Whitepaper 2022

Promoting hand hygiene with behavioural change

How to successfully create a sustained behaviour

Executive Summary

In this whitepaper three scientists present a strategic model to change hand-hygiene behaviour. The model includes the components of system change, education, reminders and feedback to result in cultural change. This model can be relevant for implementation in environments like hospitals, food-processing establishments, nursery schools or homes.

Topics discussed: How can large groups of people be motivated to maintain hand hygiene? We take a close look at the model, describing each step and including evidence-based studies on changing hand-hygiene behaviour and maintaining hand hygiene. We also provide a mini training on correct hand-hygiene methods.

Introduction

Our hands are fantastic! They are one of the primary means through which we experience connection to the world and to other humans. When we interact with people and objects with our hands, we not only experience the sensation of touch, but we also transfer substances (oils, dirt, perfumes, micro-organisms, etc.) between the two touching surfaces. Usually this exchange is not problematic, and sometimes it's actually beneficial; consider the scent of a loved one lingering on your skin for a short while. However, the transfer of micro-organisms between different hands, or hands and surfaces, is one of the mechanisms through which diseases can be transmitted.

Although we all know that hand hygiene can help to keep us healthy, many of us would benefit from knowing how to clean our hands correctly and when it is appropriate to do so. It is also common that knowledge alone is not enough: we know that we should be diligent about hand hygiene, but in practice we do it less often or less carefully than we should.

A behavioural modification model can help overcome these challenges. Implementing the components of system change, training, reminding individuals or organisations about hand hygiene and giving them feedback can drive cultural change to create a sustained new 'norm' where correct hand hygiene is performed at an increased percentage of the time.

This paper will discuss each aspect of the behavioural change cycle as it applies to hand hygiene. It will include evidence-based information on the need for correct hand-hygiene behaviour, educational material that is relevant to hand-hygiene training, thoughts about how to drive behavioural change through reminders and feedback, as well as evidence that this cycle can create cultural change.

Societal need

Hand hygiene in the community

Many different stakeholders have an interest in helping groups of people to perform correct hand hygiene at appropriate times. In normal circumstances, you do not become sick when you have bacteria or viruses on the skin of your hands. But, more often than you might think, you put your fingers in your mouth, touch your eyes or your nose and at that point the pathogens, the microbes that can cause disease, might infect you. You may also transfer the pathogens to the food you eat or to other people. Therefore, properly timed hand hygiene can help break the chain of infection.

There is strong evidence that good hand hygiene can reduce illness in settings a high incidence of infection, such as nursery schools, dormitories, etc.

Handwashing promotion reduces diarrhoea episodes by about 30% in both nursery schools in high-income countries and among communities living in low and middle-income countries. However, the information we include in this document does not provide evidence related to the long-term impact of the interventions.[1]

It is more difficult to show the effectiveness of hand hygiene amongst adults in prosperous communities, in part because adults are less often sick, which makes gathering statistically sound data much harder. Nevertheless, healthcare authorities universally recommend good hand hygiene as one of the important tools for controlling the spread of disease. For example, one expert states:

The effectiveness of hand hygiene against influenza virus infection and transmission in the community setting is difficult to determine based on the available evidence. However, in light of its proven effectiveness in other settings, there is no compelling evidence to stop using good hand-hygiene practice to reduce the risk of influenza infection and transmission in the community settings.[2]

Hand hygiene in healthcare settings

Patient safety is a priority of any healthcare system, and one of the most effective measures to obtain it is hand hygiene. For this, it is important for healthcare workers to maintain correct adherence to this measure and perform the technique properly. Otherwise, the incidence of nosocomial infections can increase, with consequent complications.[3]

Despite its simplicity and ease of implementation, hand hygiene is still poorly practised in many healthcare facilities around the world. Up to 2018, adherence to hand-hygiene best practices had an average of 59.6% in intensive care units, and there are significant differences between high-income and low-income countries (64.5% vs 9.1%). Studies systematically reviewing different time periods found the average adherence to be around 40%.[4]

A balanced view on hygiene

Hand hygiene is very important, but at the same time it is important to have a sound and balanced view on hygiene. The human skin, covering our whole body, is covered in micro-organisms that are persistent. They are living on our skin and recent research has shown more and more benefits given by these microbes. We need them to stay healthy. Many good bacteria help the skin to stay healthy and protect us from the unwanted ones that can cause skin irritation and infections.

The composition of microbes on skin is called the skin microflora or the microbiota. These are composed of hundreds of different species. We have some information on the bacteria but there are also viruses and other microbes of which we know much less. Normally, we do not need to worry too much about these micro-organisms but, for example when preparing food, would not want to transfer too many micro-organisms into our food as they might spoil it or transfer illness, just like a surgeon would not want to transfer any micro-organisms into a wound during surgery.

Some people are very afraid of all bacteria. This is not a rational fear but it is understandable because we already know the harm that pathogens can cause; however, it is important not to be too paranoid. Washing your hands too often and with harsh products is not healthy and can destroy the skin and the healthy microflora. Hands with wounds will harbour more unwanted bacteria compared to hands with healthy skin.[6]

Therefore, the total number of hand washes during the day is not the most important measure of hand-hygiene quality. Rather, the focus should be on performing hand hygiene at those times when it is needed to help prevent transmission or infection.

It is important to keep the skin on hands healthy, including the beneficial skin microflora. Soaps should be mild and hand sanitisers as gentle as possible. Cracked or irritated skin carries more bacteria, including more pathogens.[6] Therefore, it is suggested to use a mild soap, to thoroughly dry your hands and to use a good quality moisturising cream to prevent skin irritation.

Why a behaviour change model is needed

It is known that simply telling people that hand hygiene is important will not be sufficient to cause a change in hand-hygiene behaviour. **Significant behaviour changes can only be obtained by a deliberate programme, which includes improving the prerequisites for performing hand hygiene, education on the need for hand hygiene and reminders and feedback on the quality of hand hygiene. The most successful models combine all of these elements as exemplified in the World Health Organisation's (WHO) programme for multi-modal compliance improvement strategies**.[5] In the most ideal cases, the strategy will result in cultural changes and increases in intrinsic motivation to perform hand hygiene. In most cases, however, a one-time programme will not result in lasting change. Continuing effort will be required to maintain initial gains and to stabilise the hygiene culture.

The changes in hand-hygiene behaviour of the general public during the early months of the COVID-19 pandemic show the change stages in action:

1. **Prerequisites:** Access to hand-hygiene materials such as soap, water and paper towels or hand sanitiser are necessary to perform hand hygiene. During the initial opening-up stages of the pandemic, we saw an unprecedented installation of hand sanitising stations in shops and public places.

2. **Education:** At the beginning of the pandemic, many adults had not received any new information on hand hygiene since early childhood. In response to the public health emergency, many health authorities, providers and suppliers produced high quality information on when, why and how to clean hands.

3. **Remind and communicate:** A new habit takes time to form and should be reinforced during the early stages. Most public places used prominent signage to remind employees and visitors to take infection control precautions including handwashing. Many also placed posters demonstrating correct handwashing techniques in washrooms.

4. **Feedback:** To internalise a new behaviour, it is useful to receive feedback on how well and how often the behaviour is performed over time (compare the use of a fitness watch to increase exercise behaviour). This is often the most difficult component of the model to implement well. We speculate that most individual feedback during COVID-19 was provided in closed groups of people.

5. **Cultural change:** Ideally, over the course of time, a new behaviour will stop being externally driven by outside forces and become either part of the culture of a group and/or intrinsically motivated within the individual. The desire to avoid infection with SARS-CoV-2 was of course an unusually strong motivating force. We saw large improvements in self-reported hand-hygiene frequency, which were sustained over a long time period after the initial information campaigns.

Prerequisites

The prerequisites are rather self-explanatory. System change means having the right infrastructure, equipment and resources available to perform hand hygiene.

- **Make hand hygiene easier**
- **Washrooms should be clean, easily accessible, and well-stocked**
- **Supplement washrooms with handwashing stations if needed**
- **Provide hand sanitiser in areas where water is not readily accessible**
- **Hand-sanitiser dispensers can also nudge hygiene behaviour in situations where hygiene is desirable, but when a trip to the washroom is unlikely, like at reception desks or airport boarding gates**
- **Easy, efficient, and hygienic drying must be available. Dry hands transfer fewer bacteria**

Train and educate

The following section includes examples of the type of content hand-hygiene training might include. It covers the areas of why, when and how to clean hands, which is a prerequisite for a successful programme. The training should focus on helping people to perform hand hygiene correctly and at appropriate times. It may also be helpful to understand some basics of how hand hygiene affects disease transmission.

This type of content is primarily aimed at members of the general public. Healthcare professionals will be expected to have a higher level of baseline knowledge, and to follow clinical protocols, which will not be discussed here.

Why to wash hands

Washing your hands properly with soap and water can help prevent the spread of the germs (like bacteria and viruses) that cause infectious diseases. Many people believe that the goal of handwashing should be to remove all bacteria from their hands. This is something of a misconception. There are two types of bacteria found on the hands: normal flora that live on the skin and transient flora that are acquired by touching other surfaces and that are carried on the hands for brief periods. In most circumstances, it is this transient flora that is responsible for causing infection. In contrast, normal skin flora is important for your health.

When you wash your hands with soap and water followed by drying with a paper towel, you will physically remove bacteria and dirt from your hands. Washing and drying will remove most of the transient flora. Normal skin flora is relatively unaffected by handwashing with non-medicated soap. An ordinary hand wash is fully sufficient to help break chains of infection, and handwashing is always a good choice for hand hygiene.

Hand sanitisers work in a different manner. They do not remove anything from the hands. Instead, they kill bacteria on the hands. Sanitisers are a complement to handwashing, especially when access to soap and water is limited. Sanitisers can kill both potential disease-causing bacteria and the healthy skin flora on the hands. Sanitisers need to come in direct contact with germs in undiluted form to work effectively and are therefore appropriate for use on hands that are dry and look clean.

When to wash hands

While there is no clear evidence indicating the best handwashing frequency for disease prevention,[7] more frequent hand hygiene tends to be a good strategy to improve health. For example, Fricke et al. showed that non-pharmaceutical interventions designed to reduce transmission of COVID-19, including handwashing, also reduced influenza.[8]

However, the strategy of washing more often also has drawbacks in terms of time, resource-use and potentially sore skin. Therefore, a more sophisticated strategy is to try to increase handwashing frequency at times when it is likely to interrupt a chain of infection. It is beneficial to interrupt both transmission of micro-organisms (person-to-person or person-to-object) and to interrupt transfer of micro-organisms from the hands to a part of the body, which increases the risk of infection (eyes, nose, mouth, wounds).[9]

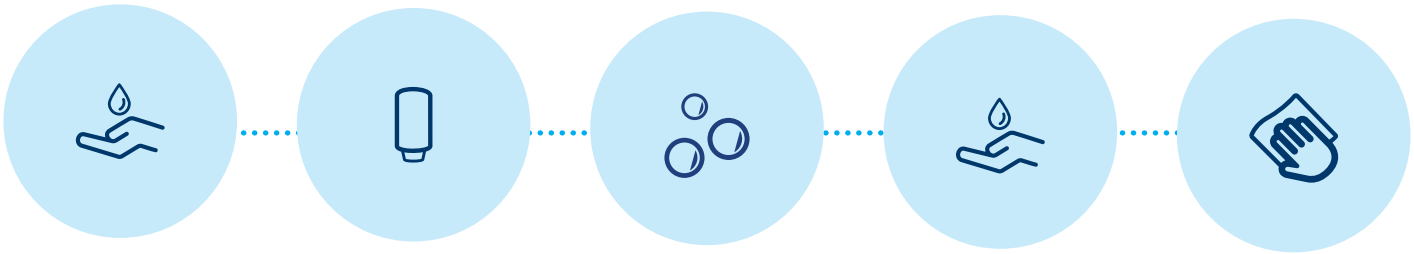
For the general public, some good times to wash hands include:

Interrupting chains of infection

- **When you move from one place to another, especially after being in a crowd**
- **After using the toilet**
- **Before and after contact with a sick person**

Interrupt transfer of micro-organisms into the body

- **Before preparing food**
- **Before handling contact lenses**
- **Before treating a cut or sore**



How to perform hand hygiene (including drying)

It makes a difference how you wash your hands. **A complete hand wash includes initial rinse, scrubbing with soap for 20–30 seconds, rinsing thoroughly, and not to forget drying with a clean paper towel**.

Every stage of the process is important for achieving a good result

- The initial rinse will remove loose soil and it is easier to spread soap over wet hands than dry.
- Scrubbing carefully with soap with remove more bacteria compared to washing with only water.[10] How long you wash for and how you rub your hands will influence how much dirt and bacteria are removed. WHO recommends a procedure for how to do it right so that every part of the hand is cleaned.[11]
- Rinsing removes dirt and bacteria along with the soap lather. It is important to rinse thoroughly since it is at this stage that bacteria are actually removed from the skin and because soap residues can cause skin irritation.
- Drying removes additional loose debris on the skin that has been loosened by washing. Drying also reduces transfer of bacteria to and from the skin when other surfaces are touched[12] and prevents a humid environment from encouraging the growth and reproduction of bacteria.

Sometimes it will be appropriate to use hand sanitiser instead of handwashing. To sanitise hands correctly, apply a palmful of sanitiser into your cupped hands and rub until dry. To achieve good results, it is important to use enough hand sanitiser to keep hands moist for the entire time listed on the product label. It is also important to rub every surface of the hand. It is common to miss one or more areas of the hands when rubbing.[13] WHO has a recommended procedure that can be followed to ensure that no areas of the hands are missed.[11]

Handwashing versus hand sanitising?

Washing with soap and water, followed by drying is always an appropriate choice for hand hygiene.

Hand sanitisers are a good complement to handwashing, especially when soap and water are not available, but they should not entirely replace handwashing since they do not remove dirt from the hands. There are special situations, particularly in medical settings, where hand sanitisers are required. Healthcare workers, for example, need to perform hand hygiene so many times per day that washing would take too much time and be tougher on the skin compared to disinfection with ethanol.

Ethanol-based sanitisers are safe, effective and commonly used. Handwashing or sanitising with alcohol will reduce the number of bacteria on the hands by similar amounts.[14] Ethanol will kill most bacteria, but it could be less efficient for some types of viruses.[15] However, when you have viruses on your hands, washing with soap, water and drying is a very reliable and efficient procedure.[16]

Feedback and culture change

Hand-hygiene improvement campaigns have been conducted with many different target groups including children, military recruits, food-service workers, the general public, etc. Hand hygiene interventions for healthcare workers are the most well-studied, closely followed by interventions with young children.

Evidence shows that interventions based purely on training or other one-time interventions can have a brief positive effect on hand-hygiene compliance; this improvement is, however, often short lived. Lasting improvement requires ongoing work using multi-modal strategies with a goal towards cultural change, which allows compliance improvements to become more self-sustaining.

A study demonstrated that a multi-modal intervention could increase hand hygiene in nursing homes. Adherence to hand-hygiene guidelines increased significantly during the intervention and remained higher six months after the intervention but remained suboptimal.[17]

It is difficult to find strong evidence that a specific type of compliance intervention will have a strong effect. Evidence is weak for the efficacy of any specific type of intervention, perhaps because the design of hand-hygiene intervention studies varies widely in terms of the interventions tested and the type of follow-up method.

Nevertheless, well-designed intervention programmes have succeeded in producing improvements, at least in the short term. A Cochrane review of hand-hygiene interventions among healthcare workers in a variety of settings found at least low-quality evidence that multi-modal interventions can improve both compliance and reduce colonisation or infections.[18]

Another Cochrane review examined hand-hygiene education programmes in nursery schools (predominantly in high income countries) as well as hospital and community-based settings (in lower income communities). The included studies varied widely in the style of intervention from mostly passive education (posters) to intensive behaviour change efforts. Some of the studies in low and middle-income countries also included provision of soap. The evidence for increased handwashing after intervention is weak (this data were also not always collected), but one study did show large increases in frequency: from three to seven times times daily. Other studies showed increased handwashing behaviour at appropriate times such as before eating. The indirect evidence of behavioural change was much stronger: handwashing interventions were shown to prevent between 25–33% of diarrhoea episodes in the study groups.[1]

A second systematic review of community-based hand-hygiene interventions found that the timing of an intervention could be critical. The authors concluded "the data suggest that proactive hand-hygiene promotion interventions, i.e., regardless of the identification of infected cases, can improve health outcomes upon implementation of such a programme, in contrast to reactive interventions in which the programme is implemented after (household) index cases are identified".[19]

A recent study evaluating feedback efforts in hand-hygiene adherence concluded that 'individual feedback was preferable to group feedback'.[20]

Studies show that effective prevention of infections is possible also in nursery schools, and this can benefit both families and staff. A programme including handwashing training for staff, children and parents was implemented. Clear hygiene routines for nappy change and regular cleaning of toys were also part of the programme. The result showed that sick absences were significantly reduced.[21]

It seems reasonable to conclude that the success of any given programme is dependent on circumstances of a particular institution and exact details of the intervention set up. It is probably the case that successful interventions will use elements of the multi-modal strategy for compliance improvement and will need to be tailored to the individual circumstances of the setting.

Conclusions

The importance of proper handwashing in maintaining health and well-being has been known for some time. For an equally long time, it has been a challenge to motivate large groups of people to perform appropriate hand hygiene.

We have shown here that it is possible to improve both hand hygiene and health outcomes by combining many different strategies.

Authors

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Carolyn received her doctorate in biological physics from MIT and worked briefly as a researcher. She quickly decided that she would be happier working at something that made a more immediate impact; so she moved to the industrial sector. Her career at Essity has moved from a pure research function, linked to microbiology, to a more applied R&D position with a main focus on hand hygiene. Today Carolyn is a Global Brand Innovation Manager working on securing the creation of a best-in-class soap and sanitiser offer. The common theme has always been hand hygiene whether it is developing products to make hand hygiene better or in helping to get the hygiene message out to customers and internal stakeholders.

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