Ensuring hand hygiene compliance: Reducing risk in the food handling environment

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Ensuring hand hygiene compliance: Reducing risk in the food handling environment

Contact of workers hands with foods represents a potentially important mechanism by which pathogens enter the food supply. Improper food handling practices contributed to approximately 97% of foodborne illnesses in food-service establishments and homes in USA (Howes et al., 1996). In a study of 81 outbreaks of food contaminated by workers, 89% involved the transmission of pathogens to food by workers’ hands (Guzewich and Ross, 1999). There is also evidence that poor personal hygiene of food workers such as unwashed or poorly washed hands are a factor in up to about 40% of food-related outbreaks of illness (Olsen et al., 2000).

Foodborne diseases contribute to human morbidity, mortality and economic loss. These financial burdens include the cost of controlling the disease, medical treatment costs, business losses and losses in productivity.

- The annual cost of foodborne illnesses in the USA, including individuals, industry and the public health sector was estimated to be between $6.5-$35 billion in 1997 (Buzby & Roberts, 1997).
- The total cost estimated due to diseases caused by food-borne pathogens, Campylobacter, non-typhi Salmonella, E. coli O157, E. coli non-O157 STEC and Listeria monocytogene alone in 2000 was at around $6.9 billion per year in USA (Brian et al., 2012).
- Recent studies provide cost of foodborne-illness estimates in USA ranging from $14.1 billion to $152 billion (Hoffmann and Anekwe, 2013).
- It is estimated that each year in the UK: around a million people suffer a foodborne illness, around 20,000 people receive hospital treatment due to foodborne illness, there are around 500 deaths caused by foodborne illness and it costs nearly £1.5 billion (FSA, 2011).
- It is also known that the cost of outbreaks due to food workers could easily exceed the costs associated with outbreaks due to person-to-person transmission of infectious agents.

Food contamination creates an enormous social and economic burden on communities and their health systems. Most importantly the irrecoverable cost for the private sector is the long term damage to an organisations reputation and its brands.

Microorganisms on the human skin can be described as two types of populations:

1. Resident microorganisms that permanently inhabit the epidermis and do not usually cause food-borne illness; and
2. Transient microorganisms that are picked up from the atmosphere or from contact with a contaminating source and can include pathogenic bacteria and viruses, which can cause food poisoning.

A professional hand washing and drying procedure should remove these transient bacteria picked up during activities in a food processing environment.
Various scientific investigations provide evidence that food workers, particularly ill individuals, can serve as the source of infection in foodborne outbreaks and that hand contact with foods represents a mode by which contamination may occur. Hence improvement of hand washing and drying practices is crucial.

In response to this evidence, the authorities around the world have included guidelines and legal requirements on methods to prevent food contamination from food workers’ hands in the food manufacturing, service and retail establishments. These methods include hand washing and the prevention or minimization of bare hand contact with food.

In reality, the prevalence of hand washing in food sector indicates that these hand hygiene practices do not occur as often as they should. Employees have reported that they sometimes or often do not wash their hands and/or wear gloves when they should. Observational studies have found unacceptably low rates of hand hygiene practices. A report by Food and Drugs Administration in 2004 pointed out that improper hand washing occurred in 73% of restaurants and failure to prevent bare-hand contact with foods in 57% of restaurants studied. A total of 115 food handlers from 29 catering businesses were observed carrying out 31,050 food preparation and hygiene actions in their workplace by Clayton and Griffith (2004). The authors concluded that, based on hygiene guidelines, food handlers were required to implement de-contamination actions on a large number of occasions and these de-contamination actions were frequently inadequately conducted. In a different study, data was collected from detailed observation on food worker hand washing practices for which hand washing is recommended (Green et al., 2006). They found that observed food workers washed their hands in only a third of the instances in which they should have washed them.

One key challenge is that even if operators have been fully trained in the correct hand
washing procedures, there is no easy method available to routinely monitor hand washing efficiency or even if it has been done at all.

A study in the USA used focus groups to interview food workers actively employed in restaurants to assess the knowledge, practices and barriers related to hand washing in restraint environments (Pragle et al., 2007). The outcome of the investigation was the identification of barriers such as inadequate facilities and supplies, lack of accountability, lack of involvement of managers and co-workers and organizations that were not supportive of hand washing.

It is clear that barriers to hand washing in the food sector are multidimensional in nature; a structured, practical and sustainable program that addresses the identified factors is needed. The program might encompass training with the involvement of both managers and co-workers, emphasis on providing attractive, clean hand washing facilities, equipped with necessary supplies and the implementation of a sustainable compliance monitoring system.

Challenges and requirements in the food sector

- Mishandling of food plays a significant role in the occurrence of foodborne illness.
- Effective personal hygiene, especially hand hygiene, is critical at every stage of food production and a legal requirement in most countries.
- Hand washing and drying is the most effective way to interrupting the transmission of disease.
- There are no standard devices and procedures available to monitor actual implementation of the hand hygiene compliance.

**Why is monitoring vital?**

The requirement for hand sanitation in the food processing industry is fundamental and has provided such facilities for many years and is very conscious of its responsibilities. The sustainability of hand washing, drying, compliance and monitoring is a problem which has not often been addressed by many establishments. Hand hygiene guidelines published by numerous authorities and regulatory bodies all over the world emphasize the importance of monitoring hand hygiene compliance and providing food workers with feedback regarding their performance as components of multimodal hand hygiene promotion programs. This is considered integral part of a successful hand hygiene promotion program.

### Advantages and disadvantages of various hand hygiene approaches (WHO 300)

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<tr>
<th>Monitoring approach</th>
<th>Advantages</th>
<th>Disadvantages</th>
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| Direct observation  | • Only way to reliably capture all hand hygiene opportunities  
• Details can be observed  
• Unforeseen qualitative issues can be detected while observing hand hygiene | • Time consuming  
• Skilled and validated observers required  
• Prone to observation, observer and selection bias. |
| Self reporting by workers | • Inexpensive | • Overestimates true compliance  
• Not reliable |
| Direct observation by peers | • Inexpensive | • Potential negative impact in person-peer relationship  
• Reliability and validity required and remains to be demonstrated |
| Consumption of hygiene products such as towels, soap and alcohol-based handrub | • Inexpensive  
• Reflects overall hand hygiene activity (no selection bias)  
• Validity may be improved understanding usage parameters e.g. busy times. | • Does not reliably measure the need for hand hygiene  
• No information about the appropriate timing of hand hygiene actions  
• No possibility to discriminate between individuals |
| Automated monitoring systems | • Absence of observer may reduce observation bias  
• May potentially produce valuable detailed information about hand hygiene behaviour and infectious risks. | • Potential ethical issues with tracking of individual activity  
• Unknown impact on staff and patient behaviour  
• Systems may be costly and failure-prone. |
In particular, monitoring hand hygiene compliance is of crucial importance to:

- Assess baseline compliance by food workers,
- Provide feedback to food workers about defective practices as well as improvement,
- Evaluate the impact of promotion interventions, and investigate outbreaks.

**Hand hygiene measurement methods**

Increasing hand hygiene compliance is a complex and difficult task (Michaels and Griffith, 2013; Clayton and Griffith, 2008). Since 2000, various strategies have been implemented to change hand hygiene behaviour through educating people on the link between hygiene and health, although with limited impact (Bloomfield et al., 2007).

Fundamental questions to be answered before selecting a method of measurement are:

- Why do you want to measure hand hygiene practices, and what are your organization’s goals?
- What elements of hand hygiene do you want to measure?
- How do you want to measure hand hygiene?

Some marketing experts believe that to drive a long-term behaviour change will result only from a sustained effort, allowing for an ingrained change within the individual, and the population in which they exist (Smith, 2004). Thus, maintaining adherence beyond a typical campaign end. Whilst people must be provided with the necessary appropriate clean facilities for practising hand hygiene, there is a need for them to be motivated to do so.

Of major interest in the last few years has been the recognition of the role of peer pressure or organisational culture to create a positive motivational culture of compliance. Although predominantly previously applied in healthcare and food environments, its principles are equally applicable and valid in other work spaces.

**Approaches to hand hygiene monitoring**

**Conventional approaches**

- Direct observation
- Observation survey
- Self-reporting

**Novel solutions**

- Wearable monitoring device for gel dispenser
- Wearable badge with prompt beeping signal
- Wearable reader for soap dispenser usage with room entry and exit
- Non-wearable devises (e.g. real time location system, motion detection sensors for usage, soap dispenser usage with room entry and exit).

While direct monitoring was considered in the past as the preferred gold-standard for hand hygiene compliance monitoring, it can introduce a number of study biases that would need to be considered and understood, before making any reviews on data presented. The Hawthorne effect, also called observation bias, refers to the tendency of people to change their behaviour when they are aware of being observed. (Srigley et al., 2014; Haas and Larson, 2007)

Over the last few years monitoring capability has had greater predominance as more electronic surveillance systems have been made available and commonly measure the use of consumables. While these are not validated in observational studies, and do not allow conclusions about an individual’s adherence to hand hygiene indications, these electronic devices, in combination with other measures may help to collect information about soap and hand rub use, including the effect of quality improvement and educational initiatives (Kinsella, et al., 2007).

Obviously an ideal system would provide an unbiased, true reflection of reality, which would include (WHO 300):

- Not interfering with the behaviour being monitored;
- Assess microbial impact of hand cleansing in real time;
- Captures and records each possible opportunity for hand cleansing;
- Low resource;
- Provides sufficient data to exclude selection bias and underpowering.

Innovative and latest electronic systems for the automatic monitoring of hand hygiene
compliance are now available and can significantly facilitate data collection. They allow continuous monitoring over time, automatic data download and analysis with minimal human resource.

In 2009, WHO documented the following summary, capturing the various advantages and disadvantages of monitoring approaches (Refer to Table on P4). Since then there have been numerous innovative technical advancements in this field.

Challenges to and strategies for improvement

It is vital to investigate the underlying factors for non-adherence to hand hygiene guidelines before deciding on improvement strategies (Allwood et al., 2004). It is also valuable to examine the organizational context of procedures and management styles, which may facilitate or inhibit adherence. Such organisational factors include the following:

- The presence of written hand hygiene policies and procedures.
- The facility’s capacity for making hand hygiene products available.
- The active involvement of leadership “from the top down”
- The presence of role models.
- The degree of accountability for non-adherent staff.
- The presence of a culture of safety.
- The active involvement of staff in improvement efforts.
- The awareness and involvement of patients and families.

A successful program requires a committed management. If management is not concerned about hand hygiene, employees will not be concerned. Recognition should be given to employees who adhere to personal hygiene principles. There must be reprimands for those who ignore or forget hand washing policies.

Management must view the problem in the same manner as a severe professional misconduct. Instruction regarding the importance of hand washing, proper methods of hand washing, and management commitment to the hand washing policy must become a part of new employee orientation and continuing employee education. People learn best if their efforts are recognized.

Owners / managers should:

1. Compliment employees for using correct hand washing procedures.
2. Provide clean, well-maintained personal hygiene facilities.
3. Share customer and health department compliments with employees.

When management trains employees in food production, food service or any retail food industry to know and use the information provided in this paper, the need for the use of plastic gloves to prepare and serve food will disappear, and so will the liability associated with inadequate hand washing.

Conflicting hygiene recommendations based on numerous products and practices for different settings may cause confusion. Hygiene success requires continued focus on monitoring, awareness and education. Employers and employees have the potential to be role models within a facility to help highlight, support, prioritise and identify interventions to help improve hand hygiene behaviour.

To conclude, there is still much to learn about food handling environments such as factories and the role they play as a hub for the spread of pathogenic and opportunistic organisms. However, promoting and influencing hygiene culture, providing expert advice on hand hygiene regimens, and the use of the latest sensor technologies available has been proven to have beneficial effect in personal and community disease transmission. In addition, novel technology now opens the door for real time feedback and new innovative strategies hold great promise for the food industry.
References

*Initial research findings 2014


Smith, B., Notes from the field: Avoiding post campaign blues, (2004), Soc Mar Q., 10, Pages 60-63


