The Science of Compliance

What Drives Hand Hygiene Compliance and How Can We Improve It

Hand Hygiene is Important

The Centers for Disease Control and Prevention and the World Health Organization have stated that "hand hygiene is the simplest, most effective measure for preventing healthcare associated infections"[1] and "the most important measure to avoid infections and spread of antimicrobial resistance."[2] Yet, studies show that healthcare workers in the United States are compliant with hand hygiene only 40% of the time.[1]

With the emergence of drug-resistant organisms and, more recently, the COVID-19 pandemic, now, more than ever, hand hygiene is critical to prevent the transmission of pathogens.

Soap and Hand Sanitizers Are Effective if Used Correctly

In the United States, antimicrobial soaps and hand sanitizers must be approved by the Food and Drug Administration, meeting strict testing criteria to demonstrate safety and efficacy. This FDA approval ensures that these hand hygiene products effectively kill bacteria on hands when used according to manufacturer instructions. The FDA does not allow any hand hygiene products to claim efficacy against viruses; however, independent studies have demonstrated the efficacy of alcohol-based hand sanitizer on the removal of bacteria from healthcare workers hands.[3] **See Figure 1.**

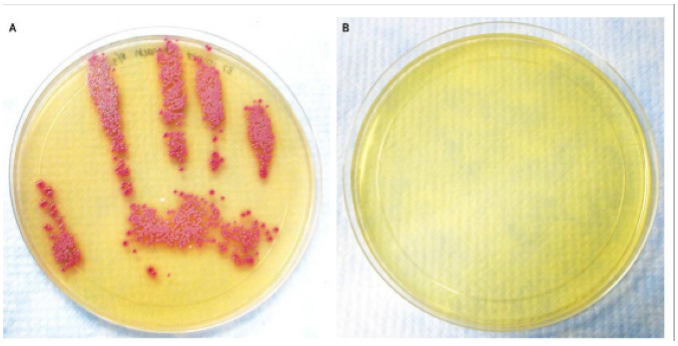

FIGURE 1

Hand contamination with MRSA after abdominal exam (A) before and (B) after hand hygiene with alcohol foam sanitizer

Cosmetic (plain) soap and water help remove pathogens from hands with a combination of surfactants that lift the pathogens off the skin, the mechanical action of scrubbing, and the rinsing action of water. In short, all of these methods of hand hygiene are considered effective in cleaning the hands when used correctly.

In fact, there are

83 different theories

of human behavior and behavior change[4]

If we know hand hygiene is important, and we know hand hygiene products are effective, why do we still have a problem? The answer is compliance!

Traditional methods to improve hand hygiene compliance include motivational programs, administrative measures such as implementing facility-wide initiatives, making improved hand hygiene compliance an institutional goal complete with its own set of rewards and punishments, increased training and using social norms such as recognition programs, peer mentors, patient empowerment, positive deviance, or endorsement by an authority figure. Infection preventionists also focus on things they think they can control, such as access to products at the point of use, promoting good skin condition and choosing a hand hygiene product that is well accepted by staff. And yet, with all this effort, compliance is still 40%. That is because in order to improve compliance, you can't just change the work environment. You have to change individual behavior.

The American Psychological Association defines compliance as "a change in a person's behavior in response to a direct request." What motivates someone to change behavior in order to be compliant with a direct request? A variety of techniques have been developed to enhance compliance with requests and, although some techniques may enhance compliance by producing attitude change, behavioral change is the ultimate goal of these techniques. Humans are complicated and what drives behavior change is not fully understood. In fact, there are 83 different theories of human behavior and behavior change![4]

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In order to make these theories more accessible to those doing implementation research, one theory, the Theoretical Domains Format (TDF) synthesizes 33 of these theories into 14 domains: Knowledge, Skills, Social/Professional Identity, Beliefs About Capabilities, Optimism, Beliefs About Consequences, Reinforcement, Intentions, Goals, Memory/Attention and Decision Processes, Environmental Context and Resources, Social Influences, Emotion, and Behavioral Regulation.[4] TDF was originally developed to identify influences on health professional behavior related to the implementation of evidence-based practices, so it seems appropriate that we examine hand hygiene compliance through that framework. Table 1 describes each of the domains and provides an example of its application related to hand hygiene. One study conducted using the TDF framework in a long-term care facility in Ontario, Canada found that the beliefs about Consequences, Social/Professional Identity, and Knowledge were seen as facilitators for hand hygiene compliance, while domains of Resources, Memory/Attention and Beliefs About Consequences were seen as barriers to hand hygiene compliance.[5] **Understanding which domains are influencing an individual's practice is key to changing behavior.**

TABLE 1. **Theoretical Domains Format Adapted from Atkins et al**[4]

Domain	Description	Example
1. Knowledge	Awareness of the existence of something	Procedural knowledge Knowledge of scientific rationale
2. Skills	An ability or proficiency acquired through practice	Skills • Competence • Practice Interpersonal skills
3. Social/professional role identity	A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting	Professional identify • Professional role Social identify • Organizational commitment
4. Beliefs about capabilities	Beliefs about capabilities/acceptance of the truth, reality or validity about an ability, talent or facility that a person can put to constructive use	Self-confidence • Perceived competence, Perceived behavioral control • Self-esteem
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained	Optimism • Pessimism • Unrealistic optimism
6. Beliefs about consequences	Acceptance of the truth, reality or validity about outcomes or a behavior in a given situation	Outcome expectations • Anticipated regret
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the reasons and a given stimulus	Rewards • Incentives • Punishment Consequences • Reinforcement
8. Intentions	A conscious decision to perform a behavior or resolve to act in a certain way	Stability of intentions
9. Goals	Mental representations of outcomes or end states that an individual wants to achieve	Goal priority • Action planning
10. Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Memory • Attention • Decision making Cognitive overload/tiredness
11. Environmental context and resources	Any circumstances of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behavior	Environmental stressors Resources/material resources Organizational culture Salient events/critical incidents Person X environment interaction Barriers and facilitators
12. Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings or behaviors	Social pressure • Social norms Group conformity • Alienation • Modeling
13. Emotion	A complex reaction pattern involving experiential, behavioral and psychological elements, by which the individual attempts to deal with a personally significant matter or event	Fear • Anxiety • Stress • Depression • Burn-out
14. Behavior regulation	Anything aimed at managing or changing objectively observed or measured actions	Self-monitoring • Breaking habit Action planning

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Other methods that change behavior are beginning to make an impact as well. Compliance monitoring and feedback is a promising method to drive a change in behavior, leading to improved compliance.

Many studies have shown that a feedback loop creates accountable people who ask for and offer more feedback. The way that monitoring and feedback is executed can have a big impact on its effectiveness, which we'll cover in a moment.

Measuring Hand Hygiene Compliance

The World Health Organization, a major proponent of hand hygiene compliance, promotes a multi-modal improvement strategy with five key elements:

1. **System Change**
2. **Training and Education**
3. **Monitoring and Feedback**
4. **Reminders and Communications**
5. **A Culture of Safety**

The World Health Organization emphasizes that implementing only one strategy is likely to result in failure.[6] So, as we review the hand hygiene compliance monitoring methods that are available today, reflect on the methods you are currently using, keeping in mind that whatever methods you use should help you consistently deliver on these five elements.

There are three basic hand hygiene compliance monitoring methods available to hospitals today: Direct Observation, Product Usage Measurement and Electronic Monitoring.

Direct Observation

Direct observation is the use of trained observers (often peers) to directly observe and document compliance with hand hygiene. Data may be collected manually on a paper audit, or it may be technology-assisted with the use of an app.

Advantages: Direct observation is the only method that can evaluate all Five Moments for Hand Hygiene as outlined by the World Health Organization.[6] Historically, it has often been considered the gold standard because it is the only method that directly measures both healthcare worker compliance and technique. Moreover, this method gives the staff a means for situational training and feedback because it is so hands-on.

Disadvantages: In 2019, Jeanes et al conducted a systematic review of studies measuring the validity of hand hygiene compliance measurement by observation.[7] The aim of the study was to identify and describe potential biases in hand hygiene compliance monitoring by direct observation and to develop methods to reduce bias and increase the validity of compliance measurements. In their systematic review, they identified bias in the form of:

- Information bias – Hawthorne effect, duration, training, inter-rater reliability
- Selection bias – Sampling bias of timing, setting, occupational group
- Confounding bias - Unable to control for confounders

Their conclusion was that published research on hand hygiene compliance measured by direct observation lacked validity, and that hand hygiene should be measured using methods that produce a valid indication of performance and quality using a standardized methodology.

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Product Usage Measurement

Measuring product use is an indirect way to measure hand hygiene compliance by measuring soap and hand sanitizer usage. It provides the number of hand hygiene product dispenses.

Advantages: Product use measurement is less resource intensive than direct observation. It is possible to do it either manually or electronically, and it can be done in any hospital setting.

Disadvantages: Product use measurement does not monitor compliance of individual healthcare workers or provide any information about compliance by role or shift. It does not specifically measure or track any of the Five Moments and it does not account for visitor or patient use of product. Because it is only measuring product dispenses, there is no context on missed opportunities.

Electronic Hand Hygiene Compliance Monitoring (EHHCM)

EHHCM includes several different types of sensors, technologies and digital interfaces to capture and report hand hygiene compliance.

Advantages: These systems are designed to track healthcare worker hand hygiene compliance remotely. Some may provide real time feedback to the healthcare worker. When the system includes a database, it allows for automated reports.

Disadvantages: Some technologies can be expensive with high maintenance costs. Some technologies make it necessary to work closely with engineering to assess possible interference with existing equipment. Some technologies require hardwiring on-site and must connect to the hospital IT network, which may tax the network.

There are many considerations when choosing an EHHCM system. Accuracy is one of the most important considerations. If a system cannot accurately collect data, the information isn't meaningful, and the staff will quickly lose confidence in it.

Conclusion

It is well-understood that hand hygiene is one of the most effective strategies to prevent the transmission of infection available today, and that FDA-approved hand soaps and sanitizers are effective when used correctly. Despite that, hand hygiene practice remains sub-optimal in healthcare. Attitudes, beliefs and behavior influence healthcare worker compliance with hand hygiene. There have been many theories to help understand what motivates humans to act. Once such theory, designed for healthcare, is the Theoretical Domains Framework. This framework identifies influences on health professional behavior associated with evidence-based recommendations. Understanding and applying behavioral theories may help change behavior. According to the World Health Organization, monitoring and feedback on hand hygiene compliance provides information to help drive behavior changes and improve outcomes. There are three commonly used methods to monitor and provide feedback: direct observation, product usage measurement and electronic hand hygiene compliance monitoring. Understanding the advantages and disadvantages of each monitoring method can help you choose the right method for your situation.

Applying theory-based behavior change and implementing effective monitoring and feedback are important interventions to improve hand hygiene compliance and thereby reduce the transmission of infections.

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The Ecolab Hand Hygiene Compliance Monitoring System

The Ecolab Electronic Hand Hygiene Compliance Monitoring (EHHCM) System is a complete offering that helps hospitals monitor and standardize hand hygiene compliance while driving measurable clinical, operational and financial value. Ecolab's EHHCM allows hospitals to accurately record hand hygiene events by individual, driving a 2x average improvement in hand hygiene compliance from a hospital's average observed baseline of 35-45%, resulting in sustained post-implementation levels of 80-90%. By arming healthcare workers with a badge and patient beds with monitors, the system tracks when a healthcare worker approaches a patient and reminds them via a subtle beep and blinking light when they have forgotten to wash or sanitize their hands. Customizable, clinician-friendly dashboards collect data, allowing hospitals to lead process improvements where they are needed most.

To learn more,
visit www.ecolab.com/compliancemonitoring

Ecolab Healthcare

Ecolab, a global leader in infection prevention and environmental hygiene, is driven to help health systems and hospitals realize clinical, operational and financial value through repeatable and measurable workflows. Our products, training, consultative service, standardized processes and digital dashboards provide actionable insights and opportunities for corrective actions that help reduce the costs and inefficiencies of infections, while improving margins and keeping patients and staff safe.

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