

The Hidden Invader

Toilet Flush – A Major Source of Hospital-Acquired Infections

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Introduction

Flushing your toilet could kill you. That sounds absurd, but it is a fact of life (and death) in hospitals and healthcare facilities, as well as in homes and in public facilities. This white paper will focus on diseases transmitted via toilet flushes – including which fatal illnesses are spread in this fashion and how they are spread. The solution to this deadly killer will be found in improved in-bathroom disease transmission prevention (DTP) technology, but that is beyond the scope of this study.

Run the Numbers

There is a relatively unknown medical fact-of-life that healthcare-associated infections (HAI), otherwise known as nosocomial infections, are a major cause of nearly two million extended hospital stays and nearly 100,000 hospital deaths in America each year. This deadly problem used to be called hospital-acquired infections, but the name has been changed to “healthcare-associated” to more accurately reflect the fact that the kinds of healthcare which triggers these infections is also provided outside of hospitals. Whatever it’s called, it creates millions of illnesses, costs billions of dollars, and kills a hundred thousand Americans every year.

Various studies peg the frequency of HAI infections at anywhere from five percent to twelve percent of all hospitalizations. A decade ago, a study identified 1.7 million HAIs in the United States, resulting in 99,000 deaths, making it the sixth leading cause of death in America. Beyond this staggering human toll, The Centers for Disease Control and Prevention (CDC) estimated in 2009 that direct costs from HAI range up to \$45 billion dollars per year.

A major cause of these potentially deadly diseases is actually quite prosaic – it’s a toilet flush. Even with the lid down, a toilet flush creates an aerosol of microscopic water droplets infested with disease organisms. These are inhaled, they coat bathroom surfaces – including tooth brushes – and in many ways they enter the body. Even a healthy body can succumb to the onslaught of these disease organisms, but a body with a compromised immune system – including people with other illnesses, or people recovering from surgery – has a harder time fighting off these opportunistic disease entities.

A benchmark study in the 1970s indicated that these deadly infections could be reduced by 32% if infection control programs could be developed that addressed the real causes of these infections.

Consider some of these facts:

In America, in 2009, according to the Centers for Disease Control and Prevention of the National Institutes of Health, the leading causes of death in America were:

• Heart disease:	599,413
• Cancer:	567,628
• Chronic lower respiratory diseases:	137,353
• Stroke (cerebrovascular diseases):	128,842
• Accidents (unintentional injuries):	118,021
• Nosocomial Infection (HAI)	99,000
• Alzheimer's disease:	79,003
• Diabetes:	68,705
• Influenza and Pneumonia:	53,692
• Nephritis, nephrotic syndrome, and nephrosis:	48,935
• Intentional self-harm (suicide):	36,909
• HIV/AIDs	17,774

This seemingly unknown cause of death not only kills 99,000 Americans each year – that’s five percent of all the Americans who die from all causes each year – also costs American \$45 billion each year in direct costs. This cost – and these staggering death totals – do not include people who acquire these fatal illnesses at homes or in health-related non-hospital facilities. When those figures are added in, the death toll and financial costs go from horrific to staggering.

However, because – except within hospitals – this health crisis is not carefully tracked, the actual cost is subject to debate by experts, but even the most sanguine of these

experts still believes that this unseen killer costs America each year more money - \$150 billion a year – than the cost of operating the entire United States Navy.

This Preventable Killer

Some of the fatalities noted in the CDC report (above) are preventable, while others are the natural result of aging, such as Alzheimer's, or are caused by unknown factors, such as many cancers. However, none of those causes of death are more preventable than this mystery killer, the HAI.

What kills at least 99,000 Americans each year, and costs our society as much as operating our entire US Navy in a time of war? Infections acquired in hospitals and healthcare facilities, and the same kinds of infections acquired from daily life, from being exposed to deadly disease pathogens and organisms. Some of these deaths are caused by the direct exposure of a patient to the disease itself, and some of it is caused by care-givers carrying disease organisms from one patient to another.

However, it appears that one of the greatest causes of death or serious illness comes from the flushing of a toilet. People flush the toilet – with or without putting down the seat, and it literally kills them.

According to the Journal of the American Medical Association, if this problem was classified as a disease, it would rank as the sixth leading cause of death in the United States. Considering the damage it causes in terms of health – and of life itself – not to mention the astronomical and soaring costs incurred by individuals, families, healthcare facilities and society as a whole, perhaps it should be classified as a disease.

If it were seen as a killer disease, perhaps more efforts would almost certainly be put into finding effective solutions to this massive, multi-phasic problem.

Examples

A typical flush creates an aerosol spray of germs and bacteria that:

- Reaches a 20-foot airborne radius
- Remains airborne for as much as two hours
- Remains potent for up to three days, especially on moist surfaces and in crevices
- Infests tooth brushes, counter-tops, towels, pill-bottle caps and other surfaces

Germ commonly found in toilet flush-created aerosols include:

- Salmonella – a deadly killer
- Norovirus
- Shigella
- Hepatitis A
- Fecal coliform
- MRSA and C-Difficile – “Treatment-Resistant Super-Bacteria”

Here is how the process works:

According to airborne germ expert Steve Welty, when MRSA, C-Diff and NV germs become aerosolized and humans breathe them in, those airborne germs can impale themselves on the mucus layer that lines the entire human respiratory system. They are eliminated from the body into the toilet; when the toilet flushes, these disease vectors are aerosolized and injected into the air, where they can be breathed.

Normally, the human respiratory system is an efficient airborne disease filtration system. Tiny hair-like cilia transport the mucus-captured germs back up through the trachea into your pharynx, the area behind the tongue, where these germs are swallowed down the esophagus. Once the germs arrive in the human stomach, most airborne disease vectors are quickly and efficiently killed by stomach acids.

However, aerosolized MRSA, C-DIFF and NV are gut-living germs; rather than dying within the environment of the stomach, they thrive and quickly multiply, wreaking havoc throughout the intestinal tract.

Even those who are not “infected” with an active disease such as MRSA, C-Diff or NV nonetheless have those bacteria and virions living in their guts. These are expelled from the body during normal elimination. However, those who have intestinally-related illnesses “shed” bacteria and virions through diarrhea or normal elimination, and these shed disease organisms are aerosolized, creating a “fecal cloud” that lingers in the air for hours, and is projected into the airstream in the bathroom, and beyond.

Toilet flushing launches intestinal bacteria and virions, propelling them airborne. Once airborne, these germs initially ride water droplets, which evaporate in less than a second. The remaining airborne “naked” germs are called “droplet nuclei,” which can stay airborne for hours. They are distributed by the air movement within the room. All toilet-aerosolized droplet nuclei are lifted up into the breathing zone, allowing unsuspecting people to breathe them in.

Eventually bacteria and virions fall – a process called “plate out” – landing like party confetti, dusting every single surface in the bathroom. They are also distributed on air currents into the patient rooms – in hospitals or healthcare facilities – or into adjacent rooms in the home, office or adjacent to public restroom facilities, coating surfaces in these rooms and eventually out further doors into the larger facility, making it nearly impossible to kill them all and providing infinite opportunities for anyone to infect themselves.

Conclusion

HAI is a killer, taking a hundred thousand American lives a year, making it, in effect, the sixth most deadly killer of Americans. It also costs, at a minimum, close to \$50 billion dollars a year, a price-tag that is growing every year. While there are many kinds of HAIs inflicting themselves on patients in hospitals, skilled nursing facilities, other care-centers and even individuals in their homes and public facilities, those which are aerosolized via toilet flushes are among the most pernicious of these hidden killers. This is especially ironic, since the toilet is supposed to be part of the sanitation system which (presumably) prevents diseases, rather than spreads them.

The old and the very young are the most vulnerable to HAI diseases, especially MRSA, C-Diff and NV, which are all gut-based diseases which are excreted and become airborne during toilet flushes, re-infecting patients in hospitals and exposing nursing and medical staffs, visitors and even “the next patient” to use their room.

Sources

The following are some of the sources reviewed during the development of this White Paper. While these sources were helpful, all conclusions (and any mistakes) are those of the author, and not of the sources.

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