chemicals or heat
- Disinfection \neq cleaning
 - In general, cleaners don't disinfect, and disinfectants don't clean!
 - Exceptions are detergent/disinfectants
- Environmental surfaces (e.g., desks, floors, doorknobs, light switches, etc.) can be candidates for Low-Level Disinfection
- Disinfectants are classified as pesticides, are subject to EPA registration prior to marketing in the U.S.



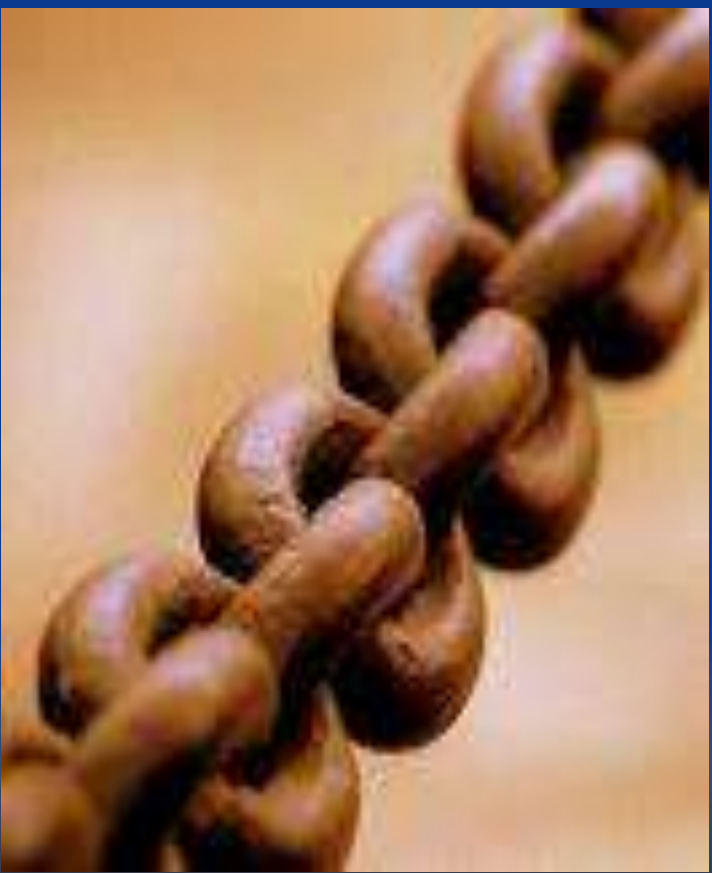
Low-Level Disinfection

- Kills most vegetative bacteria, some viruses, and some fungi, but NOT mycobacteria
 - Hospital-grade disinfectants used primarily for housekeeping
 - quaternary ammonium compounds (“quats”)
 - some phenolics
 - some iodophors
 - Hospital-grade disinfectants are not limited to hospital use only

As for all disinfectants, follow the label instructions carefully, including pre-cleaning the surface as indicated before applying the disinfectant



Chain of Infection



- **Virulent pathogen:**
 - Bacteria, fungi, viruses, parasites, prions
- **Sufficient number of pathogen:**
 - Infectious dose
- **Mode of transmission:**
 - Contact, droplet, airborne
- **Portal of entry:**
 - Broken skin, mucous membrane, respiratory tract, ingestion
- **Susceptible host:**
 - Age, immunity, medical conditions

Other possible links include reservoir, portal of exit



A Comprehensive Approach to Infection Prevention

- Cleaning and disinfection of environmental surfaces is only one aspect
- Keep the hands clean
- Prevent surface contamination from occurring in the first place
- Practice respiratory hygiene/cough etiquette
- Maintain good health habits
- Stay home when sick

So Why All the Fuss About Hand Hygiene?

- *A very common mode of transferral of pathogens is via the hands!*
- Surface to hand to portals of entry (e.g., eyes, nose, mouth)
- Control measure that gives you the maximum control





U.S. Hygiene Habit Survey



- 888 adults surveyed in the U.S. in August 2009
- 65% of the households surveyed expressed concern about spread of novel H1N1 influenza
- 93% believed that good hygiene habits will help to limit spread
- 33% reported changing their hygiene habits in response to the coming novel H1N1 influenza epidemic and influenza season

Survey sponsored by the Soap and Detergent Association (SDA); reported in *Infection Control Today*, posted 9/2/09 www.infectioncontrolday.com



Environmental Surfaces



- Environmental surfaces (e.g., walls, floors, desks) are generally not directly involved in infectious disease transmission
- Surfaces may serve as reservoirs of microorganisms that may potentially cause infection
- Persistence affected by temperature, surface material, humidity, presence of organic matter
- Hand contact, transfer of contamination
- Correct portals of entry are important



Taking Steps to Preventing Environmental Contamination

- Practice respiratory hygiene / cough etiquette consistently
 - Cover sneezes and coughs
- Encourage persons who are ill with symptoms of ILI to stay home
- Discard used items with respiratory secretions (e.g., tissues) properly
- Keep hands clean

Cleaning and Disinfecting of the Housekeeping Surfaces

- Follow manufacturer's instructions if using proprietary cleaners or disinfectants
 - Use conditions (e.g., concentration, contact time)
- Clean and disinfect surfaces that are touched by hand on a frequent and regular basis
 - Door knobs, light switches, bed rails
 - Surfaces around the toilet



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Posted at: 05/05/2009 5:12 PM
 By: Chris Ornelas, KOB-TV, and Joshua Panas, KOB.com
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Crews spend day disinfecting high school



With classes resuming a few days earlier than expected, Socorro school workers were busy Tuesday sanitizing and disinfecting schools.

A 14-year-old girl and a 15-year-old boy both tested positive for H1N1 in Socorro.

At the high school, a three man team spent the day wiping down every desk, doorknob and locker.

There are 45 classrooms worth of desks and 600 lockers that line the halls. And that doesn't account for restrooms or other common areas.

Besides starting school again on Thursday, there is one other scheduling change: An awards ceremony at the high school that was scheduled for Tuesday night has been moved to May 13.

As for the other New Mexico schools closed this week, Carlsbad High School and Deming interMediate School will reopen Wednesday and Lordsburg school officials will meet on Wednesday to decide when they'll resume classes.

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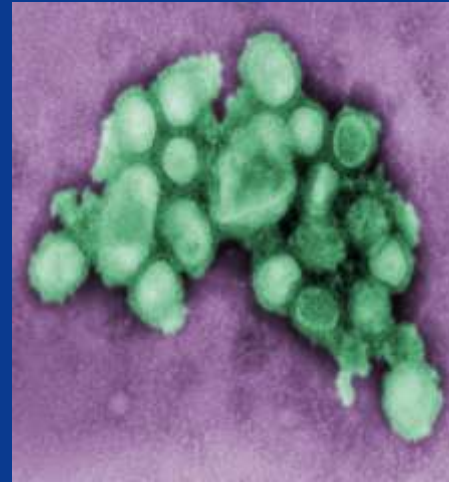
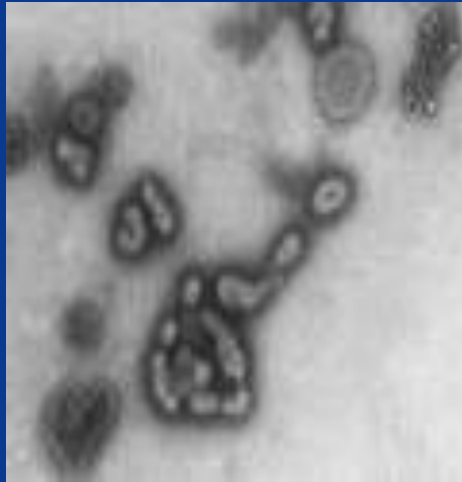
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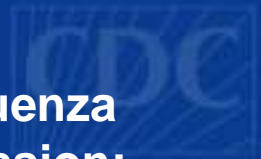
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Emerging Pathogens Control Strategy



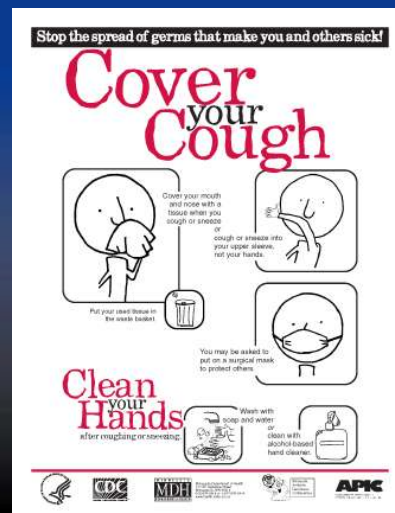
- Biophysical and biochemical properties of emerging pathogens are important predictors of resistance or sensitivity to chemical disinfectants
- Resistance to therapeutics is a separate issue
- Evaluate Chain of Infection as part of ICRA
- Rational assessment for environmental control



Modes of influenza virus transmission:

- Direct contact with droplets
- Direct contact with virus aerosols
- Indirect contact with surfaces contaminated with respiratory secretions – transfer to portal of entry

Photo
Source: CDC
Public Health
Image Library



Fomites/Surfaces vs. Aerosol Transmission: Influenza Virus



- Boone & Gerba (2005): 23% - 59% of fomites in child care facilities and homes were positive for influenza A RNA by PCR
- Mubareka et al (2009): influenza A viruses studied in guinea pigs:



- ◆ Influenza A/Panama/2007/1999 (H3N2): infectious aerosol transmission more efficient compared to spread via contaminated fomites
- ◆ 3 of 4 (75%) and 5 of 6 (83%) animals infected in aerosol studies, while 1 of 8 (12.5%) animals infected when exposed to contaminated surface; 0 of 6 animals infected when exposed to contaminated fomites



Environmental Control of Novel H1N1 Influenza Viruses

- Basic biophysical and biochemical properties of novel H1N1 influenza viruses are comparable to those of seasonal influenza viruses
- Sensitivity to disinfectants predicted to be equivalent to that for human influenza A viruses
- Infection control strategy for environmental surfaces will be similar to current protocols (e.g., focus on frequently touched surfaces, LLD)

Strategies to Enhance the Safety and Efficacy of Cleaning and Disinfecting

- Use cleaners and disinfectants wisely, as part of a comprehensive infection prevention strategy
- Follow label instructions for correct and efficacious use
- Pay attention to MSDS advisories for safety
- Look for opportunities to prevent surface contamination from occurring
- Look for opportunities to reduce the amounts of chemicals used
- Wide-spread disinfection of all surfaces in schools in response to emerging pathogens not warranted

CDC on the Internet

CDC Home
Centers for Disease Control and Prevention
Your Online Source for Credible Health Information

2009 H1N1 Flu
We last updated January 18, 2010 5:04 PM ET

Situation Update
Flu Activity: Overall flu activity in the United States decreased during the week of January 3-9, 2010, as reported in FluView. Though flu activity, caused by either 2009 H1N1 or seasonal flu viruses, may rise and fall, it is expected to continue for several more months.
[See More On Key Flu Indicators](#)

Vaccination: CDC recommends influenza vaccination as the first and most important step in protecting against the flu. Because supply and availability of the 2009 H1N1 vaccine have increased dramatically, CDC is now encouraging anyone who has been patiently waiting to receive the 2009 H1N1 vaccine to get vaccinated at this time.
[Find a Vaccine](#)

General Information

- H1N1 Flu & You
- Caring for Someone Sick at Home
- In the News
- Quick Facts on Antivirals
- CDC Estimates of Cases

Vaccination

- General Information
- For Clinicians/Healthcare Professionals
- Vaccine Safety
- Vaccine Supply Status

Info for Specific Groups

- Health Care Providers
- State, Local & Tribal Health Officials
- Child Care Programs
- People 65 and Older
- People with Asthma
- Parents & Caregivers
- Pregnant Women
- Travelers & Travel Industry

Free Resources

- Brochures
- Flyers
- Postcards
- Other Resources

Additional Resources

Clinical & Public Health Guidance

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1600 Clifton Road, NE
Atlanta, GA 30333
800-CDC-INFO (800-322-4673)
TTY: (800) 328-6388
24 Hours Every Day

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Health Topics: Oral Preparedness & Response
Seasonal & Pandemic Flu
Information on H1N1 Flu (Swine Flu)

General Information

- CDC H1N1 Flu (Swine Flu)
- H1N1 Flu Clinical and Public Health Guidance

School-Related Information

- Updated guidance for the Fall Flu Season
 - [Guidance for State & Local Health Officials & School Administrators for School Resumes in Flu During 2009-2010 School Year](#)
 - [Technical Report for State & Local Health Officials & School Administrators on CDC Guidance for School Resumes in Flu During 2009-2010 School Year](#)
 - [Preparing for Flu: A Communication Toolkit for Schools \(2-11-10\)](#)
- [Report School Dismissals](#): The School Dismissal Monitoring System has been established by CDC and the U.S. Department of Education to report on novel influenza (H1N1)-related school or school district dismissals in the United States. Report novel influenza (H1N1)-related school or school district dismissals [here](#).
- [School Planning \(Flu.gov\)](#)
- [Department of Education H1N1 Flu Information](#)

Youth-Related Information

- [Body and Mind \(H1N1\) 2009 H1N1 \(a.k.a. Swine Flu\)](#)

CDC Information on Seasonal and Avian Flu

- [Influenza \(Flu\)](#)
- [Preventing the Flu](#)
- [Information for Schools, Childcare Providers, and Parents](#)

Report Flu-Related K-12 School Dismissals

H1N1 School Guidance

School Guidance H1N1 Flu

Full guidance document
Recommended school responses for the 2009-2010 school year:

- Under conditions with similar severity as in spring 2009
- Under conditions of increased severity compared with spring 2009

More flu information for schools
[www.flu.gov](#)



Internet Resources



- CDC information:

- <http://www.cdc.gov/h1n1flu/>
- <http://www.cdc.gov/h1n1flu/schools/>
- http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Enviro_guide_03.pdf
- http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Disinfection_Nov_2008.pdf

- EPA information:

- <http://www.epa.gov/oppad001/influenza-disinfectants.html>
- <http://www.epa.gov/oppad001/chemregindex.htm>



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