Assessment of video observation to evaluate hand hygiene practices of food handlers in food and drink manufacturing and processing businesses: a feasibility study.

Ellen W. Evans & Elizabeth C. Redmond

ZERO2FIVE° Food Industry Centre Research Group, Cardiff Metropolitan University, Wales, United Kingdom.

*Corresponding author: elevans@cardiffmet.ac.uk

Introduction

Hand hygiene is one of the most effective method for preventing cross-contamination. Food handlers have a major role in the prevention of foodborne illness during food production[1], consequently food handler failure to properly wash hands is frequently reported to be implicated in the spread of foodborne illness[2].

Although informative, food safety cognitions are not indicative of actual practices and may be subject to biases[3], therefore food handlers may demonstrate awareness of food safety, however may fail to translate knowledge into safe practices[4]. For this reason observational data are superior to survey data[5].

However, during direct observations, researcher presence can increase subject reactivity[6], whereas video observation provide a more comprehensive analysis over a sustained period, where familiarity reduces reactivity bias[7]. Previous video observation research have assessed food handler hygiene behaviours at retail/catering settings[8-10], however, this method of assessment has been under-utilised in food and drink manufacturing and processing business (FDMPB) environments.

Therefore, there is a need to explore the feasibility of conducting video observation of food handlers in FDMPBs to assess hand hygiene practices.

Purpose

To assess the feasibility of using video-observation to evaluate food handler hand hygiene practices in FDMPBs and utilise the technique to determine the compliance of hand hygiene practices in a FDMPB to company hand hygiene protocol.

Methods

- In-depth interviews with FDMPB managers/technical supervisors (n=11) identified hand-hygiene protocols, training procedures and explored the acceptability of video-observation to assess compliance.
- One FDMPB was selected to conduct the observational study.
- Footage from the production hand hygiene area (24 hours) was reviewed to assess compliance with procedure. Observed practices were recorded using a specifically designed Qualtrics database.
- Recorded data included; duration, occurrence (exit/entry), gender, role (food handlers/hygiene/engineering), personal protective equipment (PPE), observed malpractices, procedure adequacy and compliance.
- Descriptive analysis and inferential statistics were conducted using a Microsoft Excel database and IBM SPSS Statistics package 23.

Results

FDMPBs had unique hand-hygiene protocols with variable details. Interviews identified positive attitude towards using video-observation to assess hand-hygiene compliance. Although it was common for FDMPBs to have cameras recording activity in factories including hand hygiene areas, none had the resource/time to conduct frequent/structured observation of footage, cameras were used for security and would be referred to in the event of an incident.

Hand hygiene compliance entering production

A total of 1333 entries in to the production hygiene lobby were observed over a period of 24 hours, of which 674 were entering production and 659 were exiting production.

Compliance of each entry into the hygiene lobby was observed for compliance with the FDMPB hand hygiene protocol (Figure1).

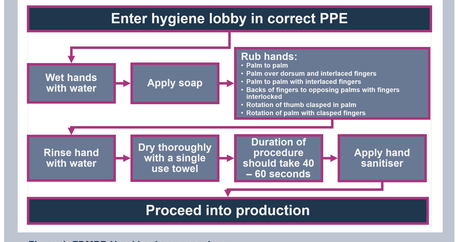

Figure 1. FDMPB Hand hygiene procedure

At the point of entry, on 70 occasions (10.4% of those entering), staff were observed failing to attempting the implementation of a hand cleaning attempt.

Of the 604 attempts to implement hand washing and drying practices prior to entering production, only 2.2% (13 attempts) were determined to be compliant with the procedure, although not compliant, the researcher believed that 8.8% of all attempts were adequate.

- The majority (77.9%) of attempts used soap to wash hands.
- Less than half (45.3%) of attempts wetted hands with water prior to applying soap.
- Less than half (41.6%) of attempts included the use of sanitiser.
- On 13 occasions, staff were observed failing to implement a hand washing/drying attempts and used hand sanitiser only prior to entering production.

Consequently, the majority (97.8%) of hand decontamination attempts implemented before entering production were not compliant with the FDMPB hand hygiene procedure.

Hand hygiene duration and drying malpractices

The FDMPB protocol states the duration of the entire hand decontamination procedure should take 40—60 seconds (from wetting hands through to drying of hands).

As indicated in Figure 2, hand-hygiene duration ranged from 1–69 seconds. In total, the duration of only 6.3% of attempts at point of entry were in adherence with the procedure (>40 seconds).

The median duration of the entire hand decontamination procedure was 17 seconds.

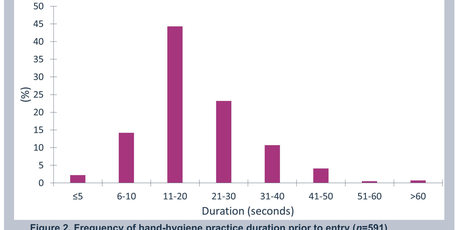

Figure 2. Frequency of hand-hygiene practice duration prior to entry (n=591)

The majority of hand washing attempts were followed by hand drying, however 1.3% entered production without drying hands and 8.9% dried hands on personal protective equipment (PPE) as illustrated in Figure 3.

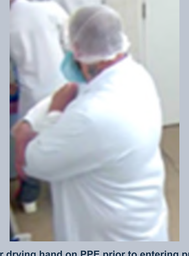

Figure 3. Food handler drying hand on PPE prior to entering production

Significant behavioural differences between staff

A significant difference in the hand-hygiene duration when entering production was determined between staff roles.

Food handlers (identifiable in white overalls) were observed implementing hand-hygiene practices of statistically significant longer durations (Md = 19 seconds, n = 456) than engineering and hygiene staff (identifiable in blue overalls) (Md = 15 seconds, n = 135) (U = 25066.5, z = -3.281, p <0.001, r = 0.12).

Differences in hand hygiene practices before entering production were explored further. As indicated in table 1, it was determined that engineers/hygiene staff were significantly less likely (p <0.05) of wetting hands first, using soap, rubbing hands palm to palm and were significantly (p <0.001) more likely of failing to attempt to implement any hand hygiene procedure.

Table 1. Significant differences in observed hand hygiene practices at point of entry of food handling staff (n=503) and hygiene/engineering staff (n=171)

Observed hand hygiene practices	Food handlers (%)	Hygiene / engineering (%)	Statistical analysis
No attempt to implement	9.1	19.3	X^2 (1, n= 674) = 11.75, p<0.001, phi = 0.137
Wet hands with water first	50.5	29.8	X^2 (1, n= 674) = 21.19, p<0.001, phi = -0.181
Apply soap	80.5	70.2	X^2 (1, n= 674) = 7.34, p<0.05, phi = -0.108
Rubbing hands palm to palm	68.4	59.1	X^2 (1, n= 674) = 4.54, p<0.05 , phi = -0.086
Rinse hand with water	87.5	77.8	X^2 (1, n= 674) = 8.67, p<0.005, phi = -0.118
Dry with single use towel	75.5	72.5	p>0.05
Duration >40 seconds	6.4	2.9	p>0.05
Use of hand sanitiser	36.8	38.6	p>0.05
Adequate attempts	9.3	3.5	X^2 (3, n= 674) = 17.92, p<0.001, Cramer's V = 0.163
Attempts compliant with procedure	2.6	0.7	p>0.05

Findings suggest food handlers may perceive hand-hygiene to be of greater importance than hygiene/engineering staff. However, no significant difference occurred in compliant attempts between engineering/hygiene staff and food handlers (p>0.05).

Observational outcomes indicate improvements in hand hygiene practices are required among all staff.

Significance of study

- Video-observation data provided an in-depth insight into hand-hygiene compliance when entering production and thus illustrated a valuable and useful resource for FDMPBs.
- Although the majority implemented hand-hygiene practices, extensive malpractices were observed that were contrary to FDMPB policy and may compromise food-safety during food production.
- The study identified site-specific issues to inform the development of a training and educational intervention to improve hand-hygiene practices among staff.
- Cognitive research is required to explore potential factors that influence hand hygiene differences between hygiene/engineering staff and food handlers and identify the potential barriers that exist for staff to adequately implement hand-hygiene practices.

Acknowledgements

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