



Food handlers and Norovirus transmission: Social science insights

Annex

Ipsos MORI

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Appendix

This appendix to the report “Food handlers and norovirus transmission, FS101143” (published separately) contains the following key documents:

1. Literature review – this brief paper produced by the University of Leeds and Queens University Belfast identified the five control strategies and the component practices that Ipsos MORI researchers sought to investigate.
2. Table included in the appendix of the literature view which highlights behaviours / practices / circumstances in norovirus transmission, barriers preventing good behaviour / practices, and potential solutions to reduce norovirus transmission.
3. Behavioural Model paper – this paper discusses why it was necessary to use a behavioural research approach, the behavioural models chosen for this study, and how they informed the development of the data collection instruments.
4. Theoretical Domains Framework and definitions
5. Theoretical Domains Framework and theoretical constructs
6. Links between interventions functions and most frequently used behaviour change techniques (BCTs)
7. Links between Theoretical Domains Framework, COM-B components and intervention functions
8. Links between policy categories and intervention functions
9. The APPEASE criteria for designing and evaluating interventions
10. Data Collection Instruments:
 - i) Employee (food handler) discussion guide
 - ii) Manager (Food Business Operator / Kitchen Manager / Supervisor) discussion guide
 - iii) Environmental observational pro forma
 - iv) Behavioural observational pro forma
 - v) Questionnaire on food safety practices
11. The characteristics of the 32 food establishments included in this study.

1. Literature review

Norovirus transmission in food handlers and its prevention

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Introduction

Noroviruses, a group of highly contagious RNA viruses belonging to the Caliciviridae family, are recognised as a common cause of viral gastroenteritis and foodborne illness in the UK (Tam et al., 2012). It has been projected that approximately 3 million norovirus cases and 130,000 GP consultations occur in the UK every year (Tam et al., 2012). These projections, however, are likely to be underestimated, as many cases of norovirus within the community go undiagnosed, as symptoms are typically mild and can be treated at home. According to national surveillance, in 2012 the UK incidence rate of laboratory-confirmed norovirus cases was 14,546, with a much lower incidence rate of 9,328 being observed the following year in 2013 (FSA, 2014). Only a minority of these incidence cases reported by national surveillance are likely attributable to a food source, instead they are associated with outbreaks that occur within health and social care settings (FSA, 2014). Nevertheless, it is anticipated that a reasonable proportion of norovirus cases (according to FSA in 2011, 314,000 cases in UK¹) are due to the consumption of contaminated food.

Clinical characteristics of norovirus include frequent projectile vomiting, diarrhoea, abdominal cramps, headaches and nausea that can affect individuals from all age groups. Symptoms, which encompass an incubation period between 10 and 50 hours following exposure, can last between 12 and 48 hours (ACMSF, 2015), and usually resolve exclusive of treatment. Dehydration is the main complication related to the norovirus infection, and can lead to hospitalisation, especially of vulnerable population groups such as very young children, the elderly and immunocompromised patients.

Characterised by its low infectious dose, ~10 virus particles (ACMSF, 2015), alongside its high level of viral shedding that can persist for more than 3 weeks (Rockx et al., 2002; Murata et al., 2007; Atmar et al., 2008), norovirus is considered a highly contagious pathogen. It is predominantly transmitted directly through person-to-person transmission (faecal-oral route), and indirectly through contaminated food, water and surfaces. Large outbreaks are typically observed during the winter months (Matthews et al., 2012), especially within health and social care institutions, cruise ships, hotels, restaurants, and other closely confined densely populated settings (Hall et al., 2011). Within health and social care institutions, it is clear that norovirus presents a huge economic burden. For instance, in 2002-2003 it was projected that norovirus outbreaks cost the English NHS £115 million (Lopman et al., 2004). Furthermore, a study that investigated the costs of norovirus outbreaks within NHS Lothian, Scotland, over two norovirus seasons, found that lost-bed days and staff absence due to norovirus resulted in costs of £1.2 million (Danial et al., 2011).

As norovirus is predominantly transmitted through the faecal-oral route, personal hygiene plays an important role in controlling and preventing further spread of the virus. Hand washing thoroughly and regularly is essential, especially after going to the toilet and prior to handling food. Another preventive measure is excluding the infected individual from work for at least 48 hours after symptoms have stopped, especially if working within health and social care institutions, schools and food establishments. Glove wearing and cooking

¹ The FSA published in 2014 the IID2 extension study which estimated foodborne norovirus to be around 74,000 per year.

food thoroughly, especially foods considered high-risk such as shellfish, is also important. Adequate cleaning and disinfecting of surfaces and other infected areas such as toilets are also essential control strategies.

Aims

The aim of this review is to identify key practices and behaviours of food handlers and circumstances which lead to norovirus transmission, as well as to identify potential norovirus control strategies.

Methods

A search of the literature was carried out using search engines: PubMed and Web of Science. Key words to identify relevant literature included: norovirus, gastroenteritis, transmission routes, food handlers and prevention strategies. Key documents produced by the European Food Safety Authority and the Food Standards Agency in relation to norovirus transmission, high-risk foods, and control strategies were identified and referred to (see reference list).

Transmission

Although norovirus is predominantly transmitted directly through person-to-person transmission (faecal-oral route or vomit-oral route), a large proportion of norovirus cases are a result of indirect transmission through the consumption of contaminated food, water or contact with contaminated surfaces and fomites. Norovirus does not replicate on food; instead, it is a suitable transmission vehicle for the virus. Food handlers either involved in the processing, preparing or serving of food, are often a major source of foodborne transmission and subsequent outbreaks (Hall et al., 2012). Understanding their key practices, behaviours and circumstances that lead to norovirus transmission, hence, would help develop control strategies to prevent the spread of this highly contagious virus.

Transmission via contaminated water

Contaminated water can play a role in foodborne transmission of norovirus. For instance, untreated sewage may overflow into rivers and coastal waters, resulting in shellfish and bivalves coming into contact with norovirus (Campos et al., 2014). Without adequate heat treatment to inactivate norovirus before consumption, the risk of becoming infected is high. Shellfish and bivalves are considered high-risk foods for these aforementioned reasons, and have been implicated in many norovirus outbreaks worldwide (Webby et al., 2007; Smith et al., 2012; Hall et al., 2012). Between January and March 2010, there were 334 norovirus cases in 65 clusters, linked to the consumption of raw oysters in five European countries, including the UK, France, Denmark, Sweden and Norway (Westrell et al., 2010).

Ready-to-eat fruit and vegetables may come into contact with faecal contaminated water during irrigation or through the application of fungicides (EFSA, 2014a; 2014b). Numerous norovirus outbreaks, specifically involving raspberries and green leafy vegetables, have been reported in the EU (Hjertqvist et al., 2006; Maunula et al., 2009; Ethelberg et al., 2010; Hall et al., 2012; Savikivi et al., 2012; Muller et al., 2015). These foods are considered high-risk as they are typically consumed raw, with little or no processing or no heat treatment to inactivate the virus.

Transmission via infected food handlers

Infected food handlers can also play a role in contaminating these high-risk ready-to-eat foods during harvesting, processing, preparing and serving. Inadequate personal hygiene such as failure to wash and dry hands after attending the toilet, or not washing hands thoroughly with soap and hot water, can result in faecal particles remaining on the hand, which subsequently could be directly transferred to food or food preparing

surfaces, leading to norovirus contamination. A catering workers hygiene survey of 1,000 food workers and managers revealed that 39% failed to wash their hands after attending the toilet whilst at work, and 53% reported not washing their hands prior to preparing food (FSA, 2002). Furthermore, an observational study of food worker hand washing practices found that hand washing was only performed for 32% of activities that require hand washing, such as food preparation, putting on gloves for food preparation and preparing raw animal products (Green et al., 2006).

Most food handlers within the food setting service are required to wear gloves, especially when handling ready-to-eat-foods. Outbreaks of norovirus where the source has been food handlers using their bare hands to prepare foods have occurred (Friedman et al., 2005; Malek et al., 2009). Not washing your hands prior to gloving may also result in cross-contamination. An experiment carried out by Ronnqvist and colleagues (2014), using reverse transcription-PCR, found that human norovirus contaminated hands prior to gloving, which subsequently led to contamination of the clean gloves, which could potentially transfer to food.

Transmission via surfaces and fomites

Another indirect transmission route for norovirus is through food preparation surfaces, clothing, and utensils including knives and chopping boards. These can become contaminated either through being in contact with contaminated hands (hands-to-surface) (Barker et al., 2004) or, to a lesser extent, contaminated food (food-to-surface) (Grove et al., 2015).

There is evidence to suggest that norovirus is environmentally stable and can survive on food preparing preparation surfaces for prolonged periods of time. A study investigating the survival of feline calicivirus, a surrogate marker indicating the contamination of human norovirus, in foods and on a stainless steel surface typically used in food establishments, found that the virus could survive up to 7 days at room temperature and under refrigeration conditions (Mattison et al., 2007). Another experiment found that Norwalk virus after 21-28 days storage under ambient conditions had an average reduction ranging from 1.5 to 2.9 log₁₀ GEP (Liu et al., 2009). Lopman et al. (2012) reported that norovirus particles on surfaces may remain infectious for up to 2 weeks.

Person-to-person transmission

Norovirus is predominantly transmitted from person-to-person via body contact, i.e. shaking hands with an infected individual who had vomit or faecal particles on their hand, or via inhalation of aerosolized vomit particles (Marks et al., 2000; 2003). In the USA between 2009 and 2013, there were 10,756 acute gastroenteritis outbreaks (Wikswow et al., 2015). 9,193 outbreaks were transmitted through person-to-person contact, of which norovirus accounted for 62% (n = 5,720). Person-to-person spread could subsequently lead to foodborne transmission if personal hygiene measures are not adequately implemented.

Control strategies

Surface cleaning

Adequate cleaning and disinfection of food production areas as well as the bathroom, surface areas, equipment and utensils should be carried out following an episode of gastroenteritis (vomiting and/or diarrhoea). The EFSA recommends disinfecting surfaces with a solution of >1000 mg/L free chlorine, preferably hypochlorite solutions, as they can potentially reduce viral infectivity by over 1000 fold. (EFSA, 2011). All food establishments should provide the adequate facilities and materials for cleaning and disinfecting according to EU legalisation (Regulation EC No 852/2004) (EFSA, 2011). Furthermore, food handlers should also not be responsible for cleaning and disinfecting areas where vomiting/diarrhoea has occurred, as it is possible for

droplets to remain on their skin. Trained personnel should take care of any spillages, ensuring they wear protective clothing such as disposal masks, gloves and aprons (EFSA, 2011).

An infected food handler's uniform can also be a potential medium for norovirus transmission. Wiping dirty hands or using their uniform to dry their hands potentially could contaminate food. Employees may also be expected to wash their own uniforms at home. This is of concern, as the temperature used to wash the uniforms within a domestic setting may not be sufficient in killing norovirus. Professional laundry services should be availed of; however, the associated costs may prevent the facilitation of these services.

Washing and cooking food

Norovirus is environmentally stable in cold and ambient temperatures, hence why raw and ready to eat foods, such as fruit and vegetables, are considered high-risk commodities. Washing fruit and vegetables during food preparation can result in 1-2 log removal of virus particles from the surface (Beuchat, 1998). Some food producers/processors disinfect their RTE commodities, such as bagged lettuce, with chlorinated water; however, higher levels of chlorine are needed to achieve a 2 to 3 log removal, which consequently could affect the colour and taste of the commodity (EFSA, 2011). Cooking/ heating foods can inactivate the virus. Temperatures ranging between 37 to 1000 C inactivated feline calicivirus (FCV) and canine calicivirus (CaCV) (Duizer et al., 2004), surrogate markers for human norovirus, while temperatures of 63 and 720 C inactivated FCV and murine norovirus 1 (MNV-1) (Cannon et al., 2006).

Personal hygiene

The FSA's "Food Handlers: fitness to work" guidelines (FSA, 2009), which were developed to help managers and their staff prevent the spread of infection in the workplace, states that for best practice a demonstration of good hand washing technique should be provided to all staff at induction. The EFSA recommends that the most effective method for reducing norovirus contamination on the hands is washing them for 20 seconds with soap and running water, and drying them for a further 20 seconds with disposable paper towels (EFSA, 2011). Knowledge, however, is not always translated into practice, as many barriers exist. For example, working within a busy catering environment creates time pressures, which potentially could prevent employees from washing their hands regularly and adequately, or instead provoke them to carry out a cursory wash, washing facilities may be inadequate i.e. no hot running water or available soap or they may be difficult to access. According to EU legislation (Regulation EC No 852/2004) it is a general requirement for food premises to have an adequate number of washbasins and toilets and suitable materials to clean hands and to dry them (EFSA, 2011).

Although alcohol-based hand gels appear to be a convenient option during busy periods, evidence regarding their effectiveness in reducing norovirus transmission is inconclusive (Park et al., 2010; Macinga et al., 2008; Bolton et al., 2013; Sickbert-Bennett et al., 2005). An experimental study found using finger pad tests that washing hands with soap and water (at a temperature of 15 degrees) was more effective in removing norovirus from hands than using alcohol-based hand disinfectants (Tuladhar et al., 2015). Food establishments should encourage hand washing with soap and water, and avoid promoting the use of these hand gels until further conclusions are drawn regarding their efficacy.

Most food service companies require their employees to wear gloves when handling food, especially RTE foods. Wearing gloves could be considered an inconvenience for some food employees, such as those that have the responsibility to prepare food and work the cash register simultaneously (Moe et al., 2009). When handwashing and gloving were carried out concurrently, norovirus transmission to food was reduced (Mokhtari et al., 2009).

Exclusion from work

Symptomatic individuals must be excluded from food handling duties, and should remain excluded until 48 hours after symptoms have stopped (FSA, 2009). Viral shedding, however, can still persist more than 3 weeks later (Rockx et al., 2002; Murata et al., 2007; Atmar et al., 2008), thus good personal hygiene is extremely important to prevent norovirus transmission to other staff members, food surfaces and food. According to the FSA's "Food Handlers: fitness to work" guidance (FSA, 2009), staff handling food should not return to their workplace until at least 48 hours after symptoms stop; the "Food Handlers: fitness to work" guidance sets out the responsibilities of both food handlers and managers (Annexes 1 and 2) when there is a possibility of food contamination resulting from poor health of staff. It should be borne in mind that viral shedding by an infectious individual has been reported to occur up to and even after 3 weeks (Rockx et al., 2002; Murata et al., 2007; Atmar et al., 2008). If returning to work after 48 hours it is therefore extremely important that personal hygiene measures, such as regular and thorough hand washing, are implemented to prevent spreading.

A study that assessed reported behaviour, knowledge and awareness of norovirus transmission of Dutch food handlers found that 204 out of 960 people (21%) working within catering companies and 27 out of 250 people (11%) working within institutions had intentions to continue to work while experiencing diarrhoea (Verhoef et al., 2013). A similar study conducted in the USA found that 11.9% (n=58) of food workers reported that they had worked on two or more shifts while experiencing vomiting or diarrhoea (Sumner et al., 2011). Lack of policies requiring the workers to report their illness to their managers was one of the factors the study found associated with the workers continuing to work while feeling ill. In the UK it is a legal requirement, however, that food workers report their illness or symptoms to their manager or supervisor (FSA, 2009).

Another issue, which is difficult for food business operators to control for, is asymptomatic food handlers who are infected with norovirus, but do not display any of the associated symptoms. Asymptomatic food handlers can have the same level of virus shedding as symptomatic food handlers (Ozawa et al., 2007). Research has shown their involvement in food-borne outbreaks of norovirus (Ozawa et al., 2007; Nicolay et al., 2011). For instance, an investigation into a norovirus outbreak that occurred during a lunch consumed in a Dublin hotel found that three asymptomatic food handlers were responsible for norovirus transmission onto ready-to-eat food, resulting in 27 cases (Nicolay et al., 2011). It is recommended in the "Food Handlers: fitness to work" guidelines that food handlers report their history of exposure i.e. if someone they live with has been diagnosed with norovirus within the last week (FSA, 2009). A rapid screening test would permit food establishments to identify asymptomatic employees; however, this may be difficult and costly to implement.

Training

Lack of knowledge and inadequate training are likely causes for food handlers' role in norovirus transmission. All employees should be aware of any food safety management systems such as HACCP within their workplace. EU legislation (Regulation (EC) 853/2004, Annex II, Chapter XII) requires that all food handlers are supervised and trained in food hygiene matters related to their work and comply with training courses if a requirement of national law (there are no national laws requiring such training in the UK, but UK food businesses are still required to comply with the EU legislation). The EFSA suggest in their scientific opinion on an update on the present knowledge on the occurrence and control of foodborne viruses that training programs to help control norovirus contamination should provide detailed information regarding norovirus. This should include virus transmission routes, incubation periods, duration of virus shedding, the importance of cleaning and disinfecting contaminated surfaces and strict compliance to hand washing, especially after being in contact with faeces or vomit. Training should be carried out regularly, and on-the-spot checks should be carried out by supervisors to ensure what the employees have learnt is being put into practice.

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2. Food handlers' behaviours/practices/circumstances in norovirus transmission, barriers preventing good behaviour/practices, and potential solutions to reduce norovirus transmission

Behaviours, practices and circumstances	Barriers preventing good behaviours/ practices and circumstances	Potential solutions
Personal hygiene		
<ul style="list-style-type: none"> Not washing hands after attending the toilet 	<ul style="list-style-type: none"> Lack of knowledge/ training 	<ul style="list-style-type: none"> New staff should be provided with hand washing training at induction
<ul style="list-style-type: none"> Not washing hands prior to preparing food 	<ul style="list-style-type: none"> No time during shift to wash hands 	<ul style="list-style-type: none"> Refresher hand washing courses for existing staff
<ul style="list-style-type: none"> Inadequate hand washing and drying Not washing hands regularly Not using soap 	<ul style="list-style-type: none"> No access to hand washing facilities Hand soap causes skin irritation Sanitary hand gels don't kill the virus 	<ul style="list-style-type: none"> Spot checks ensuring staff are washing and drying hands adequately (20 seconds with hot running water and soap, followed by drying for 20 seconds with disposal paper towels)
<ul style="list-style-type: none"> Not washing hands prior to gloving Relying on sanitary hand gels 		<ul style="list-style-type: none"> Ensure food premises have an adequate number of washbasins and toilets Purchase soaps that are less likely to irritate skin and provide hand cream for staff Discourage the use of sanitary hand gels
Handling food		
<ul style="list-style-type: none"> Using bare hands when preparing food Not changing gloves regularly Touching face during food preparation 	<ul style="list-style-type: none"> Lack of knowledge/ training No gloves available 	<ul style="list-style-type: none"> Ensure all food handlers wear gloves, especially when handling RTE foods Ensure there is an adequate supply of gloves Encourage staff to change gloves regularly and when necessary

- Provide training on the importance of good hygiene when handling food

Fitness to work

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Not reporting episode of vomiting/diarrhoea • Continuing to work while experiencing symptoms • Returning to work too early • Asymptomatic food handlers | <ul style="list-style-type: none"> • Lack of knowledge/ training • No one to cover shift • Fear of losing job • Loss of earnings • Asymptomatic food handlers are unaware they have been infected | <ul style="list-style-type: none"> • Encourage employers to follow the FSA's "Food Handlers: fitness to work" guidelines • Ensure staff do not return to work until 48 hours after symptoms stop • Implement sick pay from the first day of absence • Ensure all staff understand reporting procedures when feeling ill or if someone they live with has symptoms of gastroenteritis • Ensure staff members returning to work after an episode carry out strict personal hygiene measures, such as regular and thorough hand washing. |
|--|--|--|

Washing/cooking

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Not washing fruit and vegetables during processing/preparation • Not cooking foods (shellfish) thoroughly to inactivate the virus | <ul style="list-style-type: none"> • Lack of knowledge/ training | <ul style="list-style-type: none"> • Washing fruit and vegetables during food processing/preparation should be implemented • Consider using chlorinated water when washing fruit and vegetables • Ensure foods, especially high risk such as shellfish, are cooked thoroughly or heated adequately. Temperatures above 60°C (140°F) is recommended |
|--|---|---|

Cleaning/disinfecting

-
- | | | |
|---|---|--|
| <ul style="list-style-type: none">• Not cleaning and disinfecting contaminated surfaces and utensils• Food handlers cleaning the area where an episode of vomiting occurred instead of trained personnel• Not washing uniform correctly or not at all | <ul style="list-style-type: none">• Lack of knowledge/ training• Poor access to cleaning facilities and materials• Domestic washing machines may not kill the virus effectively owing to lower temperature settings• No trained cleaning personnel | <ul style="list-style-type: none">• Ensure there are adequate facilities and materials for cleaning and disinfecting• Contaminated surfaces should be disinfected with a solution of >1000 ppm free chlorine, preferably hypochlorite solutions• Ensure all staff are trained on proper cleaning and disinfecting procedures• Consider professional laundry services for washing staff uniforms• Ensure protective clothing such as disposal masks, gloves and aprons are worn during cleaning and disinfecting contaminated areas. |
|---|---|--|
-

3. Behavioural model paper

Purpose

This paper will outline how relevant behavioural models have been i) **selected** and ii) **applied** to the food handler norovirus transmission study to date, that is **with specific reference to data collection**. It is anticipated that the models selected will also have a significant role in both analysing the data collected and in informing intervention selection and development but this is outside the scope of this paper.

What do we mean by a model?

We use the term model fairly generically. A model may be understood as a deliberate simplification of a phenomenon or specific aspect of a phenomenon that does not have to be a completely accurate representation of reality to be useful.²

The principal reason for taking a model based approach to this study is to reduce muddle.³ Models – derived from theory – define relevant aspects of the phenomenon of interest so that researchers are able to clearly identify and differentiate between aspects of the phenomenon they are investigating. Clearly this also helps when it comes to analysis especially when triangulating data across different methods, a feature of this study.

What models have been chosen?

Two models guide this study, the Theoretical Domains Framework⁴ (TDF)⁵ and The Integrated Behavioural Model for Water, Sanitation, and Hygiene (IBM-WASH).⁶

The TDF is an integrative framework designed to help apply theoretic approaches to interventions aimed at changing behaviour. It synthesises 128 constructs taken from 33 theories of behaviour and behaviour change into a single framework. This framework allows for assessment and explanation of the barriers and facilitators of specific behaviours which in turn enables the systematic development of interventions for supporting behaviour change.

² Nilsen, P. (2015) Making Sense of implementation theories, models and frameworks, *Implementation Science*, 10:53.

³ Christmas, S et al. (2015) Thinking about Behaviour Change, Chapter 1, Part 2 - Johnston, M (2015) Use and usability: are theoretical models of behaviour change practical?

⁴ Strictly, TDF is, as the name suggests, a 'framework', that is it denotes a structure e.g. variables and attendant constructs and the relations between them to account for a phenomenon, in this case a behaviour. For our purposes this is sufficiently close to the idea of a model and, importantly, neither models and frameworks attempt to provide explanations, rather they are interested in better descriptions.

⁵ Francis, J et al. (2012) Theories of behaviour change synthesised into a set of theoretical groupings: introducing a thematic series on the theoretical domains framework, *Implementation Science*, 7: 35

⁶ Dreifelbis, R et al. (2013) The Integrated Behavioural Model for Water, Sanitation, and Hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings, *BMC Public Health*, 13:1015

Fig 1. The domains of the Theoretical Domains Framework (TDF)

TDF domain	Description
Knowledge	An awareness of the existence of something
Skills	An ability or proficiency acquired through practice
Social/professional role and identity	A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting
Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use
Optimism	The confidence that things will happen for the best, or that desired goals will be attained
Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation
Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
Intentions	A conscious decision to perform a behavior or a resolve to act in a certain way
Goals	Mental representation of outcomes or end states that an individual wants to achieve
Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment, and choose between two or more alternatives
Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behavior
Social influences	Those interpersonal processes that can cause an individual to change their thoughts, feelings, or behaviors
Emotion	A complex reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
Behavioral regulation	Anything aimed at managing or changing objectively observed or measured actions

IBM-WASH is, somewhat like TDF, a synthesis of existing behavioural models with a specific focus on WASH behaviours and their determinants. Where existing models under-represented the importance of certain determinants – not least the physical, natural and social environment and the role of habit – IBM-WASH provides a useful conceptual and practical tool for improving understanding and evaluation of the multi-dimensional factors influencing WASH behaviours.

Fig. 2 The Integrated Behavioural Model for Water, Sanitation, and Hygiene (IBM-WASH)

Levels	Contextual factors	Psychosocial factors	Technology factors
Societal/Structural	Policy and regulations, climate and geography	Leadership/advocacy, cultural identity	Manufacturing, financing, and distribution of the product; current and past national policies and promotion of products
Community	Access to markets, access to resources, built and physical environment	Shared values, collective efficacy, social integration, stigma	Location, access, availability, individual vs. collective ownership/access, and maintenance of the product
Interpersonal/Household	Roles and responsibilities, household structure, division of labour, available space	Injunctive norms, descriptive norms, aspirations, shame, nurture	Sharing of access to product, modelling/ demonstration of use of product
Individual	Wealth, age, education, gender, livelihoods/employment	Self-efficacy, knowledge, disgust, perceived threat	Perceived cost, value, convenience, and other strengths and weaknesses of the product
Habitual	Favourable environment for habit formation, opportunity for and barriers to repetition of behaviour	Existing water and sanitation habits, outcome expectations	Ease/Effectiveness of routine use of product

Why these 'models'?

There are many reasons for choosing the TDF to guide this study: it provides a structured approach to understanding behavioural barriers and facilitators in any particular situation⁷; it has been used productively to understand analogous behaviours⁸⁹ across many different contexts¹⁰; and it has facilitated the theoretically informed design of numerous behaviour change interventions.¹¹ More immediately, we – Ipsos MORI – have considerable experience using TDF and applying it to data collection. Furthermore, and this is a crucially important point for deductive social research, the TDF has been demonstrated to not only be valid but also comprehensive¹² in its ability to assess barriers to change.¹³ In short, we can be confident that we are not missing anything in the data collection – or analysis – that all researchers have a common language and that our data can be systematically translated into an intervention development process.

A clear message from the scoping phase of the study – both in expert interviews and the evidence review – was that hand hygiene is a very important determinant of norovirus transmission. A central concern of IBM-WASH is hand hygiene and why it does or does not happen. Not only is IBM-WASH focussed on a key behaviour of interest, it is comprehensive but complementary to the TDF and points out specific influences that are often underplayed and/or likely important in a complete understanding of relevant behaviours.

How were these models applied to data collection?

This study uses three separate methods (depth interviews; observations; and surveys) and their attendant data collection instruments (discussion guides; observation protocols; and questionnaires). All methods and instruments have been informed by the TDF and IBM-WASH to some extent.

The starting point for the development of data collection instruments was the evidence review “Norovirus transmission in food handlers and its prevention” and counterpart diagnosis of “food handlers’

⁷ Rachel Davis, Rona Campbell, Zoe Hildon, Lorna Hobbs & Susan Michie (2015) Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review, *Health Psychology Review*, 9:3, 323-344

⁸ Dyson, J. et al (2010) Development of a theory-based instrument to identify barriers and levers to best hand hygiene practice among healthcare practitioners, *Implement Science*. 8: 111

⁹ Squires, J. et al. (2014) Understanding Practice: Factors That Influence Physician Hand Hygiene Compliance, *Infection Control and Hospital Epidemiology* 35(12):1511-20

¹⁰ Michie, S. et al. (2015) ABC of Behaviour Change Theories: An Essential Resource for Researchers, Policy Makers and Practitioners

¹¹ Francis, J et al. (2012) Theories of behaviour change synthesised into a set of theoretical groupings: introducing a thematic series on the theoretical domains framework, *Implementation Science*, 7: 35

¹² Squires, J. et al. (2014) Understanding Practice: Factors That Influence Physician Hand Hygiene Compliance, *Infection Control and Hospital Epidemiology* 35(12):1511-20

¹³ Sarmast, H et al. (2014) TDF (Theoretical Domain Framework): how inclusive are TDF domains and constructs compared to other tools for assessing barriers to change? *BMC Health Services Research*

behaviours/practices/circumstances in norovirus transmission, barriers preventing good behaviour/practices, and potential solutions to reduce norovirus transmission.”

This scoping stage identified the broad behavioural areas of interest e.g. *Personal hygiene*, comprised of relevant (target) behaviours e.g. *Inadequate hand washing and drying* and some suggestion of the key barriers to those behaviours e.g. *No access to hand washing facilities*.

We could be confident, a priori, that the TDF would ensure that we considered all possible influences on our behaviours of interest. However, it was still reassuring that i) a behavioural analysis of the evidence review indicated all suggested barriers and solutions (facilitators) would be elicited by using a TDF frame for data collection and ii) the majority of barriers proposed were barriers of ‘Opportunity’ (in COM-B / TDF language) or ‘Contextual factors’ in (IBM-WASH language).

Depth interviews & discussion guide

Development of the discussion guide for the food handler interview ensured coverage of TDF influences in the form of suitable questions for each of the target behaviours identified at the scoping stage. There is a substantial literature on the application of the TDF to (qualitative) research¹⁴, Ipsos MORI has conducted numerous TDF informed qualitative studies and in this case the process was also overseen by a leading academic expert. In light of the audience – limited education, likely often English as a second language – and practicalities of the research process – limited time and attention we pursued an ‘adaptive interviewing approach’¹⁵ which used more general COM-B style questions with TDF-informed follow-ups. There are numerous clear areas of overlap between the chosen models such as the importance of forms of Social Influence (TDF language) such as injunctive and descriptive norms, identified as an interpersonal psychosocial factor (IBM-WASH). Development of the discussion guide for managers was less explicitly behavioural in terms of using TDF but was informed by IBM-WASH in the sense that there was an emphasis on the kinds of structural (‘Policy and regulations’; ‘Leadership/advocacy’) and Interpersonal/Household (in this case organisational) levels (‘Roles and responsibilities’, workforce structure, ‘division of labour’) which food handlers would be less well placed to respond to.

Observations & protocols

Developing observation protocols was less obviously informed by TDF except in the sense that observations allow a different kind of access to the important domain ‘Environmental context and resources.’ However, IBM-WASH indicated the importance of the ‘Habitual’ level and the extent to which an FBO environment provides the opportunity for the repetition of behaviours. This is important because several of the target behaviours in this study are not one-offs but rather “require significant repetition across both time and space and close consideration of the immediate, relevant environment.”¹⁶ The selection of observation as a method for this study as well the way in which we interpret the observational data will be informed by this idea. Further, the observation protocol explicitly asks the observer to record the ways in which a given environment supports (or not) target behaviours and implicitly enables habit formation.

¹⁴ Implementation Science Collections: Theoretical Domains Framework for behaviour change research

¹⁵ Atkins, L. et al. (2014) An adaptive interviewing approach using the Theoretical Domains Framework to identify influences on variation in adenoma detection rates

¹⁶ Dreifelbis, R et al. (2013) The Integrated Behavioural Model for Water, Sanitation, and Hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings, *BMC Public Health*, 13:1015

Survey & questionnaire

Development of the questionnaire for the food handler survey followed a similar process to the development of the food handler interview schedule. As with qualitative work there is a substantial literature on the application of TDF to quantitative, survey based work with numerous questionnaire studies which provide guidance in terms of questionnaire development.¹⁷¹⁸¹⁹ The questionnaire, like the schedule, was not entirely devoted to TDF informed questions but we ensured coverage of TDF influences in the form of suitable questions in relation to food handlers' 'hand hygiene' - explained as a combination of hand washing and glove use in the questionnaire.

We decided to focus on 'hand hygiene' because of i) the centrality of the behaviour in impacting on norovirus transmission (indicated in both the expert interviews and the secondary literature) and ii) the impracticality of asking TDF informed questions in relation to multiple target behaviours in this instance. Impracticality in this case refers mainly to questionnaire length and respondent fatigue and quality of response. Other parts of the questionnaire covered other behavioural areas of interest in a different way e.g. knowledge based questions relating to how to respond to periods of illness and exclusion.

¹⁷ Michie, S. et al. (2005) Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care*, 14(1): 26–33.

¹⁸ Taylor N, Parveen S, Robins V, Slater B, Lawton R. Development and initial validation of the Influences on Patient Safety Behaviours Questionnaire. *Implementation Science*. 2013;8:81.

¹⁹ Huijg J, Gebhardt W, Crone M, Dusseldorp E, Presseau J. Discriminant content validity of a theoretical domains framework questionnaire for use in implementation research. *Implementation Science*. 2014;9:11.

4. Theoretical Domains Framework and definitions

Domains	Definition
Knowledge	An awareness of the existence of something
Skills	An ability or proficiency acquired through practice
Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternative
Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions
Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour
Social influences	Those interpersonal process that can cause individuals to change their thoughts. Feelings or behaviour
Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting
Beliefs about capabilities	Acceptance of the truth, or validity about an ability, talent, or facility that a person can put to constructive use
Optimism	The confidence that things will happen for the best or that desired goals will be attained
Beliefs about consequences	Acceptance of the truth reality, or validity about outcomes of a behaviour in a given situation
Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way
Goals	Mental representations of outcomes or end states that an individual wants to achieve
Reinforcement	Increasing the probability of a response by arranging a dependent relationship or contingency, between the response and a given stimulus
Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event

5. Theoretical Domains Framework and theoretical constructs

Domains (Definition)	Theoretical constructs
Knowledge (An awareness of the existence of something)	Knowledge (including knowledge of condition/scientific rationale) Procedural knowledge Knowledge of task environment
Skills (An ability or proficiency acquired through practice)	Skills Skills development Competence Ability Interpersonal skills Practice Self-assessment
Memory, attention and decision processes (The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternative)	Memory Attention Attention control Decision making Cognitive overload/ tiredness
Behavioural regulation (Anything aimed at managing or changing objectively observed or measured actions)	Self-monitoring Breaking habit Action plan
Social/professional role and identity (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)	Professional identity Professional role Social identity Identity Professional boundaries Professional confidence Group identity Leadership Organizational commitment
Beliefs about capabilities (Acceptance of the truth, or validity about an ability, talent, or facility that a person can put to constructive use)	Self-confidence Perceived competence Self-efficacy Perceived behavioural control Beliefs Self-esteem Empowerment Professional confidence
Optimism (The confidence that things will happen for the best or that desired goals will be attained)	Optimism Pessimism Unrealistic optimism Identity
Beliefs about consequences (Acceptance of the truth reality, or validity about outcomes of a behaviour in a given situation)	Beliefs Outcome expectancies Characteristics of outcome expectancies Anticipated regret Consequents

Intentions (A conscious decision to perform a behaviour or a resolve to act in a certain way)	Stability of intentions Stages of change model Trans-theoretical model and stages of change
Goals (Mental representations of outcomes or end states that an individual wants to achieve)	Goals (distal/proximal) Goal priority Goal/target setting Goal (autonomous/controlled) Action planning Implementation intention
Reinforcement (Increasing the probability of a response by arranging a dependent relationship or contingency, between the response and a given stimulus)	Rewards (proximal/ distal valued/ not valued, probable/ improbable) Incentives Punishment Consequents Reinforcement Contingencies sanctions
Emotion (A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event)	Fear Anxiety Affect Stress Depression Positive/negative affect Burn-out
Environmental context and resources (Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour)	Environmental stressors Resource/ martial resources Organizational culture/ climate Silent event/ critical incidents Person x environment interaction Barriers and facilitators.
Social influences (Those interpersonal process that can cause individuals to change their thoughts. Feelings or behaviour)	Social norms Group conformity Social comparisons Group norms Social supports Power Intergroup conflict Alienation group identity Modelling

6. Links between interventions functions and most frequently used behaviour change techniques (BCTs)

Intervention functions	Frequently used BCTs
Education	Information about social and environmental consequences Information about health consequences Feedback on behaviour Feedback on outcome(s) of behaviour Prompts/cues Self-monitoring of behaviour
Persuasion	Credible source Information about social and environmental consequences Information about health consequences Feedback on behaviour Feedback on outcome(s) of behaviour
Incentivisation	Feedback on behaviour Feedback on outcome(s) of behaviour Monitoring of behaviour by others without evidence of feedback Monitoring outcome of behaviour by others without evidence of feedback Self-monitoring of behaviour
Coercion	Feedback on behaviour Feedback on outcome(s) of behaviour Monitoring of behaviour by others without evidence of feedback Monitoring outcome of behaviour by others without evidence of feedback Self-monitoring of behaviour
Training	Demonstration of the behaviour Instruction on how to perform a behaviour Feedback on behaviour Feedback on outcome(s) of behaviour Self-monitoring of behaviour Behaviour practice/rehearsal
Environmental restructuring	Adding objects to the environment Prompts/cues Restructuring the physical environment
Modelling	Demonstration of the behaviour
Enablement	Social support (unspecified) Social support (practical) Goal setting (behaviour) Goal setting (outcome) Adding objects to the environment Problem solving Action planning Self-monitoring of behaviour Restructuring the physical environment Review behaviour goal(s) Review outcome goal(s)

7. Links between Theoretical Domains Framework, COM-B Components (Capability, Opportunity, Motivation and Behaviour) components and intervention functions

Domains	COM-B components	Intervention functions
Skills	Physical capability	Training
Knowledge	Psychological capability	Education
Memory, attention and decision processes	Psychological capability	Training Environmental restructuring Restriction Enablement
Behavioural regulation	Psychological capability	Education Training Modelling Enablement
Environmental Context and Resources	Physical opportunity	Environmental restructuring Restriction Training Enablement
Social Influences	Social opportunity	Environmental restructuring Restriction Training Enablement
Professional/Social Role and Identity	Reflective motivation	Education Persuasion Modelling
Beliefs about capabilities	Reflective motivation	Education Persuasion Modelling Enablement
Optimism	Reflective motivation	Education Persuasion Modelling Enablement
Beliefs about Consequences	Reflective motivation	Education Persuasion Modelling Enablement
Intentions	Reflective motivation	Education Persuasion Incentivisation Coercion Modelling
Goals	Reflective motivation	Education Persuasion Incentivisation Coercion Modelling
Reinforcement	Automatic motivation	Training Incentivisation

		Coercion Environmental restructuring
Emotion	Automatic motivation	Persuasion Incentivisation Coercion Modelling Enablement

8. Links between policy categories and interventions functions

Policy categories	Definition	Intervention functions
Communication/marketing	Using print, electronic, telephonic or broadcast media	Education Persuasion Incentivisation Coercion
Guidelines	Creating documents that recommend or mandate practice. This includes all change to service provision	Education Persuasion Incentivisation Coercion Training Restriction Environmental restructuring Modelling Enablement
Fiscal measures	Using the tax system to reduce or increase the financial cost	Incentivisation Coercion Training Enablement Environmental restructuring
Regulation	Establishing rules or principles of behaviour or practice	Education Persuasion Incentivisation Coercion Training Restriction Environmental restructuring Enablement
Legislation	Marking or changing laws	Education Persuasion Incentivisation Coercion Training Restriction Environmental restructuring Enablement
Environmental/social planning	Designing and/ or controlling the physical or social environment	Environmental restructuring Modelling
Service provision	Delivering a service	Education Persuasion Incentivisation Coercion Training Modelling Enablement

9. The APEASE criteria for designing and evaluating interventions

Criterion	Consideration / Description
Affordability	Is there budget? Can it be delivered to, or accessed by, all those for whom it would be relevant or of benefit.
Practicability	Is it feasible to deliver? An intervention may be effective when delivered by specialist staff with extensive resources but is this available to you?
Effectiveness and cost-effectiveness	Does the benefit justify the cost? Effectiveness refers to the effect size of the intervention in a real-life setting & cost-effectiveness refers to the ratio of effect to cost.
Acceptability	Do those the intervention affects consider it appropriate? The extent to which an intervention is judged to be appropriate by relevant stakeholders (public, professional, political).
Side-effects / Safety	Will the intervention have unwanted side-effects? Have potential(negative) unintended consequences been considered in advance?
Equity	Is the intervention fair? To what extent will the intervention affect disparities in standard of living, wellbeing, health etc. between different sectors of society

10. Data Collection Instruments (DCIs)

i) Employee (food handler) discussion guide

- This interview should be with an individual who works in the kitchen and has a role in food preparation and production. Ideally it will be the person whom you will have observed during the behavioural observation but it may be difficult to arrange this given time available / shift patterns etc.
- This interview is intended to indirectly understand the various influences on behaviours and practices relevant to transmission and to gauge directly knowledge, awareness, etc of norovirus.
- Refer to approach protocol for additional detail but we recommend completing this interview as the last activity i.e. after the behaviour / practice observation. If the interview is completed prior to the kitchen observation there is greater potential for reactivity on behalf of the employee. We wouldn't necessarily be observing the same person but we may have no choice as in Pilot 2 and we want to avoid this situation.

PART 1) Introduction (Up to 5m)	
Explain background, nature and purpose of the study	
<ul style="list-style-type: none"> ○ Exploratory <u>research</u> study to better understand experiences of working in catering industry w specific interest in... <ul style="list-style-type: none"> ○ Food preparation practices and behaviours ○ How the working environment staff / employees and impacts these practices and behaviour 	Be as reassuring as possible and attempt to mitigate reactivity as far as possible.
Outline ground rules	
<ul style="list-style-type: none"> ○ We are researchers, not auditors or inspectors. We have no inspection / regulatory powers. ○ Everything we find and report will be anonymised and data will remain confidential and destroyed after 6m of project completion. ○ Confirm participant is happy to take part in the research ○ Ask if they have any questions before starting interview. ○ Ask for permission to record. 	

PART 2) Background: Food Business Operator (FBO) & Role (Up to 10m)

- Could you tell me a little about your job and what your role consists of?
 - What's your job title?
 - What responsibilities do you have?
 - Specifically, with regard to food safety
 - What qualifications do you have?
 - Specifically, with regard to food safety
 - How many members of staff are you responsible for?
 - How many hours do you work per week?
 - What shifts do you work?
 - How long have you been working here?
 - How long have you been working in the catering industry?
- What kind of uniform do you wear for work?
 - How many uniforms do you have?
 - Does everyone wash their own uniform?
 - If so, how do you wash your uniform?
- How far do you have to travel to work?
 - How easy is it to get to work?
 - How do you travel to and from work?
- What's your current living situation?
 - Do you live with any of your co-workers?
 - Do you have a family / children?

There are numerous food safety qualifications available. Typically, three levels for the Food Hygiene Certificate – 1 (awareness) 2 (food hygiene and safety) 3 (supervising food safety). There are numerous providers and courses can be taken relatively inexpensively (typically £15-20), online and they often only take a few hours. Local Authorities often provide their own courses and the FSA also provides guidance and videos.²⁰

Recommended that uniform cleaning is the responsibility of professional cleaners because domestic washing machines may not kill the virus effectively owing to lower temperature settings

Scoping interviews suggested that food handlers that live communally and/or those who have young children may be a greater transmission risk.

²⁰ <https://www.food.gov.uk/business-industry/food-hygiene/training#toc-1>

PART 3) Behaviours / Practices (4 sections: Aim to keep c.8m each)

i) Handwashing

*Now I'd like to talk about different types of behaviour or practice that are part of your job. First, we'll talk about **hand washing**. Thinking about a typical or recent shift...*

- When do you wash your hands?
- How often would you say you wash your hands in a given shift?
- Where do you wash your hands?
- How do you wash your hands?
 - Soap; Gel; Water (Hot / Cold)
- How long does it take you to wash your hands?
 - <10s; <20s; >20s.
- How do you dry your hands?
 - Paper towels; Non-paper towel; Air dryer.

The EFSA recommends that the most effective method for reducing norovirus contamination on the hands, is washing them for 20 seconds with soap and running water, and drying them for a further 20 seconds with disposable paper towels (EFSA, 2011)

After visiting bathroom;

Before food prep;

Before gloving;

Periodically regardless of activity;

After sneezing/coughing;

After eating/drinking

After taking a break;

After touching face/clothes;

Periodically regardless of activity

- Do you feel that you're able to wash your hands appropriately at work?
 - Are you aware of any guidance around (effective) handwashing? (K)
 - Have you received any training²¹²² in or demonstrations of handwashing? (Sk)
 - Would you say that handwashing is something you do automatically? (M,A,D)
 - Are there any procedures or systems in place that monitor (or encourage) hand washing? (BReg)

Lack of knowledge and inadequate training are likely causes for food handlers' role in norovirus transmission. The FSA's "Food Handlers: fitness to work" guidelines (FSA, 2009), which were developed to help managers and their staff prevent the spread of infection in the workplace, states that for best practice a demonstration of good hand washing technique should be provided to all staff at induction.

All employees should be aware of any food safety management systems such as HACCP within their workplace.

²¹ EFSA suggest training programs to help control norovirus contamination should provide detailed information regarding virus transmission routes, incubation periods, duration of virus shedding, the importance of cleaning and disinfecting contaminated surfaces and strict compliance to hand washing, especially after being in contact with faeces or vomit. Training should be carried out regularly and on the spot checks should be carried out by supervisors to ensure what the employees have learnt is being put into practice.

²² EU legislation requires that all food handlers are supervised and trained in food hygiene matters related to their work and carry out the training courses that are a requirement of national law (EFSA, 2011)

<ul style="list-style-type: none"> ○ Do you feel that you have enough opportunity to wash your hands at work? ○ Are there any features of your (physical) working environment make it harder to wash your hands? (ECR) <ul style="list-style-type: none"> ○ Time available; Equipment availability and accessibility (Soap; Gel; Handcream); Triggers or prompts e.g. posters / reminders ○ What influence do your colleagues have on your own hand washing? (SI) <ul style="list-style-type: none"> • What is the general workplace attitude toward hand washing? • What's the standard of hand washing amongst your colleagues like? • Does the presence (and behaviour) of your colleagues make it more or less likely that you will practice (appropriate) hand washing? 	
<ul style="list-style-type: none"> ○ How motivated are you to wash your hands at work? ○ How much do you feel you need (ought) to wash your hands at work? ○ What positives and negatives are there associated with (appropriate) hand washing? (BaCon) ○ What do you think will happen if you are not able to practice appropriate hand washing? (Opt) ○ Are there any conflicting priorities which interfere with you washing your hands? (Go) ○ How easy or difficult is it for you to wash your hands (appropriately)? (BaCap) ○ Do you intend to wash your hands (appropriately) at work? (Int) ○ Is hand washing a standard part of your professional role? (ID) ○ What incentives (punishments; rewards) are there for hand washing at your workplace? (Rei) ○ Do your emotions or mood ever influence your hand washing? (Emo) 	
<p><i>Thinking about what we've just talked about...</i></p> <ul style="list-style-type: none"> ○ What would you say makes it harder to wash your hands appropriately at work? ○ What would you say makes it easier to wash your hands appropriately at work? 	<p><i>Use this as an opportunity to reflect back on / check your own understanding of what has been said and gain some initial understanding of salience of influence.</i></p>

PART 3) Behaviours / Practices	
<p>ii) Glove use</p> <p><i>Now we're going to talk a bit about glove use. So, thinking about a typical or recent shift...</i></p> <ul style="list-style-type: none"> ○ When did you wear gloves? <ul style="list-style-type: none"> ● When in the kitchen or preparing food; When preparing raw meat / poultry; When hands have cuts or scratches; When preparing food don't want to touch directly ● How many times do you change gloves in an hour? ● What do you change gloves for? <ul style="list-style-type: none"> ● When changing tasks of products; After preparing raw meat / poultry; When damaged or dirty; Change gloves periodically as a matter of course 	<p>Glove use here is shorthand for both wearing and changing gloves.</p> <p>Recommended glove wearing looks includes:</p> <ul style="list-style-type: none"> ○ Wear gloves when in the kitchen or preparing food ○ Wear gloves when preparing raw meat / poultry ○ Wear gloves when hands have cuts or scratches ○ Wear gloves when preparing food don't want to touch directly ○ Wash hands with every glove change <p>Recommended glove changing looks includes:</p> <ul style="list-style-type: none"> ○ Change gloves when changing tasks of products ○ Change gloves after preparing raw meat / poultry ○ Change gloves when damaged or dirty ○ Change gloves periodically
<ul style="list-style-type: none"> ○ Do you feel that you're able to use gloves appropriately at work? <ul style="list-style-type: none"> ○ Are you aware of any guidance around (effective) glove use? (K) ○ Have you received any training²³²⁴ in or demonstrations of glove use? (Sk) ○ Would you say that wearing and changing gloves is something you do automatically? (M,A,D) 	

²³ EFSA suggest training programs to help control norovirus contamination should provide detailed information regarding virus transmission routes, incubation periods, duration of virus shedding, the importance of cleaning and disinfecting contaminated surfaces and strict compliance to hand washing, especially after being in contact with faeces or vomit. Training should be carried out regularly and on the spot checks should be carried out by supervisors to ensure what the employees have learnt is being put into practice.

²⁴ EU legislation requires that all food handlers are supervised and trained in food hygiene matters related to their work and carry out the training courses that are a requirement of national law (EFSA, 2011)

<ul style="list-style-type: none"> ○ Are there any procedures or systems in place that monitor (or encourage) glove use? (BReg) 	
<ul style="list-style-type: none"> ○ Do you feel that you have enough opportunity to use gloves (appropriately) at work? ○ What features of your (physical) working environment make it harder to use gloves (appropriately)? (ECR) <ul style="list-style-type: none"> ○ Time available; Glove availability and accessibility; Oversight / spot checks; Triggers or prompt e.g. posters / reminders ○ What influence do your colleagues – managers or co-workers - have on your own glove use? (SI) <ul style="list-style-type: none"> ○ What is the general workplace attitude toward glove use? ○ What's the standard of glove use amongst your colleagues like? ○ Does the presence and behaviour of your colleagues make it more or less likely that you will practice appropriate glove wearing? 	
<ul style="list-style-type: none"> ○ How motivated are you to use gloves at work? ○ How much do you feel you need (ought) to wear and change gloves at work? <ul style="list-style-type: none"> ○ What positives and negatives are there associated with (appropriate) glove use? (BaCon) ○ What incentives (rewards / punishments) are there for (appropriate) glove use at your workplace? (Rein) ○ Do you intend to wear and change gloves when you work? (Int) ○ Is glove wearing and changing a standard part of your professional role? (ID) ○ Are there conflicting priorities which interfere with your glove use? (Go) ○ How easy or difficult is it for you to use gloves (appropriately)? (BaCap) ○ What do you think will happen if you are not able to wear and change gloves appropriately at work? (Opt) ○ Do your emotions or mood ever influence wearing or changing of gloves? (Emo) 	

<p><i>Thinking about what we've just talked about...</i></p> <ul style="list-style-type: none"> ○ What would you say makes it harder to use gloves appropriately at work? ○ What would you say makes it easier to use gloves appropriately at work? 	<p><i>Use this as an opportunity to reflect back on / check your own understanding of what has been said and gain some initial understanding of salience of influence.</i></p>
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PART 3) Behaviours / Practices	
<p>iii) Food preparation</p> <p><i>Now we're going to talk about food preparation. Again, I'd like you to think about a typical or recent shift...</i></p> <ul style="list-style-type: none"> ○ What kinds of foods do you normally prepare? ○ How would you typically prepare Ready to Eat (RTE) foods (e.g. fruit and vegetables) ○ How would you typically prepare and/or cook? <ul style="list-style-type: none"> ● Raw meat / poultry ● Shellfish ○ How would you typically determine whether food is cooked and/or ready to serve? <ul style="list-style-type: none"> ● Do you know if there are recommended temperatures for cooking and heating? <ul style="list-style-type: none"> ○ Raw meat / poultry ○ Shellfish 	<p>Food preparation here is mainly about washing and /or cooking food.</p> <ul style="list-style-type: none"> ● Fruit and vegetables should be washed during processing / preparation <ul style="list-style-type: none"> ● Some use chlorinated water ● Foods - especially high risk foods such as shellfish – should be cooked thoroughly or heated adequately. Temperatures above 60°C (140°F) is recommended
<ul style="list-style-type: none"> ○ Do you feel that you're able to prepare food appropriately at work? <ul style="list-style-type: none"> ○ Have you received any training in or demonstrations of food preparation? (Sk) ○ Are you aware of any guidance around effective food preparation? (K) ○ Would you say that the way you prepare food is automatic? (M,A,D) ○ Are there any procedures or systems in place that monitor or food preparation? (BReg) 	
<ul style="list-style-type: none"> ○ Do you feel that you have enough opportunity to prepare food appropriately at work? <ul style="list-style-type: none"> ○ What features of your (physical) working environment make it harder to prepare food (appropriately)? (ECR) <ul style="list-style-type: none"> ○ Time available; Equipment availability and accessibility – Utensils, Cutting boards, Thermometers; Space - Work surfaces, Separate storage areas; Reminders / prompts / cues; Spot checks / oversight 	

<ul style="list-style-type: none"> ○ What influence do your colleagues – managers or co-workers - have on your food preparation? ○ What is the general workplace attitude toward food preparation practice? ○ What's the standard of food preparation amongst your colleagues like? ○ Does the presence and behaviour of your colleagues make it more or less likely that you will practice appropriate food preparation? 	
<ul style="list-style-type: none"> ○ How motivated are you to prepare food appropriately at work? <ul style="list-style-type: none"> ▪ How much do you feel you need (ought) to practice appropriate food preparation? ▪ What positives and negatives are there associated with (appropriate) food preparation? (BaCon) ▪ What incentives (rewards / punishments) are there for (appropriate) food preparation at your workplace? (Rein) ▪ Do you intend to prepare food appropriately? (Int) ▪ Is (appropriate) food preparation a standard part of your professional role? (ID) ▪ What do you think will happen if you are not able to practice appropriate food preparation? (Opt) ▪ Are there conflicting priorities which interfere with the way to prepare food? (Go) ▪ How easy or difficult is it for you to prepare food (appropriately)? (BaCap) ▪ Do your emotions or mood ever influence your food preparation? (Emo) 	
<p><i>Thinking about what we've just talked about...</i></p> <ul style="list-style-type: none"> ○ What would you say makes it harder to prepare food appropriately at work? ○ What would you say makes it easier to prepare food appropriately at work? 	<p><i>Use this as an opportunity to reflect back on / check your own understanding of what has been said and gain some initial understanding of salience of influence.</i></p>

PART 3) Behaviours / Practices	
<p>iv) Illness / Exclusion</p> <p><i>Now we're going to talk a bit about illness and how people cope with illness during the working week...</i></p> <ul style="list-style-type: none"> How have you / would you deal with illness – specifically vomiting / diarrhoea - during the working week? <ul style="list-style-type: none"> How long would you stay away from work if you experienced these symptoms? How many times have you gone to work while you've been ill / having experienced these symptoms? What about if you lived with someone who had these symptoms - would that have any impact on whether you went to work? 	<p><i>Symptomatic individuals must be excluded from food handling duties, and are recommended to remain excluded until 48 hours after symptoms have stopped (FSA, 2009). Viral shedding, however, can still persist ≥ 3 weeks later (Rockx et al., 2002; Murata et al., 2007; Atmar et al., 2008), thus, good personal hygiene is extremely important to prevent norovirus transmission to other staff members, food surfaces and food</i></p> <p><i>A study conducted in the USA, found that 11.9% (n=58) of food workers reported that they had worked on two or more shifts while experiencing vomiting or diarrhoea (Sumner et al., 2011).</i></p>
<ul style="list-style-type: none"> Do you feel you're able to deal appropriately with periods of illness while working? <ul style="list-style-type: none"> Have you received any training in or demonstrations of how to what to do? (Sk) Are you aware of any guidance around how to respond to sickness / what to do when you're sick? (K) Are there any procedures or systems in place that monitor employee illness? (BReg) 	<p><i>Lack of policies requiring the workers to report their illness to their managers was one of the factors the study found associated with the workers continuing to work while feeling ill. In the UK it is a legal requirement, however, that food workers report their illness or symptoms to their manager or supervisor (FSA, 2009).</i></p>
<ul style="list-style-type: none"> Do you feel you have the opportunity to respond appropriately to periods of illness at work? <ul style="list-style-type: none"> What practical environmental factors might effect whether or not you stay at home when you're ill? <ul style="list-style-type: none"> Money / Sick pay; Resourcing / staff cover; Understanding management What influence do your colleagues have on how you respond to illness? 	<p><i>Appropriate response meaning reporting illness to work, staying at home until 48h after symptoms have passed and then taking special precautions once back at work.</i></p> <ul style="list-style-type: none"> Reporting symptoms of gastroenteritis i.e. vomiting / diarrhoea

<ul style="list-style-type: none"> ○ How do your colleagues tend to respond when they're sick? ○ What is the general workplace attitude toward employee sickness? 	<ul style="list-style-type: none"> ● Not coming to work while experiencing symptoms ● Only returning to work 48h after symptoms have stopped
<ul style="list-style-type: none"> ○ How motivated are you to behave appropriately when you're ill? ○ How much do you feel you need (ought) to respond appropriately? ○ What positives and negatives are there associated with responding appropriately when you're ill? (BaCon) ○ What incentives (rewards/punishments) are there for (appropriate) illness response at your workplace? (Rein) ○ Do you always intend to stay at home when you're ill? (Int) ○ How easy or difficult is it for you to respond in the recommended way when you're ill? (BaCap) ○ Are there conflicting priorities which interfere with responding appropriately to illness? (Go) ○ Is responding appropriately when you're sick a standard part of your professional role? (ID) ○ What do you think will happen if you are not able to respond appropriately when you're ill? (Opt) ○ Do your emotions or mood ever influence how you deal with illness? (Emo) 	<p><i>Staff experiencing the symptoms of norovirus, but feel they can continue to work, may also be reluctant to report their illness while working for fear of losing job or fear of losing earnings or there might be no one to cover the shift.</i></p> <p><i>A study that assessed reported behaviour, knowledge and awareness of norovirus transmission of Dutch food handlers, found that 20% (n=204) of those working within catering companies and 11% (n=27) working within institutions had intentions to continue to work while experiencing diarrhoea (Verhoef et al., 2013).</i></p>
<p><i>Thinking about what we've just talked about...</i></p> <ul style="list-style-type: none"> ○ What would you say makes it harder to respond appropriately to illness? ○ What makes it easier to respond appropriately to illness? 	<p><i>Use this as an opportunity to reflect back on / check your own understanding of what has been said and gain some initial understanding of salience of influence.</i></p>

PART 4) Conclusion (c.5m)	
<p><i>Before we finish, I wanted to get your thoughts on norovirus because it's a common source of foodborne illness and relevant to this discussion of food preparation practices...</i></p> <ul style="list-style-type: none"> ○ What do you know about norovirus? <ul style="list-style-type: none"> ○ What kind of risks does it present? ○ How relevant would you say it is to your role? ○ What do you know about how it's spread / transmitted? ○ What do you know about how to control spread / transmission? 	<p>Noroviruses are highly contagious viruses and a common cause of foodborne illness in the UK. There are an estimated 3 million norovirus cases and 130,000 GP consultations in the UK every year (Tam et al., 2012).</p>
<p>That's it in terms of my questions; do you have any questions before we wrap up?</p> <p>Is there anything else that you feel is important that we haven't yet covered?</p> <p><i>Thank for time, explain next steps of the project</i></p>	

v) Employee (food handler) discussion guide

- This interview should be with an individual who i) works in the kitchen at least some of the time but ii) is relatively senior and has responsibility for, and a good knowledge of the kitchen staff. It is important that this person is able to speak good English unless other language arrangements have been made.
- In line with best practice, this interview is intended to reassure – this person is unlikely to be the gatekeeper with whom you may have spoken up to this point but will likely be more important in getting buy-in to the study and eliciting pertinent data - as well as gain knowledge of relevant restaurant characteristics, understand training, certification, processes and policies and to provide a point of (official) comparison with other methods.
- Refer to approach protocol for additional detail but we recommend completing this interview at the beginning of the visit – or even prior to the visit by telephone if a face to face discussion is not possible for whatever reason. The manager is also likely to be the person who will provide a tour of the premises (relevant to the observations) and may be the person you need to negotiate the visit with once on site.

PART 1) Introduction (Up to 10m)	
Explain background, nature and purpose of the study	
<ul style="list-style-type: none"> ○ Exploratory <u>research</u> study to better understand experiences of working in catering industry w specific interest in... <ul style="list-style-type: none"> ○ Food preparation practices and behaviours ○ How the working environment staff / employees and impacts these practices and behaviour? ○ Explain the overall approach (x2 interviews; x2 observations; survey) 	<p>Be as reassuring as possible and attempt to mitigate reactivity as far as possible.</p>
Outline ground rules	
<ul style="list-style-type: none"> ○ We are researchers, not auditors or inspectors. We have no inspection / regulatory powers. ○ We're not interested in specific named businesses; we're interested in businesses as examples of types of organisations. ○ Everything we find and report will be anonymised and data will remain confidential and destroyed after 6m of project completion. ○ All data we collect will be used to create a report. All reporting will be done in the aggregate and no individuals or businesses will be identified. ○ You – the participant - have the right to refuse to take part in this research or withdraw at any time. ○ Confirm participant is happy to take part in the research ○ Ask if they have any questions before starting interview. ○ Ask for permission to record. 	

PART 2) Background: Food Business Operator (FBO) & Role (Up to 10m)

- Could you tell me a little about [name of establishment]?
 - How would you categorise yourselves? (Fast food; Takeaway; Fast casual; Casual etc)
- What kind of organisational structure do you have?
 - What does the management structure look like?
 - How long have the current management been in place?
 - How many staff work here?
 - How many staff work specifically in the kitchen?
 - What are their roles?
 - What languages do the staff speak?
 - What language does the kitchen work in?
 - What kind of staff turnover do you have?
- Could you tell me a little about your job and what your role consists of?
 - What's your job title?
 - What responsibilities do you have?
 - Specifically, with regard to food safety
 - What qualifications do you have?
 - Specifically, with regard to food safety
 - How many members of staff are you responsible for?
 - How many hours do you work per week?
 - What shifts do you work?
 - How long have you been working here?
 - How long have you been working in the catering industry?

There are numerous food safety qualifications available. Typically, three levels for the Food Hygiene Certificate – 1 (awareness) 2 (food hygiene and safety) 3 (supervising food safety). There are numerous providers and courses can be taken relatively inexpensively (typically £15-20), online and they often only take a few hours. Local Authorities often provide their own courses and the FSA also provides guidance and videos.²⁵

²⁵ <https://www.food.gov.uk/business-industry/food-hygiene/training#toc-1>

PART 3) FBO Capabilities (c.10m)

Now I'd like to get a bit of a better sense of your organisation in terms of staff, structure and procedures...

- Do any employees receive any training around food preparation and food safety?
 - Elaborate...
- Do any of the kitchen staff have food safety / hygiene qualifications?
 - Elaborate...
 - What kind of impact do you think having trained staff makes in terms of food practices and behaviours?
- What kind of barriers are there to training employees?
 - Money
 - Time
 - Language
 - Other?
- Do you have any systems or procedures in place to support food preparation and food safety?
 - Advice / information provision
 - Encouragement
 - Manager visibility
 - Surveillance
 - Spot-checks
 - Audit
 - Incentives: Rewards / Punishments
 - Food safety management systems e.g. HACCP (Hazard Analysis and Critical Control Points)
- How much of a role does food safety guidance play in the day to day running of the business?
 - How familiar are you or the staff with the Food Standards Authority's "Food Handlers: fitness to work" guidelines?
- Does anyone have overall responsibility for food preparation and hygiene practice?
 - What does this entail?
- How do you typically deal with staff illness?

- Do you have any procedures / systems in place?
- How would you deal with a situation in which a member of staff is suffering from vomiting and diarrhoea and calls in to let you know?
- How would you deal with a situation in which an employee experienced these symptoms - vomiting and diarrhoea – on site?
- Who would be responsible for cleaning / disinfection?

PART 4) Concluding thoughts & norovirus ²⁶	Up to 10m
<p><i>Reflecting on what we've discussed...</i></p> <ul style="list-style-type: none"> ○ What would you say are the main challenges you face as an FBO in ensuring appropriate practice when it comes to food preparation and production? <ul style="list-style-type: none"> ○ What makes it easier to engage in appropriate practice? <p><i>Finally, I wanted to get your thoughts on norovirus²⁷ because it's a common source of foodborne illness and relevant to this discussion of food preparation practices...</i></p> <ul style="list-style-type: none"> ○ What do you know about norovirus? <ul style="list-style-type: none"> ○ How relevant would you say it is to your day to day business? ○ What kind of risks does it present? ○ How much do you know about how it's transmitted? ○ How much do you know about how to control transmission? 	<p>This should function as a general, indirect influences (barriers / enablers) type question.</p> <p>Spend time exploring this using the open questions suggested.</p>
<p>Is there anything else that you feel is important that we haven't yet covered?</p> <p><i>That's it in terms of my questions, thank you very much for your time.</i></p>	

²⁶ Ensuring coverage both indirectly (prior) and directly (at this stage) of original objectives: To provide contextual information about how food handlers might contract and transmit norovirus; To investigate food handlers' awareness of norovirus risks, their depth of understanding of these risks and their ownership of responsibility for risk mitigation; To understand the circumstances which lead to behaviours that would either increase or decrease the likelihood of norovirus transmission; To identify any practices which might mitigate these risks for both food-handlers and management staff; To understand the extent to which protocols in place are comprehensive, clearly communicated, understood and adhered to by staff, and identify any factors which prevent both staff and management from following best practice

²⁷ Noroviruses are highly contagious viruses and a common cause of foodborne illness in the UK. There are an estimated 3 million norovirus cases and 130,000 GP consultations in the UK every year (Tam et al., 2012).

vi) Environmental observation proforma

- Conduct an observation of the working environment (specifically) bathroom (c.10m) and kitchen (c.10m).²⁸
- We are interested in the extent to which the working environment influences - acts as a barrier or enabler - for certain food-related behaviours and practices.
- Please familiarise yourself with this observation schedule prior to observation. Please pay particular attention to both the information provided on recommended behaviours and how that relates to the actual observation.
- Refer to approach protocol for additional detail but we recommend completing this observation i) after the initial manager interview ii) for the bathroom observation to come first iii) followed by the kitchen observation which iv) leads into the behaviour / practice observation.
 - **Bathroom:** On the basis of the pilot we do not envisage it being problematic or time consuming to conduct an observation of the bathroom facilities.
 - **Kitchen:** It is likely helpful to ask someone to provide a quick tour of the kitchen environment. Keep the conversation as open as possible i.e. ask to be shown the general layout of the kitchen, who does what / where etc but, if unclear, do include gentle prompts related to key behaviours of interest i.e. asking about hand washing facilities, location of plastic gloves etc.
- All Food Business Operators (FBO's) should request that you wear some kind of approved clothing / overalls when spending time in the kitchen. Pre-empt this requirement in your conversation with the gatekeeper.
- Making notes whilst observing / standing up so make sure you have some kind of hard surface to write on. Clipboards are the obvious option but perhaps try and use something that is less typically associated with audits and inspections.

²⁸ http://www.cdc.gov/nceh/ehs/ehsnet/docs/jfp_food_worker_hand_hygiene.pdf

Target behaviours	Environmental barriers	Environmental enablers
Personal Hygiene		
<ul style="list-style-type: none"> • Not washing hands after attending the toilet • Not washing hands prior to preparing food • Inadequate hand washing and drying • Not washing hands regularly • Not using soap • Relying on sanitary hand gels • Not washing hands prior to gloving 	<ul style="list-style-type: none"> • Lack of knowledge/ training • No time during shift to wash hands • No access to hand washing facilities • Hand soap causes skin irritation • Sanitary hand gels don't kill the virus 	<ul style="list-style-type: none"> • Ensure food premises have an adequate number of washbasins and toilets • Purchase soaps that are less likely to irritate skin and provide hand cream for staff • Discourage the use of sanitary hand gels
<p>Key Recommended Behaviour: Effective hand washing is one of the most important barriers to norovirus transmission. The recommended method for <i>reducing norovirus contamination on the hands, is washing them for 20 seconds with soap and running water, and drying them for a further 20 seconds with disposable paper towels</i> (EFSA, 2011)</p>		
Handling Food		
<ul style="list-style-type: none"> • Using bare hands when preparing food • Not changing gloves regularly • Touching face during food preparation 	<ul style="list-style-type: none"> • No gloves available 	<ul style="list-style-type: none"> • Ensure all food handlers wear gloves, especially when handling RTE foods • Adequate supply of gloves • Encourage staff to change gloves regularly and when necessary
Washing / Cooking		
<ul style="list-style-type: none"> • Not washing fruit and vegetables during processing/preparation • Not cooking foods (shellfish) thoroughly to inactivate the virus 		<ul style="list-style-type: none"> • Availability of chlorinated water for washing fruit and vegetables
Cleaning / Disinfecting		

<ul style="list-style-type: none">• Not cleaning and disinfecting contaminated surfaces and utensils	<ul style="list-style-type: none">• Poor access to cleaning facilities and materials	<ul style="list-style-type: none">• Ensure there are adequate facilities and materials for cleaning and disinfecting• Contaminated surfaces should be disinfected with a solution of >1000 ppm free chlorine, preferably hypochlorite solutions
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Bathroom(s)

Checklist: Conduct a rapid observation of the bathroom area and complete the checklist.

Feature	Count	Y	N
A. Bathrooms available and easily accessible from food preparation / handling area			
B. Number of doors required to pass through from kitchen / work area			
C. Type of door openings (Handle; Push?)			
D. Number of bathrooms			
E. Number of washbasins ²⁹ / sinks			
F. Washbasins / sinks available and easily accessible			
G. Taps / water available / accessible / at wash basin			
H. Taps / water type (Automatic; Manual?)			
I. Hot water available via taps			
J. Liquid soap available and easily accessible / at each washbasin / sink			
K. Liquid soap dispenser type (Automatic; Manual?)			
L. Liquid soap brand?			
M. Presence of sanitary hand gel as replacement and/or alternative to soap			
N. Hand gel brand?			
O. Paper towels available and easily accessible / at each handwashing sink			
P. If no paper towels, please specify alternatives (Electric dryer, towel, recycled towel etc.)			
Q. Waste / rubbish disposal available and easily accessible			
R. Hand hygiene information visible (e.g. posters, notices, prompts / cues)			
S. Evidence of regular cleaning / inspection			

²⁹ According to EU legislation (Regulation EC No 852/2004) it is a general requirement for food premises to have an **adequate number** of washbasins and toilets and suitable materials to clean hands and to dry them (EFSA, 2011).

Field notes: Expand on checklist providing i) additional detail and specifically ii) consider how the given environment facilitates (or not) recommended behaviours.

Sketch: Make a sketch of the environment in question with relevant dimensions to help contextualise your notes.

Kitchen

Checklist: Conduct a rapid observation of the kitchen area and complete the checklist.

Feature	Count	Y	N
A. Washbasin / sinks available and easily accessible (Within 10ft; Visible)			
B. Number of washbasins ³⁰ / sinks			
C. Washbasin / sink function (Make note)			
D. Taps / water available / accessible / at wash basin			
E. Taps / water type (Automatic; Manual?)			
F. Hot water available at washbasins/sinks			
G. Liquid soap available and easily accessible / at each washbasin / sink			
H. Liquid soap dispenser type (Automatic; Manual?)			
I. Liquid soap brand? (Make note)			
J. Presence of sanitary hand gel as replacement and/or alternative to soap			
K. Hand gel brand? (Make note)			
L. Paper towels available and easily accessible / at each handwashing sink			
M. If no paper towels, please specify alternatives (Electric dryer, towel, recycled towel etc.)			
N. Hand hygiene information visible (e.g. posters, notices, prompts / cues)			
O. Availability of chlorinated water for washing fruit and vegetables			
P. Gloves available, accessible and in sufficient supply			
Q. Materials for cleaning / disinfecting easily available			
R. Cleaning / disinfecting resource (Make note)			
S. Employees visible to manager			
T. Employees visible to customers			
U. Waste / rubbish disposal available and easily accessible			
V. Evidence of regular cleaning / inspection			

³⁰ According to EU legislation (Regulation EC No 852/2004) it is a general requirement for food premises to have an **adequate number** of washbasins and toilets and suitable materials to clean hands and to dry them (EFSA, 2011).

Field notes: Expand on checklist providing i) additional detail and specifically ii) consider how the given environment facilitates (or not) recommended behaviours.

Sketch: Make a sketch of the environment in question with relevant dimensions to help contextualise your notes.

vii) Behavioural observation proforma

- Conduct a c.50m observation³¹ of one employee preparing / producing food. There should be >1 employee in the kitchen area engaged in food preparation and production. The employee should be chosen on the basis of your ability to observe them relatively unobtrusively (e.g., without interfering with their work) but be unaware that you have chosen to observe them specifically. To limit the influence of your presence on employee behaviour, observe them for 10-15m before beginning the data collection period to allow time to adjust to your presence. This should be facilitated by engaging in the environmental observation. Employees should not be made aware of precisely which aspects of their behaviour are of interest.
- Please familiarise yourself with this observation schedule prior to observation. Please pay particular attention to both the information provided on recommended behaviours and how that relates to the actual observation.
- Refer to approach protocol for additional detail but we recommend completing this observation after i) the initial manager interview and ii) the environmental observation but prior to iii) the employee interview.
- All Food Business Operators (FBO's) should request that you wear some kind of approved clothing / overalls when spending time in the kitchen. Pre-empt this requirement in your conversation with the gatekeeper.
- Making notes whilst observing / standing up so make sure you have some kind of hard surface to write on. Clipboards are the obvious option but perhaps try and use something that is less typically associated with audits and inspections.

³¹ http://www.cdc.gov/nceh/ehs/ehsnet/docs/jfp_food_worker_hand_hygiene.pdf

Target behaviours	Environmental barriers	Environmental enablers
Personal Hygiene		
<ul style="list-style-type: none"> • Not washing hands after attending the toilet • Not washing hands prior to preparing food • Inadequate hand washing and drying • Not washing hands regularly • Not using soap • Relying on sanitary hand gels • Not washing hands prior to gloving 	<ul style="list-style-type: none"> • Lack of knowledge/ training • No time during shift to wash hands • No access to hand washing facilities • Hand soap causes skin irritation • Sanitary hand gels don't kill the virus 	<ul style="list-style-type: none"> • Ensure food premises have an adequate number of washbasins and toilets • Purchase soaps that are less likely to irritate skin and provide hand cream for staff • Discourage the use of sanitary hand gels
Target Behaviour: Effective hand washing is one of the most important barriers to norovirus transmission. The recommended method for <i>reducing norovirus contamination on the hands, is washing them for 20 seconds with soap and running water, and drying them for a further 20 seconds with disposable paper towels</i> (EFSA, 2011)		
Handling Food		
<ul style="list-style-type: none"> • Using bare hands when preparing food • Not changing gloves regularly • Touching face during food preparation 	<ul style="list-style-type: none"> • No gloves available 	<ul style="list-style-type: none"> • Ensure all food handlers wear gloves, especially when handling RTE foods • Adequate supply of gloves • Encourage staff to change gloves regularly and when necessary
Washing / Cooking		
<ul style="list-style-type: none"> • Not washing fruit and vegetables during processing/preparation • Not cooking foods (shellfish) thoroughly to inactivate the virus 		<ul style="list-style-type: none"> • Availability of chlorinated water for washing fruit and vegetables
Cleaning / Disinfecting		
<ul style="list-style-type: none"> • Not cleaning and disinfecting contaminated surfaces and utensils 	<ul style="list-style-type: none"> • Poor access to cleaning facilities and materials 	<ul style="list-style-type: none"> • Ensure there are adequate facilities and materials for cleaning and disinfecting • Contaminated surfaces should be disinfected with a solution of >1000 ppm free chlorine, preferably hypochlorite solutions

Behaviours / Practice Observation Checklist

Behaviour / Practice	Count	Y	N
Hand hygiene			
A. Washing hands			
B. Washing for 20s (Make note of duration)			
C. With soap (If not, specify)			
D. With running water (If not, specify)			
E. With running water (If not, specify)			
F. Drying for 20s (If not, specify)			
G. Drying w disposable paper towels (If not, specify)			
H. Hand washing after visiting the bathroom (and before new activity)			
I. Before and after preparing food (esp. raw animal products)			
J. Before gloving for food preparation / handling			
K. After eating, drinking, using tobacco (and before new activity)			
L. After coughing / sneezing / using tissue (and before new activity)			
M. After handling dirty equipment, utensils or clothing (and before new activity)			
N. After touching any part of body other than clean hands/exposed arms (and before new activity)			
Glove use			
O. Wearing gloves when in the kitchen			
P. Wearing gloves when preparing food (esp. RTE and meat/poultry, shellfish)			
Q. Touching one's face when wearing gloves			
R. Touching one's uniform when wearing gloves			
S. Changing gloves "regularly and when necessary" / "periodically"			
T. Changing gloves when changing tasks			
Cleaning / Disinfecting			
U. Cleaning / disinfecting contaminated surfaces			
V. Cleaning / disinfecting contaminated utensils			
W. Keep raw meat/poultry/shellfish separate from other foods from separate storage areas			
X. Keep raw meat/poultry/shellfish separate from other foods during preparation with separate work areas / surfaces			
Y. Work only with raw meat / poultry until the task is complete			
Washing / Cooking			
Z. Washing fruit and vegetables during preparation			
AA. Cooking / heating relevant – esp. high risk e.g. shellfish – food thoroughly i.e. temperatures > 60°C (140°F)			

Field notes: Expand on checklist providing i) additional detail and specifically ii) consider how the given environment facilitates (or not) recommended behaviours.

Sketch: Make a sketch of the environment in question with relevant dimensions to help contextualise your notes.

viii) Questionnaire on food safety practices

Ipsos MORI
Social Research Institute



FOOD PREPARATION: HAVE YOUR SAY

This questionnaire is about your experience of food preparation. The study is being carried out by Ipsos MORI, an independent research organisation, on behalf of the Food Standard Agency (FSA) – the independent regulator responsible for food safety in the UK. The information you provide will help the FSA make food preparation and production practices better. Your views are important to understand how the FSA can best help you with your job.

This questionnaire is anonymous – we will not ask you for your name or where you work. Results won't be presented at the level of individual food establishments, but will be pooled together.

Instructions

- The questions can be answered by putting a tick in the box next to the answer that applies to you. Most questions ask you to **"Tick one box only"** however some ask you to **"Please tick all that apply"**.

The questionnaire is easy to complete and **will take about 10 minutes to complete**.

- Please read the instructions for answering each question carefully.
- If you mark the wrong box, fill in the box and put a tick in the right one like this: ☐ ☒
- Please check you have answered all the questions.

Thank you very much for your help

ABOUT YOU

Here there are some questions about you. We are asking these so that we can understand the different situations people work in.

Q1 First, what's your job title?

Write in job
title

Q2 As part of your job, do you ever cook or prepare food? This could happen from time to time, it does not need to be your main task. *Please tick one box only*



Yes

☐

No

☐

Q3 Which food safety / hygiene qualification(s), if any, do you have? (e.g. Food Hygiene Certificate Level 1)

Write in food safety
hygiene
qualification(s)

No qualifications ☐

Q4 How often, if at all, do you personally wash your work uniform? If you have more than one work uniform, please think about the one that you wear today. *Please tick one box only*



Several times a week

☐

About once a week

☐

About once a fortnight

☐

About once a month

☐

Less than once a month

☐

Never

☐

I don't have a work uniform

☐

It gets washed by an external
cleaner

☐

Don't know / can't remember

☐

EXPERIENCE OF HAND HYGIENE IN THE WORKPLACE

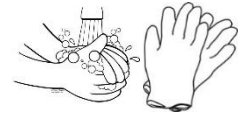
This section is about your experience with hand hygiene in the workplace. This is hand washing and using gloves as part of food preparation.

Q5 Please think about your own hand hygiene in the workplace. To what extent do you agree or disagree with each of the following? Please tick one box only on each line



		Strongly agree (1)	Agree (2)	Tend to agree (3)	Neither (4)	Tend to disagree (5)	Disagree (6)	Strongly disagree (7)	Don't know
a.	I am familiar with official hand hygiene guidance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	I feel I have been well trained in hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	It is my responsibility to carry out hand hygiene while at work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	If I do not carry out hand hygiene, there could be bad consequences for my workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	I carry out hand hygiene even when I'd rather not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f.	Hand hygiene is a priority for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g.	Sometimes I forget to carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h.	I feel guilty if I do not carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j.	Sometimes I don't have enough time to carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k.	Hand hygiene is something I do automatically	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l.	I feel ashamed if I do not carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m.	If I do not carry out hand hygiene as it will have negative impacts in my workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n.	I always intend to carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q6 Please think about hand hygiene in the workplace. To what extent do you agree or disagree with each of the following?
Please tick one box only on each line



	Strongly agree (1)	Agree (2)	Tend to agree (3)	Neither (4)	Tend to disagree (5)	Disagree (6)	Strongly disagree (7)	Don't know
a.. My work place rewards those who have good hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. My workplace has procedures and systems in place that encourage hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. My colleagues expect me to carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Hand hygiene is routine in my workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. My colleagues carry out hand hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. There are some practical barriers to hand hygiene (e.g. no soap, no dryer etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. There are enough reminders about hand hygiene in my workplace e.g. notices, posters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. If I do not carry out hand hygiene I may be penalised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q7 What makes it difficult, if anything, to carry out hand hygiene in the workplace?

Write in what makes it difficult

WHEN YOU ARE SICK

Here are some questions about when you are sick, specifically when you experience vomiting & diarrhoea.

Q8 In the past year, how many times, if ever, did you go to work when you were sick with vomiting & diarrhoea? *Please tick one box only*

- | | |
|--------------|--------------------------|
| None | <input type="checkbox"/> |
| 1-3 | <input type="checkbox"/> |
| 4-5 | <input type="checkbox"/> |
| 6-10 | <input type="checkbox"/> |
| More than 10 | <input type="checkbox"/> |

IF YOU SELECTED 'NONE' AT Q8, SKIP THE QUESTION BELOW AND GO TO Q10

Q9 If you went to work sick with vomiting & diarrhoea, why did you do so? *Please tick all that apply*

- | | | | |
|------------------------------------|--------------------------|---|--------------------------|
| There was nobody to cover my shift | <input type="checkbox"/> | I did not know I was sick when I went to work | <input type="checkbox"/> |
| I was worried about losing my job | <input type="checkbox"/> | I needed the money | <input type="checkbox"/> |
| It was not fair on colleagues | <input type="checkbox"/> | I was still able to work | <input type="checkbox"/> |
| My boss would have been angry | <input type="checkbox"/> | Don't know | <input type="checkbox"/> |

Other (please specify)

Q10 Which of the following, if any, would you do if you were sick with vomiting & diarrhoea? *Please tick all that apply*

- | | | | |
|--|--------------------------|---|--------------------------|
| Reporting symptoms to work | <input type="checkbox"/> | Returning to work 24 hours after symptoms have stopped | <input type="checkbox"/> |
| Not coming to work while feeling sick | <input type="checkbox"/> | Returning to work 48 hours after symptoms have stopped | <input type="checkbox"/> |
| Returning to work after 24 hours | <input type="checkbox"/> | Being careful not to pass on your illness to other people at work | <input type="checkbox"/> |
| Returning to work after 48 hours | <input type="checkbox"/> | None of these | <input type="checkbox"/> |
| Returning to work when symptoms have stopped | <input type="checkbox"/> | I don't know | <input type="checkbox"/> |

KNOWLEDGE OF NOROVIRUS

This section is about norovirus. This is a virus that causes vomiting, diarrhoea, abdominal cramps, headaches and nausea. It can affect individuals from all age groups. There are approximately 3 million cases and 130,000 GP consultations linked to norovirus in the UK every year.

Q11 Before today, how much, if anything, did you know about norovirus? Please tick only one

- | | |
|----------------|--------------------------|
| Great deal | <input type="checkbox"/> |
| Fair amount | <input type="checkbox"/> |
| Not very much | <input type="checkbox"/> |
| Nothing at all | <input type="checkbox"/> |

Q12 As far as you know, how long can norovirus be carried and spread by someone who has been infected? Please tick only one

- | | | | |
|--------------|--------------------------|---|--------------------------|
| Up to 2 days | <input type="checkbox"/> | Up to 14 days | <input type="checkbox"/> |
| Up to 5 days | <input type="checkbox"/> | Up to 21 days | <input type="checkbox"/> |
| Up to 7 days | <input type="checkbox"/> | For as long as you are showing symptoms i.e. vomiting/diarrhoea | <input type="checkbox"/> |
| | | Don't know | <input type="checkbox"/> |

Q13 Which of the following ways, if any, help to reduce the spread of norovirus? Please tick all that apply

- | | | | |
|--|--------------------------|---|--------------------------|
| Staying at home when sick with vomiting / diarrhoea | <input type="checkbox"/> | Using alcohol based hand sanitizers / gels | <input type="checkbox"/> |
| Cooking shellfish thoroughly | <input type="checkbox"/> | Avoiding touching food with bare hands | <input type="checkbox"/> |
| Making sure you leave the windows open in the kitchen | <input type="checkbox"/> | Drying your hands with hot air dryers, as opposed to paper towels | <input type="checkbox"/> |
| Cleaning surfaces and utensils | <input type="checkbox"/> | Storing ready to eat foods e.g. fruits and vegetables at 34°F (1°C) | <input type="checkbox"/> |
| Wearing clothes made of pure cotton | <input type="checkbox"/> | Going to the toilets at least once an hour | <input type="checkbox"/> |
| Washing your hands with soap and water for at least 10 seconds | <input type="checkbox"/> | Washing ready to eat foods e.g. fruits and vegetables | <input type="checkbox"/> |
| Washing your hands with soap and water for at least 20 seconds | <input type="checkbox"/> | None of the above | <input type="checkbox"/> |
| Professional cleaning of work uniforms | <input type="checkbox"/> | Don't know | <input type="checkbox"/> |

Other (please specify)

Thank you for taking the time to complete this questionnaire. Your views are important to understand how the FSA can best help you with your job.

**Please place it in the envelope provided,
seal it, and hand it back to the person who gave it to you.**

If the person who gave it to you has left copies of the questionnaire, please post this envelope – you do not need to buy a stamp, as the researcher left free post envelopes.

11. The characteristics of the 32 food establishments included in this study.

Type of catering business	Number
Restaurant/café/canteen	17
Pub/Bar/Nightclub	4
Takeaway/sandwich shop	4
Hotel/B&B/Guest House	4
Other	3
	32

Food Hygiene Rating Score (FHRS)	Number
Low (0-2)	6
Medium (3-4)	13
High (5)	13
	32

Location	Number
Manchester	4
Wigan	3
Ribble Valley	5
Bromley	5
Camden	3
Southwark	9
Other in London	3
	32

Number of employees	Number
1-10	21
11-25	5
26-50	1
50+	1
Missing info	4
	32

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About Ipsos MORI's Social Research Institute

The Social Research Institute works closely with national governments, local public services and the not-for-profit sector. Its c.200 research staff focus on public service and policy issues. Each has expertise in a particular part of the public sector, ensuring we have a detailed understanding of specific sectors and policy challenges. This, combined with our methodological and communications expertise, helps ensure that our research makes a difference for decision makers and communities.