

**DRAFT**

**Report of the *Food Handlers with Potentially Foodborne Diseases*  
Subcommittee of the NDSC's Scientific Advisory Committee**

**Preventing Foodborne Disease:**

***A Focus on the Infected Food  
Handler***

**National Disease Surveillance Centre**

**September 2002**

## ***CONTENTS***

<b>Foreword</b>	4
<b>Membership of Food Handler Working Group</b>	5
<b>Terms of Reference</b>	5
<b>Summary of Recommendations</b>	6
<b>1. Introduction</b>	14
1.1 Foodborne Infectious Disease: Extent & Burden	
1.2 The Food Handler Dimension	
1.3 Food Industry: Challenges	
1.4 Food Handler Training	
1.5 Need for Irish Guidelines	
1.6 Target Audience	
<b>2. The Legislative Framework</b>	18
2.1 Introduction	
2.2 Legislative Overview	
2.3 Legislative Framework	
2.4 Food Handler Defined	
2.5 Responsibilities of Food Handlers	
2.6 Responsibilities of Proprietors	
2.7 Codes of Practice, Guides and Standards	
2.8 Conclusion	
<b>3. An Assessment of Risks posed by Infected Food Handlers: <i>The Evidence</i></b>	30
3.1 Introduction	
3.2 Level of Evidence	
3.3 Pathogens	
3.4 Foodhandler Symptoms	
3.5 Pathogen Infectivity	
3.6 Mode of Transmission to Food	
3.7 Commonly Implicated Foods	
3.8 Outbreak Settings	
3.9 Review Limitations	
3.10 Conclusion	
Risk Assessment Summary	
<b>4. Prevention of Food Contamination by Infected Food Handlers</b>	41
4.1 Introduction	
4.2 Hand Hygiene	
4.3 Hand Washing	
4.4 Hand Wash Products	
4.5 Hand Drying	
4.6 Barriers to Bare Hand Contact	
4.7 Other Personal Hygiene Aspects	
4.8 Infected Skin Lesions & Purulent Discharges	
4.9 Vomitus in Food Preparation Areas	
4.10 Conclusion	
Recommendations	
<b>5. Illness Reporting</b>	51
5.1 Introduction	

5.2 What should be Reported?	
5.3 Subsequent Action	
5.4 Reporting Challenge	
Recommendations	
<b>6. Fitness to Work</b>	<b>54</b>
6.1 Introduction	
6.2 Health Surveillance: Lack of Standardisation	
6.3 What constitutes Fitness to Work <i>as a Food Handler</i> ?	
6.4 Health Questionnaires	
6.5 Medical Examination	
6.6 Microbiological Screening	
6.7 Work Exclusion / Restriction	
Recommendations	
<b>7. Pathogen-Specific Control Measures</b>	<b>68</b>
7.1 Introduction	
7.2 Typhoid Fever / Paratyphoid Fever	
7.3 Verocytotoxin-producing <i>E.coli</i> (VTEC)	
7.4 Hepatitis A	
7.5 Shigellosis	
7.6 Salmonellosis (non-typhoidal)	
7.7 Norwalk-like Viruses (NLVs)	
7.8 <i>Staphylococcus aureus</i>	
7.9 Group A ( $\beta$ -Haemolytic) Streptococcus	
7.10 Cholera	
7.11 Amoebic Dysentery	
7.12 Other Pathogens	
Recommendations	
<b>8. Prevention of Food Handler Infection with Foodborne Pathogens at Work</b>	<b>83</b>
8.1 Introduction	
8.2 Meat Processing Industry	
8.3 Relevant Zoonotic Pathogens	
8.4 Susceptible Food Handlers	
8.5 Preventive Aspects in the Meat Industry	
Recommendations	
<b>GLOSSARY</b>	<b>87</b>
<b>REFERENCES</b>	<b>90</b>
<b>APPENDICES</b>	
APPENDIX A: Outbreaks Reviewed	
APPENDIX B: Food Handler Questionnaire	
APPENDIX C: Medical Certification: Fitness to Work	
APPENDIX D: Food Handler: Good Hygiene Practices and Reporting Requirements	
APPENDIX E: Organism/Condition: Recommended Control Measures	

## **Foreword**

To achieve the public health goal of reducing foodborne illness to the fullest extent possible, steps must be taken at each point in the food chain where hazards can occur. The food handler role on this food safety journey is a pivotal one.

Ireland has over 37,500 food premises, covering activities ranging from the processing, manufacturing and retailing of food through to its serving to consumers. Food premises comprise such diverse entities as abattoirs, butcher shops, bakeries, supermarkets, delicatessens and the food service sector (including hotels, nursing homes, hospitals and schools). Food handlers constitute a very sizeable section of our workforce.

Assessing the risks posed by food handlers infected with potentially foodborne infectious diseases is not an easy task. While infected food handlers have been identified in a plethora of foodborne outbreaks, they have not infrequently been the victims themselves. Nevertheless, food handlers infected with certain pathogens – who in some instances may not even be symptomatic – can and do pose a risk to food safety. All food premises have a responsibility to manage food safety risks, thereby protecting the consumer.

It is evident that aspects of risk reduction in relation to food handlers infected with potentially foodborne infectious diseases are not being addressed in a standardised way in this country or, indeed, internationally. There is lack of consistency, and not a little confusion, with regard to various risk reduction parameters such as food handler health screening, assessment of fitness to work and application of work exclusion criteria. Additionally, and very significantly, there are indications that the crucially important areas of hand-washing compliance and reporting of relevant conditions by food handlers demand ongoing, rigorous emphasis.

This document aims to inform and advise. The presented guidelines are considered to represent good practice in the light of current best scientific evidence - where such evidence is available. They are generally reflective of the advice currently cited in a number of very useful UK and US documents (PHLS 1995; DOH Food handlers: fitness to work 1995; FSA/Scottish Exec. Health Dept Guidance 2002; Chin 2000; Food Code 2001). Our hope is that they will lead to greater clarity and consistency in application of risk reduction strategies throughout Ireland. It is important that all involved 'speak with one voice' about what is required to protect consumer and food handler health alike.

The Committee members devoted considerable time and energy to researching these guidelines. Several experts in the field were consulted along the way. It is emphasised that the guidelines will need to be reviewed and updated as new evidence and expert opinion continue to inform. The assistance of all involved is acknowledged with much gratitude.

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*September, 2002*

## **Membership of Food Handler Working Group**

- Dr. Colette Bonner, Specialist in Public Health Medicine, Eastern Regional Health Authority (Medical Secretary)
- Dr. Mary Cronin, Specialist in Public Health Medicine, National Disease Surveillance Centre
- Mr. Dan Crowley, Veterinary Officer, Cork County Council
- Dr. Margaret Fitzgerald, Chief Specialist Public Health, Food Safety Authority of Ireland
- Dr. Barbara Foley, Surveillance Scientist, National Disease Surveillance Centre
- Ms. Catherine Lawlor, Veterinary Inspector, Dept. of Agriculture, Food & Rural Development
- Dr. Anne Maloney, Consultant Microbiologist, Waterford Regional Hospital
- Dr. Dan Murphy, Director, Health & Safety Authority of Ireland
- Dr. Nuala O' Connor MICGP, Douglas, Cork.
- Dr. Margaret B. O' Sullivan, Specialist in Public Health Medicine, Southern Health Board (Chairperson)
- Mr. Tom Prendergast, Principal Environmental Health Officer, South Western Area Health Board
- Ms. Emer Ward, Clinical Nurse Specialist, Wexford General Hospital

## **Terms of Reference**

1. To assess the risk posed by food handlers infected with potentially foodborne infectious diseases
2. To review current legislation regarding food handlers and work
3. To develop evidence based guidelines on:
  - a) Prevention of food handlers becoming infected with foodborne pathogens in their work environment
  - b) Prevention of food handlers infected in or outside the food business contaminating food and contributing to foodborne illness
  - c) Screening of food handlers routinely, with sporadic illness and in an outbreak situation
  - d) Exclusion from work and fitness to work
  - e) Treatment guidelines, if appropriate, for asymptomatic food handlers to eliminate carriage

## Summary of Recommendations

### ***Background: RISK ASSESSMENT SUMMARY***

- While food handlers can be innocent victims in outbreaks of foodborne infection, there is ample epidemiological, microbiological and environmental evidence linking infected food handlers with causation in a significant number of outbreaks.
- The pathogens found to be most frequently linked to food handler transmission have been Norwalk-like Viruses (NLVs), Salmonellas and Hepatitis A (HAV).
- To constitute a risk, the infected food handler is generally symptomatic – most often with gastrointestinal symptoms. However, food handlers in the pre- or post-symptomatic phases of illness have also been implicated in causing foodborne outbreaks.
- The most frequently associated symptoms are vomiting and / or diarrhoea – underscoring the importance of symptom reporting and exclusion from food handling duties while symptomatic.
- By far the most common mode of pathogen transmission to food by the infected food handler is via fecally contaminated hands. Poor hand hygiene is *the* contributing factor.
- Other reported modes of transmission include infected skin lesions (usually on hands), naso-pharyngeal secretions (*Staph*, *Strep*), aerosolisation of vomitus (NLV) and fomites (NLV, HAV).
- There is **overwhelming evidence that food handlers whose work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment (HIGH RISK FOOD HANDLERS) are those most commonly implicated** in foodborne outbreaks. The unhygienic handling of such foods constitutes a particularly grave risk.
- Infected food handlers can potentially infect food in any setting, but have been demonstrably implicated at points of the food chain near to the consumer.

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### ***Recommendations: HYGIENE***

- The key to the prevention of contamination of food by food handlers is food handler training and the ability to maintain high standards of hygiene.
- Food handlers should have ongoing *training and instruction* in the importance of personal hygiene and handwashing. Appropriate translation, where necessary, is a fundamental element of training. There should be regular assessment of knowledge and practice.
- Convenient, adequate and well-maintained handwashing facilities should be located in all areas of a food premises including kitchen, staff changing and toilet areas.
- The provision of convenient, adequate and properly maintained toilet facilities is essential.

- The handwashing guidelines as outlined are recommended:

#### **HAND WASHING GUIDELINES**

HANDS SHOULD BE WASHED AS FREQUENTLY AS  
NECESSARY AND ALWAYS.....

When?

- Before starting / recommencing work
- After using toilet
- Before handling cooked or ready-to-eat foods
- After handling or preparing raw food
- Before gloving and after glove removal
- After any non-food contact *such as*
  - after touching skin/ hair/ face
  - after coughing, sneezing, blowing nose
  - after cleaning duties
  - after shaking hands
  - after handling money
  - after handling refuse
  - after smoking

How?

- Wet hands under warm running water
- Use sufficient soap to form a good lather
- Systematically rub all parts of hands with soap and water
- Lather for 10-15 seconds minimum, vigorously and thoroughly rubbing all hand surfaces, including the fingertips and thumbs
- Rinse hands thoroughly with running water
- Dry hands thoroughly ( using paper towel *or* hand dryer *or* cabinet roller towel)

- Ideally, taps should be non-hand operable. Non-hand operable taps should be considered when upgrading or refurbishing premises.
- The use of plain (unmedicated) soap for handwashing is effective and is recommended as adequate (while acknowledging that alternatives are specified in Vertical Directives).
- Both bar soap and liquid soap are acceptable. Use of liquid soap (with a preservative) may be more practicable. Ideally, dispensing of liquid soap should be by means of disposable cartridges (*i.e.* topping up of dispenser not required). Otherwise, dispensers should be readily accessible for cleaning and drying.
- The use of nailbrushes is not recommended except to remove heavy soiling which cannot be removed using soap and water alone.
- Paper towels (in a compatible dispenser) or hand dryers are recommended for hand drying. Properly maintained mechanical roller towels (cabinet roller towels or CRTs) are also acceptable.
- It is considered that, in view of the lack of direct scientific evidence regarding the effectiveness of glove use in food handling, it is not currently possible to make a categorical recommendation regarding whether or not gloves should be used.

- The widespread use of gloving in relation to ready-to-eat foods is acknowledged. Where gloves are used, it is imperative that they are used in conjunction with an effective handwashing regime (hands washed before and after gloving), are of good quality, intact and are single use *i.e.* used for one task only such as working with ready-to eat food or with raw food, used for no other purpose, and discarded when damaged or soiled, or when interruptions occur in the operation.
- Food handlers should ensure that infected lesions and cuts on exposed areas of the skin (hands, arms, face, neck, scalp) are totally covered with a distinctively coloured waterproof dressing.
- Food handlers should wear suitable, clean and appropriate outer clothing. Hair should be neat, tidy and restrained where possible. Jewellery wearing should be kept to a minimum.
- While no recommendation in relation to mask use is considered possible because of paucity of evidence, the legislative requirement regarding mask use in some sectors is acknowledged.
- Where vomiting occurs in a food handling area, exposed food should be disposed of. The area should be cleaned and subsequently disinfected with a freshly prepared hypochlorite-based cleaner that releases 1,000 ppm of available chlorine (according to manufacturer's instructions).

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### ***Recommendations: REPORTING***

- Relevant conditions and infections transmissible by infected food handlers via food should be reported by food handlers to management.

Conditions which should be Reported
<ul style="list-style-type: none"><li>• <b>Diarrhoea</b></li><li>• <b>Vomiting</b></li><li>• Jaundice</li><li>• Fever</li><li>• Sore throat with fever</li><li>• Infected skin lesions (<i>e.g.</i> boil, infected wound) or cuts on exposed body parts (hand, arm, face, neck or scalp)</li><li>• Purulent discharges from the eyes, ears, nose or mouth/gums</li></ul> <p><i>(Gastrointestinal illness while on holidays, especially overseas, should also be reported on return)</i></p>

- The importance of reporting needs to be repeatedly emphasised at pre-employment (with handout), at refresher training and annually. The training of managers is especially crucial in this regard. Appropriate translation, where necessary, is an essential aspect.
  - Reporting by high-risk food handlers needs concerted, ongoing focus.
  - Illness / symptom reporting by food handlers should be facilitated and encouraged by management without fear of penalty or financial loss.
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**Recommendations: *FITNESS TO WORK***

- The guidelines, as outlined, for medical assessment of employee fitness to handle food are recommended:

**FITNESS TO HANDLE FOOD**  
**- GUIDELINES FOR MEDICAL ASSESSMENT -**  
(in conjunction with APPENDIX E)

**Personal Hygiene**

- Understanding and practice of good personal hygiene, most especially hand washing, in all circumstances

**Gastrointestinal**

- No symptoms of infectious gastrointestinal illness (no vomiting or diarrhoea for at least 48 hours after symptoms have abated and stools have returned to normal) – where causative organism has not been identified.
  - *Routine stool screening not necessary for all sporadic cases -*
- Where pathogen has been identified, *c.f.* APPENDIX E
- Microbiological stool clearance before return to work always applicable to high-risk\* food handler in relation to confirmed or suspected infection with Typhoid, Paratyphoid, Verocytotoxin-producing *E.coli* (VTEC) and *Shigella dysenteriae*

**Jaundice**

- No symptoms / signs of Hepatitis A infection within previous 7 days

**Skin**

- No infected skin lesion or cut on an exposed body part (specifically hand, arm, face, neck or scalp) that cannot be totally covered during food handling
- Skin conditions predisposing to skin infection (e.g. eczema) on exposed parts require individual assessment

**Discharges**

- No purulent discharge from eye, ear, nose or mouth/gums

**Throat**

- No evidence of acute streptococcal sore throat in high-risk\* food handler

\*High-risk food handler: work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment

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**Recommendations: *HEALTH SURVEILLANCE***

**Health Questionnaires**

- The benefit of pre-employment health questionnaires is unproven. There is insufficient evidence to recommend them as standard practice. Their use is supported as an adjunct to appropriate training in good hygiene practice and safe food handling, and the reporting of relevant conditions by food handlers.

### **Medical Examinations**

- There is no scientific indication for the *routine* medical examination of food handlers in the prevention of spread of food-borne pathogens, whether on recruitment or otherwise. The practice is not recommended, unless required by legislation.
- The legal requirement for medical certification should be used as an opportunity to ensure that food handlers have the requisite understanding of personal and food handling hygiene, and of the importance of illness reporting.

### **Microbiological Screening**

- *Routine* stool screening of food handlers has no scientific support and is not recommended. Neither is there any indication for *routine* skin, nasal or throat swabbing.
- Stool screening may be indicated for food handlers with symptoms of gastrointestinal illness based on individual risk assessment, taking account of such factors as illness severity and hygiene practice.
- Stool screening for suspected illness due to, carriage of, or relevant contact with Typhoid / Paratyphoid / Verocytotoxin-producing *E.coli* (VTEC) or *Shigella dysenteriae* is always indicated for high-risk food handlers.
- Screening in an outbreak situation may involve the requesting of stool specimens, nasal / throat/ skin swabs or screening for the presence of skin lesions on exposed parts of the body or for symptoms / signs of jaundice (depending on the outbreak and the pathogen suspected / identified).
- Criteria for microbiological screening may be varied at the discretion of the Director of Public Health / Designated Medical Officer, in consultation with the Consultant Microbiologist, following an individual or outbreak risk assessment.

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### **Recommendations: *EXCLUSION / RESTRICTION (GENERAL)***

- No food handler with gastroenteritis should work while symptomatic.
- As a general rule, any food handler with symptoms of gastrointestinal infection (with diarrhoea and/or vomiting) should be advised to remain off work until 48 hours after clinical recovery and stools have returned to normal (where the causative pathogen has not been identified). Where the pathogen has been identified, specific exclusion criteria are summarised in APPENDIX E.
- For high-risk food handlers, pathogen-specific exclusion criteria with microbiological stool clearance always apply in relation to Verocytotoxin-producing *E.coli* (VTEC), Typhoid, Paratyphoid, *Shigella dysenteriae* and Streptococcal throat.
- Any food handler who is an asymptomatic stool carrier - other than a high-risk food handler carrier of Verocytotoxin-producing *E.coli* (VTEC), Typhoid, Paratyphoid or *Shigella dysenteriae* – if practising good personal hygiene, does not generally need to be excluded.
- Any food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and / or symptoms.

- The decision to exclude any food handler should be based on individual risk assessment.
- The overriding prerequisite for fitness to return to food handling duties is strict adherence to personal hygiene.
- Infected skin lesions on exposed body parts (especially hands and forearms) should be adequately covered with a distinctively coloured waterproof dressing until healed. If not adequately covered, exclusion / restriction may need to be considered depending on the food handling activity.
- Those with purulent discharges (from the eye, ear, nose or mouth) should not work near open food; they may need to be excluded / restricted to non-food handling duties until recovered.

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**Recommendations: *SPECIFIC PATHOGENS*** (see also APPENDIX E)

**Overall**

- Recommended control measures for foodborne pathogens which can be transmitted by infected food handlers via food are summarised in APPENDIX E.

**Typhoid / Paratyphoid** - [*High-risk food handlers*]

- Case: exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals, starting 2 weeks after completion of antibiotic treatment
- Carrier: exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals
- Suspected case (history suggestive of enteric fever): consider need to obtain 6 consecutive negative stool samples at 2 week intervals
- Contact of case / outbreak: exclude until 3 consecutive negative stool samples obtained, taken at weekly intervals, starting 3 weeks after last contact with untreated case
- Household contact of carrier: consider excluding until 3 consecutive negative stool samples obtained, taken at weekly intervals, starting from date of carrier identification
- Fluoroquinolones are recommended for the elimination of carriage. Where sensitivity is a problem, cephalosporin antibiotics should be considered.

**Verocytotoxin-producing *E.coli* (VTEC)** - [*High-risk food handlers*]

- High-risk food handlers infected with VTEC should be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued)
- High-risk food handlers who are household contacts of cases of VTEC infection should generally be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued), unless careful risk assessment suggests otherwise.
- In the absence of convincing evidence, antimicrobial treatment is currently not indicated for VTEC carriage in food handlers

**Hepatitis A (HAV)**

- A food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and / or symptoms
- A food handler contact of a Hepatitis A case need not be excluded provided good hygiene practice is observed
- Routine Hepatitis A vaccination of food handlers is not indicated

- When a food handler is a household contact of a confirmed case of HAV, the food handler should be considered for prophylaxis (HNIG or HAV vaccine)
- Food handler colleagues of a food handler case of Hepatitis A should be included as close contacts for prophylaxis purposes
- People who have recently been exposed to food prepared by a food handler case of Hepatitis A may benefit from prophylaxis. This should be considered by the investigating Director of Public Health / Designated Medical Officer, following risk assessment

**Shigella** - [*High-risk food handlers*]

- Asymptomatic carriers of *S.sonnei* practising good personal hygiene do not require exclusion or microbiological clearance
- High-risk food handlers infected with *S. dysenteriae* should be excluded from food handling until 2 successive negative stools samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics have been discontinued)
- Antimicrobial treatment is not indicated for shigella carriage in food handlers, not least because of the problem of antibiotic resistance

**Salmonella** - [*High-risk food handlers*]

- Asymptomatic salmonella (non-typhoidal) carriers practising good personal hygiene do not require exclusion or microbiological clearance
- On the basis of current evidence, treatment of salmonella carriage in food handlers is generally not indicated as it is of doubtful efficacy and may prolong excretion

**Norwalk-like Virus (NLV)**

- Food handlers infected with NLV should be excluded for 48-72 hours after resolution of illness. Evidence for longer exclusion periods remains the subject of debate, unless hygiene habits are questionable. Microbiological clearance is not indicated.

**Staphylococcus aureus** - [*High-risk food handlers*]

- Nasal carriers of *S.aureus* need not be excluded from food handling.
- Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed
- Treatment of nasal carriage is generally not indicated; it may be considered where the food handler is implicated in an outbreak

**Group A ( $\beta$ -Haemolytic) Streptococci** - [*High-risk food handlers*]

- Exclude high-risk food handlers with streptococcal sore throat until symptom resolution
- Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed

**Cholera** - [*High-risk food handlers*]

- Food handlers infected with *V.cholerae* 01 or 0139 should be excluded for 48 hours after the first normal stool. When microbiological clearance is indicated (*e.g.* sanitary facilities / personal hygiene suspect), two consecutive negative stools at intervals of at least 24 hours are required.
- Prolonged carriage is rare. If treatment of carriage is considered, sensitivities should guide the choice of antimicrobial used in view of the possibility of resistant strains.

**Amoebic Dysentery**

- High-risk food handlers should be excluded for 48 hours after the first normal stool. While microbiological clearance is not required for return to work, treatment of carriers of pathogenic strains is recommended.

***Recommendations: PREVENTION OF INFECTION WITH FOODBORNE PATHOGENS AT WORK***

**General**

- The recommendations previously made relating to the prevention of food contamination by infected food handlers - including training in safe food handling, good personal hygiene, the provision of adequate and well maintained workplace sanitation facilities, and illness reporting - are also applicable to the prevention of food handler infection with foodborne pathogens at work.

**In addition, in the meat processing industry:**

- The education and training of food handlers in the meat processing industry should include information on:
  - the nature of relevant zoonotic diseases *and*
  - the minimisation of risk of infection to themselves by careful handling of potentially infected food-animals, carcasses and offal
- Additional protective clothing should include:
  - rubber aprons that can be frequently and easily washed down during the day (should be washed in a cabinet to contain splash), boots and gloves
  - the legal requirement for mask usage in the mince meat processing sector is acknowledged
- Hygiene facilities should include:
  - a sufficient number of boot washing facilities
  - sufficient number of facilities for cleaning tools / disinfecting equipment
- The legal requirement that taps should not be hand operable in this sector is acknowledged
- There should be appropriate ventilation systems with reduction of aerial contamination in areas where aerosols and / or dust are hazards
- Skin injuries should be treated promptly and efficiently when they occur
- In relation to the primary processing of food animals there should be
  - an effective dehiding and evisceration process (in particular, the prevention of spillage of animal gut contents during evisceration)
  - an effective evisceration accident procedure
  - adequate waste disposal measures

Detailed measures relevant to the primary processing of food animals are contained in 'Guidelines for the Implementation of Food Safety Management Systems in Beef and Lamb Slaughter Plants through HACCP Principles' (Guidelines FSAI 2002). There are, as yet, no such Irish guidelines for the porcine or poultry processing industries.

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## Chapter 1

### Introduction

#### 1.1 Foodborne Infectious Disease: Extent & Burden

Foodborne illness causes personal distress, preventable death and avoidable economic burden. For some consumers, foodborne illness results only in mild, temporary discomfort or lost time from work or other daily activity. For others, especially vulnerable groups such as children, older people and those with impaired immunity, foodborne illness may have more serious or long-term consequences and, most seriously, may be life threatening.

The true incidence of food-borne diseases is difficult to quantify. It is believed that in industrialised countries less than 10% of cases are reported, and that even fewer are investigated (Food Code 2001). In a study of rates of infectious intestinal disease in England, it was established that 20% of the population suffer from infectious intestinal disease every year, while only 3.3% present to their family doctor with infectious intestinal disease (Wheeler *et al*, 1999). Irish outbreak surveillance data in 1998/1999 indicated that over 1,900 people were ill as a result of foodborne outbreaks, with 4% requiring hospitalisation and two associated deaths (Bonner *et al*, 2001).

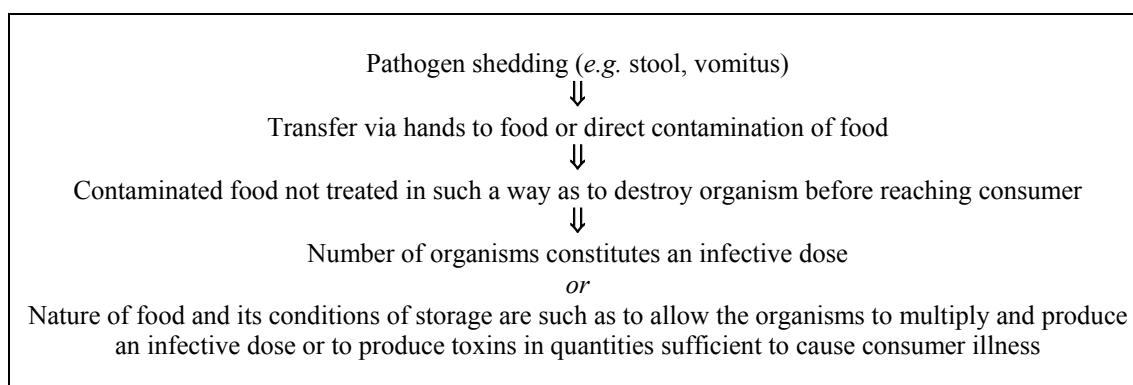
#### 1.2 The Food Handler Dimension

The food industry has a responsibility to ensure that food provided to the consumer is safe, and that it does not become a vehicle in a disease outbreak or in the transmission of communicable disease. Risk factors identified by the US Centres for Disease Control and Prevention as contributors to foodborne outbreaks that have been investigated and confirmed are: unsafe sources, inadequate cooking, improper holding, contaminated equipment and poor personal hygiene (Food Code 2001). The food handler dimension is crucially important.

Several definitions of food handler exist, both legislative and otherwise, in Ireland and internationally. The Food Safety of Ireland (FSAI) offers a clear and unambiguous definition: **‘A food handler is any person involved in a food business who handles food in the course of their work, or as part of their duties, to any extent whether the food is open or pre-wrapped’** (*Guide to Food Safety Training: Level II*).

The origins of microbial contaminants in food include the food itself or its source, the environment, cross-contamination or an infected food handler. Contamination from microorganisms can be responsible for infectious disease outbreaks passed from food workers to consumers via food (Paulson 1996). The focus of this document is on the food handler *infected with potentially foodborne infectious diseases*. An infected food handler can contaminate food resulting in foodborne disease as outlined (Table 1.1).

**Table 1.1 Infected Food Handler & Food Contamination: Event Sequence**



*Source: WHO 1989*

In 2000, thirty-six outbreaks of infectious intestinal disease were reported to the FSAI; twenty-seven were reported in 2001. Contributory factors cited by the investigators included inadequately trained or supervised staff and infected food handlers (Table 1.2). An infected food handler was identified in 18% of general outbreaks of infectious intestinal disease in this country in 1998/9 (Bonner *et al*, 2001), although it was unclear whether or not the food handler was the source of the outbreak. In the UK, an infected food handler was identified in 12% of foodborne outbreaks in 1995/6 (Evans *et al*, 1998). It has been suggested that the cost of outbreaks due to infected food handlers can in some instances far exceed the costs associated with outbreaks due to person-to-person transmission of infectious agents (Dalton *et al*, 1996).

**Table 1.2 Factors Contributing to Outbreaks of Infectious Intestinal Disease: Ireland 2000 / 2001**

<b>Factors</b>	<b>2000</b> (factors listed in 16/36 outbreaks reported)	<b>2001</b> (factors listed in 17/27 outbreaks reported)
Poor hygiene conditions in premises	6	5
Inadequate storage / refrigeration	6	6
Inadequately trained / supervised staff	6	6
<b>Infected food handlers</b>	<b>5</b>	<b>1</b>
Cross contamination	5	4
Grossly contaminated raw ingredients	3	-
Inadequate hygiene facilities	2	7
Inadequate cooking	1	-

*Source: FSAI / NDSC 2002*

### 1.3 Food Industry: Challenges

The scope of the food industry is vast, its constituent sectors diverse. It covers all activities from the processing, manufacturing and retailing of food right through to the service sector. There are over 37,500 food premises in Ireland (FSAI Annual Report 2000). The FSAI oversees the inspection of these food premises/businesses through its service contracts with the Department of Agriculture Food and Rural Development (DAFRD), the Health Boards, the Local Authority Veterinary Service and the Department of the Marine and Natural

Resources (DMNR). The food premises under the remit of DAFRD (600) range from large abattoirs, meat manufacturing and processing plants, through to milk plants and eggs / egg product premises. The vast majority of the premises inspected by the Health Boards (36,000) are retail and catering businesses, but also include many plants manufacturing foods of non-animal origin. The Local Authority Veterinary Service inspects small abattoirs and small meat manufacturing plants supplying the domestic market (600 premises). DMNR officials inspect premises engaged in the processing, handling and storage of fish (almost 350 premises).

Food handlers work in these varied settings. Employers face a multitude of challenges in relation to the safe handling of food. These challenges should not be underestimated. There are skills shortages in many sectors. There is evidence of high staff turnover. Seasonal demands and high rates of casual labour are particular features in some areas. Significant throughputs of foreign labour, with attendant language barriers and cultural differences, present their own difficulties. The increased production of ready-to-eat foods and more facilities for eating out are added factors demanding vigilance. Operators of care facilities for vulnerable groups – hospitals, nursing homes, residential and day care centres, creches etc. - need to be particularly vigilant in minimising the risk of exposure to foodborne infection. The frail elderly, very young, those with chronic illness, the immunosuppressed and pregnant women are especially vulnerable.

The ultimate responsibility for the production of safe food rests primarily with the food industry. The industry must have appropriate systems in place to ensure this. Since 1998, it has been a legal requirement for all food businesses to have a food safety management system based on the principles of the Hazard Analysis & Critical Control Point (HACCP) system. HACCP is a systematic approach to identifying and controlling food safety hazards – it involves identifying and controlling what could go wrong and planning for prevention. An effective HACCP system should ensure the production of safe food, thereby preventing food poisoning incidents. HACCP does not replace good hygiene practices; rather, it compliments them.

## **1.4 Food Handler Training**

The food handler does not, of course, have to be infected to contribute to the spread of foodborne pathogens. Whether infected or not, good personal hygiene and safe food handling practices are essential prerequisites for the food handler.

Food safety training and the provision of hygienic, supportive work environments are integral to ensuring a food safety culture. It is a legal requirement that staff involved in a food environment are adequately trained and / or supervised commensurate with their work activity. The responsibility for training and supervision of staff lies with the proprietor of every food business. This is the case for all staff whether they are part-time, full-time or casual, or whether they are employed in the public or private sector. The FSAI has set training standards in accordance with current legislation and in line with best practice. These are laid out in a series of FSAI training guides to support industry in the food service, retail and manufacturing sectors: *‘Guide to Food Safety Training Level I - Induction Skills’* and *‘Guide to Food Safety Training Level II – Additional Skills’*.

## **1.5 Need for Irish Guidelines**

There are no evidence based Irish guidelines which comprehensively cover the prevention of microbial contamination of food by infected food handlers. In practice, the advice contained in such very excellent 1995 UK documents as *‘Food Handlers Fitness to Work’* (DOH 1995)



- produced by an expert working group convened by the Department of Health, and '*The prevention of human transmission of gastrointestinal infections, infestations and bacterial infections*' (PHLS 1995) - produced by the Public Health Laboratory Surveillance Centre, has been widely drawn upon. Other reports such as the WHO guidelines (WHO 1989) on '*Health Surveillance and Management Procedures for Food Handling Personnel*' have also been extensively referred to. However, inconsistencies in application are apparent.

It is timely to review the evidence base, where such evidence exists, with regard to relevant risk reduction parameters. These parameters include personal hygiene aspects (especially hand hygiene), reporting of relevant illnesses/conditions, health screening (including the use of health questionnaires, medical examinations and stool screening), assessment of fitness to work and criteria for work exclusion, in addition to treatment of pathogen carriage where appropriate. Up-to-date evidence-based guidelines should lead to a more informed, consistent approach to risk reduction. It is cautioned, however, that reviewing and updating will be necessary as science and expert opinion continue to inform.

## **1.6 Target Audience**

This document adopts a risk-based approach. It identifies those food handlers most likely to pose a risk with regard to the potential spread of foodborne pathogens.

Its main aims are to prevent the introduction of foodborne pathogens to food by infected food handlers by:

- identifying the risks posed
- identifying appropriate preventive measures
- identifying, and addressing, those circumstances relating to specific pathogens that pose particular risks

The guidelines are intended mainly for:

- I. Food business proprietors, managers and supervisors
- II. Health Professionals (including Public Health, Occupational Health, General Practitioners, Microbiologists and Infection Control Staff)
- III. Enforcement Officers (including Environmental Health Officers, Veterinary Inspectors, Dairy Produce Inspectors, Technical Agricultural Officers, Sea Fisheries Officers)

It is pointed out that those workers involved in primary agricultural or harvesting processes are not considered as food handlers for the purposes of this guidance. Neither are those non-food handlers who can affect food safety *i.e.* people involved in food businesses whose duties and responsibilities can impinge on food safety (*e.g.* maintenance staff, cleaning staff) as they are outside of this Committee's remit.

## Chapter 2

### The Legislative Framework

#### 2.1 Introduction

Current food law is complex. As set out in statute, food law has four main purposes – to protect human health, to prevent fraud, to inform the consumer and to facilitate trade (Compendium of Food Law 1998). In addition to core legislation, a multiplicity of Irish regulations (enacting European Union (EU) Directives) apply. Many of these regulations are specific to different subsectors of the food industry. In recent years, almost all of our food rules are based on legislation agreed by Member States of the EU (Compendium 1998).

Individual businesses and food handlers have legal obligations related to the need to avoid contamination of food. The relevant legislation, as it pertains to food handlers and the prevention of spread of foodborne infectious disease by food handlers, is reviewed. Specifically, those areas relating to such aspects as training / instruction / supervision, adequate facilities and clean work environment, personal hygiene, illness reporting, work exclusion and medical certification of fitness to work are examined.

#### 2.2 Legislative Overview

The principal legislation which controls the spread of foodborne infection within the manufacturing, processing, distribution, catering and retail sectors of the Irish food industry is included in EU Directives and Irish Statutes.

##### I. EU Directives

A Directive is a requirement by the Council of the EU that all Member States shall adopt national measures to meet its objectives. The European Communities Act 1972 confers, on Ministers, powers for the implementation of EU Directives by the making of national regulations. European Directives have been gradually developed since 1964 in response to the needs of the internal market. The Commission of the European Communities currently has a series of proposals outlined with the intention of harmonisation of food law by 2004.

- **Horizontal Directives** have universal application to all food businesses  
*e.g.* Council Directive 93/43/EEC on the Hygiene of Foodstuffs is enabled in Ireland by the *European Communities (Hygiene of Foodstuffs) Regulations, 2000*.
- **Vertical Directives** have specific application to particular food businesses. There are 17 such Directives (Table 2.1); they apply an additional specific layer on top of the Horizontal Directive

e.g. Council Directive 64/433/EEC as amended by 91/497/EEC is enabled in Ireland by the *European Communities (Fresh Meat) Regulations, 1997*.

## II. Irish Statutes

- The *Food Hygiene Regulations 1950-89*, introduced under the Health Act 1947/70, set out the statutory requirements in relation to food hygiene. They apply essentially to those sectors of the food industry to which no vertical (product specific) or sector specific rules apply (Compendium of Food Law 1998). They exclude distinct areas of manufacturing and processing such as meat products, fish & shellfish products and milk products – food businesses to which the Vertical Directives have application.
- The *Abattoirs Act 1988* and regulations made thereunder, have application to all abattoirs permanently derogated from Council Directive 64/433/EC as amended.

**Table 2.1. Vertical Directives**

1.	Council Directive 64/433/EEC	(Fresh meat)
2.	Council Directive 77/99/EEC	(Meat products)
3.	Council Directive 94/65/EEC	(Minced meat & meat products)
4.	Council Directive 71/118/EEC	(Fresh poultry meat)
5.	Council Directive 92/45/EEC	(Wild game)
6.	Council Directive 91/495/EEC	(Farmed game)
7.	Council Directive 89/437/EEC	(Eggs & egg products)
8.	Council Directive 92/46/EEC	(Milk & milk products)
9.	Council Directive 89/362/EEC	(Milking hygiene)
10.	Council Directive 91/493/EEC	(Fishery products)
11.	Council Directive 91/492/EEC	(Live bivalve molluscs)
12.	Council Directive 92/48/EEC	(Hygiene on fishing vessels)
13.	Council Directive 92/118/EC	(Gelatine, frogs legs, & snails)
14.	Council Directive 77/96/EEC	(Trichina examination)
15.	Council Directive 90/667/EEC	(Animal by-products)
16.	Council Directive 93/119/EEC	(Animal welfare)
17.	Council Directive 96/93/EC	(Certification of animal & animal products)

## 2.3 Legislative Framework

In order to approach a review of current legislation regarding food handlers and work in a practical and meaningful way, key areas in relation to the prevention of spread of foodborne pathogens are highlighted and the pertinent legislation reviewed in this context.

The key areas highlighted include the definition of a food handler and the promotion of standards in the workplace. The legal responsibilities of food handlers are significant: they relate to personal hygiene, the reporting of certain illnesses/conditions relevant to food safety and not working if a possible source of infection relevant to food safety. The legal responsibilities of proprietors are crucial as they relate in particular to the provision of a hygienic work environment with appropriate staff facilities; the provision of staff training, instruction and supervision and the exclusion of staff from food handling duties where necessary. There is also a legislative requirement to ensure the medical certification of staff in some sectors.

The current legislative framework is outlined (Table 2.2).

**Table 2.2 Legislative Framework**

		<b>Relevant Legislation</b>
1. Food handler definition		<ul style="list-style-type: none"> <li>Food Hygiene Regs 1950 (SI 205 of 1950)</li> </ul>
2. Promotion of Standards		<ul style="list-style-type: none"> <li>European Communities (Hygiene of Foodstuffs) Regulations, 2000</li> <li>Food Safety Authority of Ireland Act 1998</li> </ul>
3. Responsibilities of Food Handlers	<p>a) Personal Hygiene</p> <p>b) Reporting illness to Supervisor</p> <p>c) Not working if a possible source of infection</p>	<ul style="list-style-type: none"> <li>European Communities (Hygiene of Foodstuffs) Regulations, 2000 (SI 165 of 2000) Second Schedule Part 8</li> <li>Food Hygiene Regs 1950 (Article 31)</li> <li>Vertical Directives (Table 2.1)</li> <li>Food Hygiene Regs 1950 (Article 33(3))</li> <li>Infectious Disease Regulations 1981 (and Amendments)</li> <li>Abattoirs Act 1988 (Abattoir) Regs 1989-1998</li> <li>Food Hygiene Regs 1950 (Article 33(1))</li> </ul>
4. Responsibilities of Proprietors	<p>a) Provision of staff facilities / clean work environment</p> <p>b) Staff training / instruction / supervision</p> <p>c) Work Exclusion</p> <p>d) Medical Certification</p>	<ul style="list-style-type: none"> <li>European Communities (Hygiene of Foodstuffs) Regulations, 2000 (SI 165 of 2000) Second Schedule Parts I, II &amp; III</li> <li>Vertical Directives* (Table 2.1)</li> <li>European Communities (Hygiene of Foodstuffs) Regulations, 2000 (SI 165 of 2000) Second Schedule Part 10</li> <li>Vertical Directives* (Table 2.1)</li> <li>European Communities (Hygiene of Foodstuffs) Regulations, 2000 (SI 165 of 2000) Second Schedule Part 8</li> <li>Food Hygiene Regs 1950 (Article 33(2))</li> <li>Vertical Directives (Table 2.1)</li> <li>Irish Regulations Implementing EU Directives requiring Medical Certification (Table 2.4)</li> </ul>

\* part coverage

## **2.4 Food Handler Defined**

There is no definition in EU Legislation of a food handler / food worker. The *Codex Alimentarius*<sup>0</sup>, (Latin, meaning Food Law or Code), a collection of internationally adopted food standards, defines a food handler as: 'Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements'.

In Irish legislation, a food worker is defined as follows:

'food worker' means a proprietor, employee, or any other person who works in or in connection with a food business but does not include a person who works only in a part of a food premises, food stall or food vehicle where –

- a) food is not manufactured, prepared, stored, distributed or exposed for sale, or
- b) food is imported, stored, distributed, exposed for sale or sold only in impermeable containers

**(Food Hygiene Regulations 1950 (Irl))**

While it is useful to have a definition of food handler, the application and interpretation of this definition raises some issues. Since the *Food Hygiene Regulations 1950* do not have universal application, the definition above does not apply to substantial sections of the food industry *i.e.* those sections to which Vertical Directives apply. In addition, the legislative definition does not assist in categorising food handlers with regard to potential risks of spread of foodborne disease. As will be detailed in Chapter 3, certain food handling duties pose considerably more risk than others.

## **2.5 Responsibilities of Food Handlers**

The existing legal responsibilities of food handlers in connection with the prevention of transmission of foodborne pathogens encompass personal hygiene, illness reporting and not working if a possible source of infection relevant to food safety.

### **2.5.1 Personal Hygiene**

Food handler obligations relating to personal hygiene are included in the *European Communities (Hygiene of Foodstuffs) Regulations, 2000* and the *Food Hygiene Regulations 1950*. They cover personal hygiene (in particular hand washing), clean clothing, hygienic maintenance of equipment and general hygiene measures. In addition, each of the Vertical Directives has an additional prescriptive layer which applies to its specific area of work.

'Every person working in a food handling area shall maintain a high degree of personal cleanliness and shall wear suitable, clean and, where appropriate, protective clothing'

**(European Communities (Hygiene of Foodstuffs) Regulations, 2000 (SI 165 of 2000) Second Schedule Part 8)**

'A food worker, while engaged on any work in connection with a food business

- (1) shall keep himself clean and shall, in particular
  - (a) wash his hands immediately after using a sanitary convenience, and
  - (b) wash his hands and (if they are uncovered while engaged on his work) his forearms at other times as often as may be necessary to keep them clean;
- (2) shall wear clean outer clothing;

- (3) shall maintain all machinery, apparatus, utensils, tables or other equipment used in contact with food or food material for which he is responsible in a clean and hygienic condition;
- (4) shall not unnecessarily handle food or food material;
- (5) shall not spit or engage in any other unhygienic practice in such proximity to food as to be liable to cause contamination or infection thereof;
- (6) shall not cause any contravention of these Regulations;
- (7) shall, in addition to the foregoing matters, take every other reasonable precaution to prevent the contamination of food and to prevent danger to the public health arising from his work in the food business and his presence in the place where the food business is carried on'

**(Food Hygiene Regulations 1950 (Irl) Article 31)**

The European Communities (Hygiene of Foodstuffs) Regulations 2000 - which have general application - are far less prescriptive than the Food Hygiene Regulations 1950 in relation to the personal hygiene of the food handler. Neither set of regulations addresses risk categorisation.

### **2.5.2 Reporting Illness**

The reporting, to their employers, of illnesses/conditions that might be relevant to the spread of foodborne disease by food handlers is addressed in the *Food Hygiene Regulations 1950* and the *Abattoirs Act 1988*. The *Food Hygiene Regulations 1950* do not apply throughout the food industry. The *Abattoirs Act* is applicable to national trade only; other food animal sectors (i.e. export plants) are not covered with regard to such reporting. Legislation does not therefore comprehensively cover the entire food industry in this regard.

'When a person proposes to take up employment in connection with a food business, the proprietor shall require him to state (in writing if so required) whether he is suffering from or is a probable source of infection with a scheduled infectious disease or whether he has ever suffered from typhoid or paratyphoid, and such person shall to the best of his knowledge comply with such request'.

**(Food Hygiene Regulations, 1950 Article 33)**

'As soon as any person engaged in or about any abattoir becomes aware that he is suffering from, or is the carrier of, any disease or condition to which paragraph (1) relates, he shall forthwith cease work in or about such abattoir and give notice of the fact to the person in charge of the abattoir whereupon that person or the occupier shall immediately notify the veterinary inspector allocated to the abattoir'.

**(Abattoirs Act, 1988 (Abattoirs) Regs, S.I. 152 of 1989)**

Scheduled (notifiable) infectious diseases are contained in the Infectious Disease Regulations 1981 (and subsequent amendments in 1985, 1988 and 1996) – Table 2.3. These Regulations permit health authorities to take measures to prevent the spread of infectious diseases, including diseases which can be foodborne. Currently notifiable foodborne illnesses relevant to potential pathogen transmission via food/water by an infected food handler are: Bacillary Dysentery (Shigellosis), Cholera, Food Poisoning (bacterial other than Salmonella), Gastroenteritis (when contracted by children under 2 years), Salmonellosis (other than Typhoid or Paratyphoid), Typhoid and Paratyphoid Fevers, and Viral Hepatitis Type A.

**Table 2.3 Diseases Currently Notifiable in Ireland**  
(Under Infectious Disease Regulations 1981 & subsequent Amendments - excluding Sexually Transmitted Diseases)

Acute anterior poliomyelitis
Acute encephalitis
Acute viral meningitis
Anthrax
<b>Bacillary Dysentery (Shigellosis)*</b>
Bacterial Meningitis (incl. meningococcal septicaemia)
Brucellosis
<b>Cholera*</b>
Creutzfeldt Jakob Disease (1996)
nv Creutzfeldt Jakob Disease (1996)
Diphtheria
<b>Food Poisoning (bacterial other than Salmonella)*</b>
<b>Gastroenteritis (when contracted by children under 2 years)*</b>
Infectious mononucleosis
Infectious parotitis (mumps)
Influenzal pneumonia
Legionnaires disease
Leptospirosis
Malaria
Measles
Ornithosis
Plague
Rabies
Rubella
<b>Salmonellosis (other than Typhoid or Paratyphoid)*</b>
Smallpox
Tetanus
Tuberculosis
<b>Typhoid &amp; Paratyphoid Fevers*</b>
Typhus
Viral Haemorrhagic Disease
<b>Viral Hepatitis Type A*</b>
Viral Hepatitis Type B
Viral Hepatitis Type unspecified
Whooping Cough
Yellow Fever

*\*Infections relevant to foodborne transmission by an infected food handler*

There are, however, very obvious omissions from this existing list. Notably, Verocytotoxin-producing *E.coli* (VTEC) is absent. In 1999, the National Disease Surveillance Centre (NDSC) reviewed the current notifiable disease list. Recommendations were subsequently made regarding additions / amendments in the NDSC's February 2001 Report: *A Review of Notifiable Diseases and the Process of Notification*. The Report recommended the removal of certain diseases and the addition of the entire list of diseases agreed at European Union (EU) level for surveillance (including VTEC), in addition to other diseases and organisms which were given high priority by health professionals during the consultation process (including Small Round Structured Virus (SRSV)). The report has been presented to the Department of Health and Children. Legislative amendments are expected.

### **2.5.3 Not working if a possible source of infection**

The onus on a food handler not to perform work in connection with a food business if a possible source of infection relevant to food safety is covered in the *Food Hygiene Regulations 1950*.

‘A person who for the time being is a probable source of infection with a scheduled infectious disease or is suffering from any boil, septic sore or other skin ailment on the hand or forearm which could contaminate or infect food shall not perform any work in connection with a food business save by and in accordance with the permission of the local chief medical officer’

(**Food Hygiene Regulations, 1950** Article 33)

It is noted that this aspect of food handler responsibility does not apply to food handlers throughout the industry since the *Food Hygiene Regulations 1950* do not apply to the meat, bacon, poultry, fishery sectors *i.e.* to those food businesses to which the Vertical Directives have application.

## **2.6 Responsibilities of Proprietors**

The relevant legal responsibilities of proprietors encompass the provision of staff facilities and a clean work environment, the training/ instruction / supervision of staff, work exclusion when indicated, and the ensuring of medical certification in some sectors.

### **2.6.1 Staff Facilities / Clean Work Environment**

The mandatory requirements for the provision of staff facilities / clean work environment are outlined in the *European Communities (Hygiene of Foodstuffs) Regulations 2000, Second Schedule* (the Regulations state that the proprietor of a food business ‘may derogate from the rules of hygiene as set down in the Second Schedule provided that he or she does so in accordance with Directive 96/3/EC or Directive 98/28/EC’).

There are general requirements in Part I that food premises must be ‘kept clean and maintained in good repair and condition’; that the layout, design, construction and size of food premises shall permit ‘adequate cleaning and/or disinfection’ and ‘good food hygiene practices’; that an ‘adequate number of washbasins’ and ‘flush lavatories’ must be available; that ‘materials for cleaning hands and for hygienic drying’ must be provided; and that ‘adequate changing facilities’ be provided where necessary. Further specific requirements for rooms where foodstuffs are prepared, treated or processed (excluding dining areas) and for moveable, temporary and other premises are outlined in Parts II and III respectively. Hygiene requirements for transportation and equipment are also covered (Parts IV and V).

European Vertical Directives also contain specific inclusions *e.g.* Council Directive 64/433/EEC as enabled by S.I. 434 of 1997 requires that ‘establishments shall have adequate structures and facilities’ and ‘absolute cleanliness shall be required of premises and equipment’.

### **2.6.2 Training / Instruction / Supervision**

The training and supervision of food handling staff, both at commencement of employment and thereafter, is integral to food safety. These aspects are considered in the *European Communities (Hygiene of Foodstuffs) Regulations 2000*, applicable to all food businesses.



‘Food business operators shall ensure that food handlers are supervised and instructed and / or trained in food hygiene matters commensurate with their work activity’

(**European Communities (Hygiene of Foodstuffs) Regulations 2000** (SI 165 of 2000) Second Schedule Part 10)

Proprietors, managers and supervisors must ensure that these requirements are met. The Vertical Directives also include reference to supervision; they refer to training where the authorised officer brings the fact to the attention of the proprietor.

### **2.6.3 Work Exclusion**

The law requires exclusion from foodhandling areas of those workers likely to be a possible source of infections which could be transmitted via food.

‘No person, known or suspected to be suffering from, or to be a carrier of, a disease likely to be transmitted through food or while afflicted, for example with infected wounds, skin infections, sores or with diarrhoea, shall be permitted to work in any food handling area in any capacity in which there is any likelihood of directly or indirectly contaminating food with pathogenic micro-organisms’.

(**European Communities (Hygiene of Foodstuffs) Regulations, 2000** (SI 165 of 2000) Second Schedule Part 8)

‘A proprietor of a food business shall not allow any person who is a probable source of infection with a scheduled infectious disease or who is suffering from any boil, septic sore or other skin ailment on the hand or forearm which could contaminate or infect food to work in connection with a food business save by and in accordance with the permission of the local chief medical officer’.

(**Food Hygiene Regulations, 1950** Article 33)

In practice, the area of food handler exclusion is a difficult one. Individual risk assessment may need to take account of such factors as the infecting organism, the exact nature of the food handling activity and the standard of hygiene of the food handler. Decisions with regard to certain pathogens ‘likely to be transmitted through food’ and food handler *carriers* can present challenges as a variety of international guidelines are in use leading to variation in application.

Each of the Vertical Directives also has an inclusion referring to ‘persons likely to contaminate food are prohibited from working on it and handling it’.

### **2.6.4 Medical Certification**

Some EU Directives demand pre-employment and/or routine (annual) medical examination of food handlers in certain sectors. Annual medical certification is a legal requirement for food workers in meat plants, plants producing meat products and minced meat production plants; workers in the dairy sector who handle raw milk have to ensure that there is no impediment to such employment; medical certification is required of food workers in the fish processing sector at the time of recruitment. Primary producers, *i.e.* farmers & fishermen, are excluded from this requirement. Table 2.4 below delineates the Irish Regulations implementing Directives requiring medical certification.

For these groups there is an obligation:

‘to prove, by a medical certificate, that there is no impediment to such employment’ and, where annual certification is a prerequisite, that ‘medical certificates shall be renewed every year unless another staff medical check up scheme can offer equivalent guarantees to the satisfaction of a veterinary inspector. The owner or person in charge of an establishment shall

ensure that these medical certificates are available for inspection on request by an authorised officer.'

The legal requirement for medical certification of food handlers applies to certain well defined sectors of the food industry. Although most sectors are excluded, the requirement is a source of some perplexity. There is evidence of inconsistency and confusion in practice in some of those sectors for which it is not a legal requirement. The issue of routine medical certification of food handlers is examined in Chapter 6.

**Table 2.4 Irish Regulations Implementing EU Directives Requiring Medical Certification**

- **77/99:** European Communities (Meat Products and Other Products of Animal Origin) Regulations, 1995 (S.I. No.126 of 1995)
- **74/65:** European Communities (Minced Meat and Meat Preparations) Regulations, 1996 (S.I. No.243 of 1996)
- **92/46:** European Communities (Hygienic Production and Placing on the Market of Raw Milk, Heat-Treated Milk and Milk-Based Products) Regulations, 1996 (S.I. No.9 of 1996)
- **64/433:** European Communities (Fresh Meat) Regulations, 1997 (S.I. No.434 of 1997)
- **71/118:** European Communities (Fresh Poultrymeat) Regulations, 1996 (S.I. No.3 of 1996)
- **89/437:** European Communities (Egg Products) Regulations, 1991 (S.I. No.293 of 1991)
- **92/45:** European Communities (Wild Game) Regulations, 1995 (S.I. No.298 of 1995)
- **91/495:** European Communities (Rabbit Meat and Farm Game Meat) Regulations, 1995 (S.I. No.278 of 1995)

## **2.7 Codes of Practice, Guides & Standards**

Various guides, standards and codes of practice have been produced for use by the food industry. A series of these has been researched and published by the National Standards Authority of Ireland (NSAI) and, more recently, by the Food Safety Authority of Ireland (FSAI).

### **2.7.1 Significance**

Recent years have seen a novel approach to the way in which food hygiene and safety rules are written. EU Directives have sought to harmonise food hygiene rules across the European region by moving away from detailing prescriptive food hygiene rules to the development of a framework of legislative objectives. Previously, regulations tended to be quite prescriptive. Now, a framework of objectives is set out but the law does not lay down in as much detail how to reach those objectives. Hence the importance of the production of guides to good practice and standards to fill the gap.

The *European Communities (Hygiene of Foodstuffs) Regulations 2000* provide for the FSAI to approve guides to good hygiene practice which may be used voluntarily by food businesses as a guide to compliance with the Regulations. The NSAI had been assigned the role of development of such guides under Council Directive 93/43/EEC.

The *Food Safety Authority of Ireland Act, 1998*, makes provision for the development of guidelines or codes of practice by itself, or with such representatives of particular food business groups or organisations as it deems appropriate. Any such guidelines require the approval of the Board, following consultation of the Scientific Committee.

The *Food Safety Authority of Ireland Act, 1998* states that ..... ‘the Authority..... shall, in particular, take all reasonable steps to ensure that such food complies –

- (1) with food legislation in respect of food safety and hygiene standards, or
- (11) where appropriate, with the provisions of generally recognised standards or codes of good practice aimed at ensuring the achievement of high standards of food hygiene and food safety.’

## **2.7.2 FSAI Codes of Practice / Guidance Notes**

The FSAI has produced a series of Codes of Practice and Guidance Notes to assist both regulators and the food industry in achieving a higher degree of compliance with the law and with good practice generally (Table 2.5). The Authority points out that these guidelines do not substitute for particular Regulations. However, it emphasises that adherence to the guidelines should make compliance easier by providing the basis for a high degree of consistency in the application of the relevant Regulations. Guides to Food Safety Training have are among those most recently produced.

**Table 2.5 FSAI Codes of Practice & Guidance Notes\***

<ul style="list-style-type: none"><li>• Code of Practice No.1 <i>Risk Categorisation of Food Businesses to Determine Priority for Inspection</i></li><li>• Code of Practice No.2 <i>Inspection of Food Operations run by Health Boards</i></li><li>• Code of Practice No.3 <i>Risk Categorisation, Inspection and Sampling Frequencies of Meat Manufacturing Premises Producing Solely for the Domestic Market</i></li><li>• Code of Practice No.4 <i>Production of Fresh Fruit and Vegetables</i></li><li>• Guidance Note No.1 <i>Inspection of a Food Business</i>. FSAI 2001</li><li>• Guidance Note No.2 <i>EU Classification of Food</i>. FSAI 2001</li><li>• Guidance Note No.4 <i>Approval of Independent Meat Production Units under EC Meat Legislation (Meat Products, Minced Meat &amp; Meat Preparations)</i>. FSAI 2001</li><li>• Guidance Note No.5 <i>Approval and Operation of Independent Meat Production Units under EC Fresh Meat Legislation</i>. FSAI 2001</li><li>• Guide to Food Safety Training – Level I. FSAI 2001</li><li>• Guide to Food Safety Training – Level II. FSAI 2001</li></ul>
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\*not exhaustive

## **2.7.3 NSAI Irish Standards**

The NSAI has been to the forefront in the production of sector specific guides as national standards (Table 2.6), making a significant contribution to the improvement of food safety in this country.

**Table 2.6 NSAI Irish Standards\***

- |  |
|--|
| <ul style="list-style-type: none"><li>• IS 3219:1990 <i>Code of Practice for Hygiene in the Food and Drink Manufacturing Industry.</i> NSAI</li><li>• IS 340:1994 <i>Hygiene in the Catering Sector.</i> NSAI</li><li>• IS 342:1997 <i>Guide to good hygiene for the food processing industry in accordance with the Council Directive 93/43/EEC on the Hygiene of Foodstuffs.</i> NSAI</li><li>• IS 341:1998 <i>Hygiene in Food Retailing and Wholesaling.</i> NSAI</li><li>• IS 343:2000 <i>Food Safety Management.</i> NSAI</li></ul> |
|--|

\*not exhaustive

Irish standards IS 340 and IS 341 are among a series of sector specific guides which identify general hygiene requirements including requirements relating to personal hygiene for that sector. In addition, IS340 contains requirements relating to medical fitness.

Irish Standard IS 342 provides guidance on compliance with hygiene rules set out in Council Directive 93/43/EEC. It also includes requirements relating to personal hygiene and applies to all food processing companies with the exception of those food processing sectors which are the subject of specific European Community veterinary rules - namely the meat, fish and dairy sectors.

Irish Standard IS 343 sets out how food safety should be managed. It defines the elements of successful food safety management. It incorporates HACCP (Hazard Analysis and Critical Control Points – a systematic approach to identifying, evaluating and controlling food safety hazards – a preventive system of hazard control rather than a reactive one). However, before HACCP is addressed, the food business must put in place the pre-requisite programme covering sector specific general rules and requirements relating to food hygiene, including personal hygiene.

Irish Standard IS 3219 provides for hygiene in the food and drinks manufacturing industry. It is currently being reviewed and will become a support standard for IS 343 for use in the food and drinks manufacturing sectors.

## 2.8 Conclusion

While our current food law is wide-ranging, there are gaps and overlaps with regard to food handler risk reduction in the spread of foodborne pathogens. There are stringent requirements in some sectors which are absent from others. The presence of a plethora of EU Directives, the intermingling of different disciplines (hygiene, animal health and official controls) and the existence of different hygiene regimes for products of animal origin and other foods result in a fairly cumbersome situation. Hardly surprisingly, there is ambiguity and not a little confusion in relation to some key preventive aspects throughout the food industry and enforcement bodies alike.

The legislative framework is in a state of flux. Our *Food Hygiene Regulations 1950-89*, which have been superseded to a significant degree by subsequent European Union and national legislation, are presently being revised. The NDSC's review of the current list of notifiable diseases in Ireland, with its recommended additions and amendments, is currently under consideration by the Department of Health and Children. The EU plans to have all EU food law harmonised by 2004.

Measures to control potential food handler risks in the spread of foodborne infection demand a sound evidence base. Science should inform and lead the way. Guidelines should reflect current best evidence and best practice, all the while cognisant of current legislative requirements.

## Chapter 3

### **An Assessment of Risks posed by Infected Food Handlers: *The evidence***

#### **3.1 Introduction**

Infected food handlers are not uncommonly associated with outbreaks of foodborne disease. Infected food handlers were implicated in 18% of general outbreaks of infectious intestinal disease in Ireland in the 1998/9 period (Bonner *et al*, 2001). However, the association between the infected food handler and the transmission of foodborne disease frequently presents an investigative challenge. Careful outbreak investigation may reveal the infected food handler to be yet another innocent outbreak victim or, on occasion, the index case.

This chapter uses an evidence-based approach to analyse the information presented in the literature and to identify the main risk factors contributing to foodborne illness caused by infected food handlers. A thorough search of published, English-language, scientific literature for the period 1980-2001 was conducted to identify articles that described outbreaks of foodborne disease that were believed to have resulted from contamination of food by infected food handlers. Stringent inclusion criteria applied - there had to be sound epidemiological evidence and microbiological evidence implicating the food handler. While not claiming to be an exhaustive list, it is considered that the articles reviewed are a relevant representation of the literature on the subject. The citation sources used were: PubMed-‘Entrez’, MedLine, Eurosurveillance, ProMed, FS-NET, US FDA and *local ID bulletin reports*. Key words applied in the search were: “foodhandler”, “food handler”, “food worker”, foodborne outbreaks” and “foodborne disease”.

A total of 41 outbreaks involving 12 different pathogen species were identified. Outbreaks ranged in size from less than ten cases to over 3,000 cases (*c.f.* APPENDIX A). Aspects relating to the role of the infected food handler in causing foodborne illness are addressed – the level of evidence implicating the food handler; the most commonly reported pathogens; clinical symptoms; pathogen infectivity; mode of transmission to food; commonly implicated foods and outbreak settings.

#### **3.2 Level of Evidence**

The investigation of an outbreak of foodborne illness attempts to identify the vehicle of infection (*i.e.* contaminated food or water ) most significantly associated with illness. If the identity of the food vehicle is established, the investigation extends to try to identify the source of contamination of that food vehicle. Outbreak investigation, conducted systematically, examines epidemiological, microbiological and environmental evidence.

**EPIDEMIOLOGICAL EVIDENCE**

In broad terms, there are two types of epidemiological study – descriptive and analytical. The analytical studies relevant to outbreak investigation constitute either cohort or case control studies. The level of evidence gained from a particular study design is summarised (Table 3.1). Randomised controlled trials provide the strongest type of epidemiological evidence but are not appropriate to outbreak investigation.

**Table 3.1 Level of Evidence**

<i>Level</i>	<i>Type of epidemiological evidence</i>
<b>Ia</b>	Evidence obtained from a meta-analysis of randomised controlled trials
<b>Ib</b>	Evidence obtained from at least one randomised controlled trial
<b>IIa</b>	Evidence obtained from at least one well designed controlled study without randomisation
<b>IIb</b>	Evidence obtained from at least one other type of well designed experimental study
<b>III</b>	Evidence obtained from well-designed non experimental descriptive study, such as comparative studies, correlation studies, and case studies
<b>IV</b>	Evidence obtained from expert committee reports or opinions and/or experience of respected authorities

*Source: US Agency for Healthcare Policy and Research (NHS)*

The outbreaks studied in this review each presented either cohort, case control or descriptive epidemiological evidence. The epidemiological and microbiological evidence implicating food handlers is listed (Table 3.2). Over half of the outbreaks provided analytical epidemiological evidence - case control (42%); cohort (12%). The remainder comprised well-designed descriptive epidemiological outbreak studies. All of the outbreaks demonstrated microbiological evidence implicating food handlers.

**Table 3.2 Epidemiological & Microbiological Evidence Implicating Food Handlers**  
(41 outbreaks reviewed)

<i>Type of Evidence</i>	<i>No. Outbreaks</i>
<b>Microbiological</b>	<b>41 (100%)</b>
<b>Epidemiological: Analytical</b>	<b>22 (54%)</b>
• <b>Case Control</b>	17 (42%)
• <b>Cohort</b>	5 (12%)
<b>Epidemiological: Descriptive</b>	<b>19 (46%)</b>

When a particular food vehicle has been implicated in an outbreak, a hypothesis is generated as to the likely means by which the food was contaminated. In all of the outbreaks reviewed, a food handler was implicated to varying degrees as the source. In 71% of the outbreaks, a temporal association was demonstrated *i.e.* that the food handler admitted to symptoms either prior to or during the outbreak (Faustini *et al*, 1998; Hedberg *et al*, 1991; Dryden *et al*, 1994;

Sundkvist *et al*, 2000; Olsen *et al*, 2001; Lo *et al*, 1994; Reid *et al*, 1988; Patterson *et al*, 1993; Parashar *et al*, 1998; Daniels *et al*, 2000). While such an association was not demonstrated in just over one-quarter of outbreaks, it is believed that either asymptomatic food handlers (all were culture positive) or non-reporting of symptoms were likely factors. It has been observed that a food handler will often deny symptoms because of fears related to financial sanctions and job security (Lew *et al*, 1991).

## **MICROBIOLOGICAL EVIDENCE**

Microbiological evidence was available in all of the outbreaks reviewed (Table 3.2), demonstrating that the food handler carried the same organism as the other people who were ill. Definitive proof that the food handler was the cause was possible where a temporal association was also established.

The development of molecular typing evidence, in combination with the demonstration of a temporal association, has aided greatly in the investigation of outbreaks and testing the hypothesis that the food handler is the cause. In a Norwalk-like Virus (NLV) associated outbreak described by Daniels *et al*, 2000, a food handler who prepared sandwiches for a school lunch reported that her infant had been sick with watery diarrhoea since just before the outbreak. A stool sample from the infant was positive for NLV by RT-PCR, and was identical to those from both the deli ham and students' stool specimens. This was the first time RT-PCR and sequence analysis successfully confirmed viral contamination of a food item likely to have been contaminated by a food handler. Molecular typing, in combination with demonstrating a temporal association, served to definitively implicate the food handler. Another recent NLV outbreak investigation (Anderson *et al*, 2001) also used this technique. Molecular typing methods have now been developed for other pathogens as well and have been used in outbreaks implicating food handlers *e.g.* *Salmonella javiana* (Lee *et al*, 1998), *Salmonella virchow* (Maguire *et al*, 2000) and *Cryptosporidium parvum* (Quiroz *et al*, 2000).

## **ENVIRONMENTAL EVIDENCE**

Environmental investigation can be used in conjunction with epidemiological and microbiological evidence to add weight to implicating a food handler. Poor personal hygiene - most particularly poor hand hygiene - was commonly reported as having contributed to the outbreaks reviewed. This has previously been documented as a frequently reported practice linked to foodborne outbreaks (Bean *et al*, 1990). Other commonly cited environmental factors associated with the outbreaks reviewed included improper storage of food and temperature abuses. Inadequate hygiene facilities for food handlers was a notable factor in some outbreaks.

In a Hepatitis A virus outbreak described by Weltman *et al*, 1996, the implicated baker was observed not to have adhered to strict hand-washing procedures, and was observed not to have worn gloves on occasion when he was obliged to do so. In addition, the environmental investigation revealed that a hand-washing sink in the bakery had tap handles that were difficult to use and that the water took several minutes to heat.

In an outbreak of shigellosis on a cruise ship described by Lew *et al*, 1991, environmental inspection found that only one toilet was available in the galley area for over 100 food handlers to use while they were on duty. This toilet facility was locked (the head chef kept the key), and had no disposable towels. The authors concluded that poor personal hygiene of the food handlers contributed to the outbreak.

In an outbreak of giardiasis (Mintz *et al*, 1993) raw sliced vegetables were the source of infection. Poor hand hygiene of an infected food handler was identified as a cause of contamination of the raw vegetables.



### 3.3 Pathogens

Fifty-nine per cent of all outbreaks reviewed were found to have been attributable to bacterial pathogens; 41% were due to viral pathogens. The single most common pathogen in food handler implicated outbreaks was Norwalk-like Virus (NLV). The other reported pathogens were Hepatitis A virus, *Salmonella* spp., Verocytotoxin-producing *E.coli* (VTEC), *Staphylococcus aureus*, *Streptococcus pyogenes*, *Shigella flexneri*, *Campylobacter jejuni*, *Yersinia enterocolitica*, *Cryptosporidium* spp, *Giardia lamblia* and *Vibrio parahaemolytica* (Table 3.3).

**Table 3.3 Infected Food Handler Implicated Outbreaks of IID : Causative Pathogen**

Pathogen	No. Outbreaks
Norwalk-like viruses (NLVs)	12
<i>Salmonella</i> spp	9
Hepatitis A (HAV)	5
<i>Giardia lamblia</i>	3
<i>Shigella flexneri</i>	3
<i>Staphylococcus aureus</i>	2
Group A <i>Streptococcus</i>	2
Verocytotoxin-producing <i>E.coli</i> (VTEC)	1
<i>Campylobacter jejuni</i>	1
<i>Vibrio parahaemolytica</i>	1
<i>Yersinia enterocolitica</i>	1
<i>Cryptosporidium</i> spp	1
<b>Total Outbreaks Reviewed</b>	<b>41</b>

While foodborne illness may be mild and relatively short-lived for many victims, others can be more severely affected. Especially vulnerable are children, the elderly and the immunocompromised. Infection with these pathogens predominantly causes gastrointestinal symptoms, such as diarrhoea and vomiting, which can lead to severe dehydration. Some pathogens can have other serious sequelae *e.g.* in up to 30% of cases of VTEC infection, life-threatening complications can occur, of which Haemolytic Uraemic Syndrome (HUS) is the most common (FSAI,1999).

*Salmonella typhi* / *S. paratyphi* infections are particularly problematic in view of their potential seriousness and the possibility of carriage. There have been no reported outbreaks associated with these pathogens in Ireland to date. However, given the now extensive amount of foreign travel and the increasing numbers of immigrants employed in the food industry, there is potential for these pathogens to become sources of foodborne infection here. An interesting outbreak of paratyphoid fever in the UK, associated with a fish-and-chip shop, was described by Francis *et al* in 1989 . The source of infection for the initial cases was believed to have been a food handler who was infected overseas six years earlier. This food handler's wife (also a food handler), whose faeces and urine were originally culture negative, became culture positive on one occasion. She was considered to be the source of two further cases; secondary household spread of infection from these two cases resulted in one symptomatic and two asymptomatic infections. Another outbreak of typhoid fever (Xercavins *et al*, 1997) highlights the potential for a prolonged outbreak caused by a casual food handler who was a carrier in a hospital setting. The outbreak lasted from 1988 to 1994 and was due to intermittent low level exposure of patients to *Salmonella typhi* by the food worker.

### 3.4 Food Handler Symptoms

#### PRESENCE OF SYMPTOMS

Symptoms of gastrointestinal infection generally include nausea, malaise, abdominal pain, diarrhoea and / or vomiting. **The evidence is that food handlers are more likely to contaminate food in the symptomatic phase of illness *i.e.* when symptoms such as diarrhoea and / or vomiting are present.** Diarrhoea and/or vomiting were by far the most commonly reported symptoms involving infected food handlers implicated in the foodborne outbreaks reviewed.

Staff members involved in an outbreak of *Shigella sonnei* gastroenteritis in the week prior to an outdoor festival prepared ready-to-eat foods that led to an outbreak involving over 3,000 people. Some of the food handlers were symptomatic with diarrhoeal illness during food preparation. A salad had been thoroughly mixed by hand by these staff members and there was limited access to proper washing facilities (Lee *et al*, 1991).

Guzewich & Ross (1999:Sect I) in a review of the risks posed by food handlers found that, in outbreaks involving infected food workers, 93% were either ill prior to or at the time of the outbreak; in most of the remaining outbreaks, an asymptomatic food worker was believed to have been the source of the infection. In this current review, a lesser proportion of outbreaks (71%) were found to have been linked with food handlers who admitted to being symptomatic (*i.e.* having symptoms either just prior to or during the outbreak). The remainder of the outbreaks were related to food handlers who did not report symptoms but who were culture positive. Explanations could be either non-reporting of symptoms or asymptomatic food handlers; the problem of non-reporting of symptoms has been highlighted (Lew *et al*, 1991).

#### ABSENCE OF SYMPTOMS

However, the food handler may also be infectious (may be shedding the pathogen) during the pre-symptomatic and post-symptomatic phases of illness.

***Pre-symptomatic Phase:*** In some illnesses, the food handler is particularly infectious during this phase but is unaware of his/her illness. This has been highlighted with regard to some Hepatitis A outbreaks. In 1994, an outbreak of Hepatitis A virus was reported in New York (Weltman *et al*, 1996) associated with an infected baker who had contaminated food while applying a sugar glaze to pastries after baking. Seventy-nine people became ill prior to the outbreak being investigated. The incubation period for Hepatitis A can be as long as six weeks, and the person is infectious in the pre-symptomatic period prior to the onset of jaundice. A similar outbreak occurred in the UK in 1999 (Sundkvist *et al*, 2000). Eight people who had drank in a public house in the two weeks before the barman became ill developed Hepatitis A. Fomite transmission by contamination of glasses was considered the most likely route of spread of infection.

Several outbreaks of NLV gastroenteritis also demonstrated the infectivity of the food handler in the pre-symptomatic phase of illness (Gaulin *et al*, 1999; Connolly *et al*, 1994). Lo *et al* 1994 describe an outbreak of NLV gastroenteritis that occurred in a hospital in Wales in 1994. Descriptive evidence implicated a pre-symptomatic food handler who handled salad items as the possible source; she had become ill the day following salad preparation. This lady had a young child at home who had been ill with a gastrointestinal illness during the previous two days. The investigative team suggested that pre-symptomatic faecal shedding in the mother was a possible explanation for the contamination of the food.

***Post-symptomatic Phase:*** Following acute illness with certain pathogens, a person may shed the pathogen for a period of time after the illness or may become an asymptomatic carrier. A

number of outbreaks have been described which illustrate the role of food handlers who were asymptomatic carriers in the transmission of infection. An outbreak of *Salmonella typhi* in a public school in Madrid was considered to have originated from an asymptomatic carrier who was one of the three food handling workers in the school restaurant (Usera *et al*, 1993). Another outbreak in a university hospital in Amman, Jordan (Khuri-Bulos *et al*, 1994) implicated an asymptomatic food worker, culture positive for *S. enteritidis*, who had prepared the mashed potato which was implicated as the likely vehicle of infection. In a hospital outbreak of *S. enteritidis* in the UK (Dryden *et al*, 1994), faecal screening of asymptomatic people demonstrated a high carriage rate among catering staff. There was an association between illness and eating meals prepared by one of the food handlers.

### **3.5 Pathogen Infectivity**

The degree of pathogen infectivity can be highly significant in determining the scale/nature of an outbreak.

High attack rates are common features of many NLV outbreaks. This is explained by characteristics of the pathogen (low infectious dose required to cause illness; pathogen survival for long periods in the environment on surfaces/ fomites / possibility of multifactorial spread) and the symptoms caused (projectile vomiting that can become aerosolised). Consequently, a food handler who is symptomatic with viral gastroenteritis has the potential to infect large numbers of people. For example, Kobayashi *et al*, 1991, describe a food handler associated outbreak in Japan in 1989 where 3,236 (42%) of 7,801 schoolchildren became ill following consumption of school lunches. Lo *et al*, 1994 relate an outbreak of NLV gastroenteritis in a hospital where 81 patients and 114 staff were affected. This type of outbreak can be extremely difficult to control, even when the infected food handler has been excluded from work, because of environmental contamination. Shigella also has a low infectious dose; a large food handler implicated outbreak resulted in over 3,000 cases (Lee *et al*, 1991).

For many other pathogens the infectious dose required is much higher *i.e.* large numbers of organisms required to cause infection. However, an infected food handler can contaminate food which, together with operational deficiencies (*e.g.* inadequate storage, temperature abuses), can lead to proliferation of the pathogen to sufficient numbers in the food to infect consumers. In a *Salmonella Hadar* outbreak in Italy which affected over 400 people (Faustini *et al*, 1998) a meat salad was significantly associated with illness. It was postulated that the meat salad was contaminated by an infected food handler and the meat was then cooled at room temperature, not by rapid refrigeration, which contributed to proliferation of the pathogen.

### **3.6 Mode of Transmission to Food**

Pathogens can be transmitted to food by an infected food handler in a number of ways. This literature review confirms that **the hands are the most important vehicle for transfer of pathogens to food** *e.g.* from faeces, infected skin lesions, nose or other sites to food. Other means of pathogen transfer include naso-pharyngeal secretions, respiratory (aerosolisation of vomitus) and fomites. These factors underscore the importance of strict personal hygiene practices of food handlers and adherence to good food hygiene practices in the prevention of foodborne illness.

## **Hands**

**Faecal-oral:** The overwhelming evidence from the literature is that this is the most common cause of contamination of food by an infected food handler. It involves transmission of the pathogen to food by the food worker's fecally contaminated hands - the result of breakdown in personal hygiene. Both bacterial and viral infections have been transmitted in this way *e.g.* *Salmonella* spp (Hedberg *et al*, 1991; Lee *et al*, 1998), HAV (Sundkvist *et al*, 2000; Weltman *et al*, 1996), *Shigella flexneri* (Lew *et al*, 1991; Dunn *et al*, 1995), VTEC *E. coli* (Irish *et al*, 2000), *Yersinia enterocolitica* (Morse *et al*, 1984), *Campylobacter* spp (Olsen *et al*, 2001), *Giardia lamblia* (Mintz *et al*, 1993; Quick *et al*, 1992). The question of glove use as a barrier to bare hand contact was found to have been infrequently referred to in the outbreaks reviewed; it is therefore considered inappropriate to comment on glove use in the context of these outbreaks in view of the paucity of available information. Strict personal hygiene is the only effective means of preventing faecal-oral transmission.

Assessing hygiene practices of food handlers can, however, be extremely difficult. In an outbreak caused by an infected food handler with Hepatitis A infection, a decision had been made not to administer immunoglobulin to contacts because it was felt that the personal hygiene of the food handler (who had prepared many uncooked foods served at the event) was satisfactory. It transpired that ninety-one people were subsequently found to have been infected (Massoudi *et al*, 1999), casting doubt on the assessment of hygiene practice in this instance.

**Infected skin lesions:** Transmission of staphylococcal and streptococcal infection via uncovered, infected skin lesions has been reported in a number of foodborne outbreaks. An outbreak of Group A Streptococcus (GAS) pharyngitis following a school banquet was linked to a food handler who had prepared a macaroni and cheese dish (Farley *et al*, 1993). The food handler had a small healing lesion on the dorsum of one hand. Culture of the lesion grew GAS. This was the first published report that found a hand-lesion infected with GAS as the only identified source of food contamination. Pereira *et al*, 1994 relate an outbreak of *S. aureus* food poisoning caused by a food handler with a healing lesion on his neck, culture-positive for *S. aureus*. A cream filled cake at a birthday party, from which *S. aureus* was also isolated, had been inadvertently contaminated by the food handler.

## **Naso-pharyngeal secretions**

Food can become contaminated by the food handler via infected naso-pharyngeal secretions (by coughing, sneezing or direct contact from nose to hands). Foodborne outbreaks of staphylococcus (Richards *et al*, 1993) and streptococcus (Bar-Dayana *et al*, 1996) have been reported to have been transmitted in this fashion. Katzenell *et al*, (2001) reviewed the literature relating to streptococcal contamination of food, concluding that foodborne streptococcal pharyngitis can originate from the pharynx or hand lesions of a food handler. The authors noted that epidemics tend to occur in warm climates and in the hottest months of the year.

## **Aerosolisation**

Aerosolisation as a mode of transmission is particularly relevant in relation to NLV outbreaks and has been a factor in food handler related outbreaks. Vomitus particles may become aerosolised and transmitted to food via an airborne route (Reid *et al*, 1988) which can result in large numbers of people becoming ill (Arness *et al*, 1999; Kassa *et al*, 2001)

## **Fomites**

The ability of viruses to survive in the environment on surfaces (fomites) has been well documented in the literature. Environmental surfaces contaminated by infected food handlers have been postulated to be sources of pathogen transmission in some outbreaks involving NLV and HAV. Lo *et al*, 1994 described an outbreak of NLV gastroenteritis where it was

believed that mechanical transmission of the virus via clothes and hands was possible. Sundkvist *et al* described transmission of Hepatitis A via contaminated drinking glasses.

### Eye / Other Infections

Many guidance documents recommend that food handlers with eye / ear / mouth infections should refrain from food handling duties (DOH Food handlers: fitness to work 1995; Codex Alim 1997; WHO 1989). No outbreak due to such infections was identified in this literature review. Purulent eye discharges due to *S. aureus* have, however, been recognised as a source of foodborne infection (Chin, 2000).

## 3.7 Commonly Implicated Foods

Specific food items were identified as vehicles for transmission in 85% of the outbreaks (Table 3.4). No food item was pre-wrapped, canned or bottled. All of the implicated foods could be categorised as ready-to-eat foods *i.e.* foods which had gone through most or all of their preparation steps (*c.f.* Glossary). Such foods commonly comprised sandwiches, salads and cooked meats - foods that required extensive hand contact during preparation.

Table 3.4 Infected Food Handler Implicated Outbreaks of IID : Food Items

Food Item	No. of times Food Item Implicated in Outbreak
Cooked food items ( <i>e.g.</i> ham, chicken, fish, mashed potatoes)	10 (24%)
Cold sandwiches	8 (20%)
Cold salads, incl. raw veg & cheese	8 (20%)
Other cold foods	3 (7%)
Bakery goods	3 (7%)
Beverages, incl. ice	2 (5%)
Fruit	1 (2%)
Not identified	6 (15%)

*No. Outbreaks = 41*

Undoubtedly, the highest risk posed by an infected food handler whether symptomatic, pre-symptomatic or a carrier was the unhygienic handling of ready-to-eat foods. Consistent with what was stated in WHO's 1989 guidelines regarding food handling personnel (WHO 1989), those food handlers who present a special risk of transmitting pathogenic organisms from themselves to food can be defined as '*persons whose work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment*'. Many current guidance documents use a similar definition (PHLS 1995; Guidelines VTEC PHLS 2000; FSA/Scottish Exec Health Dept Guidance 2002). Such foods constitute a high risk if contaminated because there are no further preparation steps to control the hazard.

**High-risk food handler:** *one whose work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment*

## 3.8 Outbreak Settings

The outbreaks described in the literature - where an infected food handler was implicated as a source of infection - occurred in such diverse locations as schools, universities, in the community, restaurants, pubs, hotels, hospitals, nursing homes, canteens, military training

bases, a cruise-ship, prisons, summer camps, offices, a manufacturing company and conferences. Thirty-seven per cent of the outbreaks were associated with commercial catering premises (restaurants, hotels *etc.*), 19% with educational facilities (schools, universities, summer camps) and 17% with health care settings (hospitals, nursing homes). Most significant is contamination of ready-to-eat foods being prepared and provided to the public for consumption – the riskiest outbreak settings being at those points of the food chain near to the consumer. Some outbreak settings have been very large indeed with hundreds, and in some cases thousands, of consumers becoming ill following exposure to contaminated foods. Vulnerable populations, including the ill and the elderly, have been victims in several documented outbreaks.

### **3.9 Review Limitations**

A caveat of this literature review is that evidence implicating food handlers has been confined to published scientific articles relating to outbreak situations. It is important to point out that these publications represent only a small fraction of foodborne disease outbreaks and an even smaller fraction of all foodborne disease. Some outbreaks, especially those causing mild illness, may not even be reported to health authorities. Of the outbreaks which are investigated, only a small proportion are written up, submitted to and ultimately published in peer-reviewed journals. Some degree of publication bias cannot therefore be outruled. In addition, many sporadic cases of foodborne illness are likely to be underreported.

As a result, it is possible that this review markedly under-represents the true number of foodborne outbreaks related to infected food handlers. However, it is unlikely that the investigation of all outbreaks and sporadic cases would produce any evidence at variance with the review's conclusions.

### **3.10 Conclusion**

Unequivocal evidence has been presented which demonstrates that infected food handlers can serve as sources of infection in foodborne outbreaks in a wide variety of locations where food is handled.

Food handlers have been associated with the transmission of both viral and bacterial pathogens via food. In terms of symptoms, it is those food handlers who are symptomatic with gastrointestinal symptoms – diarrhoea and/or vomiting – *and who continue to work through those symptoms* that present the greatest risk. However, in viral outbreaks, the pre-symptomatic and post-symptomatic phases of illness are also significant in relation to risk of transmission. Less commonly, foodborne outbreaks implicating food handlers have been associated with infected skin lesions or infected discharges (*e.g.* nasopharyngeal).

The potential for transmitting foodborne disease is clearly greatest the nearer along the food chain the food handler is to the consumer. The review, for instance, found no evidence linking handlers of raw meat in production facilities and abattoirs with outbreaks of consumer illness. Overwhelmingly, infected food handlers *who handle unwrapped food to be consumed raw or without further cooking or other forms of treatment* are the subgroup of food handlers identified as presenting the highest risk.

The hands are by far the most important vehicles for pathogen transfer from stools, nose, infected areas of skin or other sites to food. Poor personal hygiene of food handlers – *in particular failure to wash hands appropriately* – is a major risk factor for contamination of food. Poor hand hygiene was frequently reported in the outbreaks reviewed. In addition,

lapses in safe food handling practices, including improper storage and temperature abuses, commonly exacerbated the problems posed by poor hand hygiene.

Preventing incidents of gastrointestinal illness associated with infected food handlers demands a multifaceted approach. Very clearly, this assessment of risk underscores the absolute importance of education and training in personal hygiene and safe food handling practices, as well as the reporting of relevant symptoms so that appropriate action can be taken where necessary to address any possible risks.

### **Risk Assessment Summary:**

- While food handlers can be innocent victims in outbreaks of foodborne infection, there is ample epidemiological, microbiological and environmental evidence linking infected food handlers with causation in a significant number of outbreaks.
- The pathogens found to be most frequently linked to food handler transmission have been Norwalk-like Viruses (NLVs), Salmonellas and Hepatitis A (HAV).
- To constitute a risk, the infected food handler is generally symptomatic – most often with gastrointestinal symptoms. However, food handlers in the pre- or post-symptomatic phases of illness have also been implicated in causing foodborne outbreaks.
- The most frequently associated symptoms are vomiting and / or diarrhoea – underscoring the importance of symptom reporting and exclusion from food handling duties while symptomatic.
- By far the most common mode of pathogen transmission to food by the infected food handler is via fecally contaminated hands. Poor hand hygiene is *the* contributing factor.
- Other reported modes of transmission include infected skin lesions (usually on hands), nasopharyngeal secretions (*Staph*, *Strep*), aerosolisation of vomitus (NLV) and fomites (NLV, HAV).
- There is **overwhelming evidence that food handlers whose work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment (HIGH RISK FOOD HANDLERS) are those most commonly implicated** in foodborne outbreaks. The unhygienic handling of such foods constitutes a particularly grave risk.
- Infected food handlers can potentially infect food in any setting, but have been demonstrably implicated at points of the food chain near to the consumer.

## Chapter 4

### Prevention of Food Contamination by Infected Food Handlers

#### 4.1 Introduction

There are four main facets to the prevention of food contamination by food handlers:

- A supportive work environment with the provision of clean, hygienic work premises and adequate toilet, handwashing and changing facilities
- Instructing and/or training, and supervising staff in the safe handling of food
- Good personal hygiene practice by food handlers
- The reporting by food handlers to management of relevant infectious or potentially infectious conditions so that appropriate action (including exclusion) can be considered

Legislative requirements, as earlier outlined, apply to all four areas. This chapter concentrates primarily on personal hygiene aspects (mainly hand hygiene) and the evidence base for action applicable to those aspects. Chapter 5 considers the reporting of relevant conditions by food handlers.

Good hygiene practice, a critical factor in preventing the spread of infection, is essential for all food handlers in order to protect consumer health and ensure a safe food supply. The primary concern is the avoidance of microbiological contamination of food by infected food handlers, whether by direct contact with open food, or by indirect contact (e.g. with surfaces in production and processing areas). Food handlers suffering from gastrointestinal symptoms, *i.e.* diarrhoea or vomiting, are especially likely to contaminate food and the environment. Management in the food industry has an important role in minimising the risk of contamination of food by ensuring that all staff understand the importance of good personal hygiene and receive training and/or instruction in the safe handling of food. All such training should be appropriately targeted, with particular emphasis on the high-risk food handler.

#### 4.2 Hand Hygiene

Contaminated hands can serve as vectors for the transmission of microorganisms. Pathogenic microorganisms responsible for outbreaks are spread from the hands of the food handler to others when the food handler contaminates his/her hands and then passes these microorganisms to consumers via hand contact with food or drink. (Fendler *et al*, 1998a). The consumer is exposed following the ingestion of these microorganisms, which may cause gastrointestinal illness. Hand contact with ready-to-eat foods represents a very important mechanism by which pathogens may enter the food supply. *Food handlers whose work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment have been identified as a particular risk group.*

Two types of microorganism are found on the hand: resident and transient (Larson 1995; Miller 1994). Resident microorganisms, buried deep within the pores, reside on the hand permanently and are normal microflora of the skin. They are not easily removed from the skin



by mechanical friction (Larson 1995). Resident microorganisms do not, however, normally pose a threat of infectious disease. *Staphylococcus aureus*, a bacterium, is the only resident microorganism that is a cause of food safety concern (Miller 1994). There are situations, e.g. an infected cut, in which resident microorganisms may cause disease – but washing serves to degerm the infected area (Fendler *et al*, 1998b).

Transient microorganisms can be bacterial (e.g. *E. coli*) or viral (e.g. NLV) and are picked up accidentally, residing on the hand for a short period of time only. They are easily transmitted by hands unless removed by the mechanical friction of washing with soap and water or destroyed by the use of an antiseptic solution (Larson 1995). Transient organisms cause great concern to the food industry because they are loosely attached to the skin surface and can easily contaminate food if food handlers do not wash their hands adequately (Guzewich & Ross, 1999 II). They include fecal microorganisms which may contaminate the hands, fingers and arms of food handlers after using the toilet.

### **4.3 Hand Washing**

Hand washing includes the process of washing *and* drying hands. Hand washing removes contaminating microorganisms from the surface of the hand so that they cannot be transmitted to food. However, data from UK and American studies have found that only 50% to 60% of people wash their hands after using the toilet (Foodlink 2001; Guinan *et al*, 1997). Michaels (2001) reports that hand washing compliance is below 50% for almost every group studied. Compliance with hand washing among health workers is even reported to be low (Pittet and Boyce 2001). Cultural differences in hand washing practices have also been found in the US (Shiferaw *et al*, 2000). In general it has been found that males and those in the younger age groups tend to have poorer handwashing practices. It has been shown that particular areas of the hand are frequently missed with handwashing – notably the tips of the fingers and thumbs (Taylor 1978); fingers are thought to be the most important part of the hand in terms of transfer and spread of pathogenic microorganisms (Ansari *et al*, 1991 J Clin Micro). These behavioural factors, along with the practical difficulties of being able to wash hands repeatedly and when needed, are important considerations in food handler training.

Experts agree that hand washing is single most effective way to prevent the spread of microorganisms (PHLS 1995; Le Baron *et al*, 1990). Much has been written in the scientific literature regarding optimum duration, water flow and temperature, types of products / soaps used and hand drying methods.

**Duration:** Duration of hand washing is important for mechanical action as well as exposure to the cleansing agent (Larson 1995). It is the abrasive action obtained by vigorously rubbing the surfaces being cleaned that loosens the hands' transient microorganisms (Food Code 2001). Recommendations regarding the duration of hand washing range from 10-30 seconds (Miller 1994; Paulson 1994; Nicoletti *et al*. 1990; Larson 1987; Larson *et al*. 1989; Pratt *et al*. 2001). Interestingly, Chamberlain *et al*. (1997) found a tenfold reduction in the median number of transient bacteria following both long (3 minute) and short (10 second) hand washes, suggesting that the hand washing technique used is more important than the duration of hand washing. A hand wash duration of 10-15 seconds minimum is commonly recommended (Larson 1995; Food Code 2001).

**Water Flow / Volume:** Studies have found that microorganisms can be reduced to a safe number on washed hands and finger tips if hands are washed under running water with the wash hand basin stopper being removed (Snyder 1998). Bidawel *et al* (2000) also found that the volume of water used in handwashing to be significant. The greater volume of water used the lower the rate of transfer of viruses.

**Temperature:** While studies have found that no resident bacteria are removed at temperatures less than 40°F, it is transient microorganisms on hands (rather than resident microorganisms) that are of greatest concern in food establishments (Guzewich & Ross 1999 II). Since transient microorganisms are more easily removed by routine hand washing (not located in deep skin layers), it has been noted that water temperature may not play a role in their removal from the skin (Guzewich & Ross 1999 II). In any event, water temperatures must be within a comfortable range to the user in order to be effective and practical (Guzewich & Ross 1999 II).

**Taps:** The handling of taps has been associated with contamination of hands (Gould 1994; Ayliffe *et al*, 1998; Babb 1998). Lever action (elbow/wrist operated) taps have been advocated to avoid hand contamination (Gould 1994; Ayliffe *et al*, 1998; Babb 1998; Bushell 2000).

**Nail Brushes:** The use of nailbrushes is not encouraged except to remove heavy soiling which cannot be removed by soap and water alone (Babb 1998). It has been suggested that the frequent use of nailbrushes may damage skin and increase microbial proliferation (Ayliffe *et al*, 1998). Wet or damp brushes are likely to be heavily contaminated with microorganisms. (Babb 1998). If nailbrushes are used they should be sterile and dry (Babb 1998; Ayliffe *et al*, 2000).

#### **4.4 Hand Wash Products**

Hand wash products include unmedicated (plain) soaps, medicated soaps (antimicrobial / antibacterial) and alcohol hand disinfectants. Soaps may either be in bar or liquid form. A number of studies have been carried out to evaluate the effectiveness of a variety of such hand wash products. However, there has been no standardised approach to evaluation, making comparisons between studies difficult (Guzewich & Ross 1999 II). In the UK, existing food handler guidelines have not specified the use of particular hand wash products (DOH Food handlers: fitness to work 1995; PHLS 1995).

##### **4.4.1 Plain (Unmedicated) Soap**

Plain or non-antimicrobial, non-antiseptic soaps are detergent-based cleansers that have no bactericidal activity and, by mechanical action, are used for the physical removal of dirt (Larson 1995). Washing with plain soap and water has been shown to be effective in mechanically removing transient microorganisms from the hands (Paulson 1994; Larson 1995; Paulson *et al*, 1999). Plain soaps are considered to be sufficient to remove transient microflora from the hands of food employees (Paulson 1994). They have been recommended as adequate for the removal of microorganisms and, thereby, the prevention of the spread of gastrointestinal infections (PHLS 1995; Ayliffe *et al*, 1998; Snyder 1998). In addition plain soaps are gentle on skin, are non-allergenic and are cosmetically acceptable – important factors in promoting hand washing compliance.

##### **4.4.2 Medicated Soap**

Medicated soaps are variously termed as antimicrobial, antibacterial or antiseptic soaps. They contain ingredients active against microorganisms on the skin (Larson 1995); they are used for the mechanical removal and killing or inhibition of both transient and resident flora (Larson 1995). Fendler *et al* (1998a) note that the literature clearly demonstrates that antimicrobial handwashing agents can be highly effective in killing pathogens and can provide residual antimicrobial activity over a period of several hours. The anti-microbial

effectiveness of medicated soap is increased with multiple applications over a number of days (Namura *et al*, 1994), of particular relevance when a long-term reduction in colonising microflora is needed (Larson *et al*, 1989). It is to be noted that the use of medicated soaps is specified in Vertical Directives and therefore applies to some sectors of the food industry.

The impact of repeated washing with harsh substances and the sustainability of these products if they are irritant to food workers hands require consideration. In a recent review on the effects of hygiene skin products, Larson (2001) found that the integrity of the skin could be damaged by excessive washing with antiseptic preparations and this was related to more frequent colonisation by *S. hominis* and *S. aureus*. Common chemicals used in medicated soaps include (Larson EL 1995) (a) ***Chlorhexidine gluconate*** which has a broad spectrum of activity and a relatively low skin-irritation potential; several *clinical* studies report good reductions in skin flora after 15-second handwash (Larson *et al*, 1986), (b) ***Iodine solutions*** which have a wide range of activity but have a propensity towards skin irritation and allergic effects in sensitive persons and (c) ***Triclosan*** which has good antimicrobial activity against most bacteria, is only minimally affected by organic matter and appears to be non-allergic with short term use.

Any advantages of using medicated soaps need to be balanced with possible irritant effects, possible damage to skin integrity and the potential of resistant strain emergence. The use of plain soap by food handlers for handwashing should be adequate for removing transient microorganisms; it also avoids the risks of excessive drying and irritation leading to dermatitis.

#### **4.4.3 Alcohol Hand Disinfectants**

Alcohol hand disinfectants are only effective when used on physically clean hands; they are completely inactivated by any organic matter (Larson 1995; Paulson *et al*, 1999). They provide a rapid reduction in skin microflora and are a very effective method of hand asepsis (Paulson *et al*, 1999; Larson EL 1995). Alcohol based formulations have been recommended in preference to detergent based products for health care workers (Larson 2001). Alcohol solutions have been shown to have a very drying effect on the skin causing skin irritation, although many commercially produced products now contain emollients. While alcohol formulations containing 70% alcohols have been found to be effective in reducing the numbers of *E. coli* and rotavirus (Ansari *et al*, 1989), alcohol products are not effective against viruses such as Hepatitis A (Mbithi *et al*, 1993). Recent research has shown that washing hands with a mild soap was more effective than applying a 70% alcohol hand sanitizer (Charbonneau *et al*, 2000).

#### **4.4.4 Bar Soaps or Liquid Soaps?**

Bar soaps have been found to have higher bacterial cultures after use compared to liquid soaps (McBride 1984). Very significantly, however, studies have found that bacteria were not transferred to hands on subsequent use (Heinze 1985; Heinze & Yackovich 1988). Proponents of bar soap recommend that small bars be used and changed frequently; in addition, soap should be kept on soap racks to allow for drainage, as if soaps are left lying in a pool of water this is likely to result in contamination (Larson EL 1995; Infection Control Nurses Association 1998; Ayliffe *et al*, 2000).

Despite the positive evidence relating to the use of bar soaps, a number of reports have stated a preference for liquid soap for routine hand washing (Gould 1997; Babb J 1998; Infection Control Nurses Association 1998). Overall, practical advantages in using liquid soap have been cited - including ease of access through dispensers, avoidance of contact with

contaminated hands, and speed and ease of lathering. Liquid soap dispensers with disposable cartridges reduce the risks of contamination compared with refillable containers (Ayliffe *et al*, 1992). Where only refillable containers are available, it has been recommended that these need to be thoroughly cleaned before replenishing. Liquid soap dispensers should preferably be wall-mounted and operated by elbow, wrist or foot (Ayliffe *et al*, 1992)

It is noted that the use of liquid soaps is standard practice in certain meat processing sectors. However, this Committee considers that there is insufficient evidence to recommend the practice of liquid soap use in food premises as a standard.

#### **4.5 Hand Drying**

The importance of adequate hand drying cannot be underestimated. Hands must be dried adequately (Coates *et al*, 1987). Wet hands facilitate the transfer of bacteria and viruses; residual moisture on hands is significantly associated with the increased transfer of microorganisms (Ansari *et al*, 1988; Larson 1995; Patrick *et al*, 1997; Springthorpe & Sattar 1998).

Authors differ regarding their preference for paper towels or hand dryers (Ansari *et al*, 1991a; Taylor *et al*, 2000). Significant reductions in bacterial counts have been demonstrated when hands are dried with paper towels, since the friction effect physically removes bacteria from hands (Blackmore 1989). In addition, paper towels dry hands rapidly and a dispenser can be used by several people at once (Blackmore 1987). While there are advantages offered by paper towels, it has been pointed out that there are also issues of hand contamination with pathogens from paper towel exit areas (Guzewich & Ross 1999, Section II). Hand dryers are in common use. A disadvantage of using hand dryers is that warm air currents dry the hands slowly and that each hand dryer can only be used by one person at any one time. Some authors have suggested that hand dryers may accumulate microorganisms from toilet aerosols and contaminate hands as they are dried; they have in turn recommended that paper towels are the most hygienic hand drying method (Snyder 1998).

While significant reductions in bacterial counts have been noted when hands are dried with cloth towels (Blackmore 1989), they are a potential source of cross-contamination. Single cloth towels are inferior to paper towels or hand dryers in terms of bacteriologic quality (Blackmore 1987; Redway *et al*, 1994). The bacteriologic quality of *continuous* cloth towels is reported to be less than that of paper towels (Blackmore 1989). Proposed causes include the laundering process as well as the possibility of bacteria transfer from one user to the next as the towel is rotated and pulled in order to obtain a clean area (Guzewich & Ross 1999, Section II). There is a paucity of evidence relating to the use of cabinet dispensed roller towels. Despite this, it is the considered view of this committee that, if properly maintained and used, their use is acceptable.

Recommended handwashing - *including hand drying* - guidelines are outlined (Table 4.1).

Table 4.1 Hand Washing Guidelines

<p><b>Hands should be washed as frequently as necessary and always...</b></p> <p><b>When?</b></p> <ul style="list-style-type: none"><li>➤ <b>Before starting / recommencing work</b></li><li>➤ <b>After using toilet</b></li><li>➤ <b>Before handling cooked or ready-to-eat foods</b></li><li>➤ <b>After handling or preparing raw food</b></li><li>➤ <b>Before gloving and after glove removal</b></li><li>➤ <b>After any non-food contact <i>such as</i></b><ul style="list-style-type: none"><li>- after touching skin/ hair/ face</li><li>- after coughing, sneezing, blowing nose</li><li>- after cleaning duties</li><li>- after shaking hands</li><li>- after handling money</li><li>- after handling refuse</li><li>- after smoking</li></ul></li></ul> <p><b>How?</b></p> <ul style="list-style-type: none"><li>➤ <b>Wet hands under warm running water</b></li><li>➤ <b>Use sufficient soap to form a good lather</b></li><li>➤ <b>Systematically rub all parts of hands with soap and water</b></li><li>➤ <b>Lather for 10-15 seconds minimum, vigorously and thoroughly rubbing all hand surfaces, including the fingertips and thumbs</b></li><li>➤ <b>Rinse hands thoroughly with running water</b></li><li>➤ <b>Dry hands thoroughly ( using paper towel <i>or</i> hand dryer <i>or</i> cabinet roller towel)</b></li></ul>
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## 4.6 Barriers to Bare Hand Contact

### 4.6.1 Gloves

Gloves provide a physical barrier between food and hands (Babb 1998). The use of gloves has been advocated by some as a means of eliminating bare hand contact with ready-to-eat foods and thereby preventing the transfer of pathogenic microorganisms from hands to food (Ayliffe *et al*, 1998). However, it has been emphasised that no direct scientific evidence has been published to support the premise that use of a physical barrier (gloves) on the hands of food handling personnel prevents transfer of pathogens to food and consequently to support a requirement for no hand contact with ready-to-eat food (Fendler *et al*, 1998b). In the US, it has been reported that regulations prohibiting bare hand contact are viewed by the food industry as unnecessary, expensive and potentially dangerous to workers and patrons alike (Michaels 2001).

Gloves alone are not sufficient to prevent the transmission of pathogenic microorganisms from food employees to consumers (Fendler *et al*, 1998b). The use of gloves may provide a false sense of security and may discourage frequent hand washing (Babb 1998). Handwashing has been strongly encouraged prior to gloving (Fendler *et al* 1998a; Paulson April 1996) and after glove removal (Larson 1995). The exterior and interior of the glove can become contaminated with microorganisms if hands are not washed prior to gloving. Microorganisms may grow more rapidly on a gloved hand due to the increased levels of moisture and nutrients (Food Code 2001).

**Glove use is only effective and acceptable when used in association with an effective handwashing regime** (Larson *et al*, 1989; Babb 1998; Fendler *et al*, 1998a; Pittet & Boyce 2001). If used, it has been recommended that disposable gloves should be 'single use'; food handlers should dispose of and replace gloves after handling potentially contaminated materials (*e.g.* money, raw food) or after putting gloved hands to their mouth or nose (Fendler *et al*, 1998). Hardly surprisingly, doubts regarding glove-changing compliance have been expressed, given that handwashing compliance is below about 50% for almost every group studied (Michaels 2001). Glove use can cause users to engage in risky food handling practices or activities resulting in cross-contamination (Michaels 2001). Gloves do not prevent cross-contamination as food handlers may continue to touch raw food or contaminated surfaces (Fendler *et al*, 1998a).

Many types of glove materials, with a variety of specific characteristics pertinent to overall functionality, are now available. The food industry lacks glove quality standards; studies indicate that gloves used in food service are generally poor quality and have higher leakage rates than gloves used in healthcare (Fendler *et al*, 1998a). An additional complication of gloving is the high potential in food handlers for allergic reactions (contact dermatitis<sup>Kumar 1999</sup> and urticaria) to latex (Schwartz 1995; Fendler *et al*, 1998a) and plastic gloves (Fendler *et al*, 1998a).

A great deal of information is available on the negative aspects of glove usage. The value of gloving in food handling settings is assumed, but has not been proven (Fendler *et al*, 1998a). There are difficulties in proving the effectiveness of gloving. More research is needed to assess the positive effects of glove use in reducing disease transmission in the food industry. Until such evidence is available, it has been emphasised that there must be a reliance on conscientiously employed handwashing practices (Michaels 2001).

#### **4.6.2 Other Barriers**

Other physical barriers to bare hand contact include such items as deli tissues, spatulas, tongs and other dispensing equipment. Their use has been encouraged (US Department of Health and Science). However, there is currently a lack of available evidence regarding the use of such barrier methods (Guzewich & Ross, Section II, 1999).

### **4.7 Other Personal Hygiene Aspects**

**Personal behaviour:** Food handlers should refrain from behaviour which could result in contamination of food such as smoking, spitting, chewing or eating, sneezing or coughing over unprotected food (Codex Alim).

**Clothing:** Recommendations with regard to appropriate clothing, general tidiness and other hygiene aspects are based on common sense and best practice. Best practice guidelines promote the wearing of suitable, clean and appropriate outer clothing by food handlers (Guides to Food Safety Training, FSAI). The use of protective clothing is recommended for

certain categories of food handler; where used, protective clothing should be clean, durable and light-coloured.

**Hair:** Hair can be a source of microbacterial contamination. Food handlers should keep their hair neat and tidy; hair restraints (*e.g.* hats, hair coverings, nets) and beard restraints should be worn where appropriate to effectively keep hair from contacting exposed food. The use of hair restraints also discourages the touching of hair.

**Jewellery:** Jewellery can be a source of microbacterial contamination. Higher bacterial counts have been found on the hands of people with rings compared to those without (Jacobson *et al*, 1985). Wrist jewellery may also prevent adequate handwashing (Aston & Tiffney 1997; Sprenger 1997). A greater reduction in microbial counts has been shown after handwashing among those not wearing rings (Salisbury 1998).

**Face Masks:** There is a legislative requirement for the wearing of facemasks in the minced meat sector. It is to be noted that a number of studies currently challenge the efficacy of routine face mask use in the hospital setting by surgical staff; it has been advocated that more well designed studies are required before changes in practice can be implemented (Romney 2001). Any recommendation with regard to face mask use in the food sector is therefore beyond the scope of this document at the present time.

#### **4.8 Infected Skin Lesions & Purulent Discharges**

There is potential for food handlers with infected lesions on exposed body parts to contaminate food with *Staphylococcus aureus* or streptococci. Hence the importance of ensuring that infected lesions on exposed areas of the skin (hands, arms, face, neck, scalp) are adequately covered with a clean waterproof dressing. Waterproof dressings are necessary to ensure that microorganisms from an infected lesion do not contaminate the food being handled. Cuts on exposed parts should be similarly covered as such dressings also prevent bacteria from food, especially raw meat or fish, infecting cuts (Sprenger 1997). Coloured dressings (*e.g.* blue or green) are preferred, and are commonly used, as their colour makes them more visible in food should they become detached. Fingernails should be kept short and clean.

Purulent (pus containing) discharges of the eye, ear, nose or mouth/gums are also a potential source of food contamination. The reporting of these infections by food handlers, and of skin lesions as above, is further considered in Chapter 5.

#### **4.9 Vomitus in Food Preparation Areas**

It is the responsibility of management to ensure that toilets, hand washing facilities and food contact surfaces in food premises are maintained to the highest standard. This is especially critical after contact by anyone reporting diarrhoea or vomiting.

Specific mention is here given to the risks of food contamination with Norwalk-Like Virus (NLV) from an infected food handler. NLV has been shown in Chapter 3 to be a frequent cause of outbreaks involving infected food handlers. Within the general community, circulation of NLV is common, causing sporadic cases and small clusters of gastroenteritis. It has been reported in the UK that over 1500 times more cases occur in the community than are recorded (Cowden 2002). Vomiting is a prominent symptom in NLV-associated gastroenteritis. Onset of vomiting can occur with little or no warning. NLV can be detected in vomitus, and in some incidents, staff have vomited in kitchens. Minimisation of the risk of

transmission of infection by vomiting is problematical. Besides direct gross contamination of food, aerosols produced by vomiting could contaminate food or alternatively lead to contamination of work surfaces with the potential for subsequent transfer to foods (Viral GE Subcommittee, PHLS 1993).

Recent recommendations have been made by the PHLS Viral Gastroenteritis Working Group (Chadwick 2000) in relation to hospital outbreaks of gastroenteritis due to NLV. Where vomiting has occurred in a food preparation area, it has been recommended that the vomit should be carefully removed (wearing disposable gloves and apron), the area cleaned (with detergent, hot water and disposable cloth), the food preparation area disinfected (with a freshly prepared hypochlorite-based cleaner that releases 1,000 ppm of available chlorine) and any exposed food / food that may have been contaminated destroyed. The Centres for Disease Control and Prevention, in a recent review of the public health consequences of NLV, makes similar disinfection recommendations. It notes that, because environmental surfaces have been implicated in the transmission of enteric viruses, surfaces that have been soiled should be cleaned with an appropriate germicidal product (*e.g.* 10% solution of household bleach) according to the manufacturer's instructions (CDC MMWR 2001).

#### **4.10 Conclusion**

The training of food handlers in good hygiene practices is a most critical element in reducing contamination risks to food. *Good hand hygiene is the key risk reduction measure* in the prevention of transfer of potentially harmful microorganisms on hands to food and ultimately to consumers of that food.

The hands of food handlers can be readily contaminated with microorganisms, usually from the gastrointestinal tract. Effective hand washing is crucial. Hand washing with soap and water, followed by thorough hand drying, is effective in removing transient microorganisms from hands. Thorough handwashing, at the right times and with a cosmetically acceptable formulation, is more important than the type of soap used. There is a low general awareness of the importance of hand hygiene regimens by food handlers (Fendler *et al*, 1998a). Education and training programmes as well as measures to promote compliance are needed throughout the food industry.

It is stressed that glove use is only effective and acceptable when used in association with an effective handwashing regime. The complete covering of skin lesions and cuts on exposed areas of skin with distinctive waterproof dressings is important. Other personal hygiene measures include keeping fingernails short and clean, wearing suitable clean outer clothing, keeping hair neat and covered, and minimising the wearing of jewellery.

A supportive work environment is essential to ensuring that staff understand, are trained, are supervised, are encouraged and are provided with adequate and well-maintained facilities to allow for the practice and maintenance of good personal hygiene standards at all times.



## **Recommendations**

- The key to the prevention of contamination of food by food handlers is food handler training and the ability to maintain high standards of hygiene.
- Food handlers should have ongoing *training and instruction* in the importance of personal hygiene and handwashing. Appropriate translation, where necessary, is a fundamental element of training. There should be regular assessment of knowledge and practice.
- Convenient, adequate and well-maintained handwashing facilities should be located in all areas of a food premises including kitchen, staff changing and toilet areas.
- The provision of convenient, adequate and properly maintained toilet facilities is essential.
- The handwashing guidelines as outlined in Table 4.1 are recommended.
- Ideally, taps should be non-hand operable. Non-hand operable taps should be considered when upgrading or refurbishing premises.
- The use of plain (unmedicated) soap for handwashing is effective and is recommended as adequate (while acknowledging that alternatives are specified in Vertical Directives).
- Both bar soap and liquid soap are acceptable. Use of liquid soap (with a preservative) may be more practicable. Ideally, dispensing of liquid soap should be by means of disposable cartridges (*i.e.* topping up of dispenser not required). Otherwise, dispensers should be readily accessible for cleaning and drying.
- The use of nailbrushes is not recommended except to remove heavy soiling which cannot be removed using soap and water alone.
- Paper towels (in a compatible dispenser) or hand dryers are recommended for hand drying. Properly maintained mechanical roller towels (cabinet roller towels or CRTs) are also acceptable.
- It is considered that, in view of the lack of direct scientific evidence regarding the effectiveness of glove use in food handling, it is not currently possible to make a categorical recommendation regarding whether or not gloves should be used.
- The widespread use of gloving in relation to ready-to-eat foods is acknowledged. Where gloves are used, it is imperative that they are used in conjunction with an effective handwashing regime (hands washed before and after gloving), are of good quality, intact and are single use *i.e.* used for one task only such as working with ready-to eat food or with raw food, used for no other purpose, and discarded when damaged or soiled, or when interruptions occur in the operation.
- Food handlers should ensure that infected lesions and cuts on exposed areas of the skin (hands, arms, face, neck, scalp) are totally covered with a distinctively coloured waterproof dressing.
- Food handlers should wear suitable, clean and appropriate outer clothing. Hair should be neat, tidy and restrained where possible. Jewellery wearing should be kept to a minimum.
- While no recommendation in relation to mask use is considered possible because of paucity of evidence, the legislative requirement regarding mask use in some sectors is acknowledged.
- Where vomiting occurs in a food handling area, exposed food should be disposed of. The area should be cleaned and subsequently disinfected with a freshly prepared hypochlorite-based cleaner that releases 1,000 ppm of available chlorine (according to manufacturer's instructions).

## Chapter 5

### Illness Reporting

#### 5.1 Introduction

The reporting by food handlers to management of illnesses or symptoms that might be relevant to the spread of foodborne disease is integral to prevention – most especially in the case of the high-risk food handler. Such conditions should be reported so that any need for possible temporary restriction in food handling duties, exclusion from food handling, or for medical advice can be considered. In addition, it affords management the opportunity to reinforce personal hygiene advice. As previously outlined in Section 2.5.2, there is also a legislative basis to reporting. The *Codex Alimentarius* states that ‘any food handler known or suspected to be suffering from, or to be a carrier of, a disease or illness likely to be transmitted through food ..... should immediately report illness or symptoms of illness to management’ (Codex Alim). The standards, guidelines and other recommendations of the Codex Alimentarius Commission are considered to reflect international consensus regarding the scientific requirements for protecting human health from foodborne risks.

#### 5.2 What should be Reported?

Food handlers should be aware of the need to report to management immediately if they are ill. The pathogens responsible for diseases / illnesses which can be transmitted from infected food handlers via food are listed (Table 5.1). Confirmed illness due to, or carriage of, such pathogens as Typhoid, Paratyphoid, Verocytotoxin-producing *E. coli* (VTEC) and *Shigella dysenteriae* are of particular relevance as exclusion of high-risk food handlers is always applicable in such instances until microbiological clearance criteria for work resumption are met (Chapter 7).

Table 5.1 Pathogens / Conditions Transmissible by Infected Food Handlers via Food	
<i>Aeromonas</i>	Salmonellosis ( <i>Salmonella</i> spp)
Amoebic Dysentery ( <i>Entamoeba Histolytica</i> )	<i>Salmonella typhi</i> / <i>paratyphi</i> (Enteric Fever)
<i>Campylobacter</i> sp.	<i>Shigella</i> spp.
Cholera	<i>Staphylococcal aureus</i>
<i>Cryptosporidium</i> spp.	Streptococcal disease
<i>E. coli</i> (other than VTEC)	Vibrios (non-cholera)
<i>E.coli</i> (VTEC)	Viral gastroenteritis (Rotavirus)
Giardiasis ( <i>Giardia lamblia</i> )	Viral gastroenteritis (Norwalk-like Virus: NLV)
Hepatitis A	<i>Yersinia</i> spp.

The **relevant symptoms** which should be reported have been listed by the Centres for Disease Control and Prevention (CDC) as commonly experienced by people suffering from pathogens transmissible through food by infected food handlers: diarrhoea, vomiting,

jaundice, fever and sore throat *with* fever (Food Code 2001). A food handler suffering from any of these symptoms presents an increased risk of transmitting foodborne illness (Food Code 2001). Visibly infected skin lesions e.g. boils, cuts etc. (Codex Alim; DOH Foodhandlers Fitness to Work 1995) and discharges from the eye, ear (Codex Alim; Foodhandlers 1995), nose (Codex) and mouth/gums (Foodhandlers 1995) are also relevant as there is the potential to contaminate food with *Staphylococcus aureus* or streptococci.

The symptoms/conditions listed (Table 5.2) may therefore be indicative of a disease that could potentially be transmitted through the food supply by infected food handlers and should be reported. **Gastrointestinal symptoms of diarrhoea and/or vomiting are highly significant; these symptoms have been most frequently associated with outbreaks involving infected food handlers.** A liquid stool in particular is liable to contaminate the hands and the environment, facilitating the spread of gastrointestinal pathogens. While certain pathogens causing gastroenteritis may be passed in the stools for varying periods after recovery from illness, transmission at that stage is generally unlikely provided that good hygiene is practised by the food handler.

**Table 5.2 Conditions which should be Reported**

- **Diarrhoea**
  - **Vomiting**
  - Jaundice
  - Fever
  - Sore throat with fever
  - Infected skin lesions (*e.g.* boil, infected wound) or cuts on exposed body parts (hand, arm, face, neck or scalp)
  - Purulent discharges from the eyes, ears, nose or mouth/gums
- (Gastrointestinal illness while on holidays, especially overseas, should also be reported on return)*

### **5.3 Subsequent Action**

Supervisors should use their discretion as to whether or not those who report relevant illnesses / conditions need to be temporarily subjected to certain restrictions or exclusion from food handling duties. Medical advice will at times be necessary in the decision making process. General exclusion criteria and fitness to work are examined in Chapter 6; actions with regard to food handler infection with specific pathogens are detailed in Chapter 7.

**Diarrhoea / Vomiting:** Any food handler with diarrhoea and / or vomiting should immediately cease food handling and report the condition to their line manager (Food Handlers Fitness to Work 1995). No food handler with gastroenteritis should work while symptomatic. While it is initially very difficult to be certain whether one bout of vomiting or diarrhoea is infectious, if there is only one bout in a 24-hour period, and it is not associated with fever, it is reasonable to assume that it is not infectious and the person may resume food handling duties (Food Handlers Fitness to Work 1995). Otherwise, as a general rule, any food handler with diarrhoea and/ or vomiting should be excluded from work until 48 hours after symptoms have abated and stools have returned to normal (where the causative pathogen has not been identified) – *c.f.* Section 6.7. Where the pathogen has been identified, specific exclusion criteria are addressed in Chapter 7 & APPENDIX E.

**Jaundice:** *c.f.* Chapters 6/7.

**Sore throat with fever:** Streptococcal sore throat is only of significance in the context of the high-risk food handler and is considered in Chapter 7.

**Infected skin lesions / purulent discharges:** Infected lesions containing pus on the hands / wrists / arms represent a direct threat for introducing *S.aureus* into food (Food Code 2001). Consequently, an impermeable bandage / waterproof dressing should completely cover such lesions. Lesions on other exposed parts of the body (face, neck, scalp) should also be covered. Food handlers should be aware that hands and fingers that contact pustular lesions on other parts of the body or with the mucous membranes of the nose also pose a direct threat for introducing *S. aureus* into food (Food Code 2001). Cuts can become sites of infection; cuts on exposed body sites should be similarly covered. Those with purulent discharges from the eye, ear, nose or mouth/gums should not work near open food and may need to be restricted to non-food handling activities until recovered.

**Hygiene Advice:** Reporting always presents an opportunity to management to ensure that personal hygiene advice is vigorously reinforced.

## **5.4 Reporting Challenge**

The challenge of illness/symptom reporting by food handlers, a most critical aspect of food safety, should not be underestimated. Many fail to report (Cox *et al*, 1995); *anecdotal evidence suggests that it is an all too rare occurrence, even among high-risk food handlers*. The importance of reporting needs repeated emphasis: at pre-employment (with handout), at refresher training and annually. Appropriate translation for non-nationals should be an indispensable component. Reporting by high-risk food handlers merits concerted, ongoing focus. The training of managers is especially significant.

Food handlers should neither suffer financially nor be penalised on foot of health surveillance demands. The use of casual labour in the food industry – especially the catering sector – and the financial penalties which can be incurred by staff if absent due to illness, does not encourage the reporting of illness. Food handlers need reassurance that they will not suffer loss of pay if they report illness, or symptoms such as diarrhoea / vomiting, or any other circumstance that could post a risk to hygienic food production. Disincentives to the honest disclosure of symptoms should be tackled. An important consideration in relation to food handler exclusion centres around loss of pay. The adoption of a work policy that includes paid leave for ill employees with gastroenteritis would probably increase compliance with illness related work exclusion policies (Daniels *et al*, 2000).

## **Recommendations**

### **Reporting**

- Relevant infections, and those conditions outlined in Table 5.2, should be reported by food handlers to management
- The importance of reporting needs to be repeatedly emphasised at pre-employment (with handout), at refresher training and annually. The training of managers is especially crucial in this regard. Appropriate translation, where necessary, is an essential aspect.
- Reporting by high-risk food handlers needs concerted, ongoing focus
- Illness / symptom reporting by food handlers should be facilitated and encouraged by management without fear of penalty or financial loss

## **Chapter 6**

### **Fitness to Work**

#### **6.1 Introduction**

The relative merits, costs and benefits of the health screening of food handlers remains the subject of debate. This, despite past conclusions of expert committees and working groups which have questioned the relevance of routine medical examination of food handlers and which have recommended education in hygienic practices as a much more effective preventive measure in the control of foodborne diseases (WHO 1989).

The questions posed on the topic of food handler health screening in relation to fitness to work with food are multi-fold. These relate to the use of health questionnaires, whether pre-employment or otherwise; the undertaking of medical examinations; the requirements for medical certification; the conducting of microbiological screening whether routinely, during sporadic illness or in an outbreak situation; and the criteria for exclusion from food handling duties.

#### **6.2 Health Surveillance: Lack of Standardisation**

Lack of uniformity is evident in the procedures adopted by countries in undertaking health surveillance of food handlers. Routine medical examinations or microbiological screening tests are variously undertaken in assessing fitness to work as a food handler.

##### **6.2.1 European Dimension**

In the course of researching this report, sixteen European countries were surveyed to ascertain the health surveillance procedures currently in place in those jurisdictions. Eight countries responded – France, Italy, Denmark, Sweden, Germany, Austria, Finland and Greece.

The term food handler or food worker is used in most countries to define workers who work with food, with the terms being used interchangeably by some. A legal definition of food handler/food worker is in operation in four countries. A regulatory framework relating to food handler fitness to work is in place in all responding countries; two utilise additional guidance documents. Pre-employment screening of workers is undertaken in seven of the eight responding countries. There is wide variation in approach. The systems reported to be in place are outlined (Table 6.1).

In all countries, food handler exclusion from work following illness is dependent on the particular circumstances of the illness. Most countries (7) place restrictions on food workers following illness. Where there is no microbiological diagnosis, two countries do not exclude workers, while four countries exclude while symptomatic; two countries did not respond.

**Table 6.1 Pre-employment Screening**  
(Survey of 8 European Countries)

Country	Pre-employment Screening
France	Stool culture for salmonella, shigella, stool microscopy for amoeba, nasopharyngeal swab for staphylococcus, pharyngeal swab for Streptococcus Group A.
Italy	A medical visit and questionnaire on knowledge in food.
Denmark	Food workers working with milk, fish, meat and eggs at wholesale level (according to EU Directives) must undergo a medical examination. There is no requirement for stool sampling unless there is an indication for same.
Sweden	Pre-employment medical examination for those working with milk, fish, meat and eggs
Germany	All food handlers must have certified education by local health authorities before starting work and afterwards, annual repetitions by employer. In some specific factories, according to EU directives (eggs and fresh meat) stool samples have to be tested before a person starts working
Austria	Before starting work, food handlers examined for infectious diseases, including chest-x-ray and stool examination. Stool exams repeated every year; chest-x-rays at 2 yr intervals
Finland	Pre-employment stool salmonella investigation
Greece	Food workers must have Health Booklet issued by District Public Health Authority.

*Surveyed by: Food Handler Subcommittee NDSC, 2001*

Six of the responding countries have organism-specific exclusion criteria. The criteria vary substantially between countries. They range from a requirement of three negative samples before allowing return to work, to not allowing a healthy carrier of shigella to work with unpacked foods, to allowing return to food handling when asymptomatic.

The circumstances where food handlers are required to provide stool samples are diverse and reveal little consistency between countries. Circumstances include employment commencement, routine annual examinations, where infection or carriage is suspected, following sick leave for gastrointestinal illness, outbreak situations and following travel abroad in some instances (Table 6.2).

**Table 6.2 Stool Sample Requirements**  
(Survey of 8 European Countries)

Country	Circumstances where food handlers are required to provide stool samples
France	*At start of employment and after interruption of employment of greater than six months *If foodstuffs contaminated and transmission by food handler suspected *After sick leave for gastrointestinal or respiratory illness
Italy	In 'old' regulations, food handlers were required to provide stool samples for testing each year for enteropathogenic bacteria before licence renewal. This practice now abandoned in most regions because of huge resources required and lack of efficacy. *Samples can be requested if disease or carriage suspected.
Denmark	Yes; if well founded evidence that an outbreak source is contamination from staff
Sweden	Yes; food workers always sampled when circumstances indicate that it is meaningful
Germany	Yes; on request of local health authorities in case of investigation of Infectious Disease
Austria	Yes; annual routine examination
Finland	Yes; employer can request stool sample if employee has traveled abroad
Greece	Yes; when responsible physician requires it

*Surveyed by: Food Handler Subcommittee NDSC, 2001*

### 6.2.2 Ireland

Lack of standardisation is evident in this country also - in terms of different food premises management demands, varying approaches of individual health professionals to health surveillance in practice and the specific legislative requirements applicable to some sectors. However, two sets of guidelines produced in the UK in 1995 have served as very useful reference sources: '*Food Handlers Fitness to Work*' prepared by an expert working group convened by the Department of Health (DOH Foodhandlers Fitness to Work 1995) and '*The prevention of human transmission of gastrointestinal infections, infestations and bacterial infestations*' produced by a Working Party of the PHLS Salmonella Committee (PHLS 1995). The latter is currently under review.

A more standardised approach to food handler health surveillance, based on best evidence where such is available, would provide greater clarity and would better inform local professional judgement. **It is emphasised, however, that the key to the prevention of contamination of food by infected food handlers is food handler training and the ability to maintain high standards of hygiene.** A food-handler does not have to suffer from overt infection to pose a threat to food safety (WHO 1989); there is ample evidence that pathogens can be transmitted in the pre-symptomatic (Gaulin *et al*, 1999) and post-symptomatic phases of illness.

### 6.3 What constitutes fitness to work as a food handler?

Irish and EU Legislation puts an onus on employers to satisfy themselves that no food handler poses a hygiene risk to the product.

Employers therefore need to satisfy themselves that their food handling employees:

- undergo appropriate induction and training
- understand the principles of hygiene (the absence of which is the single most important impediment to work as a food handler)
- are fit to handle food and to establish, if indicated, confirmation of the absence of specific foodborne pathogens
- undertake to report any illness that could pose a risk to food safety

Based on the assessment of risks posed by food handlers infected with potentially foodborne pathogens in Chapter 3, it is reiterated that the most pertinent risk factors are:

- poor hand hygiene - the most common mode of pathogen transmission to food by an infected food handler being via fecally contaminated hands
- the unhygienic handling of unwrapped foods to be consumed raw or without further cooking or other forms of treatment
- gastrointestinal symptoms of diarrhoea and/or vomiting, with the pre- and especially the post-symptomatic phases also being of relevance (notably in relation to Norwalk-like Virus)
- infection with Hepatitis A

In conjunction with relevant guidance documents (DOH Foodhandlers *Fitness to Work* 1995; PHLS 1995; WHO 1989; Food Code 2001; Codex Alim; Chin 2000), the general principles of fitness to work are outlined (Table 6.3)

**Table 6.3**  
**FITNESS TO HANDLE FOOD**  
**- GUIDELINES FOR MEDICAL ASSESSMENT -**  
(in conjunction with APPENDIX E)

**Personal Hygiene**

- Understanding and practice of good personal hygiene, most especially hand washing, in all circumstances

**Gastrointestinal**

- No symptoms of infectious gastrointestinal illness (no vomiting or diarrhoea for at least 48 hours after symptoms have abated and stools have returned to normal) – where causative organism has not been identified.
  - *Routine stool screening not necessary for all sporadic cases* -
- Where pathogen has been identified, *c.f.* APPENDIX E
- Microbiological stool clearance before return to work always applicable to high-risk\* food handler in relation to confirmed or suspected infection with Typhoid, Paratyphoid, Verocytotoxin-producing *E.coli* (VTEC) and *Shigella dysenteriae* (*c.f.* Chap 7)

**Jaundice**

- No symptoms / signs of Hepatitis A infection within previous 7 days (*c.f.* Chap 7)

**Skin**

- No infected skin lesion or cut on an exposed body part (specifically hand, arm, face, neck or scalp) that cannot be totally covered during food handling
- Skin conditions predisposing to skin infection (e.g. eczema) on exposed parts require individual assessment

**Discharges**

- No purulent discharge from eye, ear, nose or mouth/gums

**Throat**

- No evidence of acute streptococcal sore throat in high-risk\* food handler (*c.f.* Chap 7)

\*High-risk food handler: work involves touching unwrapped foods to be consumed raw or without further cooking or other forms of treatment

The issues which arise in relation to assessment of fitness to work include:

- the use of health questionnaires
- the role of medical examination
- the question of microbiological screening
- the grounds for exclusion from food handling duties

## 6.4 Health Questionnaires

In practice, the most effective methods of reducing contamination risks to food will remain training individuals in good hygiene practices and the reporting of illness (Harker 2001). There is no evidence that routine use of health questionnaires prevents the spread of infection



from an infected food handler. Only 'snapshot' information about health status at a particular point in time is provided. Additionally, the accuracy of the completed questionnaire is dependent on the understanding of the questions by, and the honesty of, the employee. The process may foster a false sense of security.

Nevertheless, the routine use of health questionnaires for prospective food handling employees is common practice among Irish food industry exemplars. Expert opinion also seems to generally favour their use for pre-employment screening (WHO 1989; Foodhandlers Fitness to Work 1995; Food Code 2001; Harker 2001; Cox *et al*, 1995). The US Food Code takes the view that proper management of a food establishment operation begins with employing healthy people and instituting a system of identifying employees who present a risk of transmitting foodborne pathogens to food or to other employees (Food Code 2001). The WHO has pointed out that short questionnaires can focus on the few conditions of relevance to food safety (WHO 1989).

A recent survey of the Food Industry Medical Association (FIMA), comprising mainly occupational physicians representing food manufacturers, retailers and distributors in the UK, supported the use of pre-employment questionnaires, irrespective of employment type (Harker 2001). It suggested that the format of the questionnaire would enable the applicant to complete the questionnaire without including medical details. Forms with no positive answer could be 'passed fit' by non-medical / nursing personnel; those indicating a possible health problem should be assessed by a health professional. However, others have expressed concern regarding medical confidentiality aspects of such questionnaires, insisting that they should be inspected and interpreted only by health professionals (Cox *et al* 1995).

This committee considers that, if used, pre-employment health questionnaires play a subsidiary role to the absolute importance of (a) training and instructing employees in good hygiene practice and the safe handling of food and (b) reporting of relevant conditions by the food handling employee. The committee acknowledges that health questionnaires, although merely a 'snapshot' of health status, present an opportunity to underscore the absolute importance of reporting any relevant illness or circumstance that could pose a risk to food safety. It is therefore considered that the incorporation of relevant issues into a health questionnaire is appropriate (APPENDIX B). Cognisant of best practice within the industry, the use of such questionnaires is supported as an adjunct to – but not as a substitute for – the absolute requirement of reporting. The use of health questionnaires may not be an issue for companies who have access to occupational health services, but many medium and smaller companies involved in food production, preparation, service and retail may not have access to occupational health services. Ideally, those practitioners giving medical advice should have relevant occupational health training.

The routine use of health questionnaires, other than at recruitment or in conjunction with the legislative requirement for medical certification (Section 6.6), is considered to be unnecessary if 'on-the-job' reporting of relevant conditions by food handlers is actively encouraged and facilitated by management. The latter is the more effective approach, alerting management to relevant food handler illnesses/ circumstances on an ongoing and timely basis.

**The benefit of pre-employment health questionnaires is unproven. There is insufficient evidence to recommend them as standard practice. Their use is supported as an adjunct to appropriate training in good hygiene practice and safe food handling, and the reporting of relevant conditions by food handlers.**

## 6.5 Medical Examination

### 6.5.1 Is Routine Medical Examination necessary?

Medical examination of a food handler should be carried out if clinically or epidemiologically indicated. The question of *routine* medical examination is a separate issue.

The information obtained from a health examination is valid only for the time at which it is carried out. Routine medical certification of a food handler's fitness to work can only declare that the individual is not, *at that point in time*, suffering from any impediment to employment as a food handler on public health grounds (WHO 1989). Medical certification cannot declare an individual free of medical considerations for the future. Physical examination will not detect carriers of gastrointestinal disease. There is no evidence that pre-employment or routine examinations are of value in the prevention of foodborne disease (WHO 1989; Foodhandler Fitness to Work 1995; Cox *et al* 1995). Routine medical examinations of food handlers are viewed as costly - in time and money, ineffective and unnecessary (WHO 1989).

While some employers in this country choose to have routine medical examinations for their food handling employees (*e.g.* pre-employment), there is no requirement for medical certification of food handlers under Ireland's general food hygiene legislation *i.e.* under the Food Hygiene Regs, 1950 (S.I. 205 of 1950) or the European Communities (Hygiene of Foodstuffs) Regs, 2000 (S.I. 165 of 2000). Rather, these Regulations require that staff report illness and that proprietors question staff, excluding them from work if necessary.

**There is no scientific indication for *routine* medical examination of food handlers in the prevention of spread of foodborne pathogens, whether on recruitment or otherwise. The practice is not recommended, unless required by legislation.**

### 6.5.2 EU Directives Requiring Certification

Some EU Directives, however, demand pre-employment and/or routine (annual) medical examination of food handlers in some sectors (*c.f.* Section 2.6.4). Annual medical certification is a legal requirement for food workers in meat plants, plants producing meat products and minced meat production plants; workers in the dairy sector who handle raw milk have to ensure that there is no impediment to such employment; medical certification is required of food workers in the fish processing sector at the time of recruitment. For these groups there is an obligation "to prove, by a medical certificate, that there is no impediment to such employment" and, where annual certification is a prerequisite, that "medical certificates shall be renewed every year unless another staff medical check up scheme can offer equivalent guarantees to the satisfaction of a veterinary inspector".

Doctors working in the UK food industry consider the routine certification of meat workers to be of doubtful value (Cox *et al*, 1995), there being no epidemiological evidence that routine certification will reduce the incidence of food poisoning. Hardly surprisingly, this inconsistency is a source of some confusion within the general food sector in that, for instance, food handlers working in the meat processing sector need routine medical clearance while those working with ready-to-eat foods do not.

The single most important impediment to working as a food handler is a lack of understanding and awareness of the principles of hygiene (Foodhandlers Fitness to Work 1995). The legal requirement for certification presents an opportunity to reinforce good hygiene practice and to emphasise the reporting of relevant illnesses / conditions that could pose a risk through food handling.

**The legal requirement for medical certification should be used as an opportunity to ensure that food handlers have the requisite understanding of personal and food handling hygiene and of the importance of illness reporting**

### 6.5.3 Medical Consultation and Fitness to Work

In addition to the legislative requirement for medical certification in some sectors, medical examination of a food handler should be carried out if clinically or epidemiologically indicated – this may be appropriate at various times following certain instances of illness reporting or sick leave, following assessment of a completed health questionnaire, or in an outbreak situation.

The UK Food Industry Medical Association (FIMA) has suggested that guidelines for health practitioners could be developed to ensure competence in making decisions on fitness to work (Harker 2001). The general principles outlined in Table 6.3 are applicable, covering the key issues in relation to fitness to work as a food handler. A template for medical certification, which could be used by the medical practitioner, is appended (APPENDIX C). A food handler advice sheet on ‘Good Hygiene Practices and Reporting Requirements’ is also appended (APPENDIX D) which could be given to, and discussed with, the food handler as part of the health consultation process – serving to reinforce the ongoing importance of personal hygiene and reporting.

#### Specific Health Considerations:

- **Stool screening:** The requesting of stool samples will depend on individual assessment; stool sampling does not need to be routinely done in all sporadic cases of gastroenteritis. Negative stool samples from an employee recovering from a diarrhoeal illness are not necessary conditions of returning to work, with the exception of certain specific infections (Foodhandlers 1995). However, stool microbiological clearance will always be necessary before declaration of fitness to work for the high-risk food handler who has had Verocytotoxin-producing *E.coli* (VTEC), *S. typhi*, *S. paratyphi* or *Shigella dysenteriae* infection. Consultation with the Director of Public Health / Designated Medical Officer or Consultant Microbiologist is advised. Details on pathogen-specific microbiological clearance requirements are discussed in Chapter 7. It is recommended that all laboratory request forms should specify ‘food handler’.
- **Bowel Disorders:** There is no reason why a person with inflammatory bowel disease should not work as a food handler, provided that the normal standards of personal hygiene expected of such a worker are satisfied. Although these patients may always have loose stools, they are usually able to recognise any changes from their normal pattern which would indicate a superimposed gastroenteritis (Cox *et al*, 1995); they should be aware of the need to notify their managers in such instances.

Decisions relating to fitness to work as a food handler in the case of someone with an ileostomy or colostomy should depend on the individual’s level of personal hygiene (Cox *et al*, 1995). The bacterial content of ileostomy effluent is one-twentieth that of normal faeces; colostomy effluent has a bacterial content more akin to normal faeces (Cox *et al*, 1995).

- **Skin Diseases:** Skin problems such as eczema and psoriasis are common. Lesions of eczema are very frequently colonised or infected by *S. aureus* and sometimes by *S. pyogenes*. Such organisms are dispersed into the environment on naturally shed skin

scales (Noble 1975), with catering industry implications (Cox *et al*, 1995). The hazard presented by active eczema is real and requires individual assessment of risk (Cox *et al*, 1995). Colonisation of psoriatic lesions with potentially pathogenic bacteria is less of a problem than in atopic eczema (Cox *et al*, 1995). However, lesions involving the hands and forearms or the scalp (common) and face (rare) present a potential hazard (Cox *et al*, 1995). It is not possible to be prescriptive about such skin diseases; small scaly lesions on exposed parts should be covered; larger lesions, especially on hands/ forearms/ face/ neck/ scalp should be subject to individual medical assessment and advice. It has been recommended that skin conditions require thorough dermatological investigation in order to diagnose them sufficiently accurately to give reliable medical advice about employment (Cox *et al*, 1995).

- *Chest / Respiratory Diseases:* There is no evidence that chest and upper respiratory tract infections pose a risk of food contamination. A history of tuberculosis does not pose a risk to food. However, the infection may affect an individual's health in such a way as to make them unfit for work or they may pose a risk of infection to others in the workplace.
- *Blood-borne Infections:* Blood-borne infections (notably Hepatitis B, Hepatitis C and HIV) do not present a risk as far as microbiological contamination of food is concerned. Provided those affected are well, there is no contraindication to their employment as food handlers.

## **6.6 Microbiological Screening**

### **6.6.1 Pathogen Excretion (Stools)**

Gastrointestinal pathogens are excreted, often in very large numbers, in the acute phase of disease when stools are characteristically loose and frequent. There is, however, a significant difference between those who are acutely ill from a gastrointestinal infection and those who continue to excrete the organism after the clinical illness is over. The latter have recovered clinically, have normally formed stools and excrete diminishing numbers of organisms as time passes. Those with diarrhoea present a far greater risk of spreading infection than do known symptom-free excretors, but even symptom-free excretors with poor or doubtful standards of personal hygiene pose a potential risk. Clinically well excretors with normal formed stools and good personal hygiene standards pose minimal risk (FSA/Scottish Ex. Health Dept Guidance 2002). Several studies support the conclusion that asymptomatic excretors play a minor role in initiating outbreaks of infectious intestinal disease (Ryan *et al*, 1996).

### **6.6.2 Routine Microbiological Screening**

Periodic testing of asymptomatic food handlers for the presence of diseases transmissible through food is not cost effective or reliable (Food Code 2001) – whether routine microbiological screening of stools or routine swabbing of the skin, nose or throat.

As with routine health examination, the information obtained from microbiological examination of stools for pathogens is *valid only for the time at which it is carried out*. This lack of support for routine stool screening of food handlers is consistent with the view of the WHO (WHO 1989). Importantly, the risk of pathogen transmission by a person with normally formed stools (*if practising good hygiene*) is minimal. Also, a negative result does not necessarily mean there are no pathogenic organisms in the specimen, only that none were detected by the test at that particular time. Other findings support the lack of necessity for

routine stool screening of food handlers. Following a food handler associated salmonella outbreak that occurred despite routine surveillance cultures of kitchen employees, it was concluded that routine screening of food handlers was not cost-effective and should not be used as a substitute for education and proper hygienic practices (Khuri-Bulos *et al*, 1994). A study which looked at the prevalence of pathogenic microorganisms in over 1,000 asymptomatic individuals in Australia noted that pathogens were rarely found in asymptomatic individuals in the community (Hellard ME *et al*, 2000).

Additionally, in outbreaks traced to food handlers (Chap. 3), contamination of food has been noted to have typically occurred either during (most usual) or shortly before / after an acute illness – routine screening would not have detected or prevented these acute illnesses. Contamination is infrequently traced back to an asymptomatic carrier. Carriers of *S. typhi*, who may cause foodborne outbreaks while asymptomatic, are a probable exception to this rule. Routine screening might detect some chronic *S. typhi* carriers, but a great deal of effort would be needed to find even one carrier; it is hard to justify such enormous resources in terms of expense and time (WHO 1989).

***Routine stool screening of food handlers has no scientific support and is not recommended. Neither is there any indication for routine skin, nasal or throat swabbing.***

### **6.6.3 Sporadic Illness**

Sporadic gastrointestinal illness is common. In England, it has been established that 20% of the general population suffer from infectious intestinal disease every year (Wheeler *et al*, 1999). Some experts recommend that, in the general population, stool specimens should be taken from all sporadic cases (PHLS 1995). However, it has been pointed out that because of its low yield in unselected specimens, stool culture is often cost ineffective (Choi SW *et al*, 1996). Extrapolating from this, the value of stool sampling in all sporadic food handler cases of gastrointestinal illness is questionable. Additionally, negative stool samples from a food handler are not necessary conditions of return to work following recovery from diarrhoeal illness, with the exception of certain specific pathogens (Foodhandlers 1995).

Stool screening may be indicated for food handlers with symptoms of gastrointestinal illness based on individual risk assessment, taking account of such factors as illness severity and personal hygiene practice. It is *always* recommended where there is suspicion of infection (either case or carrier) with Verocytotoxin-producing *E. coli* (VTEC), Typhoid, Paratyphoid or *S. dysenteriae* in a high-risk food handler, or where a relevant contact history in relation to these pathogens exists (*c.f.* Chap 7).

**Stool screening may be indicated for food handlers with symptoms of gastrointestinal illness based on individual risk assessment, taking account of such factors as illness severity and hygiene practice**

**Stool screening for suspected illness due to, carriage of, or relevant contact with Typhoid / Paratyphoid / VTEC / *Shigella dysenteriae* is always indicated for high-risk food handlers**

### **6.6.4 Outbreak Situation**

Following a suspected food poisoning incident, standard investigative procedures are adopted in an effort to identify factors which may have led to the outbreak and to implement control measures. The investigation includes epidemiological, environmental and microbiological elements. Screening of food handlers may be indicated in the course of the investigation.

Depending on the outbreak and the pathogen suspected or identified, such screening may involve the requesting of stool specimens, nasal / throat / skin swabs or screening for the presence of skin lesions on exposed parts of the body or for symptoms / signs of jaundice. Decisions relating to microbiological screening are generally agreed by the investigating Director of Public Health / Designated Medical Officer in consultation with the local Consultant Microbiologist.

It is not possible to be prescriptive but, broadly speaking, such screening may be indicated where:

- there is evidence of current or recent illness among staff *or*
- a food handler carrier is suspected *or*
- the pathogen has not been identified *or*
- to confirm a food handler link

The basis for the above is evidenced from the literature review in Chapter 3, where there are numerous instances of outbreak causation being solved, the pathogen identified, exclusion criteria applied to prevent the possibility of further spread, and where proven links have been established on the basis of food handler screening in outbreak situations.

It has been pointed out in relation to Norwalk-like Virus (NLV) that outbreaks are often reported too late for obtaining satisfactory stool specimens from initial cases and it may be easier to obtain samples from secondary cases (Viral Gastro Subcomm PHLS 1993) - who may be food handlers. In the case of possible implication of food handlers, it is often worth examining stool samples from them, even if they deny illness, since positive results can help to confirm the link with the kitchen where the food was prepared (Viral Gastro Subcomm PHLS 1993).

**Screening in an outbreak situation may involve the requesting of stool specimens, nasal/  
throat/skin swabs or screening for the presence of skin lesions on exposed parts of the body or  
for symptoms/signs of jaundice (depending on the outbreak and the pathogen suspected /  
identified)**

**Criteria for microbiological screening may be varied at the discretion of the Director of Public  
Health / Designated Medical Officer, in consultation with the Consultant Microbiologist,  
following an individual or outbreak risk assessment**

## **6.7 Work Exclusion / Restriction**

In certain circumstances, food handlers will need to be temporarily excluded from work or restricted to non-food handling duties to reduce the risk of spreading infection via food. The decision to exclude or restrict any food handler should be based on individual risk assessment.

The degree of risk posed may be influenced by several factors:

- the infecting organism (if known) and its infectivity
- the clinical state of the food handler
- the exact nature of the food handling activity
- the standard of hygiene of the food handler
- the availability of adequate hygiene facilities at work
- the susceptibility of the population being served

### **Gastrointestinal Infection:**

The evidence implicating infected food handlers with foodborne pathogen transmission clearly indicates that the risk is greatest for those who are clinically ill with gastrointestinal

symptoms. All cases of gastroenteritis should be regarded as potentially infectious, although diarrhoea and vomiting are caused by many infective and non-infective agents (PHLS 1995). Agents causing gastroenteritis may infect without causing symptoms or be excreted for long periods after recovery from illness. Under these circumstances transmission is unlikely, provided that good personal hygiene is practised (PHLS 1995).

Published expert opinion varies with regard to how long food handlers suffering from common causes of gastrointestinal infection should be excluded (*i.e.* whether until clinical recovery or longer) *and* with regard to who exactly should be excluded beyond clinical recovery.

- Apart from high-risk food handlers, the UK Public Health Laboratory Service generally advises return to work for food handlers after clinical recovery when stools have returned to normal (PHLS 1995). PHLS 1995 states that all cases of gastroenteritis should be regarded as potentially infectious and should normally be excluded from work until the person is free from diarrhoea and vomiting. It recommends referral to *Food handlers: fitness to work* for detailed guidance on food handlers. It stresses the importance of assessing infected people in risk groups (including high-risk food handlers), for whom special action should be considered depending on individual circumstances (and delineates such action in relation to individual pathogens depending on whether the individual is a case, excreter, carrier or contact). It recommends that *people not in risk groups present a minimal risk of spreading gastrointestinal illness and may return to any form of work after they have recovered clinically and their stools have returned to normal*, with microbiological follow up being unnecessary except after enteric fevers and infections caused by Verocytotoxin-producing *E. coli* (VTEC).
- UK food handler guidelines recommend *exclusion for 48 hours after clinical recovery* (*i.e.* no vomiting for 48 hours and bowel habit has returned to normal for 48 hours) for all common causes of gastrointestinal infection (Foodhandlers 1995). It is to be noted that these guidelines apply to food handlers who handle open food only – the document stating that: ‘workers who handle only pre-wrapped, canned or bottled food, or those involved in primary agricultural or harvesting processes are not considered as food handlers for the purposes of this guidance’.
- Recent Scottish guidelines on the investigation and control of outbreaks of foodborne disease (FSA/Scottish Exec Health Dept 2002) make the general recommendation that *all* persons with diarrhoea should be advised to *remain off work until 48 hours after clinical recovery*. With regard to identified pathogens, however, the guidelines only advise exclusion beyond clinical recovery for serious pathogens (*e.g.* VTEC, *S.typhi*, *S.paratyphi*, *etc*) involving certain risk groups.

The overriding principle of food handlers not working when they are suffering from diarrhoea and /or vomiting due to common causes of infectious gastrointestinal illness is firmly established. Cognisant of varying expert opinion on the subject of exclusion periods this Committee considers that, as a general rule, *all* food handlers should be advised to remain off work until 48 hours after clinical recovery where the causative pathogen has not been identified. Adopting a risk-based approach, this is most crucially important in the case of high-risk food handlers. Where the pathogen has been identified, specific exclusion criteria are addressed in Chapter 7 & APPENDIX E. In all instances of work exclusion, the prerequisite for fitness to return to food handling duties is strict adherence to personal hygiene.

Food handlers whose work involves *handling unwrapped food to be consumed raw or without further cooking or other forms of treatment* have been identified as constituting *the* high-risk

food handler group. Stringent pathogen-specific exclusion criteria, with microbiological stool clearance, are always indicated for this group in relation to VTEC, Typhoid, Paratyphoid and *S.dysenteriae* - the evidence for which is detailed in Chapter 7. For other pathogens, in instances where it is not certain that the food handler will maintain good hygiene, exclusion may be required until microbiological clearance of infection has been demonstrated. Careful individual consideration should be given to all handlers of open foods.

Infected skin lesions and purulent discharges have been considered previously. General food handler exclusion / restriction guidelines are summarised (Table 6.4). Pathogen-specific criteria, and microbiological clearance criteria where applicable, are examined in Chapter 7.

**Table 6.4 GENERAL EXCLUSION / RESTRICTION GUIDELINES**

- |  |
|--|
| <ul style="list-style-type: none"><li>• No food handler with gastroenteritis should work while symptomatic.</li><li>• As a general rule, any food handler with symptoms of gastrointestinal infection (with diarrhoea and/or vomiting) should be advised to remain off work until 48 hours after clinical recovery and stools have returned to normal (where the causative pathogen has not been identified). Where the pathogen has been identified, specific exclusion criteria are summarised in APPENDIX E.</li><li>• For high-risk food handlers, pathogen-specific exclusion criteria with microbiological stool clearance always apply in relation to Verocytotoxin-producing <i>E.coli</i> (VTEC), Typhoid, Paratyphoid, <i>Shigella dysenteriae</i> &amp; Streptococcal throat (<i>c.f.</i> Chap 7).</li><li>• Any food handler who is an asymptomatic stool carrier - other than a high-risk food handler carrier of Verocytotoxin-producing <i>E.coli</i> (VTEC), Typhoid, Paratyphoid, or <i>Shigella dysenteriae</i> – if practising good personal hygiene, does not generally need to be excluded.</li><li>• Any food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and / or symptoms (<i>c.f.</i> Chap 7)</li><li>• The decision to exclude any food handler should be based on individual risk assessment</li><li>• The overriding prerequisite for fitness to return to food handling duties is strict adherence to personal hygiene</li><li>• Infected skin lesions on exposed body parts (especially hands and forearms) should be adequately covered with a waterproof dressing until healed. If not adequately covered, exclusion may need to be considered depending on the food handling activity</li><li>• Those with purulent discharges (from the eye, ear, nose or mouth) should generally not work near open food and may need to be restricted to non-food handling duties until recovered.</li></ul> |
|--|



## **Recommendations:**

### **Fitness to Work**

- The recommended guidelines for medical assessment of employee fitness to handle food are tabulated (Table 6.3)

### **Health Questionnaires**

- The benefit of pre-employment health questionnaires is unproven. There is insufficient evidence to recommend them as standard practice. Their use is supported as an adjunct to appropriate training in good hygiene practice and safe food handling, and the reporting of relevant conditions by food handlers.

### **Medical Examinations**

- There is no scientific indication for the *routine* medical examination of food handlers in the prevention of spread of food-borne pathogens, whether on recruitment or otherwise. The practice is not recommended, unless required by legislation.
- The legal requirement for medical certification should be used as an opportunity to ensure that food handlers have the requisite understanding of personal and food handling hygiene, and of the importance of illness reporting.

### **Microbiological Screening**

- *Routine* stool screening of food handlers has no scientific support and is not recommended. Neither is there any indication for *routine* skin, nasal or throat swabbing.
- Stool screening may be indicated for food handlers with symptoms of gastrointestinal illness based on individual risk assessment, taking account of such factors as illness severity and hygiene practice
- Stool screening for suspected illness due to, carriage of, or relevant contact with Typhoid / Paratyphoid / Verocytotoxin-producing *E.coli* (VTEC) or *Shigella dysenteriae* is always indicated for high-risk food handlers
- Screening in an outbreak situation may involve the requesting of stool specimens, nasal / throat/ skin swabs or screening for the presence of skin lesions on exposed parts of the body or for symptoms / signs of jaundice (depending on the outbreak and the pathogen suspected / identified).
- Criteria for microbiological screening may be varied at the discretion of the Director of Public Health / Designated Medical Officer, in consultation with the Consultant Microbiologist, following an individual or outbreak risk assessment

### **Exclusion / Restriction Guidelines**

- No food handler with gastroenteritis should work while symptomatic.
- As a general rule, any food handler with symptoms of gastrointestinal infection (with diarrhoea and/or vomiting) should be advised to remain off work until 48 hours after clinical recovery and stools have returned to normal (where the causative pathogen has not been identified). Where the pathogen has been identified, specific exclusion criteria are summarised in APPENDIX E.
- For high-risk food handlers, pathogen-specific exclusion criteria with microbiological stool clearance always apply in relation to Verocytotoxin-producing *E.coli* (VTEC), Typhoid, Paratyphoid, *Shigella dysenteriae* and Streptococcal throat (*c.f.* Chap.7)
- Any food handler who is an asymptomatic stool carrier - other than a high-risk food handler carrier of Verocytotoxin-producing *E.coli* (VTEC), Typhoid, Paratyphoid or *Shigella dysenteriae* – if practising good personal hygiene, does not generally need to be excluded.

- Any food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and / or symptoms (*c.f.* Chap.7)
- The decision to exclude any food handler should be based on individual risk assessment
- The overriding prerequisite for fitness to return to food handling duties is strict adherence to personal hygiene
- Infected skin lesions on exposed body parts (especially hands and forearms) should be adequately covered with a distinctively coloured waterproof dressing until healed. If not adequately covered, exclusion / restriction may need to be considered depending on the food handling activity.
- Those with purulent discharges (from the eye, ear, nose or mouth) should not work near open food; they may need to be excluded / restricted to non-food handling duties until recovered.

## **Chapter 7**

### **Pathogen-Specific Control Measures**

#### **7.1 Introduction**

Foodborne pathogens transmissible by infected food handlers vary in their capacity to infect and in the potential seriousness of the illnesses they can cause. Pathogens such as Shigella, Verocytotoxin-producing *E.coli* (VTEC) and Norwalk-like virus are highly infectious, with only a small number of organisms needed to produce infection. VTEC and *S.typhi* are notable in view of the potential severity of the medical consequences to those who become infected.

The application of stringent control measures - such as a requirement for microbiological clearance prior to returning to food handling duties – is appropriate in relation to food handlers (usually high-risk) infected with certain pathogens. Examining individual pathogens, this chapter looks at the circumstances where such control measures are indicated, and where they are specific to high-risk food handlers or are more generally applicable. Consideration is also given to the question of whether or not treatment of asymptomatic food handlers to eliminate carriage is necessary.

However, it is cautioned that while pathogen-specific guidelines are here presented on the basis of current best evidence and expert opinion, they cannot take account of every eventuality. The guidelines are intended to aid the decision making process; they are not intended to advise on the clinical management of individual cases. In practise, decision making on pathogen-specific control measures is an area that may require the exercise of considerable professional judgement.

The circumstance of each food handler case, carrier or contact needs to be considered individually. Factors such as type of food handling activity, standards of personal hygiene, provision of sanitation facilities at work and the vulnerability of the population served (*i.e.* very young, frail elderly, ill or immunocompromised) should be taken into account. If microbiological clearance is indicated, once an individual meets the criteria for clearance he/she should no longer be considered a risk and should be allowed to return to normal working. Pathogen-specific control measures are summarised in Appendix E.

#### **7.2 Typhoid Fever / Paratyphoid Fever**

Typhoid and Paratyphoid Fever (both also known as Enteric Fever) are caused by *Salmonella typhi* and *S. paratyphi* A, B, C respectively. Although rarely notified in this country, these infections are endemic in parts of the developing world. It has recently been reported that the risk of travellers contracting typhoid while abroad is rare except for areas in north and west Africa, Peru and South Asia (PHLS CDR Wkly 2002).

**Symptoms** (Chin 2000)

Typhoid and Paratyphoid Fever are characterised by insidious onset of sustained fever, severe headache, malaise and nausea. Constipation tends to occur more commonly than diarrhoea. Typhoid Fever, if untreated, can have a case-fatality rate as high as 10-20%. This has been reduced to less than 1% with prompt antibiotic treatment. Paratyphoid Fever tends to be a milder illness, with a much lower case-fatality rate. The relapse rate for Typhoid Fever can be as high as 15-20%, while relapses of Paratyphoid Fever may occur in about 3-4% of cases.

**Excretion**

The carrier state may follow acute illness or mild or even subclinical infections. About 10% of untreated typhoid fever patients will discharge bacilli for 3 months after onset of symptoms, and 2%-5% become permanent carriers. Considerably fewer persons infected with paratyphoid organisms may become permanent gallbladder carriers (Chin 2000).

**Exclusion/ Microbiological Clearance**

Expert opinion agrees on the need for exclusion and microbiological clearance of cases, carriers and contacts of cases from food handling. However, the guidelines of the American Public Health Association (APHA) (Chin 2000) appear somewhat less restrictive than those of the UK Public Health Laboratory Service (PHLS 95). In a comparison of published guidelines on length of follow up of *S.typhi* and *S. paratyphi* patients in Birmingham over a decade ago, it was considered that for those who might pose a special risk to others (*vis* food handlers), it would be worth having at least five consecutive negative sets of cultures before discharge from surveillance (Braddick *et al*, 1991). In the absence of any new published evidence and, in particular, in the absence of prospective evaluation of any new policies, it seems reasonable that Ireland should remain in line with current PHLS (PHLS 95) and UK Food Handler (Foodhandler Fitness to Work 95) guidelines in terms of microbiological stool clearance requirements prior to returning to food handling. However, it is again pointed out that the former guidelines relate to high-risk food handlers; the latter to all handlers of unwrapped, uncanned and unbottled foods. This Committee's recommendations on Typhoid / Paratyphoid exclusion and microbiological clearance criteria are made in relation to the high-risk food handler.

**High-risk Food Handler:**

**Case – exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals, starting 2 weeks after completion of antibiotic treatment** (PHLS 95; Foodhandler 95)

**Carrier – exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals** (Foodhandler 95)

**Suspected Case (history suggestive of enteric fever) - consider need to obtain 6 consecutive negative stool samples at 2 week intervals** (Foodhandler 95)

**Contact of a Case/ Carrier**

Because of the potential seriousness of Typhoid and Paratyphoid Fevers, strict exclusion and microbiological clearance criteria also apply to a food handler who is either a household contact of an acute case, or who has a history of contact with a known outbreak or a known case at home or abroad.

**High-risk Food Handler:**

**Contact of case / outbreak – exclude until 3 consecutive negative stool samples are obtained, taken at weekly intervals, starting 3 weeks after last contact with an untreated case** (PHLS 95; Foodhandler 95)

Food handlers who are household contacts of carriers also merit consideration. In the household situation, as there may be continuing exposure to a potential source of infection (*i.e.* contact with continuing asymptomatic carrier), a food handler who is negative on screening should return to food handling duties only if they fully understand and adhere to good hygiene practice.

***High-risk Food-Handler:***

**Household contact of carrier – consider excluding until 3 consecutive negative stool samples are obtained, taken at weekly intervals, starting from the date of carrier identification** (Foodhandler 95)

***Treatment of Carriage***

There is universal agreement regarding the necessity to treat the carrier state in Enteric Fever. In recent studies, the new oral quinolones are reported to have produced excellent results in the treatment of the carrier (Chin 2000). Fluoroquinolones are recommended when attempting to eliminate carriage of *S.typhi* (Trujillo 1991; Hendershot 1995). Studies on Ciprofloxacin, Norfloxacin or Ofloxacin treatment resulted in a cure in 80-90% of chronic enteric carriers of *S.typhi* (Graninger 1996) (Two studies: Ciprofloxacin 750mg twice daily for 28 days; Norfloxacin 400mg every 12 hours for 28 days). Ciprofloxacin has recently been recommended as the drug of choice for chronic adult carriers of *S.typhi* (Red Book 2000).

However, the appearance of strains of *S.typhi* with decreased sensitivity to Ciprofloxacin may pose a problem. In 1998 in the UK, 21% of investigated infections of *S.typhi* had decreased sensitivity to Ciprofloxacin (Threlfall 1999). The majority were linked with the Indian sub-continent. All strains with decreased sensitivity to Ciprofloxacin were fully sensitive to Cephalosporin antibiotics such as Ceftriaxone or Cefotaxime. Reference to antibiotic sensitivity patterns is crucial.

The treatment of chronic carriers may depend on whether anatomic abnormalities such as biliary or kidney stones are present (Mandell *et al*, 1995). If gallstones are present, antibiotics alone have a high failure rate for eradication of the carrier state in some, but not all, studies. Those carriers who do not respond to an initial course of treatment should be referred for specialist opinion to rule out biliary or renal disease.

**Fluoroquinolones are recommended for the elimination of carriage. Where sensitivity is a problem, cephalosporin antibiotics should be considered.**

### **7.3 Verocytotoxin-producing *E.coli* (VTEC)**

Verocytotoxin-producing *E. coli* (VTEC) is a serious, global, public health concern. The most common strain causing illness in humans in Ireland is *E.coli* 0157: H7. VTEC serogroups other than 0157 may also cause illness. There is no evidence that the sources and routes of transmission differ from VTEC 0157 (Guidelines:VTEC PHLS 2000). The measures outlined below are therefore recommended for the control of all VTEC infections, irrespective of serogroup.

***Symptoms***

VTEC poses a serious risk to humans as the number of organisms required to cause illness is very low. VTEC infections cause a spectrum of illnesses, from mild non-bloody diarrhoea to haemorrhagic colitis (comprising abdominal pain, diarrhoea and frank red blood). Bloody diarrhoea is seen in about 50% of VTEC 0157 cases (Guidelines: VTEC PHLS 2000). In up to 30% of cases, life-threatening complications can occur, of which Haemolytic Uraemic

Syndrome (HUS) is the most common (FSAI VTEC 1999). The reported case fatality rate of HUS is from 3-17%, and a substantial number of survivors suffer long-term residual impairment (Guidelines VTEC PHLS 2000).

### ***Excretion***

The duration of excretion of the pathogen is typically one week or less in adults. Prolonged carriage is uncommon (Chin 2000) but can occur, notably in young children (PHLS VTEC 2000). Isolation from faeces is routinely successful usually only if specimens are obtained within four days of the onset of symptoms (PHLS VTEC 2000).

### ***Exclusion / Microbiological Clearance***

Because of the extremely small number of organisms needed to produce infection, and because of the potential severity of this disease, experts agree on the necessity for stringent precautions to prevent any possible spread of infection. Experts have stressed the importance of exclusion of high-risk food handlers until stool microbiological clearance has been obtained (PHLS VTEC 2000). After providing two negative stool specimens it is considered unlikely that an individual will still be excreting the organism.

**High-risk food handlers infected with VTEC should be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued).**

### ***Contact of a Case***

In view of the potential seriousness of this infection and its ease of spread in households, action regarding a high-risk food handler who is a household contact of a case of VTEC infection requires the exercise of considerable judgement. Recent PHLS guidelines recommend that, if the food handler is a household contact of a case of VTEC, the exclusion criteria above should also apply (PHLS VTEC 2000). However, the report also points out that the contact may (on occasions), if passing normal stools, be allowed to go to work without obtaining the additional reassurance of two consecutive negative stool specimens taken at an interval of not less than 48 hours. All such decisions need to be justified, however, and should be made only after a careful assessment of the risk of further spread.

Additionally, the report states that it is wise to ensure that the household case is passing normal stools and no longer excreting the organism after clinical recovery. In the event of persistent excretion of VTEC 0157, particularly in young children, both the case and the household contacts may need to be kept under longer-term review by the public health authority (PHLS VTEC 2000).

**Food handlers should be advised to report household contact with a VTEC case. High-risk food handlers who are household contacts of cases of VTEC infection should generally be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued), unless careful risk assessment suggests otherwise**

### ***Treatment of Carriage***

The role of antibacterial treatment of infections with *E.coli* 0157:H7 is uncertain (Chin 2000). Some researchers have stated that antimicrobial agents have no proven value in the treatment of *E.coli* 0157:H7 infections (Besser *et al*, 1999). There is evidence to suggest that treatment with fluorquinolones and certain other antimicrobials may actually precipitate complications such as HUS (Chin 2000; Wong *et al*, 2000), a progression which may be influenced by several factors (Zimmerhackl 2000). A further concern about the use of antimicrobial agents in VTEC infections reflects the ability of sub-inhibitory concentrations of antimicrobial agents in vitro to cause lysis or sub-lethal damage to VTEC with subsequent liberation of Verocytotoxins (PHLS VTEC 2000).

Overall, no convincing data currently indicate that antimicrobial agents alter the natural history of VTEC infection or the duration of faecal excretion of the organism (PHLS VTEC 2000). It should be pointed out, however, that most studies have been retrospective, lacked adequate controls, been of small size, and have recorded dosage and duration of treatment inconsistently. Furthermore, most studies have been of co-trimoxazole, aminoglycosides, or beta-lactam antibiotics rather than fluoroquinolones that are effective in other forms of infective enteritis (PHLS VTEC 2000).

**In the absence of convincing evidence, antimicrobial treatment is currently not indicated for VTEC carriage in food handlers**

## **7.4 Hepatitis A**

Recognised foodborne outbreaks caused by Hepatitis A virus (HAV) are usually associated with contamination of uncooked food during preparation by a food handler who is infected with HAV (Red Book 2000). The virus is transmitted by the faecal-oral route. Immunity following infection protects against re-infection and appears to persist for life (Crowcroft *et al*, 2001). Personal hygiene remains the cornerstone of measures for preventing HAV infection and its spread (Crowcroft *et al*, 2001).

### ***Symptoms*** (Crowcroft *et al*, 2001)

HAV infection causes a prodromal illness of fever, nausea, loss of appetite, abdominal pain and mild gastrointestinal upset, followed by jaundice. Asymptomatic and mild disease is common in children; the severity of infections increases with age.

### ***Excretion***

The virus is present in the stools, reaching peak levels the week or two before symptom onset and diminishes rapidly after symptoms appear (Chin 2000). Most cases are probably non-infectious after the first week of jaundice (Chin 2000).

### ***Exclusion***

As most cases of Hepatitis A infection are probably non-infectious within a week of jaundice / symptom onset, there is consistency within current international guidelines regarding food handler case exclusion – with exclusion advised for the week after the onset of jaundice and / or symptoms (PHLS 95; Foodhandlers Fitness to Work 95; FSA/Scottish Exec Health Dept 2002; Food Code 2001). The US Food Code 2001 also gives the option of returning to work if at least two blood tests show falling liver enzymes.

**A food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and/or symptoms**

### ***Contact of a Case***

The US Food Code(2001) makes the point that because Hepatitis A virus infection can occur without clinical illness (*i.e.* without symptoms) or because a person may shed Hepatitis A virus in the stool for up to a week before becoming symptomatic, it is possible that a person unknowingly may have been exposed to an asymptomatic Hepatitis A virus shedder or to an infected person who is in the incubation stage. No restriction/exclusion routinely occurs in these - presumably much more common - circumstances. It follows therefore that there is no reason to exclude food handlers from work who may be contacts of a case of Hepatitis A providing good hygiene practice is observed.

**A food handler contact of a Hepatitis A case need not be excluded provided good hygiene practice is observed**

***Microbiological Clearance***

None required

***Treatment of Carriage***

None required

***Immunisation***

Outbreaks of Hepatitis A associated with food handlers are not frequent enough to justify routine vaccination of all catering staff (Crowcroft *et al*, 2001; Red Book 2000). In a recent study on the economics of vaccinating restaurant workers against Hepatitis A, it was concluded that vaccination was unlikely to be economical from either the restaurant owner or the societal perspective (Meltzer *et al*, 2001).

**Routine Hepatitis A vaccination of food handlers is not indicated**

PHLS recommends that prophylaxis should be considered for close contacts of a confirmed case of HAV infection (Crowcroft *et al*, 2001). The choices for prophylaxis are between human normal immunoglobulin (HNIG), HAV vaccine or using both together. HAV vaccine is increasingly being used for contacts in place of HNIG because of concerns about use of human blood products. The vaccine should be given as close to the time of exposure as possible and the latest time that the vaccine is likely to be effective in preventing disease is probably 7 days from onset of disease in the primary case (Crowcroft *et al*, 2001). HNIG offers protection to close contacts who are identified too late to be protected by vaccine (8 days or more from exposure). The window of opportunity for HNIG to prevent a secondary case is 14 days post-exposure, but HNIG may modify disease severity if given after 14 days (Crowcroft *et al*, 2001).

Since food handlers often work long hours, eat together and share toilet facilities, it is considered that their workplace colleagues should be included as close contacts for prophylaxis, as well as telling them not to work if they develop any symptoms (Personal Communication: Natasha Crowcroft, PHLS 2001).

**Where a food handler is a household contact of a confirmed case of HAV, the food handler should be considered for prophylaxis (HNIG or HAV vaccine)**

**Food handler colleagues of a food handler case of Hepatitis A should be included as close contacts for prophylaxis purposes**

Where there has been widespread exposure from an infected food handler preparing food while symptomatic, PHLS has advised that HAV vaccine or immunoglobulin should be offered to patrons if feasible, depending on the delay to knowing about the case (Personal Communication, Natasha Crowcroft, PHLS 2001). A local assessment of risk by the Outbreak Control Team (symptomatic food handler? high-risk food? deficiencies in personal hygiene? *etc.*) should inform the decision making process.

**People who have recently been exposed to food prepared by a food handler case of Hepatitis A may benefit from prophylaxis. This should be considered by the investigating Director of Public Health / Designated Medical Officer, following risk assessment**



## 7.5 Shigellosis

There are four serogroups of *Shigella* (Chin 2000): *S.sonnei*, *S. boydii*, *S. dysenteriae* and *S. flexneri*. *S.sonnei* is the most common species of shigella in Ireland. Shigellosis is highly infectious, with a low infectious dose of 10-100 organisms. The principal route of transmission is faecal-oral from cases with diarrhoea. Spread may be facilitated by a contaminated environment, particularly toilets or fomites (Viral GE Subcomm, PHLS 1993). Food and water vehicles are uncommon but important when they occur.

### **Symptoms** (Chin 2000)

Shigella infection is characterised by diarrhoea accompanied by fever, nausea, vomiting and cramps. *S.sonnei* usually causes a mild illness with a short clinical course and almost negligible case-fatality rate except in the immunocompromised host. *S.boydii*, *S.dysenteriae* and *S.flexneri* infections present clinically as dysentery (diarrhoea with blood, mucus and pus). *S.dysenteriae* is often associated with serious disease and severe complications that include toxic megacolon and the haemolytic uraemic syndrome (Chin 2000).

### **Excretion**

The excretion of shigella following apparent recovery from illness may be both intermittent and prolonged (Newman 1993). The duration of excretion of the organism is usually up to 4 weeks after illness (Chin 2000); rarely the carrier state may persist for months or longer.

### **Exclusion / Microbiological Clearance**

Guidance on exclusion and microbiological clearance varies internationally. That from the American Public Health Association (Chin 2000) differs significantly from that issued by PHLS (PHLS 1995). The former advises that microbiological clearance prior to return to work should be determined by two consecutive negative stool specimens, advice which is adopted by the US Food Code 2001. PHLS advises that microbiological stool clearance should only be considered for infections with *S. dysenteriae* in high-risk food handlers (PHLS 1995). Scottish guidelines (FSA/Scottish Executive Health Dept Guidance 2002) advise microbiological clearance for *S. flexneri*, *boydii* and *dysenteriae*. The UK food handler guidelines (*Fitness to Work* 1995) do not recommend microbiological clearance, pointing out that - in the case of *Shigella sonnei* - it has been shown that there is a 10% chance of the next sample being positive after three negative samples (Mawer 1994) *i.e.* three negative stools do not equate to clearance, and do not preclude the excretion of small numbers of organisms, possibly intermittently. In addition, it has been observed that, on those occasions where exclusion was considered appropriate, the use of negative faecal samples to determine clearance of *S.sonnei* appears to have conferred no additional benefit (PHLS 1993).

The weight of evidence suggests that, although the infectious dose is small, asymptomatic shigella carriers practising good personal hygiene pose minimal risk of spread of the infection. In addition, *S.sonnei*, the most common shigella species in Ireland, generally causes a mild illness. It is considered, however, that because of the potential severity of *S. dysenteriae*, it is prudent that stringent precautions are taken to prevent any possible spread of that serogroup.

<p><b>Asymptomatic carriers of <i>S.sonnei</i> practising good personal hygiene do not require exclusion or microbiological clearance</b></p>
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<p><b>High-risk food handlers infected with <i>S.dysenteriae</i> should be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued).</b></p>
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### ***Treatment of Carriage***

Little information exists relating to antimicrobial treatment of shigella carriage. While appropriate antimicrobial treatment may reduce duration of carriage to a few days (Chin 2000), the literature suggests that antimicrobial treatment of cases of *S. sonnei* is seldom indicated. Routine use of antimicrobial agents is not recommended solely to speed return to work, not least because of the possible development of antibiotic resistance (Viral GE Subcomm. PHLS 1993).

Multidrug resistance is common (Cheasty *et al*, 1998). Since 1983, the incidence of resistance to ampicillin in *S. dysenteriae*, *S. flexner* and *S. boydii* infection in England and Wales has increased from 42 % to 64% and the incidence of resistance to trimethoprim from 6% to 64%. For *S. sonnei*, almost 50% of isolates were resistant to ampicillin or trimethoprim and 15% were resistant to both (Cheasty *et al*, 1998).

**Antimicrobial treatment is not indicated for shigella carriage in food handlers, not least because of the problem of antibiotic resistance.**

## **7.6 Salmonellosis (non-typhoidal)**

There are over 2,000 known serotypes of salmonella. Numerous serotypes are pathogenic for humans. *S. typhimurium* and *S. enteritidis* are the most commonly reported in Ireland. Most cases occur sporadically. Outbreaks can arise from food contaminated at its source, or less often, during handling by an ill person or carrier. Person-to-person spread can also occur.

### ***Symptoms*** (Chin 2000)

Salmonellosis is characterised by sudden onset of headache, abdominal pain, diarrhoea, nausea and sometimes vomiting. Vomiting may be severe. Fever is almost always present. Anorexia and diarrhoea often persist for several days. Infection may develop into septicaemia or focal infection. Deaths are uncommon except in the very young, very old, debilitated and immunocompromised.

### ***Excretion*** (Chin 2000)

A temporary carrier state occasionally continues for months. Depending on the serotypes, approximately 1% of infected adults and 5% of children aged less than five years may excrete the organism for over one year.

### ***Exclusion / Microbiological Clearance***

Human carriage of non-typhoidal salmonella plays a negligible role in transmission (Mandell *et al*, 1995). Only 2% of 566 outbreaks in the United Kingdom were related to a specific food handler. Prolonged carriage in food handlers after gastroenteritis is rare and the amount of organisms is small. It therefore seems reasonable to allow individuals to return to work after diarrhoea has fully resolved.

Current guidelines in the UK (PHLS 95; Fitness to Work 95), Scotland (FSA/Scot.Exec 2002) and the US (Chin 2000; Food Code 2001) do not require the elimination of salmonella carriage before return to food handling duties. Farthing has recommended that if good personal hygiene can be assured then carriers may return to work (Farthing *et al*, 1996). The American Public Health Association does, however, stipulate that exclusion of asymptomatic infected individuals is indicated for those with questionable hygiene habits (Chin 2000) - two negative stool cultures not less than 24 hours apart; if antibiotics are used, initial culture should be taken at least 48 hours after the last dose.

**Asymptomatic salmonella (non-typhoidal) carriers practising good personal hygiene do not require exclusion or microbiological clearance**

### ***Treatment of Carriage***

The general consensus on literature review concurs that antibiotic treatment of salmonella carriage may not eliminate the carrier state but may indeed prolong excretion (Chin 2000). However, most of the evidence seems to be extrapolated from the treatment of cases of salmonellosis, with little direct evidence available on treatment of the carrier state. Quinolones, in common with other antibiotics, have produced unimpressive microbiological results in adults with uncomplicated non-typhoid salmonella enteritis (Wistrom *et al*, 1995; Sirinavin & Garner 2000). Not only have they had doubtful efficacy in the treatment of uncomplicated infections caused by salmonella, they may also prolong the carrier state and promote antibiotic resistance (Wistrom *et al*, 1995). A controlled, randomised, double blind study concluded that norfloxacin treatment for 10 days decreased the excretion of salmonella bacteria during the first week, but there was no difference in excretion rates 1-6 months after treatment initiation in the treatment versus placebo group (Pitkajarvi *et al*, 1996). While some success in the elimination of carriage has been achieved with quinolones, the minimum dosage and duration of treatment has not yet been established (Farthing *et al*, 1996). Overall, it has been advised that antibiotics, including 5-fluoroquinolones, are not useful for intestinal salmonella eradication and should not be recommended (Sirinavin & Garner 2000).

Interestingly, it has been proposed that this non-intervention policy is unlikely to find favour with employers of food handlers (Farthing *et al*, 1996), and that there will be some instances where quinolone therapy of asymptomatic salmonella excretion might be considered. Oral ciprofloxacin has been advocated for the treatment of convalescent excretors of salmonellae as part of infection control measures in hospital outbreaks (Farthing *et al*, 1996). It has been argued that this approach has its limitations: while stool cultures may be negative soon after stopping quinolone therapy, bacteriological relapse may nevertheless follow two or more weeks later. Further clinical trial evidence is needed before quinolones can be recommended as a routine measure to control salmonella excretion during outbreaks. In situations where a quinolone is used, it has been stressed that stool cultures should be taken after at least 3 weeks to detect relapse rates (Farthing *et al*, 1996).

**On the basis of current evidence, treatment of salmonella carriage in food handlers is generally not indicated as it is of doubtful efficacy and may prolong organism excretion.**

## **7.7 Norwalk-like Viruses (NLVs)**

Also known as small round structured viruses (SRSVs), NLVs are an antigenically diverse group of caliciviruses which have similar morphology under the electron microscope and appear to cause an identical clinical picture of projectile vomiting and diarrhoea (NLVs MMWR 2001). They have been commonly implicated in food handler associated outbreaks.

The low infectious dose of NLVs (i.e. less than 100 viral particles) readily allows spread by droplets, fomites, person-to-person transmission and environmental contamination. A clear understanding of how food handlers contaminate food is crucial (Viral Gastro Subcomm PHLS, 1993). It was initially assumed that transmission was solely by faecal contamination due to poor hygiene. Alternative methods of contamination are now apparent. Direct contamination of food by vomitus can obviously occur. In addition, aerosols produced by vomitus can directly contaminate food or alternatively lead to contamination of work surfaces with the potential for subsequent transfer to food.

### ***Symptoms***

Illness is characterised by acute onset of nausea, vomiting, abdominal pain and diarrhoea. Vomiting is relatively more prevalent among children, whereas a greater proportion of adults experience diarrhoea. Constitutional symptoms (*e.g.* headache, fever, chills and myalgia) are common.

### ***Excretion***

Both pre and post-symptomatic contamination of foods has been documented in outbreaks traced to food handlers. Anecdotal evidence from outbreak investigations has also shown that viral shedding can occur for a prolonged period and in the absence of clinical illness (NLVs MMWR 2001). Excretion of virus in faeces begins a few hours before the onset of symptoms and can continue for up to 7-10 days, with maximum shedding occurring 24-72 hours after exposure (Chadwick 2000). One volunteer study has shown that viral antigen can be detected in stools seven days after exposure in both symptomatic and asymptomatic persons (Graham *et al*, 1994); in another, viral antigen was detected up to two weeks after exposure (Okhuysen *et al*, 1995). The epidemiologic significance of these findings remains unclear. Further research is needed to determine whether the viral antigen that is detectable for prolonged periods after recovery from illness is evidence of infectious virus or not. Additional research is also necessary to assess the time of maximal viral shedding.

Prolonged duration of viral shedding that can occur among asymptomatic individuals increases the risk for secondary spread and is of concern in food handler-related transmission. Infected food handlers might contaminate food items during preparation. The risk is increased when the food item is consumed without further cooking. Because of the low infectious dose of NLVs, even a limited contamination can result in substantial outbreaks.

### ***Exclusion / Microbiological Clearance***

The exclusion of food handlers for 48-72 hours after resolution of illness is generally recommended to prevent outbreaks caused by food handlers; the evidence for lengthier periods of exclusion is not conclusive. Although data are limited regarding whether detectable viral antigen in the post symptomatic phase of illness represents infectious virus, food handlers should be required to maintain strict personal hygiene at all times. Clearance stool specimens are of no value and should not be requested (Viral Gastro Subcomm PHLS 1993).

<b>Food handlers infected with NLV should be excluded for 48-72 hours after resolution of illness. Evidence for longer exclusion periods remains the subject of debate, unless hygiene habits are questionable. Microbiological clearance is not indicated.</b>
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## ***7.8 Staphylococcus aureus***

*S.aureus* is a common cause of bacterial skin lesions (including impetigo, folliculitis, carbuncles, abscesses and infected lacerations). About 20-30% of the general population are nasal carriers (Chin 2000). Transmission is through contact with a person who either has a purulent lesion or is an asymptomatic carrier of a pathogenic strain. The pathogen can also inhabit apparently normal skin. The hands are the most important instruments for transmitting infection.

Foodborne transmission occurs by ingestion of a food product containing staphylococcal enterotoxin. Foods involved are particularly those that come in contact with food handlers' hands, either without subsequent cooking or with inadequate heating or refrigeration. When these foods remain at room temperature for several hours before being eaten, toxin-producing staphylococci multiply and elaborate the heat stable toxin.

***Symptoms (of food poisoning)***

Symptoms are abrupt and sometimes violent in onset, with severe nausea, cramps, vomiting and prostration, often accompanied by diarrhoea and sometimes with subnormal temperature and lowered blood pressure. Deaths are rare; duration of illness is commonly not more than a day or two, but the intensity of symptoms may require hospitalisation.

***Exclusion / Microbiological Clearance***

Treatment of skin infections may be clinically indicated. In staphylococcal outbreak situations, it is recommended to search for food handlers with skin infections, particularly of the hands, and to collect nasal swabs from food handlers (Chin 2000). Nasal carriers need not be excluded from food handling (PHLS 95). Treatment of nasal carriage is generally not indicated; it may be considered where the food handler is implicated in an outbreak (Director of Public Health / Designated Medical Officer in consultation with Consultant Microbiologist).

**Nasal carriers of *S.aureus* need not be excluded from food handling**

**Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed**

**Treatment of nasal carriage is generally not indicated; it may be considered where the food handler is implicated in an outbreak.**

## **7.9 Group A ( $\beta$ -Haemolytic) Streptococci**

Group A Streptococci (*Strep. pyogenes*) cause a variety of diseases. The most common are streptococcal sore throat and streptococcal skin infections (pyoderma or impetigo) (Chin 2000). The distinguishing characteristics of foodborne streptococcal pharyngitis have recently been reviewed (Katzenell *et al*, 2001). The evidence suggests that *S. pyogenes* originates from the pharynx or hand lesions of a food handler. It has been shown that nasal carriers of streptococci may contaminate food by sneezing, or by handling food with hands contaminated by respiratory secretions. Outbreaks may be traced to an individual with an acute or persistent streptococcal infection or carrier state (nose, throat, skin).

***Symptoms***

In comparison to airborne transmission, foodborne disease is more frequently characterised by symptoms such as sore throat, pharyngeal erythema, enlarged tonsils and submandibular lymphadenopathy than by coughing and coryza (Katzenell *et al*, 2001).

***Exclusion / Microbiological Clearance***

With adequate penicillin therapy of streptococcal pharyngitis cases, transmissibility is generally terminated within 24 hours (Chin 2000). If untreated, cases may continue to carry the organism in the pharynx and remain infectious for weeks or even months. However, the contagiousness of these carriers decreases sharply in 2-3 weeks after onset of infection (Chin 2000). Identification of pharyngeal / skin carriers can involve intensive epidemiological and microbiological investigation.

**Exclude high-risk food handlers with acute Streptococcal sore throat until symptom resolution**

**Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed**

## **7.10 Cholera**

Cholera is caused by infection of the small intestine by *Vibrio cholerae* 01 or 0139. Transmission is by ingestion of food or water contaminated directly or indirectly with faeces or vomitus of infected persons (Chin 2000). Its occurrence in this country has been confined to imported cases. Foreign travel and contaminated seafood account for most cases of cholera in the US, and antimicrobial resistance is increasing among *V.cholerae* 01 strains isolated from ill travellers (Steinberg *et al*, 2001). Travel is now more frequent and more rapid. Dramatic epidemics have occurred in Latin America, the Indian subcontinent, Southeast Asia, parts of Africa and Eastern Europe. Person-to-person spread by the faecal oral route contributes to its epidemic spread in underdeveloped countries where sanitary facilities and personal hygiene are poor.

### ***Symptoms***

The infection is characterised by massive acute diarrhoea, vomiting and dehydration; death occurs in severe, untreated cases (Rabbani & Greenough 1999); with proper treatment, the mortality rate is less than 1% (Chin 2000). Asymptomatic infection is much more frequent than clinical illness (Chin 2000).

### ***Excretion***

Stools usually remain positive for only a few days after recovery; occasionally the carrier state may persist for several months (Chin 2000)

### ***Exclusion / Microbiological Clearance***

Information regarding food handler exclusion is sparse. Secondary spread is rare where sanitary facilities are available and good personal hygiene is practised (PHLS 95). The guidelines of the PHLS 1995 recommend that food handlers (high-risk group) should be excluded for 48 hours after the first normal stool; when indicated, two consecutive negative stools taken at intervals of at least 24 hours are required.

### ***Treatment of Carriage***

Antibiotics known to be effective against the infecting strains (e.g. tetracycline against the 0139 strain and most 01 strains) shorten the period of communicability (Chin 2000). Since individual strains of 01 and 0139 may be resistant to a number of antimicrobials, sensitivities should guide the choice of antimicrobial used. Very rarely, chronic biliary infection that lasts for several years has been observed in adults associated with intermittent shedding of vibrios in the stool (Chin 2000).

<p><b>High-risk food handlers infected with <i>V.cholerae</i> 01 or 0139 should be excluded for 48 hours after the first normal stool. When microbiological clearance is indicated (e.g. sanitary facilities / personal hygiene suspect), two consecutive negative stools at intervals of at least 24 hours are required.</b></p>
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<p><b>Prolonged carriage is rare. If treatment of carriage is considered, sensitivities should guide the choice of antimicrobial used in view of the possibility of resistant strains</b></p>
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## **7.11 Amoebic Dysentery**

Amoebic dysentery is an infection with a protozoan parasite – *Entamoeba histolytica*. Differentiation of pathogenic *E.histolytica* from the morphologically identical non-pathogenic *E.dispar* is based on immunologic differences and on isoenzyme patterns. Most asymptomatic

cyst passers carry strains of *E.dispar*. Geographically, rates are higher in areas with poor sanitation (such as parts of the tropics). Transmission occurs mainly by ingestion of fecally contaminated food or water containing amoebic cysts. Infection is rarely transmitted from acute cases; most cases arise through faecal-oral spread from those excreting cysts (PHLS 1995).

### ***Symptoms***

Most infections are asymptomatic. Intestinal disease can be relatively mild or, alternatively, severe with fever, chills and bloody or mucoid diarrhoea (amoebic dysentery).

### ***Excretion***

Cysts may continue to be passed in the stools for years.

### ***Exclusion / Microbiological Clearance***

Microbiological clearance before return to work is not required (PHLS 1995).

### ***Treatment of Carriage***

All asymptomatic pathogenic infections of *Entamoeba histolytica* should be treated because of the potential or real risk of invasive disease and of transmission to others (Jackson TFHG 1987). Treatment of asymptomatic carriers with iodoquinol, paromomycin or diloxanide furoate is recommended by the American Public Health Association (Chin 2000).

**High-risk food handlers should be excluded for 48 hours after the first normal stool. While microbiological clearance is not required for return to work, treatment of carriers of pathogenic strains is recommended.**

## **7.12 Other Pathogens**

Control measures with regard to other foodborne pathogens which can be transmitted by infected food handlers via food are outlined in APPENDIX E. These pathogens include *Aeromonas spp*, *Campylobacter spp*, *Cryptosporidium spp*, *E.coli* (other than VTEC), *Giardia lamblia*, *Vibrios* (non-cholera), Rotavirus and *Yersinia spp*. The recommended guidelines for those pathogens are in line with current UK Public Health Laboratory Service advice (PHLS 1995). As a general rule, none requires microbiological clearance prior to returning to food handling duties, after symptom resolution, unless personal hygiene practices are questionable.

## **Recommendations:**

### **Overall**

- Recommended control measures for foodborne pathogens which can be transmitted by infected food handlers via food are summarised in APPENDIX E

### **Typhoid / Paratyphoid - [High-risk food handlers]**

- Case: exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals, starting 2 weeks after completion of antibiotic treatment
- Carrier: exclude until 6 consecutive negative stool samples obtained, taken at 2 week intervals
- Suspected case (history suggestive of enteric fever): consider need to obtain 6 consecutive negative stool samples at 2 week intervals
- Contact of case / outbreak: exclude until 3 consecutive negative stool samples obtained, taken at weekly intervals, starting 3 weeks after last contact with untreated case
- Household contact of carrier: consider excluding until 3 consecutive negative stool samples obtained, taken at weekly intervals, starting from date of carrier identification
- Fluoroquinolones are recommended for the elimination of carriage. Where sensitivity is a problem, cephalosporin antibiotics should be considered.

### **Verocytotoxin-producing *E.coli* (VTEC) - [High-risk food handlers]**

- High-risk food handlers infected with VTEC should be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued)
- High-risk food handlers who are household contacts of cases of VTEC infection should generally be excluded from food handling until 2 successive negative stool samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics are discontinued), unless careful risk assessment suggests otherwise.
- In the absence of convincing evidence, antimicrobial treatment is currently not indicated for VTEC carriage in food handlers

### **Hepatitis A (HAV)**

- A food handler infected with Hepatitis A should be excluded from food handling duties for seven days after the onset of jaundice and / or symptoms
- A food handler contact of a Hepatitis A case need not be excluded provided good hygiene practice is observed
- Routine Hepatitis A vaccination of food handlers is not indicated
- When a food handler is a household contact of a confirmed case of HAV, the food handler should be considered for prophylaxis (HNIG or HAV vaccine)
- Food handler colleagues of a food handler case of Hepatitis A should be included as close contacts for prophylaxis purposes
- People who have recently been exposed to food prepared by a food handler case of Hepatitis A may benefit from prophylaxis. This should be considered by the investigating Director of Public Health / Designated Medical Officer, following risk assessment

### **Shigella - [High-risk food handlers]**

- Asymptomatic carriers of *S.sonnei* practising good personal hygiene do not require exclusion or microbiological clearance
- High-risk food handlers infected with *S. dysenteriae* should be excluded from food handling until 2 successive negative stools samples are obtained (collected at least 48 hours apart and no earlier than 48 hours after antibiotics have been discontinued)
- Antimicrobial treatment is not indicated for shigella carriage in food handlers, not least because of the problem of antibiotic resistance



**Salmonella** - *[High-risk food handlers]*

- Asymptomatic salmonella (non-typhoidal) carriers practising good personal hygiene do not require exclusion or microbiological clearance
- On the basis of current evidence, treatment of salmonella carriage in food handlers is generally not indicated as it is of doubtful efficacy and may prolong excretion

**Norwalk-like Virus (NLV)**

- Food handlers infected with NLV should be excluded for 48-72 hours after resolution of illness. Evidence for longer exclusion periods remains the subject of debate, unless hygiene habits are questionable. Microbiological clearance is not indicated.

**Staphylococcus aureus** - *[High-risk food handlers]*

- Nasal carriers of *S.aureus* need not be excluded from food handling.
- Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed
- Treatment of nasal carriage is generally not indicated; it may be considered where the food handler is implicated in an outbreak

**Group A ( $\beta$ -Haemolytic) Streptococci** - *[High-risk food handlers]*

- Exclude high-risk food handlers with streptococcal sore throat until symptom resolution
- Exclude high-risk food handlers with infected skin lesions on exposed body parts that cannot be adequately covered (with waterproof dressing) until healed

**Cholera** - *[High-risk food handlers]*

- Food handlers infected with *V.cholerae* 01 or 0139 should be excluded for 48 hours after the first normal stool. When microbiological clearance is indicated (e.g. sanitary facilities / personal hygiene suspect), two consecutive negative stools at intervals of at least 24 hours are required.
- Prolonged carriage is rare. If treatment of carriage is considered, sensitivities should guide the choice of antimicrobial used in view of the possibility of resistant strains.

**Amoebic Dysentery**

- High-risk food handlers should be excluded for 48 hours after the first normal stool. While microbiological clearance is not required for return to work, treatment of carriers of pathogenic strains is recommended.

## **Chapter 8**

### **Prevention of Food Handler Infection with Foodborne Pathogens at Work**

#### **8.1 Introduction**

The outbreaks delineated in Chapter 3 are those in which infected food handlers were found to have been causally linked. However, in many outbreaks where food handlers are affected, the food handler is not uncommonly a victim of the outbreak - secondary to eating contaminated food, drinking contaminated water, being exposed to a contaminated environment or through contact with another infected person in the workplace. The route of exposure in the course of such outbreaks is dependent on the circumstances of each particular outbreak and the pathogen involved. Control measures implemented during the course of the outbreak investigation by the outbreak control team act to prevent further spread of infection.

Apart from outbreak situations, there is a paucity of published information relating to transmission of foodborne pathogens to food handlers in the course of their work (*i.e.* occupational exposure). Any evidence that does exist relating to non-outbreak situations indicates that such occupationally related infections are largely confined to those whose work involves handling animal carcasses and raw meat. While such pathogens are relevant to the health of the food handler, no evidence has been found in this review that food handlers in the meat processing industry pose a risk of passing the infection through to the consumer via the food they handle. The handled product will undergo further preparation steps before consumption – preparation steps which, if adequate, will control any potential hazard.

This chapter focuses on the occupational health risk of foodborne pathogen infection to those who handle carcasses, offals and meats from potentially infected food animals - where such evidence is available. The preventive aspects examined are therefore specific to food handlers in the meat processing industry.

#### **8.2 Meat Processing Industry**

The exposure to biological agents in the meat processing industry concerns a wide variety of bacteria, viruses, parasites and fungi. Zoonotic diseases (infectious diseases which are naturally transmissible between vertebrate animals and man) can be transmitted from infected animals or their hair, feathers, fleece, hides, blood, digestive tracts or excrements to food handlers in the occupational setting by such means as hand/skin contact, inhalation of aerosols, ingestion of dust, or by splashes in eyes. Some of the causative zoonotic agents are potential foodborne pathogens.

The primary meat processing sector comprises those businesses which slaughter, dress and cut-up animals for the production of food. Food handlers in the meat industry, especially in

the slaughtering industry, are at particular risk of acquiring certain zoonoses which are foodborne pathogens. A vitiated atmosphere contaminated with micro-organisms, inadequate ventilation if present, and frequent skin injuries contribute to the risk of exposure.

Advances in the control of zoonotic diseases in animals have reduced the hazards posed to workers in the meat industry and to consumers of meat. A limited number of zoonoses is relevant to the safety of workers slaughtering and / or processing red and white meat in Europe (Corry & Hinton 1997). Published reports on the subject are relatively scarce, and most relate to studies of pathogen carriage rates. They mainly concern VTEC, *Salmonella* spp. and *Campylobacter* sp. Other potential foodborne pathogens of relevance include *Yersinia* sp., *Staph Aureus*,  $\beta$ -Haemolytic Strep and *Cryptosporidium* sp.

### **8.3 Relevant Zoonotic Pathogens**

**VTEC:** Cattle are the primary reservoir of *E.coli* 0157:H7. The organism persists in the rumen and colon of cattle and is passed in the faeces. In an Irish study, *E. coli* 0157:H7 was detected in 0.8% of rumen samples, 2.8% of faecal samples, and on 2.8% of beef carcasses (McEvoy *et al*, 1999). However, an incidence of up to 15.7% has been reported (Chapman *et al*, 1997). The organism has also been found in sheep (Kudava *et al*, 1996). Other types (*e.g.* 026 and 0111) are found in a wide variety of food animals, particularly in sheep, goats and cattle, and to a lesser extent in pigs (Corry & Hinton 1997).

It has been pointed out that VTEC poses an occupational risk to food handlers because of its low infective dose (PHLS Subcomm VTEC 2000). A study on the prevalence of VTEC in stool samples from asymptomatic human carriers working in the meat processing industry in Switzerland has been reported (Stephan, Ragettli, Untermann 2000). A carrier rate of 3.5% was detected among staff members from three large meat processing plants.

A predisposition for VTEC in slaughterhouse employees, where the prevalence of carriers may increase up to 9%, has been proposed (Stephan & Untermann 1999). It is assumed that slaughterhouse work, where individuals presumably encounter VTEC more frequently (especially during the dehiding and evisceration process) and in higher numbers, may put these individuals at higher risk. In addition, the role of asymptomatic human carriers as a source of contamination and thus, the importance of personal hygiene measures in the meat processing industry, should not be underestimated.

**SALMONELLA:** Food animals are an important reservoir of salmonella (Frost *et al*, 1988). An Irish study conducted by the National Food Centre in 2000 indicated that:

- 2% of cattle carry salmonella and 0.16% of bovine carcasses are contaminated
- 24% of pigs carry salmonella in their caecum and 2.4% of porcine carcasses are contaminated
- 3.6 % of broilers carry salmonella and 14.9% of poultry carcasses are contaminated

Cutaneous salmonellosis has been reported in food handlers in the porcine sector (Cameron 1988; Collyer 1988; Visser 1991) The lesions take the form of pustular dermatitis or folliculitis as small, red, patchy spots on arms and hands apparent within three days of contact. Infection with salmonella is reported to be much rarer among workers in the poultry / broiler industries than campylobacteriosis (Corry & Hinton 1997).

**CAMPYLOBACTER:** Campylobacter is endemic in Irish poultry flocks. Detection rates of 90-100% have been recorded from dressed carcasses at slaughterhouses (Whyte, 2000). Poultry carcass sampling by DAFRD in conjunction with FSAI, commenced in 1999, has reported isolation rates of between 50-70% to date. A number of reports have documented

evidence that foodworkers in poultry abattoirs and processing units are at risk of infection from campylobacter. One study noted that new members of staff were found to have contracted campylobacteriosis within a few weeks of starting work in poultry processing plants (Berndtson *et al*, 1996). Another study found, on testing abattoir workers and clerical workers in the same workplace, that workers in direct contact with freshly cut animal parts had significantly higher antibody levels (Vaira *et al*, 1998).

**YERSINIA:** *Yersinia enterocolitica* is a component of the intestinal flora of red meat animals, especially pigs. It is also found on the tonsils and the nasopharynx of pigs. Some serotypes of *Y. enterocolitica* cause gastroenteritis in humans. Severe infections with *Y. enterocolitica* among newly employed foodhandlers in Danish pig abattoirs have been reported (N. Skovgaard *et al*, 1996). It has also been found that a significantly higher prevalence of antibodies occur in food handlers working on pig killing lines, compared with those working in offices in the same premises (Nesbakken *et al*, 1991).

**STREPTOCOCCAL & STAPHYLOCOCCAL INFECTIONS:** Outbreaks of skin infection due to *Streptococcus pyogenes* have been recorded among food handlers in meat processing plants. In Yorkshire, in 1978, an attack rate as high as 44% occurred in the meat packaging section (Barnham *et al*, 1980). Outbreaks associated with *Staphylococcus aureus* and  $\beta$ -haemolytic streptococci have been recorded in Scottish abattoirs (Barnham & Neilson, 1987).

**CRYPTOSPORIDIUM:** Cryptosporidia are commonly shed by cattle, sometimes sheep, and more often by calves and young lambs (Robertson & Smith, 1992). Humans may become infected following either direct or indirect contact with food-animals, particularly cattle (Casemore, 1990). The level of risk posed by cryptosporidium in the meat industry is unknown.

**OTHER INFECTIONS:** Other zoonotic agents do pose a potential risk to food handlers in the meat processing industry. However, these zoonoses are not subsequently transmissible via food handled by an infected food handler. They are therefore not considered further in the context of prevention of food handler infection with foodborne pathogens at work. Such zoonoses include include Brucellosis, Tuberculosis, Leptospirosis, Listeriosis, Orf (contagious pustular dermatitis), Q Fever, Chlamydiosis, Newcastle Disease, Ringworm and Toxoplasmosis. This committee found no reported evidence that occupational exposure to animals infected with Bovine Spongiform Encephalopathy (BSE), and in particular to Specified Risk Material (SRM), poses a health risk to abattoir workers.

## **8.4 Susceptible Food Handlers**

People working on slaughter lines are likely to be exposed to more hazards than those on meat cutting operations. It has been suggested that consideration should be given to the question of whether susceptible groups of food handlers should work on slaughter lines where exposure to these zoonoses constitutes a higher risk (Correy & Hinton 1997). Susceptible groups would include those who are immunosuppressed (*e.g.* on immunosuppressive drugs, HIV infection) or those who are pregnant.

## **8.5 Preventive Aspects in the Meat Industry (Corry & Hinton, 1997)**

The reduction in the prevalence of various diseases in farm livestock arriving at abattoirs and slaughterhouses will lead to the reduction of hazards to food handlers becoming infected with foodborne pathogens in their work environment. Some pathogens, however, such as VTEC,

campylobacters and salmonellas frequently cause no clinical disease in farm animals, and will therefore remain a potential hazard to meat workers. Further advances in making meat safer are likely to result from the introduction of various Quality Assurance schemes. These involve the identifying, monitoring and keeping records of the disease status and treatment of each animal (or poultry flock) so that its history is known when it reaches the abattoir. The Dept. of Agriculture Food & Rural Development's clean livestock policy offers an additional protective measure.

The principal pathogens responsible for food-borne illness and attributable to meat originate from the digestive tracts of animals, either directly via spillage of gut contents, or indirectly from an animal's hide or fleece. Hygienic slaughter and dressing operations, in conjunction with veterinary ante-mortem and post mortem inspection, are essential in minimising the risk of contaminating meat with pathogenic organisms. Any risks to the worker will thereby be minimised also.

Precautions to prevent infection of workers in the meat processing industry are mostly those that should already be in use to prevent the contamination of meat. Those recommendations outlined earlier in the report relating to the prevention of food contamination by food handlers should apply. The protection of meat workers from infection depends upon taking normal hygienic precautions which also protect the meat from inadvertent contamination by the workers. Additionally, further specific measures are applicable in reducing the risk of meat workers becoming infected with foodborne pathogens in their work environment – including the provision of protective clothing, sector-specific environmental and hygiene facilities and, most significantly, the prevention of gut spillage on the slaughterline.

## **Recommendations:**

### **General:**

- The recommendations previously made relating to the prevention of food contamination by infected food handlers - including training in safe food handling, good personal hygiene, the provision of adequate and well maintained workplace sanitation facilities, and illness reporting - are also applicable to the prevention of food handler infection with foodborne pathogens at work.

### **In addition, in the meat processing industry:**

- The education and training of food handlers in the meat processing industry should include information on:
  - the nature of relevant zoonotic diseases *and*
  - the minimisation of risk of infection to themselves by careful handling of potentially infected food-animals, carcasses and offal
- Additional protective clothing should include:
  - rubber aprons that can be frequently and easily washed down during the day (should be washed in a cabinet to contain splash), boots and gloves
  - the legal requirement for mask usage in the mince meat processing sector is acknowledged
- Hygiene facilities should include:
  - a sufficient number of boot washing facilities
  - sufficient number of facilities for cleaning tools / disinfecting equipment
- The legal requirement that taps should not be hand operable in this sector is acknowledged
- There should be appropriate ventilation systems with reduction of aerial contamination in areas where aerosols and / or dust are hazards
- Skin injuries should be treated promptly and efficiently when they occur
- In relation to the primary processing of food animals there should be
  - an effective dehiding and evisceration process ( in particular, the prevention of spillage of animal gut contents during evisceration)
  - an effective evisceration accident procedure
  - adequate waste disposal measures

Detailed measures relevant to the primary processing of food animals are contained in '*Guidelines for the Implementation of Food Safety Management Systems in Beef and Lamb Slaughter Plants through HACCP Principles*' (Guidelines FSAI 2002). There are, as yet, no such Irish guidelines for the porcine or poultry processing industries.

## **Glossary**

**Abattoir:** A slaughterhouse where the killing of livestock and the preparation of the meat takes place

**Antibiotic:** a substance produced by, or derived from, a microorganism that inhibits or destroys other microorganisms

**Antimicrobial or antiseptic soaps:** Soaps containing ingredients with activity against microorganisms on the skin

**Antimicrobial resistance:** see resistance

**Asymptomatic:** not showing any symptoms of a disease, although it is present

**Case:** A person with symptoms identified as having a particular disease

**Carrier:** A person that harbours a specific infectious agent without discernible clinical disease and serves as a potential source of infection

**Communicable disease:** An illness due to a specific infectious agent or its toxic products that arises through transmission of that agent or its products from an infected person, animal or inanimate reservoir to a susceptible host.

**Contact:** a person who has been exposed to a source of infection

**Contamination:** the presence of disease-causing microorganisms or their by-products, chemicals and / or foreign bodies, at a level sufficient to cause a potential health hazard

**Cross-contamination:** the transfer of harmful or potentially harmful microorganisms from contaminated surfaces or foods to other foods either by hand, physical contact, air or contact with food preparation surfaces or food utensils

**Disinfectant:** a chemical that destroys or removes bacteria and other microorganisms

**Disinfection:** the killing of infectious agents outside the body by direct exposure to chemical or physical agents

**Epidemiology:** the study of the factors affecting health and disease in populations and the application of this study to the control and prevention of disease

**Evisceration:** the removal of the abdominal organs, including intestines

**Excreter:** A person without symptoms but excreting pathogenic organisms in their faeces or urine for fewer than twelve months.

**Food:** Includes (a) any substance used, available to be used or intended to be used, for food or drink by human persons *and* (b) any substance which enters into it or is used in the production, composition or preparation of these substances.

**Foodborne disease:** any disease of microbial origin caused by, or thought to be caused by, the consumption of food or water.

**Food handler:** any person involved in a food business who handles food in the course of their work, or as part of their duties, to any extent whether the food is open or pre-wrapped.

**Food hygiene:** all measures necessary to ensure the safety and wholesomeness of food during preparation, processing, manufacture, storage, transportation, distribution, handling and offering for sale or supply to the consumer

Fomite: an object, such as a book, wooden object, or an article of clothing, that is not in itself harmful, but is able to harbour pathogenic microorganisms and thus may serve as an agent of transmission of infection.

HACCP (Hazard Control Critical Control Point): a system which identifies, evaluates and controls hazards which are significant for food safety

Hand antisepsis: the removal or destruction of transient microorganisms from the hands

High-risk food: food which supports the growth of harmful and potentially harmful microorganisms and which will not be subjected to any further heat treatment or processing which would remove or destroy such microorganisms, prior to consumption. Ready-to-eat foods are high-risk foods.

High-risk food handler: a food handler who handles unwrapped food to be consumed raw or without further cooking or other forms of treatment.

Immunocompromised / Immunosuppressed: a person who has impaired immunity due to disease (e.g. cancer) or treatment (e.g. corticosteroid drugs or radiotherapy)

Incidence: the number of episodes of a disease that occur in a specified period of time in a specified group of people

Microbiological clearance: the reduction of the number of pathogenic organisms in a specimen below that detectable by conventional means

Microorganism: any organism that is too small to be visible to the naked eye (e.g. bacteria, fungi, viruses and protozoa)

Non-food handler: a person involved in a food business whose duties and responsibilities can impinge on food safety (e.g. managers, maintenance staff, cleaning staff).

Outbreak: two or more cases of disease linked to a common source

Pathogen: a microorganism capable of causing disease

Plain or non-antimicrobial, non-antiseptic soaps: detergent based cleansers that have no bactericidal activity and, by mechanical action, are used for physical removal of dirt

Prevalence: the number of instances of a particular disease or other condition at a particular time

Ready-to-eat foods: Foods that have gone through most or all of their preparation steps. There will be a 'high-risk' if these are contaminated or allowed to deteriorate because there are no further preparation steps to control the hazard, e.g. cooked meat and poultry, pates, meat pies, cooked meat products (e.g. gravy and stock), milk, cream, custards and dairy produce, shellfish and other seafood (cooked or intended to be eaten raw), cooked rice, cooked eggs and products made with eggs, prepared salads, fruit and vegetables, soft cheeses, etc.

Resistance: the ability of a microorganism to withstand an antimicrobial agent

Screening: the process by which unrecognised diseases or defects are identified by tests that can be applied rapidly on a large scale; screening tests sort out apparently healthy people from those who may have a disease.

Specified Risk Material (SRM): those tissues of cattle, sheep and goats which are known to, or might potentially, harbour detectable BSE infectivity in infected animals.

Sporadic Case: a single case which has not apparently been associated with other cases, excretors or carriers in the same period of time.



Surveillance: the systematic collection and evaluation of data on all aspects of a disease that are relevant to its prevention and control

Susceptible / Sensitive: organisms that are unable to replicate or are killed by an antimicrobial agent

Transmission: passing infectious disease from one person to another

Virus: a very small microorganism that can only survive and multiply within a living cell

Zoonoses: infectious diseases which can be transmitted naturally from vertebrate animals to humans

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