Hand Hygiene, Infection Prevention and Food Safety Blog

The Butterfly Effect of Hand Hygiene on Antibiotic Resistance

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Ever heard of the Butterfly Effect? It's a phenomenon conceptualized by the late MIT professor, Edward Lorenz, in which small, seemingly insignificant events such as the flapping of the wings of a butterfly can lead to dramatic differences in the larger context; in this case, a tornado thousands of miles away. The goal of Lorenz's work was to point out the fragile nature of weather forecasting in a chaotic world but his analogy has become a staple in many different realms, including infection control.

According to the theory, to ensure proper patient safety, a number of small practices, such as compliance with the 5 moments of hand hygiene can lead to a large difference within the healthcare environment. The most significant observable change would be a reduction in patients presenting with healthcare-associated infections. Yet, several other potential benefits are also apparent.

The first is cost-savings. Although the idea that a squirt of an alcohol hand rub could help save millions of dollars may appear to be ludicrous at best. Yet, studies from the WHO and the CDC have shown significant cost reductions to healthcare budgets simply by adhering to hand hygiene. But the real impact was revealed in 2010 when researchers at Duke University developed simulation models of MRSA costs based on an aggregation of published data. The results were both shocking and amazing. For every increase of 1% in hand hygiene compliance, some $40,000 in savings was calculated. That could mean a possible $4 million dollars per year would be preserved for MRSA alone. In the context of other infections, such as *C. difficile* and norovirus, the potential return would certainly be greater.

Another large return from hand hygiene compliance is the development of a more harmonized workplace. Again, those few seconds to ensure hands are safe may not appear to have any impact on the atmosphere of the health care facility. Yet, in 2012, a psychological analysis of hand hygiene attitudes revealed a large gap between nurses and administrators. Both understood the importance of hand hygiene yet diverged when asked about consequences of non-compliance. As a result, whenever an infection occurred, there would be a significant difference not only in the reaction, but also, potentially, the response and professional atmosphere. On the other hand, by adhering to those five moments and keeping infection rates low, the entire workplace would be on the same boat and sailing on smooth seas.

In both these cases, the return on investment is seen at the local level. Yet the final example has a far greater scope and is the focus of this year's SAVE LIVES annual event: antimicrobial resistance.

All one needs to do is listen to the Associate Director of the CDC and you know we are facing the post-antibiotic era. Although the call may be early, there is little doubt without intervention it will be upon us sooner than later. In response, there is significant pressure to either reduce or halt the use of antimicrobials in this new age of stewardship. Yet, one of the best ways to keep the prescription pad packed away in the pocket is to prevent an infection from happening in the first place.

Though theoretical in appearance, this notion has support. In 2011, an investigation of the drop in MRSA in the country was linked to the concept of "decolonization." Although several other hygiene measures were included in this particular study, hand hygiene played a significant role. In contrast, a 2012 study of the impact of hand hygiene on antimicrobial resistance revealed as much as a 20% drop in colonization rates with full compliance. Although this may appear to be low, in the context of antimicrobial resistance, in which each and every infection means shortening the use life of these critical medicines, this is a significant achievement.

Even with these studies, it may be difficult to envision how every hand hygiene moment reduces the chances for a worldwide health meltdown due to antibiotic resistance. Yet, that is the beauty of the butterfly effect. Not only does it offer a more grand purpose for performing what may seem to be a menial task; it also offers the chance to focus on the global impact of very local decisions. To take from another movement based on the butterfly effect, when it comes to hand hygiene, though you may be acting locally, you should realize you're helping globally.

About Jason Tetro

Jason Tetro is a microbiologist who has spent the last 25 years learning about the effect germs have on our lives. He has a number of publications in peer-reviewed journals and written for a wide range of media including Scientific American and The Huffington Post to name a few. His book, entitled "The Germ Code" (Random House/Doubleday) is now available.

Jason is also a social marketer for health and hygiene. Known as the "Germ Guy", he has been featured in a number of television broadcasts and has over 12 million views in various media. You can learn more about Jason at the following link.

Tags: Antimicrobial resistance, WHO 5 Moments, MRSA, CDC, C. diff., WHO May 5th, Infection Prevention in Healthcare, Butterfly Effect

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