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Food Standards Agency  
Project FS101057

Reducing the risk of vulnerable groups  
contracting listeriosis

Report on previous outbreaks of listeriosis and  
lessons learned - report 3

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## Report on previous outbreaks of listeriosis and lessons learned

### Introduction

The aim of project FS101057 undertaken on behalf of the Food Standards Agency (FSA) was to draft guidance to reduce the risk of vulnerable groups contracting listeriosis in healthcare settings (referred to within this report as 'the guidance').

This report (report 3) examined previous listeriosis outbreaks and took the findings into consideration to help ensure the guidance was based on sound, reliable evidence. Information on previous outbreaks of listeriosis was gathered to summarise the causes, to include the foods implicated, potential food safety weaknesses that may have caused the outbreaks (both in relation to procurement and provision of food in hospitals), and procedures put in place following outbreaks and lessons learned from the perspective of local authorities, healthcare organisations, and suppliers who had experienced outbreaks. This report focused on hospital outbreaks in the UK which occurred during 2003 - 2012.

Considerable work has been undertaken by some organisations following outbreaks, and it is appropriate to learn from the experiences of colleagues within the catering, healthcare and public health professions.

The scope of this report extends beyond the work undertaken directly in relation to specific outbreaks, to include work undertaken by local authorities at regional or national levels in the wake of outbreaks to reduce the risk of listeriosis.

This report was undertaken in parallel with two other reports upon which the guidance was drafted:

- A literature review (report 1)
- Investigation into current practices used to control listeriosis in healthcare settings (report 2), via:
  - Site visits
  - A survey

### Methodology

A combination of methods were used to examine previous outbreaks, which included:

- Literature review - both 'white' literature from peer reviewed journals, and 'grey' literature such as outbreak reports.
- Site visits - observation of and/or interviews with healthcare organisations involved with previous outbreaks.
- Telephone interviews with healthcare organisations involved with previous outbreaks.
- Meetings and/or telephone interviews with environmental health practitioners involved with previous outbreaks.

Each outbreak was examined using the most appropriate method(s) based on the circumstances. The methods used to examine each individual outbreak are detailed within each outbreak summary.

The main focuses of aspects explored for each outbreak were:

The outbreak:

- Who was affected?
- Which foods were implicated?
- Food safety weaknesses that may have caused or contributed to the outbreak.

Lessons learned from outbreak:

- Regarding procurement.
- Regarding provision of food in hospitals.

Information was gathered as far as practicable. Limitations included:

- Time since outbreak – several local authorities had erased or archived premises files and outbreak information. Hospital and/or local authority personnel had changed or retired since the outbreak.
- Time taken for outbreak and associated reports to be finalised and/or published.
- Slow response times to requests for information by some organisations.

The outbreaks investigated are numbered one to nine however, they are not listed in chronological order.

Hospital linked listeriosis outbreaks occurring during 2003 until 2011 were identified via information from the Health Protection Agency, and outbreaks since 2011 via word of mouth from interviews with environmental health officers.

## Outbreak 1

### Summary of outbreak

Seven cases of *Listeria monocytogenes* were diagnosed following inpatient stays at two hospitals. All patients were over 60 years old with concurrent debilitating illness. It is likely that these patients acquired infection whilst in hospital, and were exposed to food containing *L. monocytogenes*. A complex investigation found a possible link between four of the cases and sandwiches consumed by the inpatients. In three cases the cause remained unclear. Investigations revealed a strong link between some patients and sandwiches supplied to a retail shop located at one of the hospitals. Investigations also found there was potential opportunity for multiplication of *L. monocytogenes* in contaminated foods through the distribution of foods to the hospitals, and food handling processes within the hospitals.

### Methods used to examine the outbreak

- Site visit to hospital linked to outbreak – observation and interview with Support Services Manager, Nurse Lead for Infection Prevention and Control, Retail Manager, Dietitian and local Environmental Health Officer (EHO).
- Meeting with Northern Ireland Food Liaison Group (NIFLG).
- Review of report by Dr N Irvine. 'The report of the outbreak control team of the investigation of an outbreak of listeriosis in the Belfast Health and Social Care Trust during May to November 2008'. October 2009.
- Letter from Chief Medical Officer to Chief Executives HSC Trusts, dated 28 October 2008.
- Letter from NIFLG to Northern Ireland Food Standards Agency dated December 2009.
- NIFLG 'Investigations in food safety controls in hospitals across Northern Ireland August to October 2010'. Draft document, April 2011.
- NIFLG Table: Details of EHO visits to Trust premises following the *Listeria* outbreak.

### Food safety weaknesses

Investigations identified the following food safety weaknesses within the two hospitals with affected patients (hospitals 1 and 2), and the producers of chilled ready-to-eat (RTE) foods to the hospitals (producers A, B and C):

#### Hospital 1

- Cold chain integrity issues with sandwiches:
  - Inappropriate storage of food in patient's bedside lockers.
  - Chilled display unit operating above 8°C.
  - One sandwich display unit not temperature monitored.
- Stock control issues with cooked meats and preparation of mixed salads in pantry's (food storage areas located away from the main kitchen).

## **Hospital 2**

- Cold chain integrity issues with sandwiches during delivery and within hospital:
  - The possibility that sandwiches were delivered early and left outside.
  - Producer used for sandwiches but not on the Trusts approved supplier list.
  - Possible inappropriate storage of food in patient's bedside lockers.
  - Chilled display unit in coffee shop above 8°C.
- Issues relating to appropriate cleaning of food contact surfaces.
- Issues relating to stock control of foods.
- Missing temperature records for cooking and cooling.

## **Both hospitals**

- Auditing of suppliers did not address each step of the supply chain e.g. producer A had been audited but not the distributor for producer A. For producer B the distributor was audited but not the manufacturer.

## **Producer A (pre-packed sandwiches)**

- Weakness in distribution cold chain integrity - distributor A had incomplete temperature monitoring and verification.
- *L. monocytogenes* was found in sandwiches produced by producer A sampled at the hospital, and in sandwiches and swabs taken from the producer B (although different subtypes to those found in affected patients).

## **Producer B (cooked meats)**

Cooked meats and swabs from producer B were found to contain *L. monocytogenes*.

Distribution of pre-packed sandwiches from producer B involved two distributors:

- One distributor was not registered as a food business with their local authority, did not have a Food Safety Management System (FSMS), and had no temperature monitoring records.
- The other distributor had incomplete temperature records for the distribution chain.

## **Producer C (pre-packed sandwiches for retail outlets at hospital 2)**

- Producer C distributed sandwiches themselves however they had no temperature records for vehicles used to transport foods.
- Cleaning was found to be inadequate.
- Issues were found with the hot water supply.
- Issues were found with cleanliness of protective clothing.

## **Actions to avoid recurrence**

The following actions were taken to strengthen food safety weaknesses and avoid a recurrence by the producers and the hospitals:

## **Producers A and B**

The distribution HACCP (Hazard Analysis and Critical Control Point) issues were addressed e.g. temperature monitoring and verification put in place.

## **Producer C**

- Deep clean undertaken and improvements to cleaning regime.
- Hot water issue was resolved.
- Delivery temperature checks and records introduced.

## **Hospitals**

- Retailers were asked to only use Trust approved suppliers and this was to be incorporated into lease renewal.
- A contract variation was applied for the shelf life of pre-packed sandwiches – reduced to day of production plus two days.
- A full HACCP review was required.
- Extensive deep clean undertaken.
- Microbiological sampling of food and environmental swabs was introduced.

## **Action taken at national level in Northern Ireland**

Since the outbreak, considerable work has been undertaken in order to reduce the risk of listeriosis in hospitals in Northern Ireland. Appendix 1 summarises key events and associated literature. Further detail with regard to most of these events is detailed below.

## **Recommendations made by outbreak report at national level**

The outbreak report made several recommendations for consideration at national level:

### **Procurement**

- Trusts should specify in contracts that independent retailers should ensure high risk RTE foods are from Trust approved suppliers.
- Trusts should ensure high risk RTE foods are from approved suppliers.
- Supplier audits should adequately address each step in the supply chain including production and distribution.
- Consideration should be given for guidance on the procurement specification of appropriate handling and storage of chilled RTE foods served to vulnerable patients.

### **Handling of high risk foods in hospitals**

- Trusts should work with environmental health practitioners to review their FSMS arrangements and to ensure controls are fully implemented.
- Trusts should have information available to inform staff and patients of the risks of inappropriate food storage.
- FSA should review the need to include pre-packed sandwiches in list of foods to be avoided by vulnerable patients.

## **Letter from Chief Medical Officer**

In October 2008 a letter was sent by the Chief Medical Officer (CMO) to Northern Ireland (NI) Trusts, Health Board and regional supplies officers and those involved with provision of food in healthcare settings. The letter was entitled 'key steps for minimising the risk of listeriosis from high risk ready to eat foods'. The CMO's recommendations around the procurement and handling of high risk food in hospitals were as follows:

### **Procurement**

- Those responsible for the procurement of chilled RTE foods should ensure the safety of vulnerable patients in their care.
- Businesses manufacturing high risk foods, including sandwiches, should aim to ensure *L. monocytogenes* is absent wherever possible.
- Trusts should specify within contracts that independent retailers on hospital sites must ensure high risk foods are from approved suppliers.

### **Handling of high risk foods in hospitals**

- All foods consumed by hospital patients should be free from all pathogens including *L. monocytogenes*.
- Food such as pate, soft mould ripened cheese and blue veined cheese should not be given to vulnerable patients.
- Trust must ensure their FSMS includes ward kitchens.
- Ward fridges should hold food below 5°C.
- Temperate control must be applied from production until service.
- Chilled RTE foods must not be kept on wards at room temperature.
- Chilled RTE food should be consumed as close to the date of production as possible.
- Trust staff should highlight to visitors to only bring in food for patients after discussion with the nurse in charge.
- Chilled RTE foods should be eaten immediately and leftovers disposed of.

## **Recommendations made by NIFLG to FSA in Northern Ireland**

Following the CMO letter, in December 2009 EHO's in Northern Ireland undertook a survey / inspections of all hospitals to gauge uptake of the advice. Following the CMO letter and findings of the survey, the NIFLG sent a letter to the FSA in Northern Ireland that outlined some measures in addition to those within the outbreak report and the CMO letter advice that could be implemented to reduce growth of *L. monocytogenes* in chilled RTE foods in hospitals. The letter focused on procurement and temperature control during distribution of chilled RTE foods to wards:

### **Procurement**

- FSA to produce guidelines on the procurement specification of foods intended for patients - to include considerations under Regulation (EC) No. 2073/2005

on microbiological criteria for foodstuffs, shelf life restrictions, cold chain integrity, HACCP and prior approval.

- Ensure supplier compliance audits adequately assess each stage in the supply chain (production, distribution, transportation).
- Trusts should review contracts for independent retailers on hospital sites to ensure they only use Trust approved suppliers, and operate at the same standard of controls as the Trust.

#### Handling of high risk foods in hospitals

- Trusts head offices should review HACCP plans for each site using a team based approach and involve local environmental health departments. Trusts should ensure plans are signed off by senior management.
- Ensure Trusts HACCP plans cover all foods handled by the Trust, including foods handled by nurses and foods for special dietary purposes.
- Review training for food handlers (catering and medical) to ensure understanding of specific risks posed by *L. monocytogenes*.
- The letter supported the CMO's expectation to maintain high risk foods for vulnerable patients at 5°C or less, yet highlighted that this was not expected during:
  - Preparation of foods at room temperature
  - Delivery of foods to patients in wards

Further suggested controls in these areas were made:

#### Preparation

- Hospitals should aim to keep foods as cold as possible during preparation. The time food spends out of chilled storage should be limited and this time should be effectively monitored. An alternative is chilled preparation areas.

#### Delivery to and consumption by patients

- Hospitals should aim to keep foods as cold as possible – delivery to wards should ideally be via refrigerated trolleys. It was acknowledged that it is not always practicable to achieve 5°C or less without significant investment in equipment and therefore if food is delivered and consumed within a specified period (and any leftovers disposed of immediately) this may be reasonable to rely on as a control, and if strict monitoring is in place this could give an acceptable level of assurance.

#### Food brought in by patients

- This should be considered within HACCP plans, including storage and incorporated into FSMS. Information should be available for staff, visitors and patients discouraging them from bringing in foods and advising patients of risk such foods may present and the risks of inappropriate storage.



The letter also gave a reminder of the obligation of Trusts to consider Regulation (EC) No. 2073/2005 on microbiological criteria for foodstuffs for food business operators to consider sampling and testing as part of HACCP.

A letter was sent from the Chief Environmental Health Officers Group (CEHO) to Environmental Health Departments throughout NI with regard to implementation of the advice in the CMO letter, which mirrored most of the points made in the letter to FSANI from NIFLG.

### **Hospital survey by NIFLG**

A subsequent survey of hospitals was undertaken and report drafted April 2011 by the NIFLG – additional recommendations made not already raised previously were:

- Trust policy to outline food safety roles and responsibilities of managers.
- Trusts should set and adhere to 5°C as the critical limit for storage of high risk RTE foods. This may need to be lower depending on manufacturers storage instructions of the food (e.g. some cooked meats are labelled by the manufacturer as store at 3°C or below)
- Recommended a review of the application of the 'Department of Health cook chill guidelines' to ensure controls are appropriate (for example the cook chill guidelines allows cook chill food to reach up to 10°C as an exception if the food is to be used within 12 hours).
- Trusts to include disinfection of work surfaces in ward kitchens in cleaning schedules.
- Recommends Trusts only purchase equipment capable of meeting critical temperatures – it is anticipated commercial refrigerators are required in most settings.

In 2012 further regional recommendations based on findings of hospital visits were made by NIFLG which in addition to the above included:

- Staff to be trained in corrective actions where temperatures are found to be outside limits.
- Consider use of data loggers to validate temperatures, for example during distribution of chilled foods to wards.
- Limit time of service and make consumption by patient time bound.
- Hospital should be taking frequent independent food samples in association with an accredited laboratory.
- An assessment should be undertaken to devise appropriate sampling plans. Plans should concentrate on foods served to high risk/immunocompromised patients.
- Consideration to be given to how suitable it is to provide sandwiches to the most vulnerable groups.
- Guidance and training should be provided to EHOs, procurement, laboratories, and food businesses on sampling regimes and test methodology

for monitoring *L. monocytogenes* in manufacturing environments and supplied to vulnerable patients.

- FSA/HPA guidance is required to set microbiological criteria with regard to *L. monocytogenes* in vulnerable patients
- Ensure all recommendations are applied to nursing homes and private hospitals.

### **STS site visit**

STS carried out a visit to Hospital 2 in January 2014, which comprised an observation of the site and interviews with the Support Services Manager, Dietitian, Lead nurse for Infection Prevention and Control and the independent retail shop and cafe owner. The local EHO was also present.

The purpose of the visit was to gain information on current practices and lessons learned from the outbreak.

Commitment to food safety and awareness of listeriosis by all managers interviewed was found to be extremely high. Management reported a positive 'culture change' since the outbreak, in particular at ward level. In part this was thought to be due to a change in senior catering management.

There was clearly a positive, close working relationship between the hospital and local EHOs.

Food safety standards were found to be very good, with a high level of compliance with recommendations made following the outbreak. Considerable investment has been made by the Trust, for example purchase of chilled trolleys to transport sandwiches to wards at 5°C or below.

Good practices observed are incorporated into the associated report 'current practices for the control of listeriosis in healthcare organisations'.

Recommendations pending from the outbreak were:

- On site retailers were not using a Trust approved supplier, although they were using a food safety certificated supplier.
- Food safety aspects of the contracts between the Trust and the retailer are in the process of being agreed in consultation with the local EHO.
- Specifications for suppliers are in the process of being drafted.
- The catering department have a FSMS. In addition to this there is a 'ward manual'. It was unclear as to whether the Trust had an overarching policy.

### **STS meeting with NIFLG**

The NIFLG have set up a Microbiological Standards Working Group, which comprises EHOs who have substantial experience of listeriosis outbreaks, and who have led much of the considerable work undertaken by the NIFLG to reduce the risk of listeriosis in hospitals. In order for STS to draft guidance for hospitals on

listeriosis, it was important for STS to meet with key representatives from the Group and to listen to and discuss their experiences, observations and recommendations to be taken into consideration for the draft guidance.

## Outbreak 2

### Outbreak summary

Three patients suffered invasive listeriosis. All patients had underlying illness. Although patients were at the same hospital all had different strains of *L. monocytogenes*, which implied that this was not a point source outbreak.

*L. monocytogenes* was detected at low levels in three sandwiches sampled at the hospital, at levels less than 20cfu/g (two sandwiches still had two days left of their three day shelf life). Case 1 was infected with a strain identical to the strain found in a sandwich sampled from the manufacturer. No match was found for case 2. Case 3 was infected with a strain indistinguishable from a strain found in three sandwiches sampled from the manufacturer, and on the cutting blade and roller on the line producing patient sandwiches.

The outbreak investigation was inconclusive. Due to incomplete food histories, there was no clear evidence that any of the cases consumed sandwiches or cold cooked meats whilst in hospital. However there was a possible link to externally provided sandwiches which may have been contaminated during manufacture, followed by poor temperature control and/or storage within the hospital leading to multiplication of *L. monocytogenes*, potentially at ward level.

Two other cases were identified in other local hospitals, but no links were found.

### Methods used to examine the outbreak

- Telephone interview with environmental health manager at the hospital's local authority.
- Health Protection Agency report: Investigation of a cluster of *Listeria monocytogenes* in a Hospital in Trafford July 2010.
- Face to face interview with Facilities Managers at the hospital, who were both in post at the time of the outbreak.
- Slides from Greater Manchester Food Liaison Group (GMFLG) Hospitals Workshop December 2011.
- Report on microbiological examination of pre-packed cooked meat sandwiches at the end of 'use by life' from outlets including hospitals with a focus on *Listeria monocytogenes* by Williamson et al.

### Food safety weaknesses

The outbreak report states that the hospital was not able to demonstrate that it had taken adequate steps to maintain the cold chain. Investigations found the following weaknesses in food safety procedures at the hospital:

- Many HACCP controls were not implemented in hospital ward kitchens, for example:
  - Missing thermometers in some refrigerators.
  - Incomplete temperature records for ward refrigerators and freezers.
  - Temperatures recorded outside limits without corrective action noted.

- Probiotic drink six days past its use by date.
- No training records were readily available to demonstrate that ward staff, with responsibility for meal service and subsequent food handling and storage, were suitably trained commensurate with their work activities.
- Cleaning schedules were not available for ward kitchens and standards of cleaning were inadequate.
- Internal audits revealed inadequate temperature control and food labelling in ward refrigerators and lack of temperature check records. This was found to be outstanding at a subsequent EHO inspection.
- There was no procedure in place for storage of food brought in for patients by visitors.
- Liver pate sandwiches were available for consumption by vulnerable patients.
- The hospital and other food service providers on site had not advised the local authority of all the food activities taking place, and new activities did not fall within the organisations HACCP.

### **Actions to avoid recurrence**

The sandwich manufacturer replaced cutting blades and rollers, and changed their cleaning regime.

The outbreak report made recommendations to be taken at the hospital:

- Pate and other foods such as smoked fish, mould ripened soft cheese, and sandwiches with these fillings, were taken off the menu.
- The hospital was to designate a senior person who has the authority and knowledge to ensure HACCP is followed in all ward kitchens.
- An environmental swab and food sampling plan was to be reintroduced into the hospital and ward kitchens for *L. monocytogenes*, with predetermined corrective actions for positive detections.
- The hospital was to review their HACCP system.
- To review procedures for monitoring and recording of ward refrigerators – domestic staff to record temperatures daily, ward manager to ensure monitoring takes place and the matron to be ultimately responsible. The catering manager prepared a protocol for action to be taken if temperatures were found to be unacceptable.
- Ward refrigerators were replaced with Trust approved (commercial) refrigerators with integral temperature displays. Other service providers were asked to do the same.
- Visitors were asked not to bring in food for patients, and ward staff were advised to be vigilant regarding foods brought into wards by patients and visitors. Leaflets were prepared and given to visitors.
- A working group was established to develop policies for food not provided by the Trust.
- Sandwiches were not to be stored on wards – instead to be acquired from the central kitchen when required.

- Food not eaten within one hour was to be returned to the main kitchen.
- Daily checks by ward manager were introduced to ensure food is not stored. Overnight checks were also carried out.
- Sandwich supplier advised to apply a shorter shelf life – sandwiches used on the day delivered only.
- Sandwiches returned from wards, not sold in shops by 4pm and not sold by mobile rounds trolley by 3pm, to be disposed of. If sandwiches not available for patients to be made fresh on site.
- Milk and butter to be stored in ward fridges at 1-4°C. Milk to be disposed of within 24 hours of opening.

**The outbreak report also made recommendations to be considered at national/regional level:**

- A review should be undertaken of foods that vulnerable people can consume.
- Hospitals to have a policy advising patients who are at high risk of developing listeriosis and food items to avoid.
- A review how appropriate 100cfu/g is for *L. monocytogenes*, and that there may be case for zero tolerance found in foods intended for high risk patients, for foods at high risk of *Listeria*.
- Training policy required for healthcare workers.
- Hospitals/care establishments must notify local authority of all food activities on site.
- Consideration should be given to the labelling of high risk foods with statutory warnings for high risk groups.
- Trusts to ensure documented FSMS to include ward kitchens.

**HPA statement to Trusts**

Following this outbreak it is understood that in May 2009 the Health Protection Agency sent a statement to NHS Trusts in North West England for the attention of:

- Directors of Infection Prevention
- Heads of Procurement
- Risk Management Teams
- Heads of Catering/Hotel Services
- Ward Managers
- Physicians in Oncology, medicine for the elderly and haematology.

This letter provided background of incidents of listeriosis, details of foods and vulnerable groups and advice on procurement, food safety advice for vulnerable groups, food safety procedures, food stored on hospital wards and control of listeriosis via HACCP.

**Sampling survey**

During September 2008 to August 2009, the North West Food Liaison Group (NWFLG) undertook a co-ordinated sampling programme 'microbiological

examination of pre-packed sandwiches at the end of 'use by life' from outlets including hospitals, with a focus on *L. monocytogenes*'.

1055 sandwiches were examined from 42 local authorities from 288 hospitals and 767 other types of food business. One of the purposes of the survey was to ascertain the microbiological standard of pre-packed sandwiches from hospitals compared to those sampled from other outlets. *L. monocytogenes* was identified in 5.9% of hospital sandwiches and 5.6% of sandwiches from other premises.

### **Informal survey of hospitals by EHOs**

An informal survey of food storage temperatures in hospital ward kitchens was carried out February – May 2011 by the GMFLG. This comprised of ten unannounced hospital visits, and included higher risk wards to check fridge temperatures and food storage. It was of concern that 32% of fridges were found at 8°C or above (one at 15°C), and 64% of fridges were 5°C or above. Not all contained high risk foods.

### **Listeriosis workshop**

GMFLG organised a *Listeria* seminar during December 2011 for hospitals in North West England. The workshop included presentations on *Listeria* in relation to hospitals, results of the sampling survey and informal survey of hospitals undertaken by the GMFLG. The workshop also sought feedback from the hospital caterers on questions such as:

- Who is responsible for ensuring that the food cold chain is maintained from delivery to ward kitchens?
- Who has overall responsibility for food safety on wards?
- Are sandwiches/cooked meats prepared on site and what is the shelf life?
- Have microbiological standards been set in the specification for high risk foods such as sandwiches and cooked meats?
- What audits are carried out on supplier premises? How far back do audits go along the distribution chain?
- Is training provided in relation to risk of listeriosis amongst vulnerable groups and is this available to different personnel?

### **STS site visit**

In January 2014, STS met with the Facilities Manager and Assistant Facilities Manager for the hospital who experienced the outbreak to discuss the outbreak and lessons learned. A record of the discussion is provided in Appendix 2. Although the site was not observed, the interview indicated high standards, and that recommendations raised in the outbreak report had been addressed. The consultant who carried out the visit commented on the absolute dedication and commitment demonstrated by the hospital facilities management in terms of *Listeria* control. The discussion gave rise to some interesting areas for consideration, raised within the discussion section of this report.

## Outbreak 3

### Outbreak summary

Listeriosis occurred in two patients both with advanced malignancy and receiving palliative chemotherapy.

The only common source was sandwiches eaten when attending outpatients at the oncology unit. Both patients had the same strain as identified in numerous sandwiches sampled from the hospital, and taken from the manufacturer, and swabs from the manufacturing environment.

### Methods used to examine the outbreak

- Article by Shetty et al which provides an explanation of the outbreak.
- Outbreak reports by Collings et al and Evans.

### Food safety weaknesses

#### Hospital

- At the hospital the sandwiches were stored in a unit which varied in temperature throughout the day up to 11°C.
- Sandwiches delivered to a voluntary association at the hospital were placed into a display cabinet at 10°C. For patients, the sandwiches were removed from a storage fridge and placed on hot food trolleys, and were found to reach temperatures up to 19°C.

#### Sandwich manufacturer

- At the sandwich manufacturer, the factory floor was found to be incompletely sealed and damaged. This was thought to be a source of *Listeria* spp.
- Cleaning was found to be non-systematic, with the same cloth used first for the floor then worktops.

### Actions to avoid recurrence

The following actions were required following the outbreak:

#### Hospital

- Staff were asked not to remove sandwiches from refrigerators for patients until required.
- The voluntary group were asked to reduce temperature of display cabinet to allow for opening of the door.
- An interim protocol was put in place for purchase of processed or prepared foods for patients, whereby the suppliers were required to:
  - Provide evidence of Food Registration.
  - Hold current trade association membership e.g. British Sandwich Association.
  - Provide HACCP documentation.
  - Provide evidence of staff training.
  - Provide copies of quantitative microbiological testing.



- Provide records of temperature maintenance during transportation.
- Agree to inform hospital if microbiological testing results deviate from acceptable levels.
- Declare service of notices/other enforcement action.
- Agree to access by Trust.

### **Sandwich manufacturer**

- Changed laboratory as current laboratory did not quantify any *Listeria* detected.
- Deep clean of factory undertaken.
- The floor was repaired.

### **General recommendations**

Shetty et al. made recommendations and raised questions for further exploration based on this and other hospital outbreaks and sampling projects undertaken:

- Specific advice is required concerning sandwiches.
- Questions the provision of food to immune suppressed patients and whether the PHLS guidelines for the microbiological quality of foods are acceptable – 100cfu *L. monocytogenes*/g at point of sale.
- Provision of advice to vulnerable groups with regard to diet.
- Those responsible for procuring sandwiches for hospitals should ensure the safety of vulnerable patients in their care.
- All foods consumed by hospital patients should be free from pathogens.
- Sandwich manufacturers should aim to ensure *L. monocytogenes* is absent from product.
- Hospitals should maintain temperatures below 5°C (in line with recommendations from the British Sandwich Association).
- Temperature control should be maintained from production until service.
- Sandwiches should be consumed as close to their production date as possible.
- Foods that carry greater risk of *Listeria* should not be given to vulnerable patients e.g. pate, soft mould ripened or blue veined cheese.

## Outbreak 4

### Outbreak summary

This outbreak affected five pregnant women, and appeared to be linked to pre-packed sandwiches from a retail outlet in a hospital where they attended antenatal clinic. The rare *L. monocytogenes* strain isolated from the patients was indistinguishable from the strain found in a sandwich sample and swabs taken from the manufacturer's premises.

### Methods used to examine the outbreak

- Telephone interview with environmental health manager for the hospital's local authority. All records regarding the premises/outbreak had been destroyed as the outbreak occurred in 2003. The one staff member employed with the local authority in 2003 was interviewed by the environmental health manager.
- Article by Dawson et al. which provided detail on the outbreak.

### Food safety weaknesses

- According to the local authority, there were no issues within the retail outlet and the hospital was never implicated.
- According to the local authority, the sandwiches were sold by a voluntary organisation, which used three suppliers for pre-packed sandwiches. Two were national companies and one was a local supplier. At the time the cases were confirmed, the retailer had stopped using the local supplier, so no sandwiches from this manufacturer were available for sampling at the hospital. Sampling, however, undertaken at the manufacturer's premises by their local authority, found *L. monocytogenes* present in a sandwich with brie sampled from the factory and from environmental swabs taken from chopping boards, sink plug holes and a sponge.

### Actions to avoid recurrence

- The retailer was provided with advice regarding food safety considerations for future purchase.
- The sandwich manufacturer undertook a deep clean, however despite efforts to resolve the problem the manufacturer closed.

### Environmental Health

- It was of interest that Dawson et al reported that the local EHOs concluded that new legislation that was to come into force in January 2006 (Regulation 2073/2005), requiring monitoring and specifying acceptable levels for *L. monocytogenes*, would help diminish risk of further outbreaks/cases recurring.
- From discussion with the environmental health manager, one aspect of hospital inspection which they have changed is that the level of questioning during inspections was increased to ask more information regarding suppliers. The EHO also commented that whilst many companies state in their FSMS

that they only use certificated suppliers, many do not so and fall foul of their own policy.

- This authority also tried to incorporate hospitals on routine sampling regimes.

## Outbreak 5

### Outbreak summary

Three cases were identified in hospital inpatients. Two were on immunosuppressant therapy and aged 50 and 59. The third was elderly with lung cancer and heart failure. Blood isolates from the three patients indicated a point source outbreak. The only common food exposure was found to be to salads and pre-packed sandwiches (no single type) provided by the hospital catering department. These had been consumed immediately by the patients – not left at room temperature. No microbiological evidence was found to conclusively demonstrate that the hospital food was the source of the infection.

### Methods used to examine the outbreak

- Telephone interview with environmental health manager at the hospital's local authority.
- Outbreak investigation report: A cluster of *Listeria monocytogenes* infections in hospitalised adults, Coetzee et al 2011.
- Article by Coetzee et al based on, but less detailed than outbreak investigation report.

### Food safety weaknesses

#### Hospital

Coetzee et al explain that investigations found the following weaknesses in provision of food at the hospital that may have contributed to the outbreak:

- Breaches in shelf life - prepared salads, which were made on site and should have had a one day shelf life applied, were commonly given a two or three day shelf life.
- Incomplete food histories available.
- Breaches in cold chain:
  - RTE food deliveries sometimes accepted above 5°C.
  - Gaps in record keeping during weekends and evenings.
- Lapses in cleaning and disinfection of salad vegetables using chlorine.

#### Sandwich manufacturer

- The manufacturers had a microbiological testing regime in place, including daily testing for indicator organisms at the end of shelf life (three days), and *Listeria* spp. enumeration every 10 days. There was a break in sampling over Christmas and throughout January.

### Actions to avoid recurrence

#### Hospital

The following actions were to be put in place by the hospital following the outbreak:

- A review of practices for ward level food storage, distribution and disposal.
- Ensure foods do not exceed shelf life.

- Ensure food does not exceed 5°C including all stages of distribution, particular emphasis during evening, weekend shifts and when agency staff were used.
- Staff reminded to follow protocols.
- Reinforcement of advice to patients and their families on foods to avoid commonly associated with listeriosis (such as pate, smoked fish, mould ripened cheese). This advice was given to patients with severe underlying conditions, and/or undergoing immunomodulation therapy or pregnancy. The risk of RTE food including sandwiches should be highlighted.
- Review of contract for purchasing prepared foods for hospital patients. This should include absence of *L. monocytogenes* and proof this standard is achieved.
- To develop Trust specific systems for investigation of foodborne incidents and outbreaks.
- Suppliers should provide records (identical list to those listed above under outbreak C).
- Patient diet histories should be kept routinely.
- Review management responsibilities ensuring accountability for all steps, to include those of Trust and contract caterer.

#### **Sandwich manufacturer**

- The manufacturer changed their microbiological testing procedures to include enrichment as well as enumeration techniques in the detection of *L. monocytogenes*.

## Outbreak 6

### Outbreak summary

From the recollections of the EHO, nearly all five cases were undergoing cancer treatment, immunocompromised/deficient and had consumed sandwiches offered whilst attending treatment in the oncology unit at the hospital.

*L. monocytogenes* was found in sandwiches sampled from the manufacturer's premises. There was thought to be a contamination issue with the cooked meat supplier. There was a link between the strain of *L. monocytogenes* identified in the patients and that found in the cooked meat in the sandwiches.

It is noteworthy that there is no outbreak report. Upon speaking with the environmental health department, this was not classed as an outbreak and the situation was managed by the Trust's infection control team. The environmental health department provided advice and liaised with the environmental health colleagues in whose authority the manufacturer was based.

### Methods used to examine the outbreak

- Telephone interview with principal environmental health manager at the hospital's local authority. The officer interviewed was involved with the cases.

### Food safety weaknesses

- The EHO remarked that the vulnerable patients were offered types of foods in hospital which their healthcare advisors had specifically advised them to avoid e.g. chilled cooked meats.

### Actions taken to avoid a recurrence

It is understood that the hospital have put in place a system so that vulnerable patients are not offered foods which are at higher risk of listeriosis. The system uses markers for wards to communicate to the catering department if a patient falls within a vulnerable group for listeriosis, and if so the patients are not offered specific food choices.

The EHO reports that the oncology day unit have stopped offering sandwiches and instead offer hot foods.

The EHO recalls no specific problems at the hospital, other than the possibility that patients may have kept foods in lockers. Although no examples of this were observed, there were no specific procedures in place to check.

## Outbreak 7

### Outbreak summary

Six cases were involved, affecting four hospitals. Pre-packed sandwiches were a common factor for day and long stay patients. Sampling found low levels of *L. monocytogenes* in sandwiches sampled from the hospitals and the sandwich supplier to the hospitals. The strain of *L. monocytogenes* found in the sandwiches matched the strain isolated from patients.

### Methods used to examine the outbreak

- Interview with environmental health officers involved with the outbreak.

### Food safety weaknesses

- Potentially sandwiches stored in bedside lockers.
- Chemotherapy patient advised to avoid sandwiches then offered them to eat during day procedures.

### Actions taken to avoid a recurrence

A debrief meeting was held between the environmental health departments involved and the Public Health Agency. The outbreak took place in 2012, however, at the time of writing this report the outbreak report had not been written.

## Outbreak 8

### **Outbreak summary**

Two cases affected who had both consumed food from the same hospital. It is understood that the outcome of the outbreak was inconclusive.

### **Methods used to examine the outbreak**

- Telephone interview with Environmental Services Manager for the local authority where the hospital is based.

### **Food safety weaknesses**

- Possible concerns with regard to shelf life of sandwiches produced on site.
- Possible issue with sandwiches being left at ambient temperature for long periods of time at ward level if patient was away being examined etc.
- Possible weaknesses with the checks on meat supplier.

### **Actions taken to avoid a recurrence**

Incomplete information available, however the hospital was advised to carry out checks of meat supplier and base shelf life for sandwiches on scientific evidence/testing.



## Outbreak 9

### **Outbreak summary**

Two patients affected, which included one fatality. *L. monocytogenes* isolated from hospital sandwiches, manufacturer and swabs from manufacturing environment.

The outbreak was in 2004, and according to the environmental health officer in the local authority within which the hospital was based, the hospital's control of infection would have taken the lead with the outbreak and no information was available on the premises file.

### **Methods used to examine the outbreak**

- Basic information provided by Health Protection Agency.
- Telephone interview with EHO in local authority where hospital is based.

### **Food safety weaknesses**

Unknown – insufficient information available.

### **Actions taken to avoid a recurrence**

Unknown – insufficient information available.

## Discussion

The author is aware of nine outbreaks within the UK thought to be linked to NHS Trust hospitals from during 2003 to 2012.

All outbreaks are thought to be linked to consumption of food within the hospitals. Pre-packed sandwiches were a suspect food in the majority of outbreaks, with cooked meats and salads also cited as the possible source in one outbreak.

Of the cases involved with the outbreaks, one outbreak affected pregnant women and others affected the over 60s and/or patients with concurrent debilitating illnesses.

The extent of information available for each outbreak differed considerably. The author explored each outbreak as far as practicable.

### Food safety weaknesses

The weak areas within healthcare organisations which potentially contributed to the outbreaks have recurring themes.

Table 1 summarises the main potential areas of weakness with food safety:

Outbreak	Main catering	Ward level	Retailers	Procurement
1	✓	✓	✓	✓
2		✓		
3	✓	✓		
4				✓
5	✓			
6 *				
7		✓		
8	✓	✓		✓
9 *				

\* Information unknown

Food safety at ward level is repeatedly a contributory factor, as are weak procurement requirements with regard to food safety. Detail on specific weaknesses is provided throughout this report and the guidance should be comprehensive and as such address these weak areas.

### Actions to prevent a recurrence

Many actions have been taken and recommendations made at local, regional and/or national level following outbreaks, particularly by Food Liaison Groups in North West England and Northern Ireland. Many of these recommendations need to be considered when drafting the guidance. Several recommendations will be pertinent to include, or to adapt and include. Whilst there is concern that the national guidelines may 'water down' advice provided at regional level, all recommendations should be considered objectively and in the context of other branches of research undertaken for this project. Actions and recommendations made in reaction to

outbreaks should be used where appropriate to shape the scope and detail of the guidance to proactively avoid further outbreaks.

Many of the Trusts involved with previous outbreaks have put measures in place which demonstrate that certain controls are practicable. Whilst some controls should be easy to implement in all organisations, some have required considerable investment for example chilled trolleys to deliver food to wards at 5°C. Whilst Trusts involved with outbreaks have released the necessary resources for improvements to food safety, it may be more difficult to secure commitment within Trusts who have not been involved with outbreaks and who see listeriosis as less of a threat.

## **Food handling within hospitals**

### **Commitment**

The two Trusts visited who had been involved with outbreaks demonstrated a high level of awareness and strong management commitment was evident.

There is a repeated theme that there can be grey areas in terms of responsibility at ward level, lack of clear HACCP and a breakdown of training and/or supervision. One Trust involved with a previous outbreak reports a significant culture change including at ward level under new management and in the wake of the outbreak. Another Trust involved with a previous outbreak still report their biggest challenge with food safety is that of securing commitment of ward and medical staff to follow procedures. This demonstrates that guidance must include and should be disseminated to personnel other than catering departments. The guidance provides an opportunity to combat reported concerns at ward level.

### **FSMS**

The Trust involved with an outbreak talked animatedly of their FSMS being a living, working document, in contrast to documented systems in place prior to the outbreak.

### **Food avoidance**

Despite being aware of the repercussions of an outbreak, one dietitian interviewed was concerned at the potential for unnecessary food avoidance from the guidance, as there is a need to ensure patients, particularly those that are elderly and weak, receive adequate nutrition. In particular the dietitian stressed that not all cancer patients are immunocompromised. The dietitian questioned the need to avoid butter and that any food avoidance guidance must therefore be based on scientific evidence and taking into consideration risk.

Some hospitals have taken sandwiches off the menu, or purchase sandwiches pre-packed, because of concerns about risks and responsibilities.

### **Procurement**

Weak food safety considerations during procurement of food have been a significant factor with several of the hospital outbreaks. At least two outbreaks involved patients who consumed food from on-site retailers indicating that this is an important area to

control. The guidance should serve to increase control over retailers purchasing and improve understanding of what should be in place for safe supply.

### **Involvement and awareness of EHOs**

Some environmental health departments have been very active in the investigation of *Listeria* outbreaks in their authority, and in the provision of support to hospitals following the outbreak. This was clearly evident in the two hospitals visited as part of this research.

This was in contrast to one authority which had an outbreak in their area, who stated that it was the hospital control of infection team who took the lead on the outbreak, with the EHOs role to provide advice and co-coordinated with the other local authority. One authority, who were not aware of the outbreak that had occurred in their area (10 years) ago advised that they would not be involved with a *Listeria* outbreak in a hospital unless there were 'very good reasons'. It would be pertinent to clarify what the role of environmental health departments in a *Listeria* outbreak should be.

The awareness with regard to listeriosis of EHOs interviewed through the course of this research varied considerably. EHOs involved with previous outbreaks were found to have excellent knowledge of listeriosis and suitable controls. It was of interest that an EHO at one local authority did not consider *Listeria* as a priority for the FSA, considering that nine outbreaks in 10 years was not a lot, that fatalities were almost to be expected in hospitals, and that any concerns regarding sandwiches were caused by the supplier and not the hospitals. This observation may indicate a training need which can be taken into consideration by the FSA with dissemination of the guidance.

### **Other healthcare settings**

The author is not aware of outbreaks linked to care homes or private hospitals. This could be due to under reporting and/or that the nature of the operations at care homes and private hospitals is inherently less risky, for example if sandwiches are prepared and served fresh daily. The findings of the survey associated with this project may help to confirm whether pre-packed sandwiches are less common in other healthcare organisations.

Notwithstanding, private hospitals, care homes and similar organisations providing food to vulnerable groups could still have weaknesses such as shelf life and temperature control, so to take a proactive approach and include such other healthcare organisations in the guidance to avoid outbreaks in such settings is appropriate.

### **Conclusion**

Research into outbreaks of listeriosis linked to consumption of food in hospitals has provided useful information to consider and upon which to build the guidance. The research has identified areas that need to be addressed in the guidance, and

provides suggestions as to appropriate management and control measures, many of which are tried and tested in hospitals that have experienced outbreaks.

The author is grateful to the healthcare organisations and environmental health departments for their assistance with this research.

## Further research

Other areas for potential research are:

- Outbreaks in hospitals outside UK from which relevant lessons can be learned.
- Outbreaks of listeriosis in the UK not linked to hospitals, but from which lessons can be learned.

Information regarding other listeriosis outbreaks is available from the literature review.

- Outbreaks of other pathogens linked to hospitals for which the guidance may also serve to prevent recurrence of.

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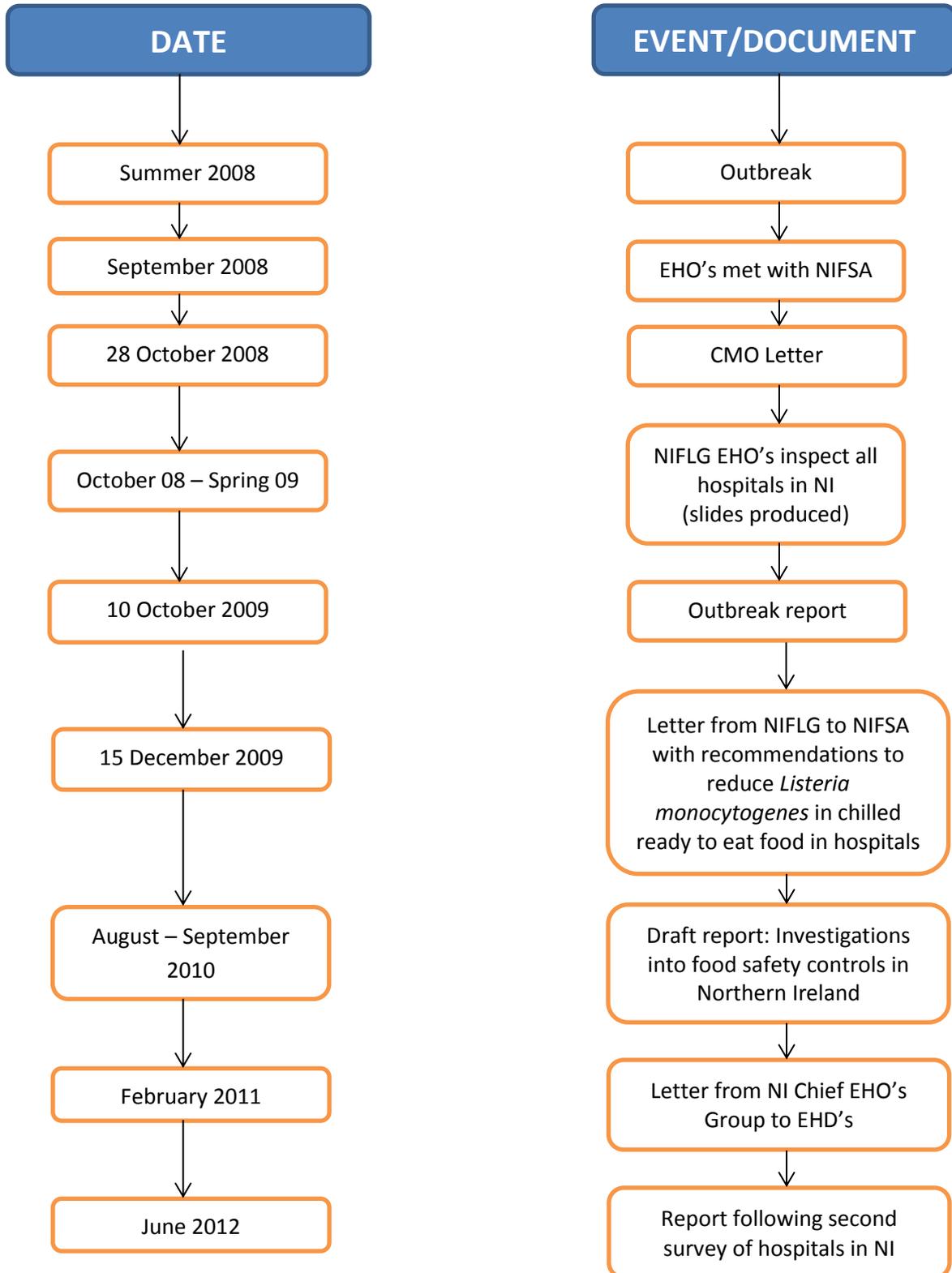
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## Appendices

### Appendix 1 – Summary of key actions taken following listeriosis outbreak (Northern Ireland 2008)



## Appendix 2 - STS record of interview with Facilities Management at hospital who experienced listeriosis outbreak

### Hospital – current practices

STS met with the Facilities Manager and Assistant Facilities Manager in January 2014 to discuss the outbreak and lessons learned. Observations and procedures now in place include:

- The catering unit and its management team have a very close working relationship with their local EHO team. EHO visits regularly, outside routine inspections, to offer advice.
- The FSMS used on site has been drawn up by the Facilities Manager (FM) and his senior management team with the assistance and approval of the EHO. It is not a general Trust-wide document adapted to suit the hospital, but a tailor-made, site-specific system which is treated very much as a 'living' document, reviewed regularly.
- All processes and procedures documented in the FSMS are geared towards control of *L. monocytogenes* but it is not mentioned specifically within these.
- A great deal of time/effort has been made to re-educate ward staff in temperature checking procedures and its importance.
- Managers reported that ward staff serving foods at ward level (domestics) have greatly improved in consistency of record-keeping and annotation of corrective actions but observed that it is the senior nurse on the ward (the ward manager) who is ultimately responsible on a day-to-day basis for ensuring records are completed.
- The managers observe that when the domestic who usually serves on a particular ward is off (e.g. on leave) this is when gaps in the records appear as the covering domestic is not being pushed at ward level to complete. This is reported as the greatest bone of contention at ward level as their opinion is that food safety does not appear to be taken seriously by many of the ward managers (who reportedly segregate medical concerns and food safety concerns).
- A new policy has been drafted (but not yet implemented) via the Director of Nursing and Infection Control that no food brought in for patients by visitors is to be stored in ward fridges - all foods must be eaten 'on delivery'.
- There is currently no control over foods being placed into bedside lockers by nursing staff so, in theory, a patient may be brought food and it be stored in the bedside cabinet without anybody's knowledge.
- All *Listeria monocytogenes* susceptible foods have been taken off the menu.
- There are also no restrictions on what patients can eat, except for those on special diets.
- With regard to purchasing, the team are pointed towards national, NHS-accredited companies but can also use some local companies provided they are accredited by a known scheme (e.g. BRC/STS Public Sector). The manager relies on the



accrediting bodies to inspect suppliers' premises and microbiological sampling results except for the sandwich supplier which the managers visit/tour themselves to ensure they are satisfied. This is as a direct result of the 2008 outbreak when they chose to visit the then-sandwich supplier and were not satisfied with the procedures followed there.

- They have recently changed sandwich supplier again as the company they were using started to outsource delivery to a chilled logistics company who regularly delivered products outside critical limits (so the sandwiches were regularly being rejected at delivery).
- The hospital undertook microbiological sampling themselves every six months. Swabs are made to edges of equipment, hand contact points, dishwasher drain (but not trough-style floor drains), ventilation canopies and processing equipment (such as the meat slicers).
- There is a refrigerated room for salad/sandwich production with its own walk-in fridge.
- Salad ingredients are washed using chlorine tablets (not other vegetables as they are bought in pre-prepared).
- All foods that go onto wards (either hot or cold) are wasted at the end of service (service lasts approximately 20 minutes) so nothing is left in the ward fridges to be stored.
- Training has been undertaken with renewed focus since the 2008 outbreak. The most senior managers have training to Level 4, supervisors Level 3 and all other catering staff to Level 2.
- With regard to ward level training, everyone at ward level who has involvement with food (as nominated by the ward managers) has Level 1 training which is refreshed every year. For these staff, training does make specific referral to the control of *L. monocytogenes* with regard to the importance of storage, but it is in terms of general foodborne illness and not particularly in-depth (as one would expect for Level 1 training content).
- The temperature probing of sandwich samples upon delivery, with sample sandwiches being delivered expressly for this purpose.

**Areas that could be improved further:**

- Temperature of fridges at ward level: only the display temperatures are recorded. It would be best practice to record the air temperature using the additional, internal thermometer as well, rather than just making visual checks.
- Cleaning of the drains/floors in the production areas: the method currently used could result in bacteria from the floors/drains splashing onto equipment/food preparation surfaces. It would be preferable to use products for the drains which cling to surfaces and do not require rinsing.
- There is currently no swabbing of the floor surfaces/drains taking place in production areas as part of the microbiological sampling regime. It is

recommended that these areas be included to ensure the cleaning method for cleaning of these areas is effective and not a potential source of contamination.

**Areas requiring further investigation:**

- At the time of the 2008 outbreak it was very difficult for investigating officers to determine what the victims had eaten while in hospital as the feeding charts were very poorly completed by nursing staff. While the catering managers are taking action where they can (such as with the 24 hour sandwich fridge) the domestic staff are not in a position to record who has eaten what on each ward (this is nursing staff's responsibility and it was not possible to confirm if this practice has improved. It would be useful to ascertain how thoroughly patient feeding charts are completed since the outbreak.