Exploring Current CDC Recommendations: Alcohol-Based Sanitizers

Exploring the legitimacy of current CDC recommendations for specific hand disinfections, as well as viable alternatives.
Sanitizing hands and eliminating the transfer of bacteria and germs, in a medical or dental setting, are of the utmost importance in the prevention of infection in a hygienic environment. In order to better understand how bacteria quickly multiply, a review of the rapid nature of bacterial contamination is necessary by understanding important facts given by the Department of Health (MN):

- Viruses can be transferred from dry smooth surfaces up to 20 minutes after being contaminated.
- E. coli, salmonella, and other bacteria can live up to two hours on surfaces like doorknobs, keyboards, and tables.
- Bacteria double every 20 minutes. Five bacteria in a sandwich at noon will total over 10 million by 7p.m. After three days, with no bacteria dying, there would be enough to cover the earth.

A Basic Understanding of the CDC’s recommendations:

In 2002, the Centers for Disease Control advised the use of alcohol-based hand rubs as necessary in a non-surgical medical environment. The CDC made this recommendation based on eliminating infections in a medical environment. Medical professionals were encouraged to use such antibacterial alcohol-based agents, on unsoiled hands, as a replacement for washing hands with soap and water. Unsoiled hands are considered those that are not visibly soiled or have not come into contact with bodily fluids, which could cause the subsequent spread of infection. The following suggestion was given about the appropriate use of alcohol-based hand sanitizers outside of medical facilities, in the general public, and inside a medical facility:

- **Sanitization appropriate outside of a medical facility:** The use of soap and water, when lathered for up to 15 seconds, scrubs bacteria spores and literally washes them down the drain.
- **Sanitization appropriate inside a medical facility:** The use of a "mild detergent containing antiseptic" (CDC), or the use of alcohol based hand sanitizers containing 60 % – 95 % ethanol or isopropanol when hands are not visibly soiled.
The Spread of Infection in Medical Environments:

The majority of medical facilities today, have rigid government and private standards. These standards make the containment of both bacteria and infection the utmost priority. However, even with the most stringent efforts, medical settings cannot control every negative outcome when working with illness and infection.

The following are a few examples (via private research), in which bacteria and illness is spread in a medical setting:

• Invasive surgical treatment which exposes the body to other outside bacteria
• Medical professionals constantly work in and around biohazards which spread bacteria in the air, causing more infections
• The patients seeking treatment in medical facilities have an already weakened immunity and can contract infection more easily
• The possibility of transmitting disease from one contagious patient to another
• Time constraints placed on medical professionals in a small, sometimes confined setting

The Purpose of Alcohol-Based Hand Sanitizers:

In an effort to eliminate such occurrences in medical settings from occurring, hand washing over the last 100 years has become standard protocol in the elimination of bacteria and subsequent infection. Alcohol is the standard sanitizing agent used by the majority of hospitals to prevent infection from occurring in a hospital setting. Alcohol is cheap and widespread in its uses, especially in medical facilities. The CDC made recommendations in 2002, citing the use of alcohol-based hand rubs as effective in fighting bacteria and infection.

Thus, the CDC defined hand sanitation that included the use of alcohol-based rubs to replace the traditional method of soap and water. The objective of moving forward with the use of alcohol-based rubs had several objectives. Primarily, the use of alcohol-based sanitizers was an effort to decrease time constraints placed on a system that is already lacking enough medical staff to care for patients. The CDC estimated that this practice alone (alcohol sanitizer use) saved staff over an hour a day.
The CDC also made such recommendations in an attempt to decrease the percentage of non-compliance by medical professionals. The purpose was to eliminate the spread of bacteria with alcohol-based hand sanitizers in a timely and effective manner. Bacteria eliminated by the use of alcohol-based sanitizing agents include, but are not limited to: streptococcus, salmonella, staphylococcus, E. coli, and shigella.

**Alcohol-Based Hand Sanitizers Ineffectiveness:**

In order to be most effective, alcohol-based hand sanitizers must completely cover the surface of the hand and dry completely. When considering the limited time of health care professionals, rarely is it possible to move from one patient to the next and allow complete coverage of the given product. In addition, many professionals do not give an ample amount of time for disinfection to take place (>10 seconds). However, it is more likely that portions of the skin have not been touched by the sanitizing solutions, leaving areas on hands prone to existing bacteria.

The result, with certain types of alcohol-based sanitizers, is their tendency to crumble off after repeated use. This, caused by build-up after multiple and consistent use. In a busy area of the hospital (e.g., Emergency Care), one may not have the time to cleanse hands to eliminate such debris. According to the 2nd edition of Hospital Epidemiology and Infection Control, "[...such buildup from alcohol based sanitizers, in gel form, leave hands soiled and with possible viruses, bacteria, fungi, and parasites]."

**Reviewing the CDC's Recommendation 6 Years Later:**

According to the Healthcare Infection Control Practices Advisory Committee, the broader context of hand sanitization is educating the medical community on adhering to hand sanitizing in an effort to prevent higher rates of infection. More specifically, the committee believes inclusive factors are those which educate the medical community on "knowledge concerning the appropriateness, efficacy, and understanding of the use of hand hygiene and skin care protection agents" (Healthcare Infection Control Practices Advisory Committee).

The recommendation made by the CDC has only been replaced one time in the last 13 years. The last recommendation, made prior to 2002, was in 1985. While advances, in the medical world continue to progress at lightening speed, this advice can be considered somewhat archaic. A culture that looks for newer and better procedures and treatments necessitates looking for better alternatives, to the use of alcohol based sanitizers, in overcoming a lack of education about the necessity of better alternatives.
Benzalkonium Chloride as an Alternative to Alcohol-Based Hand Sanitizers:

Benzalkonium chloride has a long history in the medical and pharmaceutical community. It is known as extremely effective in the long term elimination of bacteria without evaporation. The compound is extremely effective against "gram-positive bacteria in concentrations as low as 0.00050/0 and against gram-negative bacteria as low as 0.0330/0. Its specific uses are as antibacterial hand rubs and moist towel lets, as well as preoperative preparation of skin, surgeons skin and arm soak, treatment of wounds, preservation of contact lens solution, and irrigations of the eye, body cavities, bladder, and urethra." (www.tufts.edu)

Benzalkonium chloride has been used in the medical field for decades and was originally used prior to surgery. It is under the umbrella of quaternary ammonium compounds (a.k.a., "Quats") and is excellent in the fight against bacteria specifically inhibiting the growth of bacteria and it's multiplying affect. The sanitizing agent has parallel uses to alcohol, without its drying affects, and lacks the evaporative nature of alcohol, staying on hands approximately 30 -90 minutes longer (www.tufts.edu). Current estimates report even a greater bacteria kill time, upwards of 3-4 hours after application.

As common bacteria and infections, in parts of the world, become increasingly difficult to identify the necessity of an antibacterial agent with staying power is an absolute necessity. This becomes a dangerous situation when considering that "unidentified infectious agents" can cause incurable diseases, such as HIV and hepatitis C. This information coupled with the CDC’s efforts to lower infections from bacterial exposure is a powder keg waiting to explode. Research indicates that changing bacteria are from a variety of sources, which include, but are not limited to the following:

- Rapid population growth, combined with increased poverty
- Expansion of the population into 'remote areas'
- Environmental degradation
- Improved transportation, leading to easier spread of disease
- Inadequate or deteriorating public health infrastructure
- Widespread, and often inappropriate, availability and use of antibiotics
- Poor disease control and disease prevention
Switching from Alcohol-Based Hand Sanitizers to Benzalkonium Chloride-Based Sanitizers:

Benzalkonium chloride based sanitizers have quickly become a popular alternative in K-12 schools as a replacement to traditional alcohol-based sanitizers because of its ability to kill staph. Infections like staph are commonplace in locations like school gyms and locker rooms where multiple users have exposure to the same equipment. In addition to eliminating multiple strains of staph (including MRSA), the sanitizing agent is effective in the elimination of Hepatitis A and Hepatitis B, HIV, herpes, salmonella, E. coli, as well as many other infectious agents.

Containing the spread of bacteria with this product (benzalkonium chloride) will increase the likelihood that attempts to prevent infection will be successful in medical, school, and social facilities.

Furthermore, the rates of staph infection are higher in patients with differing ailments. Dry and cracked hands, which can be caused by alcohol-based sanitizers, have higher rates of staph infection. Diabetics and individuals receiving dialysis for kidney failure also "are likely to have areas of intact skin colonized with S. aureus," according to the CDC.

Looking more closely at benzalkonium chloride as an antibacterial agent, this quaternary ammonium compound can be viewed as a successor/replacement standard alcohol-based sanitizers. In fact, The American College of Toxicology describes it as "safely used as an antimicrobial at concentrations of up to 0.10/0%."

Ending the CDC's "Alcohol Recommendation":

Again, the most recent (2002) recommendation by the CDC for hand hygiene does not take into account the advances in the arena of hand hygiene. Nor does it adequately evaluate the efficacy of other hand sanitizing agents, like benzalkonium chloride. The fact remains -alcohol-based sanitizers are cheap to produce and manufacture despite their many short comings.

Additionally, only twice in the last 13 years has the CDC made recommendations for alcohol-based sanitizers. However, since these recommendations, hundreds of Westerners continue to deal with the discomfort, dangers, and potential lethality of alcohol sanitizers. Furthermore, current studies find that alcohol sanitizers are now providing a false sense of protection, as most adults and health care professionals fail to sanitize their hands correctly (below).
The above cited report supports the long held belief that many health care professionals perceive a persistent effect with alcohol-based hand sanitizers. Statistics back these recent findings, as well. However, this is not the case. Alcohol sanitizers evaporate quickly and do not protect for significant durations of time.

To compound the issue, a notable study in 2000 reported that less than half (48%) of health care workers in hospitals adhered to the CDC’s recommended hand hygiene regimen (Pittet D, *Lancet* 2000;356;1307-1312.). This includes inadequate hand washing times, or the lack thereof.

Moreover, a study conducted in 1997 showed that the median wash time for health professionals in a clinical setting was 4.7 -5.3 seconds (*J Clin Nursing* 1997;6:55-67). There is little evidence to show an improvement in these times today. According to the CDC, times under 15 -20 seconds are ineffective at reducing the risk and spread of bacterial and viral infection(s).

As opposed to alcohol-based sanitizers, benzalkonium chloride lotions last for hours and possess persistent and potent germicidal activity. They have been shown to be 99.99% effective against a broad spectrum of harmful bacteria in clinical studies.

Finally, a report issued June 8th, 2008, again, contradicts CDC recommendations. This time, regarding antimicrobial-impregnated wipes (Le., towelettes). In 2004, the CDC stated that such wipes "may be considered as an alternative to washing hands." The following article shows that not only are towelettes/wipes not effective at cleansing hands, they may also be spreading harmful and potentially life-threatening bacteria (*below*).
OMAHA, Neb. - Doctors and nurses on the go often skip soap and water in favor of an alcohol-based hand gel, thinking the quick-acting goo will kill bacteria on their hands and curb the spread of infection.

It turns out that's not enough.

In a Nebraska hospital, medical workers nearly doubled their use of the alcohol-based gel, but their generally cleaner hands had no bearing on the rate of infections among patients.

The doctor who studied the problem pointed to many villains: Rings and fingernails that are too long and hard to clean, poor handling of catheters and treatment areas that aren't sanitized.

"Hand hygiene is still important, but it's not a panacea," said Dr. Mark Rupp, an infectious disease specialist at the University of Nebraska Medical Center. He led the study at the adjoining Nebraska Medical Center.

The results of his study appear to contradict hospital guidelines from the Centers for Disease Control and Prevention that say better hand hygiene - through frequent washing or use of [alcohol-based] hand gels - has been shown to cut the spread of hospital infections.

The spread of infection-causing germs in U.S. hospitals is a huge health problem, accounting for an estimated 1.7 million infections and 99,000 deaths each year, according to the CDC. These include drug-resistant staph, urinary tract infections and ventilator-associated pneumonia, among others.

He suggested hand gels be combined with other measures, such as better cleaning of hospital units, proper insertion and maintenance of catheters, and doctors prescribing antibiotics only when necessary so more drug-resistant bacteria don't pop up.

He also said hospital workers shouldn't wear rings and should trim their fingernails even more than the CDC, recommendation of no longer than a quarter of an inch. Rupp said bacteria showed up when nails extended just beyond the fingertip [...]

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Antibacterial wipes can spread superbugs: study

LONDON (Reuters) - Disinfectant wipes routinely used in hospitals may actually spread drug-resistant bacteria rather than kill the dangerous infections, British researchers said on Tuesday.

While the wipes killed some bacteria, a study of two hospitals showed they did not get them all and could transfer the so-called superbugs to other surfaces, Gareth Williams, a microbiologist at Cardiff University, said.

The findings presented at the American Society of Microbiology's General Meeting in Boston focused on bacteria that included methicillin-resistant Staphylococcus aureus, or MRSA.

"What we have found is there is a high risk," Williams, who led the study, said by telephone. "We need to give guidance to the staff on how to use the wipes because we found there is a possibility of cross transfer."

MRSA infections can range from boils to more severe infections of the bloodstream, lungs and surgical Most cases are associated with hospitals, nursing homes or other health care facilities.

The superbug can cause life-threatening and disfiguring infections and can often only be treated with expensive, intravenous antibiotics.

Experts have been saying for years that poor hospital practices spread dangerous bacteria, and yet many studies have shown that health care workers, including doctors and nurses, often fail to even wash their hands as directed.

The findings from a study of intensive care units at two Welsh hospitals suggest that even cleaning with antin1icrobial wipes n1ay not be enough depending on how staff use them.

The researchers found that many health care workers cleaned multiple surfaces near patients, such as bed rails, monitors and tables with a single wipe and risked sweeping the infections around rather than cleaning them up.

"We found that the most effective way to prevent the risk of MRSA spread in hospital wards is to ensure the wipe is used only once on one surface," Williams said.
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