1 Overview

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1.1 Food safety for vulnerable groups

A series of food-related problems, culminating in BSE, have placed food safety high on the agenda of policy makers and local and international media. The confidence of consumers at large in the safety of food, in the food industry’s commitment to produce safe food, and in the ability of enforcement agencies to police the food chain, has been damaged. In the context of healthcare institutions, however, it is not new variant CJD or dioxin contamination that is contributing to morbidity and mortality, but a range of bacteria, viruses and protozoa (Chapter 2), causing illnesses that are easily preventable (Rocourt et al., 2003).

The position of catering services within healthcare institutions is often given low priority compared to high-profile medical services. However, catering is pivotal to the operation of the institution. For any patient to recover they must be in an anabolic state, and appetizing, nutritious food is the foundation for achieving this. The patient’s diet is as important as therapeutic and surgical interventions. Unfortunately, this is rarely recognized and while there are often fund-raising initiatives for a new MRI scanner or coronary care unit, and politicians love the high media coverage associated with announcing the opening of these facilities, the need for a new kitchen or a blast chiller does not generate the same level of interest.

Food poisoning may not cause major morbidity in robust adults but can be life-threatening in small infants, the frail elderly, or people suffering from concurrent morbidity (Kendall et al., 2003). The frail elderly (Kendall et al., 2006) and the ill (Trevejo et al., 2005) often have lower immunity than healthy adults and the infectious dose to precipitate an infection is lower (Chapter 5). For example, Enterobacter sakazakii can cause sepsis, meningitis or necrotizing enterocolitis in neonates and the case-fatality rate has been reported to be as high as 33%, however this pathogen rarely causes disease in adults (Lai, 2001). Similarly, persons over 65 years old are about 7.5 times more susceptible to Listeria monocytogenes than persons under 65 with no other condition, and persons with a range of conditions from alcoholism through diabetes, cancer, AIDS and transplant patients show an increased relative susceptibility ranging from 18 to 2584 (WHO, 2004). The problem of low-level contamination of a food
Box 1.1 Food safety advice from the American Cancer Society (2005).

During the time when your white blood cell count is low:

Food safety advice

- Avoid raw milk or milk products; any milk or milk product that has not been pasteurized, including cheese and yoghurt made from unpasteurized milk
- Avoid raw or undercooked meat, fish, chicken, eggs, tofu
- Do not eat cold smoked fish
- Do not eat hot dogs, deli meats, processed meats (unless they have been cooked again just before eating)
- Avoid any food that contains mold (for example blue cheese, including that in salad dressings)
- Avoid uncooked vegetables and fruits
- Avoid uncooked grain products
- Avoid unwashed salad greens
- Do not eat vegetable sprouts (alfalfa, bean and others)
- Avoid fruit and vegetable juices that have not been pasteurized
- Avoid raw honey (honey that has not been pasteurized)
- Do not eat raw nuts or nuts roasted in their shells
- Do not drink beer that has not been pasteurized (home brewed and some microbrewery beers); also avoid brewer’s yeast
- Avoid any outdated food
- Do not eat any cooked food left at room temperature for 2 hours or more
- Avoid any food that has been handled or prepared with unwashed hands
- Talk to your doctor about any dietary concerns you may have, or ask to talk with a registered dietician

and resulting outbreak of listeriosis in a vulnerable group is illustrated well by the report by Maijala et al. (2001) (Chapter 4). Food safety, hygienic practices and an effective food safety management system are, therefore, crucial in healthcare institutions and other healthcare settings.

From one viewpoint, food safety issues in healthcare environments are different from food safety issues in other commercial catering establishments. Certain high-risk foods should be excluded from all hospital menus. Unpasteurized milk, unpasteurized milk products and undercooked foods that could contain pathogens have no place on the menu in a healthcare institution. For immunocompromised and other high-risk patients, in particular those with haematological malignancies, a low microbial diet (LMD) can be used. LMDs are not sterile, but are diets in which specific foods are excluded in an effort to reduce the risk of infection (UCSF, 2006). An LMD has been advised by the American Cancer Society (2005) for patients when their white blood cell count is low (Box 1.1). Some US hospitals have developed lists of foods that are prohibited and lists of foods that are allowed while on LMD (Roswell Park Cancer Institute, 2005; Kansas City Cancer Center, 2006; San Francisco Children’s Hospital, UCSF, 2006). A study carried out in the UK and Ireland in 1991 by Bibbington et al. (1993) on bone marrow transplant patients reported that there were
wide variations in clinical practice and limited general agreement regarding LMDs. Some UK hospitals have nutritional protocols which include a list of foods that patients should avoid during treatment. It makes little sense to compromise patient well-being, in units where patients are receiving expensive healthcare and costly interventions, by exposing them to food that could contain *Listeria monocytogenes* and other pathogens; therefore, advice similar to that of the American Cancer Society should be followed more universally.

Irradiated foods are considered unacceptable by many consumers in the European Union (EU), but vulnerable patients are likely to hold a different view. The Centers for Disease Control and Prevention estimates that if food irradiation were used for half of the meat and poultry consumed in the US, there would be at least 900,000 fewer cases of foodborne illnesses annually and at least 352 fewer deaths due to foodborne illnesses (Tauxe, 2001). Following US Food and Drug Administration approval of irradiation of raw meat and meat products in February 2000, some healthcare institutions use irradiation-pasteurized chicken (Frenzen *et al.*, 2000). Although less popular, other hospitals and long-term care facilities use irradiation-sterilized foods on a limited basis, to provide immunocompromised patients with microbiologically safe foods that are more varied and higher in quality than meals prepared with the use of thermal sterilization alone (Osterholm & Norgan, 2004).

Some patients who cannot take food orally need to be fed directly into the gastrointestinal tract. The enteral formulae used for these patients are excellent growth media for bacteria; a UK report found that 30% of enteral tube feeds (ETF) were contaminated with a variety of microorganisms (NICE, 2003), and tube feeding may be associated with transmission of infection (Bliss *et al.*, 1998). The European Society for Clinical Nutrition and Metabolism has produced guidelines on enteral nutrition (Lochs *et al.*, 2006) and the Department of Health (UK) (2006) has produced advice aimed at reducing the risk of infection. Some reports suggest that in addition to hygienic preparation, storage and administration, ETF should also be pasteurized before use (Oliveira *et al.*, 2001). In the UK, clinical guidelines state that ‘wherever possible pre-packaged, ready-to-use feeds should be used in preference to feeds requiring decanting, reconstitution or dilution’ (NICE, 2003).

At the end of the spectrum from acute hospitals are smaller units, residential homes and meal-delivery services. In small units, food may be prepared on-site and staff engaged in patient care may also be involved in food preparation. In situations such as these, the healthcare provider/food preparer must pay particular attention to avoiding cross-contamination. Outbreaks of foodborne intestinal disease in residential institutions are common (Ryan *et al.*, 1997). In some residential homes, elderly residents help with the preparation and distribution of meals; if this is occurring, adequate supervision is required to ensure that safe practices are adhered to. In terms of meal delivery services, such as Meals-on-Wheels, volunteers should receive training that addresses safe preparation, cooking and storage of food prior to delivery as well as temperature control and maximum hot/cold holding times for meals both during and after delivery.

### 1.2 Food procurement

Many large hospitals have outsourced their catering and food provision to contractors who are believed to provide a better service, flexibility and value for money. In this situation,
the staff in the kitchens are often employees of the contractor rather than the healthcare institution, and responsibility for staff health and staff training rests with the contractor. Meals may arrive precooked and chilled or frozen, and minimal handling takes place in the healthcare institution. Furthermore, large health institutions often have shops, cafes and canteens on site that supply a range of foods, and these need to be included in the overall food safety programme. These food suppliers are often operated by outside retailers and caterers, and food from these outlets must be safe for both staff and patients.

Food is now traded on the global market and food products and ingredients are sourced from all over the world. To trade in the Single Market, products are required to meet EU standards, and if free trade is to be safe trade then all countries must pay the same attention to enforcement, to ensure full compliance with the legal requirements. The relentless price competition favours countries with economies of scale and cheaper labour and is leading to food travelling greater and greater distances. Increasing liberalization of trade under the recent World Trade Organisation round means that this trend will continue. In sourcing food, traceability is important – if the source of the food is unknown, it is not possible to know whether it has been produced to the highest standards. A requirement for full traceability should be included in all purchasing specifications. In terms of foodborne illness, the health of the residents of institutions is only as safe as the standards of the weakest supplier. Article 18 of Regulation (EC) No. 178/2002 (EC, 2002) spells out that all food business operators shall be able to identify any person from whom they have been supplied with food. There are no exemptions from this requirement for healthcare institutions.

Lessons could be learnt from the policy of the major supermarket chains that only purchase from approved suppliers. To protect their reputations and brand names they include strict food safety requirements in their purchasing specifications. These specifications use accredited industry standards such as the British Retail Consortium (BRC) Global Standard, Food (BRC, 2005), to provide reassurance of compliance. In the UK, the NHS Supply Chain management (NHS Supply Chain, 2007) organizes central tendering for contracts to supply food to many hospitals within the NHS. Hospitals participating in these arrangements and using one of the NHS Supply Chain nominated suppliers will be covered by a due diligence defence. The NHS Supply Chain specifies that successful suppliers must be approved by NHS Supply Chain appointed Hygiene Auditors in compliance with the NHS Code of Practice (NHS, 2001) or with the BRC Global Standard, Food (BRC, 2005) prior to supplying food to a Health Authority; these standards specify that the basis of the company’s food safety system shall be a Hazard Analysis and Critical Control Points (HACCP) plan. It is important to source the safest food possible and products from suppliers with aggressive pathogen-reduction programmes should be given preference, e.g. sourcing eggs from flocks that have been vaccinated against *Salmonella enteritidis*. The outbreaks of *Salmonella enteritidis* in British hospitals in 2002 associated with imported, contaminated eggs (Chapter 4) illustrated that cheaper products can mean inferior products. In 1988, the Chief Medical Officer in the UK advised that in institutions with high-risk groups, raw shell eggs should be replaced with pasteurized egg in recipes for products that would not be cooked or would only be lightly cooked. This advice was reiterated by O’Brien and Ward (2002) and by the Food Standards Agency (FSA, 2002).

A procurement policy that focuses on price alone is a recipe for disaster, and a purchasing manager who follows such a policy may be deemed negligent in the advent of
any adverse health effects in patients or residents occurring as a result of the consumption of contaminated food. Procedures must be in place for agreeing the contract specification, evaluating contractors who tender for the contract, monitoring the performance of the service delivered and the nutritional quality and safety of the food provided. Healthcare professionals with an expertise in infection control and food safety need to be involved in the development of procurement policies as part of an institution’s food safety management system.

In EU legislation, foodstuffs for particular nutritional uses (PARNUTS) are defined as ‘foodstuffs which, owing to their special composition or manufacturing process are clearly distinguishable from foodstuffs for normal consumption, which are suitable for their claimed nutritional purposes and which are marketed in such a way as to indicate such suitability’ (EEC, 1989). It is essential that these foods are labelled correctly. It should be documented in the procurement policy that any changes in formulation of PARNUTS are discussed with the institutions’ healthcare professional. PARNUTS such as high-calorie or high-protein drinks should contain information on the label to advise patients that the products should not be left at room temperature for extended periods of time.

1.3 Factors leading to foodborne disease

Regardless of the size of institutions, the same preventable faults contribute to outbreaks of foodborne disease and often several occur simultaneously (Fitzgerald et al., 2001). The risk factors associated with food preparation procedures and employee behaviours in most need of improvement in hospitals were (FDA/CFSAN, 2004):

1. Improper holding/time and temperature (40.3%)
2. Contaminated equipment/protection from contamination (18.9%)
3. Poor personal hygiene (17.5%)
4. Chemical contamination (13.4%)
5. Inadequate cooking (6.3%)
6. Food from unsafe sources (0.5%)

Temperature control is the most frequently occurring out-of-compliance food safety risk in hospitals. The range of equipment that is required in kitchens will vary depending on whether food is prepared from a raw, cook-chill or ready-to-eat state. Sufficient refrigeration is necessary to ensure that no food that should be stored chilled or frozen is left at ambient temperature. Cookers and microwave ovens should be well-maintained and designed to cope with the throughput of food. Attention has to be given to ensure that food is transported appropriately from the kitchens to the wards within institutions. Cold food has to be kept cold and hot food has to be kept hot to prevent pathogens from multiplying in food. Ward kitchens are a potential source of problems and the staff utilizing them may be different from the catering staff in the main kitchens, and they also require a competence in food safety and hygienic practices (Chapter 6).

Almost 20% (18.9%) of non-compliances with food safety guidelines in hospitals were due to contaminated equipment and insufficient protection from contamination.
(FDA/CFSAN, 2004). Often institutions are victims of their own success and as their reputation builds up throughput of patients increases, but food safety standards must be maintained. If necessary, the establishment and work practices should be re-engineered and the kitchens should be of a size appropriate to the throughput. In healthcare institutions, the situation may arise where an individual suffering from a foodborne illness is admitted for treatment, but must be barrier-nursed with rigorous attention to hygiene in order to prevent an infectious agent from spreading within the hospital to both staff and other patients (Barrie, 1996).

The person-to-person route can transmit many of the food- and water-borne pathogens, and poor personal hygiene contributes 17.5% of out-of-compliances in healthcare institutions. Person-to-person spread of bacteria can be a particular risk in healthcare institutions if hygiene standards are low, or if patients have poor personal hygiene as a result of mental or physical incapacity. The index case and initial cases in many outbreaks in institutions may be foodborne but frequently outbreaks are amplified by person-to-person spread (Wall et al., 1996). An added risk in healthcare institutions is that patients may contaminate their own meals or those of other patients, therefore appropriate assistance should be given to patients at meal times and this final step in the process should be adequately supervised. Furthermore, healthcare workers’ hands must be decontaminated before every episode of care that involves direct contact with patients’ food (Pratt et al., 2001).

It is important to have good occupational health policies to ensure that staff are excluded from work when they are infected with a communicable disease that could be transmitted directly or via food to patients and other staff members. Strategies to reduce the risk of cross-contamination from infected workers are not standardized internationally (NDSC, 2004). Guidelines for management of food handlers who are affected by a gastrointestinal infection have been produced in the UK by the Department of Health (1995, 1996) and by a Working Group of the former PHLS (Salmon, 2004), in Ireland by the National Disease Surveillance Centre (NDSC, 2004) and in the US by the FDA (FDA/CFSAN, 2005). It is recognized that in the case of workers who supply food to highly susceptible groups of the population, the risks and consequences of transmission of infection are greater than in the case of workers who do not supply food to such groups. Furthermore, for certain pathogens that cause severe morbidity and have a low infectious dose, consideration may be given to exclusion from work until stool samples are clear or confining the individual to low-risk activities (NDSC, 2004). For people at increased risk of spreading infection, such as those who work in clinical and social care who have direct contact with highly susceptible persons, it is particularly important to assess them before they return to work (Salmon, 2004).

Food from unsafe sources accounts for 0.5% of out-of-compliances in healthcare institutions and even good food safety systems will be overwhelmed by grossly contaminated product entering the kitchens (Cowden et al., 1995). The water supply, including coolers supplying mineral water and ice dispensers to the institution should be from a potable source complying with all the legal requirements (Chapter 7). The issue of visitors bringing food into the institution for patients needs to be addressed. Currently, most cancer hospitals require that visitors get approval before bringing any food to patients, but one maternity hospital in Ireland, for example, allows fruit, biscuits, sweets or crisps but not cooked food
to be brought into the hospital by visitors (National Maternity Hospital, Ireland, 2006). To reduce the likelihood of contaminated food being brought in for patients, the menu should have sufficient choice to cater for all dietary requirements, such that there is no need for food to be brought in for patients. If an institution is not catering for patients’ dietary needs/tastes, healthcare workers in that institution should be informed. If any food is brought in for patients it should be items such as biscuits and fresh fruit that will be well washed and preferably peeled. During certain outbreaks of infection, particularly due to norovirus, it may be necessary to ask visitors not to bring in certain foods, including fruit, for patients.

1.4 Food safety management

Ensuring the safety of food is a challenge in all healthcare institutions from small residential units and food-delivery services at homes of senior citizens to large acute hospitals, long-stay psychiatric hospitals and nursing homes. The food safety challenges can vary between and within institutions, from neonatal intensive care units to geriatric wards. However, the basic requirements for good hygienic practices and effective food safety management systems are the same, and in terms of legal requirements healthcare institutions are regarded similarly to any other food business.

The identification of risks and the introduction of risk-management approaches will reduce the likelihood of out-of-compliances occurring. The food safety legislation in the EU has been consolidated and simplified. Article 5 of the EU Regulation on Hygiene of Foodstuffs states that food business operators, including those in healthcare institutions, ‘shall’ put in place, implement and maintain a permanent procedure, or procedures, based on the principles of (HACCP) (Regulation (EC), 2004) to ensure safe food (Chapter 8). They are required to:

1. identify any hazards that must be prevented, eliminated or reduced to acceptable levels
2. identify the critical control points (CCPs) at which control is essential to prevent or eliminate a hazard or reduce it to acceptable levels
3. establish critical limits at CCPs, which separate acceptability from unacceptability for the prevention, elimination or reduction of identified hazards
4. establish and implement effective monitoring procedures at CCPs
5. establish corrective actions when monitoring indicates that a CCP is not under control
6. establish procedures to verify that the measures outlined in 1–5 above are working effectively
7. document and record measures in 1–6

High-standard facilities appropriate to the volume of food being produced and designed to easily accommodate the operation of HACCP are required (EC, 2004). Another prerequisite to an effective HACCP plan is recruitment and retention of good staff (WHO, 1999). Insufficient staff to run a well-equipped facility with a good food safety management system can contribute to problems. It is a legal requirement that staff preparing and serving food should be supervised adequately or receive training commensurate with the staff members’
responsibility (Regulation (EC), 2004). If there is a high turnover of staff, meeting this requirement can present a challenge. Staff are an institution’s greatest asset, but untrained staff can be an institution’s greatest liability. Despite the legislative requirement, training in itself is often not sufficient to deliver the behavioural changes necessary to work practices. The objective is to achieve competent staff. Good hygienic practices have to be as much a part of the culture of the healthcare institution’s kitchens as they are of an operating theatre. Standard operating procedures, facilities and work-flow should be such that there is only one way to prepare the food and that is the hygienic way.

In terms of controlling foodborne disease in healthcare institutions, it is essential that cases and/or outbreaks are detected early (Chapter 3). It can be difficult to differentiate the various causes of diarrhoea, such as antibiotic-associated diarrhoea caused by *Clostridium difficile*, irritable bowel syndrome, or person-to-person spread of norovirus, from foodborne disease. Therefore, all cases of diarrhoea must be documented, faecal samples should be sent for analysis, vigilance should be maintained for clusters of illness or any change in the normal pattern of bowel habit in individual patients or groups of patients. All institutions should arrange to have access to a communicable disease epidemiologist and seek their assistance as soon as there is any suspicion of an outbreak.

Foodborne illness-prevention strategies should also include provision of food safety education for select populations such as immunocompromised persons (e.g. HIV-infected patients, cancer chemotherapy recipients and persons receiving long-term oral steroids or immunosuppressive agents) who are more susceptible to infection than the general population (Chapter 5). Specific information on high-risk foods that should be avoided as well as strategies to reduce their risk of foodborne infection, such as thorough cooking, avoidance of cross-contamination, and short-term refrigerated storage of cooked perishable foods, should be provided. These patients often have repeated short admissions to hospital, and because of their vulnerability it is particularly important that they do not suffer from foodborne illness either in the healthcare institution or at home. Some hospitals offer nutritional education material and classes to patients (e.g. Coborn Cancer Center, U.S., 2000) in order to prevent foodborne infections.

Because of the litany of food scares and food-related illnesses, all EU member states have reviewed the way in which they regulate the food chain and each country now has a central food safety body. These bodies do not all have the identical remit, but risk assessment, risk management and risk communication are key responsibilities of some of them. The European Food Safety Authority was created in 2002 as an agency independent of the EU Commission to undertake risk assessment and risk communication. Responsibility for risk management and legislation remains with the Commission and the Member States. The competent authorities in member states have been encouraged to develop sector-specific guidance on what the hygiene legislation requires and to develop and disseminate codes to good hygiene practice. Healthcare institutions, because of their vulnerable populations, are a priority area for these documents in all member states.

The management of healthcare institutions should familiarize themselves with the legal requirements and codes of good practice. Their core competencies may be in healthcare rather than in food safety, therefore they should seek assistance, if required, to ensure that they are in full compliance. The manager of food services within the healthcare institution has the responsibility to ensure that systems are in place to produce safe food 7 days per week,
365 days per year. Food safety is non-negotiable and an effective food safety management system is a requirement for the protection of the health of the residents and for due diligence defence.

References


Chapter 1


Overview