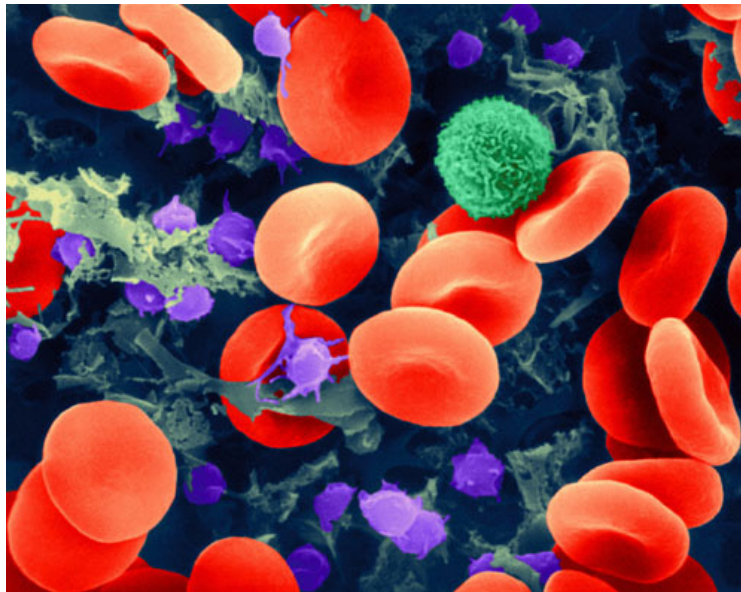


Unit 2: Disease Prevention

Instructor's Background Text Part 1 of 3



PKIDs' Infectious Disease Workshop

Made possible by grants from the Northwest Health Foundation,
the Children's Vaccine Program at PATH and PKIDs.

PKIDs' Infectious Disease Workshop

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Acknowledgements

Producing this workshop has been a dream of ours since PKIDs' inception in 1996. It has been more than two years since we began work on this project, and many people helped us reach our goal. It's not done, because it is by nature a living document that will evolve as science makes strides in the research of infectious diseases, but it's a great beginning.

There are people who've helped us whose names are not on this printed list. That omission is not deliberate, but rather from our own clumsiness in losing important pieces of paper, and we apologize.

Without the funding and support of the Northwest Health Foundation and the Children's Vaccine Program at PATH (Program for Appropriate Technology in Health), this would have been an impossible task. Dr. Katherine Vaughn, PKIDs' Medical Director and Dr. Karen Steingart, scientific advisor to PKIDs, provided excellent guidance through their editorial oversight and knowledgeable contributions to the Infectious Disease Workshop.

On PKIDs' staff are three individuals without whom this publication would never have been finished—Franji Mayes, Mylei Basich and Christine Kukka, all of whom gave their very best to ensure this workshop is accurate and user-friendly.

We are indebted to the following individuals who cheerfully gave us hours of their time and access to their resources: the American Society for Microbiology; Kathy A. Bobula, Ph.D., Coordinator, Early Childhood Education, Clark College, Vancouver, Wash.; Claudia Bratt, elementary school teacher, Truman Elementary, Vancouver, Wash.; Sue Campbell, Early Childhood Educator, Kindercare; many wonderful and helpful people at the Centers for Disease Control and Prevention, Atlanta, Georgia; Rachel Coyle, Case Aide and Residential Care Staff Lead, Jonathan's Place; Tammy Dunn, Early Childhood Director, Portland Christian Schools, Portland, Oregon; Bruce Gellin, M.D., Director of the National Vaccine Program Office in the Office of the Assistant Secretary for Health, Department of Health and Human Services; Shannon Harrison, M.D., Internal Medicine and Infectious Diseases, Teton Hospital, Jackson, Wyoming; the Immunization Action Coalition; Brad Jensen, M.D., Southwest Washington Medical Center Pathology Department; Edgar Marcuse, M.D., Professor of Pediatrics, University of Washington and Director of Medical Services, Seattle Children's Hospital and Regional Medical Center; Zack Mittge, law student, University of Oregon; the National Network for Immunization Information; Paul Offit, M.D., Chief, Section of Infectious Diseases and the Henle Professor of Immunologic and Infectious Diseases at The Children's Hospital of Philadelphia; Carol Porter, Red Cross health room volunteer, Garland Independent School District, Garland, Texas; Sarah Theberge, Curriculum Instructor, Early Childhood Education, Clark College, Vancouver, Wash.; James Whorton, Ph.D., Professor, Department of Medical History and Ethics, University of Washington School of Medicine.

We thank the following for providing nonprofit rates for their microscopic images: Dennis Kunkel Microscopy, Inc., and Science Photo Library/Photo Researchers, Inc.
(Cover photo: Dennis Kunkel Microscopy, Inc./www.denniskunkel.com.)

Additional funding for this project provided by PKIDs (Parents of Kids with Infectious Diseases).

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Warning: This section contains certain disease-related images that may not be suitable for young children.

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This publication contains the opinions and ideas of its authors. It is intended to provide helpful and informative material on the subject matter covered. Any information obtained from this workshop is not to be construed as medical or legal advice. If the reader requires personal assistance or advice, a competent professional should be consulted.

The authors specifically disclaim any responsibility for any liability, loss, or risk, personal or otherwise, which is incurred as a consequence, directly or indirectly, of the use and application of any of the contents of this workshop.

Introduction

PKIDs (Parents of Kids with Infectious Diseases) is a national nonprofit agency whose mission is to educate the public about infectious diseases, the methods of prevention and transmission, and the latest advances in medicine; to eliminate the social stigma borne by the infected; and to assist the families of the children living with hepatitis, HIV/AIDS, or other chronic, viral infectious diseases with emotional, financial and informational support.

Remaining true to our mission, we have designed the *Infectious Disease Workshop (IDW)*, an educational tool for people of all ages and with all levels of understanding about infectious diseases. In this workshop, you will learn about bacteria and viruses, how to prevent infections, and how to eliminate the social stigma that too often accompanies diseases such as HIV or hepatitis C.

We hope that both instructors and participants come away from this workshop feeling comfortable with their new level of education on infectious diseases.

The IDW is designed to “train-the-trainer,” providing instructors not only with background materials but also with age-appropriate activities for the participants. Instructors do not need to be professional educators to use these materials. They were designed with both educators and laypersons in mind.

The IDW is comprised of a master Instructor’s Background Text, which is divided into six units: Introduction to Infectious Diseases, Disease Prevention, Sports and Infectious Disease, Stigma and Infectious Disease, Civil Rights and Infectious Disease, and Bioterrorism and Infectious Disease.

For each unit, instructors will find fun and helpful activities for participants in five age groups: 2 to 6 years of age, 6 to 9 years of age, 9 to 12 years of age, 13 to 18 years of age and adults.

We welcome any questions, comments, or feedback you may have about the IDW or any other issue relating to infectious diseases in children.

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PKIDS' INFECTIOUS DISEASE WORKSHOP

Disease Prevention

Infectious diseases are scary—in part because most of us don't know anything about them. They are also scary because they can be lethal. Unless we happen to be healthcare professionals or our loved ones have been personally affected by such diseases, we only think about them when they threaten our families, our communities or ourselves.

This module helps advance our understanding about how to *prevent* infections and provides perspective on why we must assume everyone has an infectious disease and the actions necessary to protect ourselves and each other.

Standard and Transmission-Based Precautions

Everyone—parents, healthcare workers, teachers, employers, daycare providers, children and others—should use a variety of precautions to ensure viruses, bacteria and other disease-causing germs (pathogens) do not spread to themselves or others.

Standard precautions, those that should be used in all situations, require everyone to assume that anyone's blood and body fluids may carry hepatitis viruses, HIV or other blood-borne infections and that appropriate precautions should be taken.

Infectious substances include blood and all body fluids, secretions and excretions (except sweat), whether or not they contain any visible blood. Standard precautions should also be used when you come into contact with bruised, badly chapped or any nonintact skin or mucous membranes, even if blood is not visible.

This approach carries a blanket assumption that anyone—rich or poor, fat or thin, young or old—may be infected with something.



The ultimate in precautions—testing for ebola virus!

Centers for Disease Control and Prevention

Why this built-in assumption? Because many people with HIV, viral hepatitis and other infectious diseases are unaware they have an infection. Even if they wanted to inform you, they would not know to do so.

Although we cannot live our lives carrying a hospital supply room around with us, we can adapt precautions used by the experts to a manageable form and incorporate them into our daily liv-

ing.

Transmission

(source: edited from CDC publications)

Germs (microorganisms) are transmitted by several routes, and the same germ may be transmissible by more than one route. There are five main routes of transmission:

- Contact
- Droplet
- Airborne
- Common Vehicle
- Vectorborne

Contact transmission is divided into two subgroups: direct-contact transmission and indirect-contact transmission.

- *Direct-contact* transmission involves a direct skin-to-skin contact and physical transfer of germs between a susceptible individual and an infected person, such as occurs when a person touches an infected person—this can occur during most any activity that requires direct personal contact.
- *Indirect-contact* transmission involves contact of a susceptible individual with a contaminated intermediate object, usually inanimate, such as contaminated toys, needles, or toothbrushes, or contaminated hands that are not washed.

Droplet transmission, theoretically, is a form of contact transmission. However, the way the germ is transmitted to the individual is quite distinct from either direct- or indirect-contact transmission. Therefore, droplet transmission is considered a separate route of transmission.

Droplets come from the infected person primarily during coughing, sneezing, and talking.



Droplets in action

Transmission occurs when droplets containing germs from the infected person are propelled a short distance through the air and deposited on the individual's conjunctivae (mucous membranes under the eyelids and around the eyeball), nasal mucosa (mucous membranes inside the nose), or mouth. Because droplets do not remain suspended in the air, droplet transmission *must not* be confused with airborne transmission.

Airborne transmission occurs by the scattering of either airborne droplet nuclei (small-particle residue [5 μm or smaller in size] of evaporated droplets containing germs that remain suspended in the air for long periods of time)

or dust particles containing the infectious agent.

Germs carried in this manner can be widely spread by air currents and may become inhaled by a susceptible individual within the same room or over a longer distance from the infected person, depending on environmental factors; therefore, special air handling and ventilation are needed to prevent airborne transmission. Germs transmitted by airborne transmission include *Mycobacterium tuberculosis* and the varicella virus.

Common vehicle transmission applies to germs transmitted by contaminated items such as food, water and equipment. This can happen when a person infected with hepatitis A doesn't wash his hands after using the restroom and then prepares salad for guests. The germs are transferred from his hands to the raw food then to the people eating the raw food.

Vectorborne transmission occurs when vectors (carriers) such as mosquitoes, flies, rats, and other vermin transmit microorganisms. This can happen when a mosquito carries the West Nile virus from a bird to a person.

Precautions are designed to prevent transmission of germs by these routes.



Mosquito

Global Health Council

Basics of Standard Precautions

Standard precautions reduce the risk of transmission of bloodborne pathogens (such as HIV and hepatitis B and C) and should be used with everyone we know. It is impossible to determine who is living with an infection and who isn't because:

- Not everyone who is infected has obvious symptoms.
- Not everyone who is infected knows of their infections.
- Not everyone who is infected and knows of their infections chooses to share the information with others.

Standard precautions apply to 1) blood; 2) all body fluids, secretions, and excretions *except sweat*, regardless of whether or not they contain visible blood; 3) nonintact skin; and 4) mucous membranes. Standard precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection.

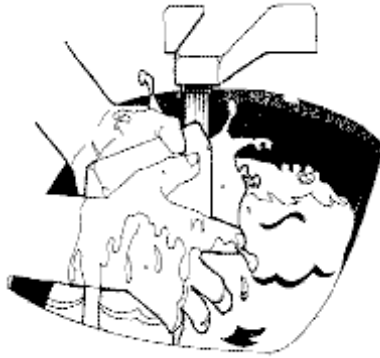
There are many ways to decrease the risk of transmission of microorganisms.

Handwashing and Gloves

Handwashing is frequently called the single most important measure to reduce the risks of transmitting germs from one person to another or from one site to another on the same person.

Washing hands as quickly and thoroughly as possible after contact with blood, body fluids, secretions, excretions, and equipment or articles contaminated by them is an important part of infection control.

Wash hands after touching blood, body fluids, secretions, excretions, and contaminated items, whether or not gloves are worn. Wash hands immediately after gloves are removed. Use a plain (nonantimicrobial) soap for routine handwashing. Use an antimicrobial agent or a waterless antiseptic agent particularly when a disease can be spread by direct or indirect contact.



Centers for Disease Control and Prevention

In addition to handwashing, gloves play an important role in reducing the risks of transmission of microorganisms.

Gloves are worn for important reasons. Gloves are worn to provide a protective barrier and to prevent contamination of the hands when touching blood, body fluids, secretions, excretions, mucous membranes, and nonintact skin. Gloves are also worn to reduce the likelihood that microorganisms present on the hands of an individual will be transmitted to others when touching someone's mucous membranes and nonintact skin. Wearing gloves does not replace the need for handwashing, because gloves may have small, inapparent defects or may be torn during use, and hands can become contaminated during removal of gloves.

Masks and Eye Protection

Although we don't usually carry around face shields, masks and goggles, it's important to put some sort of barrier between the mucous membranes around our eyeballs, inside our noses and in our mouths and another person's blood or body fluid. Various types of masks (scarves or bandannas) and goggles (eyeglasses or sunglasses) should be worn alone or in combination to provide barrier protection. A mask covering both the nose and the mouth, and goggles, should be worn by individuals during events (such as assisting car accident victims) that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions to provide protection of the mucous membranes of the eyes, nose, and mouth from contact transmission of pathogens.

Clothing

We don't carry "scrubs" or hospital gowns around with us, so when we are exposed to another person's blood or body fluids, we need to remember that our clothes are acting as barriers to germs, although they are probably not impermeable.

Our clothes may get blood or body fluid on them. It's important to not touch them with our bare hands. After we remove them for cleaning, we must be sure to wash our hands thoroughly.

Linen and Laundry

Although soiled linen (sheets, pillowcases, napkins) may be contaminated with disease-causing germs, the risk of disease transmission is small if the items are handled and washed in a manner that avoids transfer of microorganisms to people, objects or the environment. Washing such items in hot water with detergent and a mild bleach solution will kill the germs. Make sure to wash your hands after putting such items in the laundry.

Dishes, Glasses, Cups, and Eating Utensils

No special precautions are needed for dishes, glasses, cups, or eating utensils. Either disposable or reusable dishes and utensils can be used for infected persons. The combination of hot water and detergents used in dishwashers is sufficient to decontaminate dishes, glasses, cups, and eating utensils.

Inanimate Objects

Make sure disposable items that have been exposed to blood or body fluids, secretions or excretions have been disposed of properly. Put such items (needles) in a sharps container, or plastic garbage bag tied closed, or a lined trash can with a lid and ensure the bags or containers are disposed of in the appropriate place and in the appropriate way. If in doubt, call your local recycling center or waste disposal center.

All objects that are meant for multiple or continual use (such as toys or countertops) that have been exposed to blood or body fluids, secretions or excretions should be cleaned thoroughly. (See Clean Up Guidelines in this workshop.)

Resuscitation

Use mouthpieces, resuscitation bags, or other ventilation devices as an alternative to mouth-to-mouth resuscitation methods. If you have nothing on hand that is made for this purpose, you can try poking a small hole in a piece of plastic wrap and placing it over the victim's mouth. Put your mouth on the plastic and blow through the hole.

Transmission-Based Precautions

Transmission-based precautions are designed for those who are documented or suspected to be infected with highly infectious pathogens for which additional precautions beyond standard precautions are needed to interrupt transmission.

There are three types of transmission-based precautions: airborne precautions, droplet precautions, and contact precautions. They may be combined for diseases that have multiple routes of transmission. When used either singly or in combination, they should be used *in addition to* standard precautions.

Standard Precautions

Use standard precautions in all situations

Airborne Precautions

(certain infections may require more than one type of precaution)

In addition to standard precautions, use airborne precautions for those known or suspected to have serious illnesses transmitted by airborne droplet nuclei. Examples of such illnesses include:

- Measles
- Varicella (chickenpox: including disseminated zoster)
- Tuberculosis

A person thought to be infected with a disease that can be transmitted through airborne transmission should be isolated, if possible.

If the disease is serious enough to require constant medical care, the person should be taken to a hospital. If the person is being cared for at home, everyone should realize that they are at risk



Chickenpox

of infection if they are not wearing respiratory protection and are not already immune. Since proper respiratory protection must be specially purchased and cannot be found lying around the house, it is more practical to have someone immune to the disease care for the potentially infected person. For instance, in the case of measles or chickenpox, a person who has been vaccinated against these diseases or who has already been infected with these diseases is the ideal choice as caregiver.

If it isn't too uncomfortable for the infected person, you can limit the spread of droplet nuclei by placing a surgical mask on the person. A physician should always be consulted before attempting any care at home.

Droplet Precautions

(certain infections may require more than one type of precaution)

In addition to standard precautions, use droplet precautions for those known or suspected to have serious illnesses transmitted by large particle droplets. Examples of such illnesses include:

- Invasive *Haemophilus influenzae* type b disease, including meningitis, pneumonia, epiglottitis, and sepsis.
- Invasive *Neisseria meningitidis* disease, including meningitis, pneumonia, and sepsis.

Other serious bacterial respiratory infections spread by droplet transmission, including:

- Diphtheria (pharyngeal)
- Mycoplasma pneumonia
- Pertussis (whooping cough)
- Streptococcal (group A) pharyngitis, pneumonia, or scarlet fever in infants and young children

Serious viral infections spread by droplet transmission, including:

- Influenza
- Mumps
- Rubella

A person thought to be infected with a disease that can be transmitted through droplet transmission should be isolated, if possible.

If the disease is serious enough to require constant medical care, the person should be taken to a hospital. If the person is being cared for at home, everyone should realize that they are at risk of infection if they are not maintaining a distance of at least three feet from the infected person and are not immune to the disease. If not already immune to the disease, caregivers should wear surgical masks when coming into close contact with the infected person.



Diphtheria

Centers for Disease Control and Prevention

For instance, in the case of pneumonia, meningitis or whooping cough, a person who has been vaccinated against these diseases or who has already been infected with these diseases is the ideal choice as caregiver.

If it isn't too uncomfortable for the infected person, you can limit the spread of droplets by placing a surgical mask on the person. A physician should always be consulted before attempting any care at home.

Contact Precautions

(certain infections may require more than one type of precaution)

In addition to standard precautions, use contact precautions for those known or suspected to have serious illnesses easily transmitted by direct patient contact or by contact with items in the person's environment. Examples of such illnesses include:

- Gastrointestinal, respiratory, skin, or wound infections or colonization with multidrug-resistant bacteria.

- Enteric infections with a low infectious dose or prolonged environmental survival, including:
 - For diapered or incontinent patients: enterohemorrhagic *Escherichia coli* O157:H7, *Shigella*, hepatitis A, or rotavirus.
 - Respiratory syncytial virus, parainfluenza virus, or enteroviral infections in infants and young children.

Skin infections that are highly contagious or that may occur on dry skin, including:

- Diphtheria (cutaneous).
- Herpes simplex virus (neonatal or mucocutaneous).
- Impetigo.
- Staphylococcal furunculosis in infants and young children.
- Scabies.
- Zoster (disseminated or in the immunocompromised host).
- Viral/hemorrhagic conjunctivitis.
- Viral hemorrhagic infections (Ebola, Lassa, or Marburg).

A person thought to be infected with a disease that can be transmitted through contact transmission may or may not need to be isolated. Only a physician is qualified to make that determination.

If the disease is serious enough to require constant medical care, the person should be taken to a hospital. If the person is being cared for at home, everyone should realize that they are at risk of infection if they do not wear gloves when touching the infected person and are not immune to the disease. If not already immune to the disease, caregivers should wear gloves when coming into contact with the infected person or with anything the infected person may have touched.

It's important to wash hands thoroughly with an antimicrobial product or waterless antiseptic product after removing contaminated gloves. Dispose of the gloves properly so that no one and nothing is at risk of touching them. If your clothes come into contact with the infected person or objects the infected person has touched, remove and launder them and wash hands thoroughly as described above. Make sure contaminated clothes or linens don't touch anything or anyone prior to being laundered.

In the case of vaccine-preventable diseases like hepatitis A, a person who has been vaccinated against such diseases or who has already been infected with such diseases is the ideal choice as caregiver. For diseases like herpes or *E.coli* 0157, for which there is no vaccine, everyone needs to wear gloves to prevent the spread of the disease.

A physician should always be consulted before attempting any care at home.

How to Clean Up Body Fluids

(Source: CDC)

Keeping Your Home, Your Daycare or Your Work Environment Clean

One of the most important steps in reducing the number of germs, and therefore the spread of disease, is the thorough cleaning of surfaces that you work or prepare food on, or that come into frequent contact with children, such as toys that children put in their mouths, crib rails or diaper-changing areas.

Routine cleaning with soap and water is the most useful method for removing germs from surfaces. Good mechanical cleaning (scrubbing with soap and water) physically reduces the numbers of germs from the surface, just as handwashing reduces the numbers of germs from the hands. Removing germs is especially important for soiled surfaces that cannot be treated with chemical disinfectants, such as some upholstery fabrics.

However, some items and surfaces should receive an additional step—disinfection—to kill germs after cleaning with soap and rinsing with clear water. Items that can be washed in a dishwasher or hot cycle of a washing machine do not have to be disinfected because these machines use water that is hot enough for a long enough period of time to kill most germs.

The disinfection process uses chemicals that are stronger than soap and water.

Disinfection also usually requires soaking or drenching the item for several minutes to give the chemical time to kill the remaining germs. Commercial products that meet the Environmental Protection Agency's (EPA's) standards for "hospital grade" germicides (solutions that kill germs) may be used for this purpose.

One of the most commonly used chemicals for disinfection in childcare settings, for example, is a homemade solution of household bleach and water.

Bleach is cheap and easy to get. The solution of bleach and water is easy to mix, safe if handled properly and kills most infectious agents.

To create the solution, all you do is add bleach to the water. A solution of bleach and water loses its strength very quickly and easily. It is weakened by organic material, evaporation, heat and sunlight.

Therefore, bleach solution should be mixed fresh each day to make sure it is effective. Any left-over solution should be discarded at the end of the day.

NEVER mix bleach with anything but fresh tap water! Other chemicals may react with bleach and create and release a toxic chlorine gas.

Keep the bleach solution you mix each day in a cool place out of direct sunlight and out of the reach of children. Please keep all chemicals away from children.

If you use a commercial disinfectant, read the label and always follow the manufacturer's instructions exactly.

**Recipe for Bleach Disinfecting Solution
(For use in bathrooms, diapering areas, etc.)**

1/4 cup bleach
1 gallon of cool water

OR

1 tablespoon bleach
1 quart cool water
Add the household bleach (5.25% sodium hypochlorite) to the water.

**Recipe for Weaker Bleach Disinfecting Solution
(For use on toys, eating utensils, etc.)**

1 tablespoon bleach
1 gallon cool water

Cleaning Up Blood and Body Fluids

Spills of body fluids, including blood, feces, nasal and eye discharges, saliva, urine, and vomit should be cleaned up immediately.

- Wear gloves unless the fluid can be easily contained by the material (e.g., paper tissue or cloth) being used to clean it up. Be careful not to get any of the fluid you are cleaning in your eyes, nose, mouth or any open sores you may have.
- Clean and disinfect any surfaces, such as countertops and floors, on which body fluids have been spilled. Discard fluid-contaminated material in a plastic bag that has been securely sealed.
- Mops used to clean up body fluids should be (1) cleaned, (2) rinsed with a disinfecting solution, (3) wrung as dry as possible, and (4) hung to dry completely. Be sure to wash your hands after cleaning up any spill.

Washing and Disinfecting Diaper Changing Areas

Diaper changing areas should:

- Only be used for changing diapers.
- Be smooth and nonporous, such as formica (NOT wood).
- Have a raised edge or low “fence” around the area to prevent a child from falling off.

- Be next to a sink with running water.
- Not be used to prepare food, mix formula or rinse pacifiers.
- Be easily accessible to providers.
- Be out of reach of children.

Diaper changing areas should be cleaned and disinfected after each diaper change as follows:

- Clean the surface with soap and water and rinse with clear water.
- Dry the surface with a paper towel.
- Thoroughly wet the surface with the recommended bleach solution.
- Air dry. Do not wipe.

HANDWASHING—CAN'T SAY ENOUGH ABOUT IT!

American Society for Microbiology Blows Whistle on Dirty Hands

Toronto, Canada, Sept. 18, 2000—Despite an ever increasing threat from antibiotic resistant "superbugs" and emerging new microbial illnesses, at least one-third of Americans appear to have forgotten the single best piece of infection control advice Mom ever gave them—always wash your hands after you go to the bathroom.

While 95 percent of men and women surveyed say they wash their hands after using a public restroom, only 67 percent of people actually do wash before leaving the restroom, according to the results of a new survey and observational study conducted for the American Society of Microbiology's Clean Hands Campaign.

Despite increased publicity over the past several years about the importance of basic handwashing in limiting the spread of infectious disease, men and women in several American cities are even less likely to wash today than they were four years ago.

"While it may seem amusing at first, this is really a very serious issue. We need to help the public understand the significance of these findings and the importance of handwashing," said Judy Daly, Ph.D., Secretary of the American Society of Microbiology (ASM). "The more people do their part to control the spread of infections, the less we have to use antibiotics, which lose their potency over time as bacteria develop resistance to them."

ASM's Clean Hands Campaign is designed to remind Americans that "Mom was right"—it is important to wash one's hands before and after handling food products, after handling pets, before eating, and whenever one is sick, or is around people who are. Despite the generally held belief that cold germs are spread through sneezing and coughing, the majority of transmission comes from hand-to-hand contact and transfer of germs.

"Handwashing is the simplest, most effective thing people can do to reduce the spread of infectious diseases," according to Julie Gerberding, M.D., Director of the Centers for Disease Control and Prevention."

Clean Hands Campaign Survey Results

The new findings about handwashing come from a national telephone survey of 1,021 adults and observations of 7,836 persons made in public restrooms in New York, Atlanta, New Orleans, Chicago and San Francisco. Observers found that those least likely to wash in public restrooms were men in Atlanta, while those most likely to wash were women in San Francisco. Women surveyed were significantly more likely than men to at least say they wash their hands after various activities or events. For instance, 40 percent of women reported washing after sneezing or coughing, compared to 22 percent of men; 54 percent of women say they wash after

petting a dog or cat, while only 36 percent of men say they do so; and 86 percent of women, compared to 70 percent of men, say they wash their hands after handling a diaper.

Survey Findings

More than nine in ten adults (95 percent) say they wash their hands after using public restrooms; however, just six in ten (67 percent) were observed doing so. Among the observational findings from public restrooms, the dirtiest hands are in New York. Only 49 percent of the 2,283 people observed washed their hands after using a restroom in Grand Central/Penn Station.

Conversely, Chicagoans washed their hands most often (83 percent of adults observed) after going to a public restroom, followed by adults in San Francisco (80 percent). New Orleans and Atlanta were tied at 64 percent.

Across all cities, women washed their hands more often than men (75 percent versus 58 percent). This disparity was the most pronounced in Atlanta, where 84 percent of women at a Braves’ game washed up compared to only 36 percent of men.

Americans are also likely to say they wash their hands after changing a diaper (78 percent) and before handling or eating food (77 percent). However, many say they don't wash up after petting an animal (45 percent), coughing or sneezing (31 percent) or handling money (20 percent). Interestingly, Americans with college degrees are slightly less likely than those without college degrees to say they wash their hands.

	Males		Females		Total	
	1996	2000	1996	2000	1996	2000
Chicago	60%	78%	93%	86%	78%	83%
Atlanta	46%	36%	89%	84%	64%	64%
NYC	62%	43%	58%	54%	60%	49%
New Orleans	73%	55%	70%	74%	71%	64%
San Francisco	62%	71%	78%	89%	69%	80%

Survey Methodology

Part I: Observational Survey

Wirthlin Worldwide observed the behavior of 7,836 individuals (3,589 males and 4,247 females aged 18 years or older) in public restrooms (sufficiently equipped with soap, running water and towels) and recorded whether or not they washed their hands after using the facilities.

Observers discreetly watched and recorded whether or not adults using public restrooms washed their hands. Observers were instructed to groom themselves (comb their hair, put on make-up, etc.) while observing and to rotate bathrooms every hour or so to avoid counting repeat users more than once. Observers were also instructed to wash their hands no more than 10 percent of the time.

The research was conducted from August 24 through September 9, 2000 in public restrooms in well-known locales in five major metropolitan areas (Grand Central/Penn Station, New York City; Navy Pier, Chicago; Golden Gate Park, San Francisco; Braves' Baseball Game, Atlanta; and a casino, New Orleans).

Part II: Telephone Survey

Wirthlin Worldwide interviewed a total of 1,021 U.S. adults about their handwashing behavior in several situations.

Margin of error for a sample of this size is +/- 3 percent at a 95 percent confidence level. Results are weighted by age, gender, geographic region, and ethnicity to ensure reliable and accurate representation of the 18+ population in the continental U.S.

The research was conducted during the period of September 1-4, 2000.

Comparison to 1996 Handwashing Survey

Replicating a study conducted in 1996, Wirthlin Worldwide found in August of 2000 that there is still a substantial gap between those who claim to wash their hands after using a public restroom and actual observed behavior. In 1996, 94 percent of adults claimed to wash their hands while only 68 percent were observed doing so. In 2000, 95 percent claimed to wash their hands, while only 67 percent were observed doing so. There is no statistical difference between the data from the two years.

Interestingly, however, actual observed handwashing behavior declined among men (61 percent in 1996, 58 percent in 2000; a significant difference), while there was no significant change among women (74 percent in 1996 vs. 75 percent in 2000).

Survey Summary

A recent national survey conducted by Wirthlin Worldwide found that 95 percent of respondents say they always wash their hands after going to the bathroom. However, observations in public restrooms indicate that only 67 percent of adults do so.

It is well documented that the lack of handwashing spreads disease in healthcare-related settings; however, the impact of handwashing on infectious diseases among the general public in community settings had not been as extensively studied.

Several studies show that most physicians and nurses believe they wash their hands correctly; however, researchers have observed that even the handwashing technique of healthcare professionals can be inadequate as they wash their hands only 30 percent of the required time between patient contact and procedures, if they wash their hands at all. (US Centers for Disease Control).

Importance of Handwashing

Disease Prevention

The CDC reports that handwashing is one of the "most important means of preventing the spread of infection;" it is the first line of defense for infectious diseases, including respiratory infections and gastrointestinal disorders, among others.

Infectious diseases remain the leading cause of death and disease worldwide as well as the third leading cause of death in the United States.

Five of the Most Common Disease-Causing Scenarios in Your Home

In all of these scenarios, disease transmission can be prevented by handwashing (scrubbing with warm water and soap for at least 15 seconds).

HANDS to FOOD: Microscopic amounts of body waste may stick to our hands and get on the food we prepare, if we don't wash after using the toilet.

INFANT to HANDS to OTHER CHILDREN: Traces of body waste can adhere to hands after changing a baby's diaper. That waste can then be transferred to others we touch, if we don't wash our hands.

FOOD to HANDS to FOOD: Raw, uncooked foods like chicken and eggs may contain harmful germs. When handling these foods, it is important to wash our hands before handling any other foods. While cooking the chicken or eggs will kill any germs present on them, the other raw foods we touch, e.g., salad, will retain the harmful germs.

NOSE/MOUTH/EYES to OTHERS: Germs can be found in saliva, mucous and nasal discharge. Sneezing, coughing, or rubbing the eyes or nose and then touching people prior to washing hands can transmit germs.

FOOD to HANDS to INFANTS: In the same way germs can be transmitted from certain uncooked food to other foods, they can also be transmitted to an infant if the caregiver neglects to wash his/her hands between food preparation and tending the infant.

Consequences of Poorly Washed Hands

Antibiotic Resistance

In addition to preventing widespread public health epidemics, regular handwashing can reduce the spread of antibiotic-resistant bacteria. The CDC estimates the cost of treating antibiotic-resistant infections in the United States is \$4 billion annually.

Food-Related Illness

Each year an estimated 79 million people in the U.S. become ill from food-related diseases, resulting in an estimated 5,000 deaths, according to the (CDC). Poor hygiene, generally unwashed or poorly washed hands, contributes to many food-related illness outbreaks, according to the CDC. Hands can transfer germs from contaminated raw meat, eggs and poultry to other foods, or from an infected person to the food.

While many people are aware that you can get sick from eating food contaminated by *E. coli* O157:H7 bacteria, it is not as well known that other ways of transmission, such as touching food preparation surfaces contaminated with this strain of *E. coli*, also can cause illness.

Food-related disease costs the United States up to \$22 billion annually for healthcare expenditures and productivity losses.

Infection in Childcare Centers

According to the U.S. Department of Education (1995) 31 percent of children under age 6, almost 7 million, attend daycare outside their homes. Of all the children under age 6, 60 percent, about 13 million, receive some type of care and education from persons other than their parents. Children attending daycare are at greater risk for respiratory and gastrointestinal diseases. Furthermore, they are likely to spread these diseases to other family members and people in the community. It has been demonstrated that proper handwashing can substantially decrease the incidence of diarrhea in children attending daycare centers.

Infection from Pets

The CDC has reported an alarming number of salmonella infections, in both adults and children, which were associated with reptiles.

All pet owners need to take adequate measures after handling and cleaning up after their pets, including proper handwashing.

How to Wash Your Hands

(Source: CDC)

It may seem a bit silly to offer instructions on how to wash one's hands, but if not done correctly the germs will remain—along with the risk of infection. If we learn to wash our hands following these basic rules, we will significantly reduce incidence of infections. If we teach our children to wash hands in this way, we give them a lifetime of protection.

- Always use warm, running water and a mild, preferably liquid, soap. Pre-moistened cleansing towelettes do not effectively clean hands and do not take the place of handwashing.
- Wet the hands and apply a small amount (dime to quarter size) of liquid soap to hands.
- Rub hands together vigorously until a soapy lather appears and continue for at least 15 seconds. Sing the ABC song at a moderate tempo while scrubbing—that lasts about 15 seconds. Be sure to scrub between fingers, under fingernails, and around the tops and palms of the hands.
- Rinse hands under warm running water. Leave the water running while drying hands.
- Dry hands with a clean, disposable (or single use) towel, being careful to avoid touching the faucet handles or towel holder with clean hands.
- Turn the faucet off using the towel as a barrier between your hands and the faucet handle.
- Discard the used towel in a trashcan lined with a fluid-resistant (plastic) bag. Trashcans with foot-pedal operated lids are preferable.
- Consider using hand lotion to prevent chapping of hands. If using lotions, use liquids or tubes that can be squirted so that the hands do not have direct contact with container spout. Direct contact with the spout could contaminate the lotion inside the container.
- When assisting a child in handwashing, either hold the child (if an infant) or have the child stand on a safety step at a height at which the child's hands can hang freely under the running water. Assist the child in performing all of the above steps and then wash your own hands.

CDC's Hand Hygiene Guidelines

(source: CDC)

In 2002, the National Centers for Disease Control and Prevention (CDC) released new guidelines to improve adherence to hand hygiene in healthcare settings. Although most of those using PKIDs' Infectious Disease Workshop are not healthcare professionals, the suggestions made by the CDC may make it easier for teachers (and children) to keep their hands clean, particularly those working in daycare or preschool settings.

Improved handwashing or use of alcohol-based handrubs has been shown to stop outbreaks in healthcare facilities, to reduce transmission of antimicrobial resistant organisms (what some call super bugs) and reduce overall infection rates.

In addition to traditional handwashing with soap and water, the CDC is recommending the use of alcohol-based handrubs by healthcare personnel for patient care because they address some

of the obstacles that healthcare professionals face when taking care of patients. (This handrub is very convenient for anyone with no access to an abundance of clean water.)

Handrub Recipe:

- Three parts alcohol (either ethanol or isopropanol)
- Two parts glycerin

To use this handrub, pour enough to cover your thumbnail on one palm, then rub your hands together, covering all of your hands and rubbing until dry. You do not need a towel to dry your hands.

You may find that during hot weather the mixture gets too sticky. If this happens, you may add more alcohol. If you find the mixture is too watery, add a little more glycerin. But there must be at least 60 percent or three parts alcohol for the handrub to kill germs effectively.

Handrub ingredients, as well as commercially manufactured handrubs, can be purchased at any drugstore.

Handwashing with soap and water remains a sensible strategy for hand hygiene in non-healthcare settings and is recommended by CDC and other experts.

When healthcare personnel's (or anyone's) hands are visibly soiled, they should wash with soap and water.

The use of gloves does not eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves. Gloves reduce hand contamination by 70 percent to 80 percent, prevent cross-contamination, and protect patients and healthcare personnel from infection. Handrubs should be used before and after each patient just as gloves should be changed before and after each patient.

When using an alcohol-based handrub, apply product to palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry. Note that the volume needed to reduce the number of bacteria on hands varies by product.

Alcohol-based handrubs significantly reduce the number of microorganisms on skin, are fast acting, and cause less skin irritation.

Allergic contact dermatitis due to alcohol handrubs is very uncommon. However, with increasing use of such products by healthcare personnel, it is likely that true allergic reactions to such products will occasionally be encountered.

Alcohol-based handrubs take less time to use than traditional handwashing. In an eight-hour shift, an estimated one hour of an ICU nurse's time will be saved by using an alcohol-based handrub.

Historical Perspective

For generations, handwashing with soap and water has been considered a measure of personal hygiene. The concept of cleansing hands with an antiseptic agent probably emerged in the early 19th century. As early as 1822, a French pharmacist demonstrated that solutions containing chlorides of lime or soda could eradicate the foul odors associated with human corpses and that such solutions could be used as disinfectants and antiseptics. In a paper published in 1825, this pharmacist stated that physicians and other persons attending patients with contagious diseases would benefit from moistening their hands with a liquid chloride solution.

In 1846, Ignaz Semmelweis observed that women whose babies were delivered by students and physicians in the First Clinic at the General Hospital of Vienna consistently had a higher mortality rate than those whose babies were delivered by midwives in the Second Clinic. He noted that physicians who went directly from the autopsy suite to the obstetrics ward had a disagreeable odor on their hands despite washing their hands with soap and water upon entering the obstetrics clinic. He postulated that the puerperal fever that affected so many parturient women (women about to give birth—in labor) was caused by “cadaverous particles” transmitted from the autopsy suite to the obstetrics ward via the hands of students and physicians.

Perhaps because of the known deodorizing effect of chlorine compounds, as of May 1847, he insisted that students and physicians clean their hands with a chlorine solution between each patient in the clinic. The maternal mortality rate in the First Clinic subsequently dropped dramatically and remained low for years. This intervention by Semmelweis represents the first evidence indicating that cleansing heavily contaminated hands with an antiseptic agent between patient contacts may reduce healthcare-associated transmission of contagious diseases more effectively than handwashing with plain soap and water.

In 1843, Oliver Wendell Holmes concluded independently that puerperal fever was spread by the hands of health personnel. Although he described measures that could be taken to limit its spread, his recommendations had little impact on obstetric practices at the time. However, as a result of the seminal studies by Semmelweis and Holmes, handwashing gradually became accepted as one of the most important measures for preventing transmission of pathogens in healthcare facilities.