

Hospital Catering: Pitfalls, Standards and Management

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Contents

- Pitfalls –what can go wrong and does it go wrong?
- How can we manage hospital food safety?
- What are the standards for hospital food?
- Using standards in management

General Problems with Serving High Quality Hospital Food

- Decreased appetite
- Extra nutritional needs
- Depressed immune response-high risk
- Logistical/distribution problems
- Reduced budget for food purchasing
- Contracting out /buying in

Specific Problems with Serving Hospital Food

- Long term dependency on hospital food
- Numbers of people who may be involved in food service
- Confounding factors
 - ward rounds
 - 24hr requirements
 - foods from outside –relatives
 - medication eg H2 antagonists
- May be tensions between maintaining different quality components

What are the 2 principles that form the basis of all food safety management systems ?

2 Principles of Microbial Food Safety Management

- Prevent contamination of food
- Prevent pathogen survival or growth / hazard persistence

Selected Hospital Hygiene Violations USA

- Food safety inspectors at Allegheny County issue critical violations at 7 hospitals
- UPMC Magee Womens Hospital inspectors issue violations for temp control and out of date food
- West Penn Forbes regional hospital – violations for temp control
- Life Care hospital Wilkinsberg – temperature and cross contamination violations

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Hospital food hygiene 'is poor'

Almost half of hospital kitchens and canteens in England have poor hygiene standards, a dossier has suggested.

The Liberal Democrats said inspection reports obtained under the Freedom of Information Act painted a "shocking picture" of hospital food hygiene.



Cockroaches and vermin were found in some hospital kitchens

Vermin, cockroaches and the storage of medical and food items together were reported by some local authorities.

The Food Standards Agency said it would expect any authority with hospital food hygiene problems to take action.

'Wrong temperatures'

The Liberal Democrats requested environmental health officers' inspection reports on hospital food preparation areas at a quarter of all English local authorities.

Foods To Be Avoided

- Undercooked/lightly cooked meats
- RTE uncooked fermented meats eg salami
- Unpasteurised dairy products
- Soft ,semi ripened cheeses
- Some RTE fruits/veg difficult to disinfect eg sprouting seeds
- Foods with pooled lightly cooked egg
- Soft serve ice cream
- Some seafoods
- High Listeria risk foods

Perceived Higher Risk Foods in HK

- Siu mei and lo mei
- Sushi and sushimi and some other seafoods
- Oysters
- Hotpot
- Poon Choi
- Some salad items

Centre for Food Safety HK

Food Safety News

Breaking news for everyone's consumption

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FOODBORNE ILLNESS OUTBREAKS

Outbreak Linked to Louisiana Hospital

BY SUZANNE SCHRECK | JUN 02, 2010

Late last week, Dr. David Holcombe, medical director for Region 6 of the Louisiana Department of Health and Hospitals' Office of Public Health, announced that chicken salad served at the Central Louisiana State Hospital was the likely source of a *Clostridium perfringens* outbreak among patients and staff at the hospital in early May.

More than 40 people became ill with *Clostridium perfringens* infections and a 43-year-old woman, 41-year-old man, and 52-year-old man died after eating chicken salad at the hospital. Epidemiologic findings indicated that people who ate the chicken salad were 23 times more likely to show symptoms of *Clostridium perfringens* infection than people who did not eat the salad.

Environmental findings from the outbreak have not yet been released, although food safety experts are speculating that improper cooling could have played a role in the outbreak.

According to the Centers for Disease Control and Prevention (CDC), "By sporulating, [*Clostridium perfringens*] can survive high temperatures during initial cooking; the spores germinate during cooling of the food, and vegetative forms of the organism multiply if the food is subsequently held at temperatures of 60 F-125 F (16 C-52 C). If served without adequate reheating, live vegetative forms of *C. perfringens* may be ingested. The bacteria then elaborate the enterotoxin that causes the characteristic symptoms of diarrhea and abdominal cramping."

The common form of *Clostridium perfringens* poisoning is characterized by intense abdominal cramps and diarrhea which begin 8-22 hours after consumption of foods containing large numbers of *Clostridium perfringens* bacteria. The illness is usually over within 24 hours but less severe symptoms may persist in some individuals for 1 or 2 weeks.

Hospital Listeriosis UK

- 1999-2004 4 outbreaks of Listeriosis associated with sandwiches purchased from or provided in hospitals
- 3249 hospital sandwiches examined (2005-2006); 3.3% unsatisfactory enterobacteriaceae counts; 0.8 % E coli; 0.6% Staph aureus; 0.1% Listeria
- 7.6% contaminated with listeria
- 2.7% with Lm (mostly external)

Little et al 2008 J Food Protect

Hospital Listeriosis UK

- Cluster of hospital Lm cases UK 2011
- Common exposure to pre-packed sandwiches and salads
- Breaches in cold chain and shelf life controls identified

Coetzee et al Euro Surveill 2011

Hospital Listeriosis USA

- Oct 2008 Lm in NY 5 patients ill
- Tuna salad +ve for outbreak strain
- “Majority of NY hospitals had NO food safety policies to minimise the risk “

Cokes et al 2011 Infect Control Hosp Epidemiol.

Hospital Outbreaks of IID/Foodborne Disease

- IID hosp. outbreaks varies by country
- India- 20% hospitalised children get IID
- UK --Stanley Royd Hosptal 1984 - Salmonella 450 ill and 19 deaths
- Sweden EHEC in children's hospital 2004
- Norway Listeriosis 2007
- Oman , *B cereus* 50 + people in 2008
- Nosocomial IID -15% of national outbreaks of FP Wall et al
- Review by Lund & O Brian JHI Oct 2009

Hospital Food Service and Food Safety

- Food safety for patients AND staff as well as conferences UK 300 million patient meals
- In addition to “ normal pathogens “ number of papers show spread of HCAs via food
- Dilemmas over Ward preparation v CPUs and problems with tendering/contracting out
- Catering production models used in hospital food service inherently less safe than many conventional catering
- WHY and does it matter ?

Foodborne MRSA in Korea

- 165 SA strains isolated from hospital food
- 4 isolates(2.4%) were MRSA (mec A +ve)
- All MRSA were enterotoxigenic

Models of Hospital Food Production



“Most cases of FP in hospitals result from shortcomings in distribution rather than point of preparation”

HACCP and ISO22000 (2009) Arvanitoyannis

Griffith 2002

“Food safety is not an accident”

“ Consistent production of nutritious, appetising, safe food requires management”

Management

Food Safety Management: Coordinated activities to direct or control food safety. The attainment of business food safety goals in an effective and efficient way through planning, staffing, organizing, directing and controlling organizational resources

Management Systems

All the documented procedures, practices and operating procedures which influence food safety.

**Operational Performance:
What happens**

**Food Safety
Management Systems**

PRPs

HACCP

Design,
organisation
and
construction

Cleaning

Personal
hygiene

Training

Practices

Documentation

Records

**Cleaning may be the only measure to protect RTE
from recontamination**

PRPs

- Design (layout), siting, construction of premises
- Siting, construction of machinery
- Pest control
- Cleaning / sanitation
- Raw materials (including water) Selection / Purchasing
- Traceability and recall
- Personal hygiene (including facilities)
- Training
- Transport and storage
- Glass policy

Q. What is HACCP?

A. A food safety management system based on identifying problems and then preventing them from happening

Developed for food manufacturing

HACCP – Perceived Benefits: Food Safety

“The HACCP system is believed by the food safety community to be the best available approach both nationally and internationally for reducing foodborne illness”

Mike Doyle – Testimony to US Senate Committee on Agriculture, Nutrition and Forestry, September 2000

EU Regulation 852/2004 Article 5(1)

All food businesses, other than primary producers, put in place, implement and maintain a permanent procedure or procedures based on HACCP principles, including documentation and records.

Implementation 1st January 2006

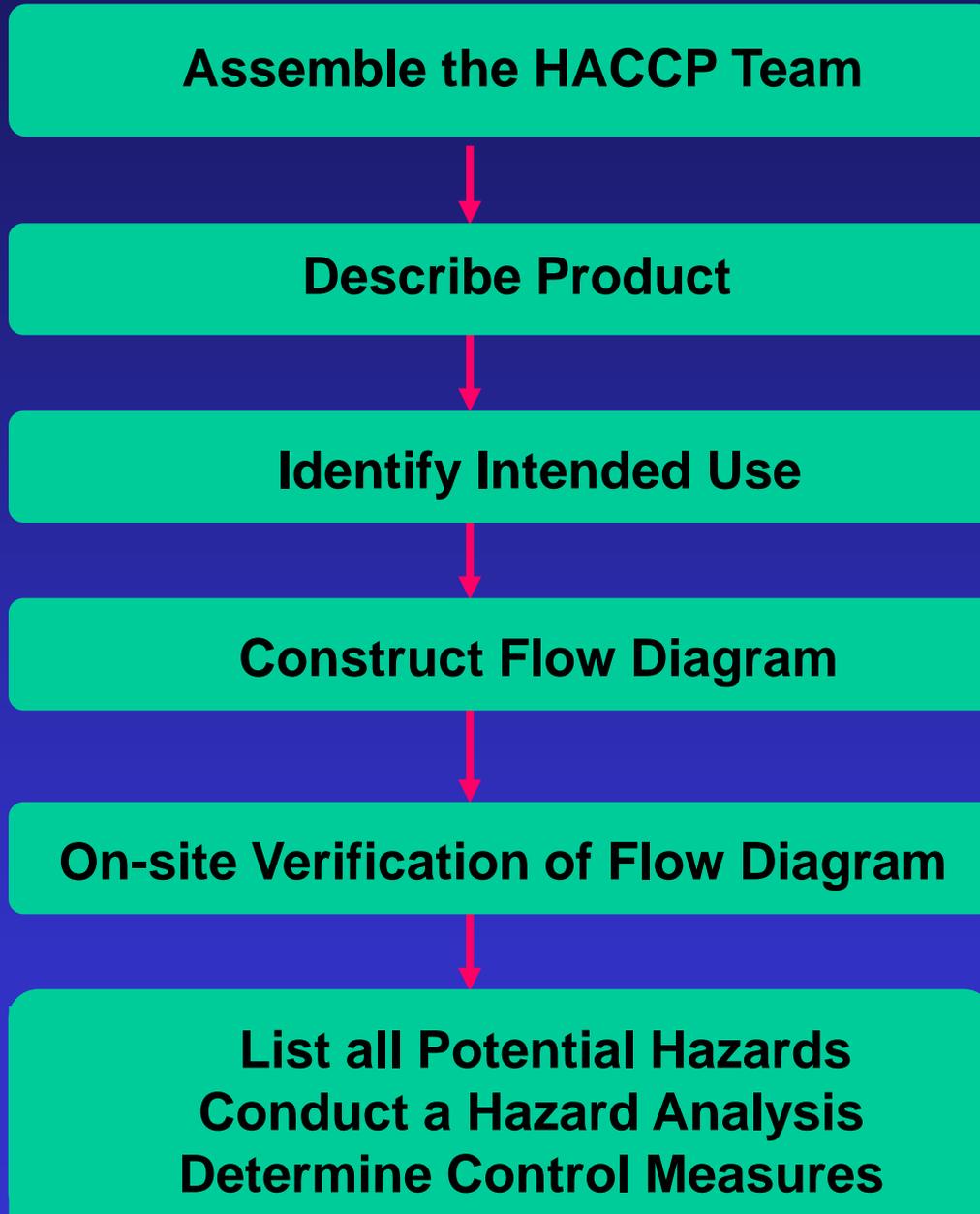
Currently (July 2007) subject of debate

HACCP

7 Codex Principles:

1. Conduct Hazard Analysis
2. Determine CCPs
3. Establish Critical Limits
4. Establish Monitoring Procedures
5. Establish Corrective Actions
6. Establish Verification Procedures
7. Establish Documentation

Codex Logic Sequence



Codex Logic Sequence

Assemble the HACCP Team



Describe Product



Identify Intended Use



Construct Flow Diagram



On-site Verification of Flow Diagram



List all Potential Hazards
Conduct a Hazard Analysis
Determine Control Measures



Identification of
what can go wrong

Codex Logic Sequence

Determine CCPs

Establish Critical Limit for Each CCP

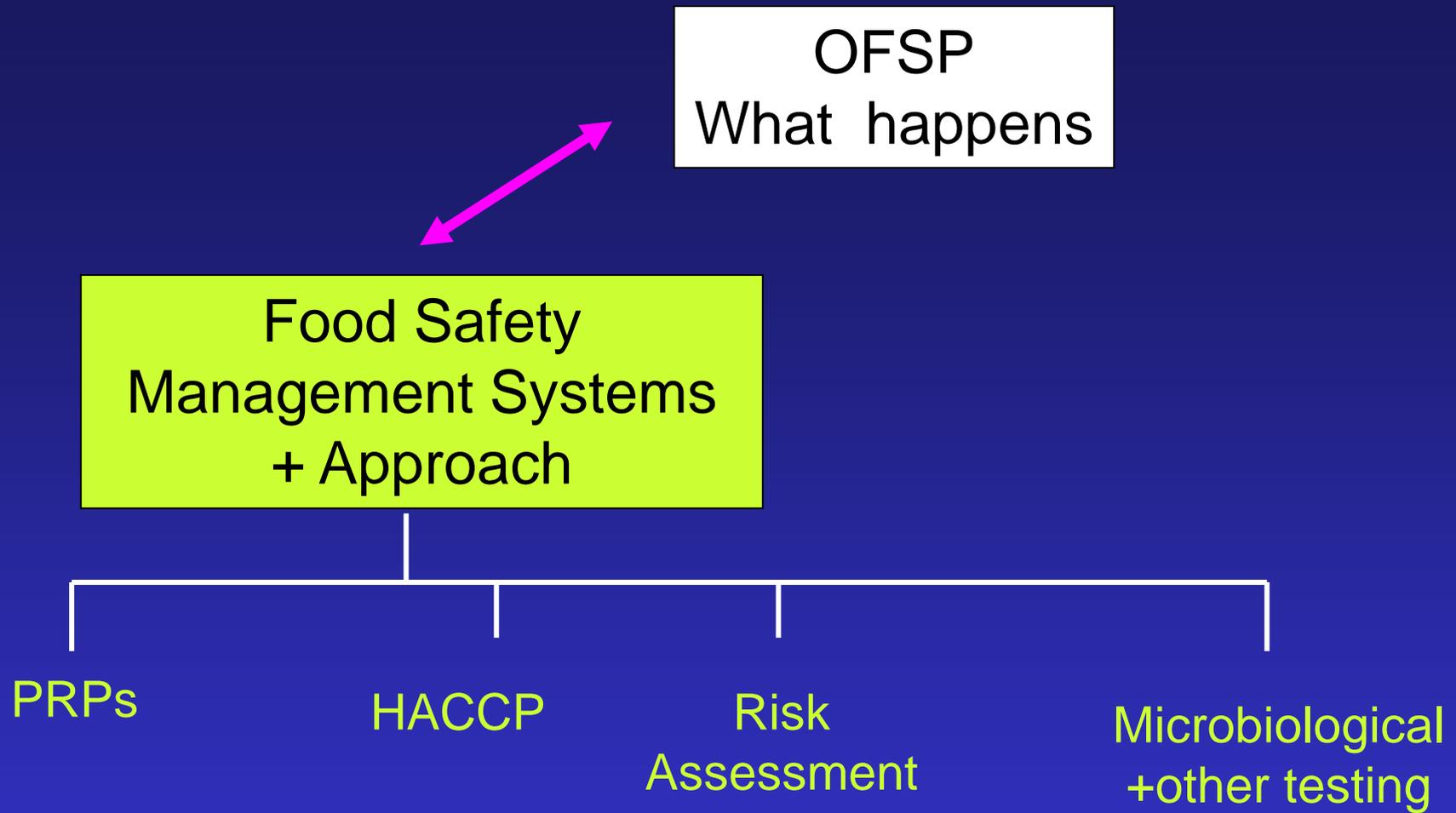
Establish a Monitoring System for Each CCP

Establish Corrective Action for Deviations that may occur

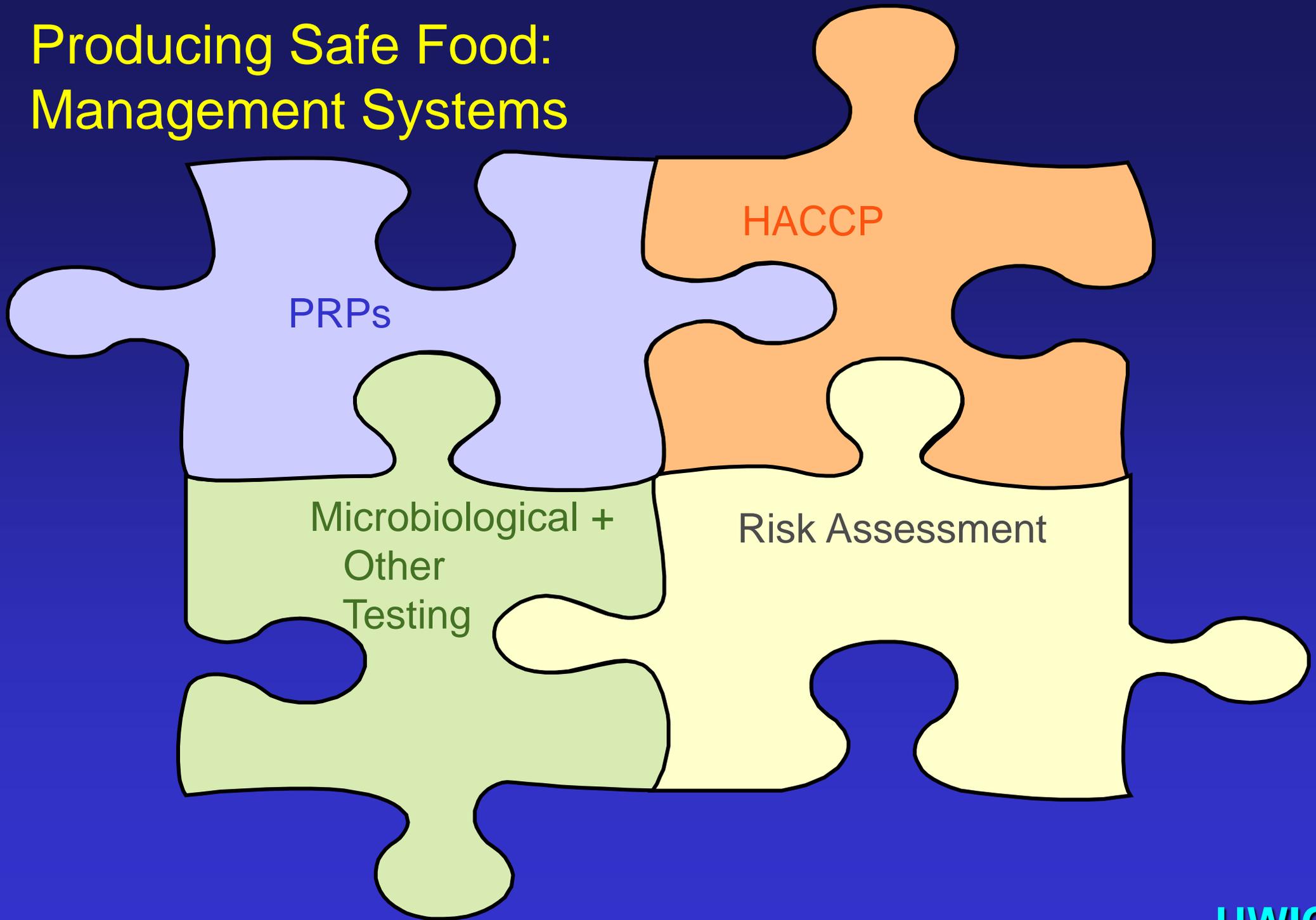
Establish Verification Procedure

Establish Record Keeping and Documentation

Managing the process of preventing things from going wrong



Producing Safe Food: Management Systems



Microbiological and Other Testing

- Product testing : not just end product + all other stages (RA)
- Surface testing
- Results tell you something about/ verify your systems

End Product and Surface Testing

Both are Important BUT

End Product Testing tells you something **HAS**
gone wrong

End Product and Surface Testing

Both are Important BUT

End Product Testing tells you something **HAS** gone wrong

Surface testing tells you if something **MAY** go wrong in the future

Both tell you something about your systems

Griffith, 2008

Microbiological criteria

Defines the acceptability of a product, or food lot, based upon the presence or absence of a number of microorganisms including parasites, and/or quantity of their toxins/metabolites, per unit(s), mass, volume, area or lot

(Should specify food, analytical method, sampling protocol and limits)

Types of Microbiological criteria

- Specification
 - buyer : supplier
- Guideline – advisory
- Standard – mandatory / legal
- Food safety Criteria : Process Hygiene Criteria

How to Test

- Enumeration
- Identification

WAYS IN WHICH FOOD PRODUCT MAY BE EXAMINED FOR MICROBIAL MEMBERS & TYPES

“TOTAL”
NUMBERS

FOOD POISONING/PATHOGENS

FOOD SAMPLE

SELECTED
GROUPS

METABOLIC
PRODUCTS



Guidelines

- UK-HPA guidelines
- UK guidelines for healthcare
- HK guidelines
- Other country guidelines

Analysis of Beef Curry Accept or Reject ?

	Actual	Spec
• ACC	8×10^4 cfu/g	1×10^5
• Enterobact.	55 cfu/g	< 100 cfu/g
• Coag+ve SA	10 cfu/g	10^2 cfu/g
• V. parahaem.	Absent	-
• Salmonella	ND	Absent in 25g
• Campylobacter	ND	Absent in 25g
• L. monocytogenes	10 cfu/g	< 100 cfu/g

What Advice Would You Give ?

	Actual	Spec
• ACC	8×10^4 cfu/g	1×10^5
• Enterobact.	55 cfu/g	< 100 cfu/g
• Coag+ve SA	10 cfu/g	10^2 cfu/g
• Salmonella	Positive	Absent in 25g
• Campylobacter	ND	Absent in 25g
• L. monocytogenes	ND	< 100 cfu/g

Salmonella :Corrective Actions : Check

- Retest
- Examine raw material records
- Thoroughly examine production process/processing efficacy
- Additional environmental sampling
- Compliance with all aspects of food safety management system requirements
- Check records/trend analysis .Consider recall of product
- Send samples for molecular/other subtyping

What Advice Would You Give ?

	Actual	Spec
• ACC	4×10^4 cfu/g	1×10^5
• Enterobact.	90 cfu/g	< 100 cfu/g
• Coag+ve SA	10 cfu/g	10^2 cfu/g -
• Salmonella	ND	Absent in 25g
• Campylobacter	ND	Absent in 25g
• L. monocytogenes	10 cfu/g	< 100 cfu/g
• Clost perfringens	200 cfu/g	< 10cfu/g

Clostridium perfringens : Corrective Actions -Check

- Time/Temperature control during production-especially cooling /post processing storage
- Raw materials quality
- Resample food
- Consider product recall depending on level
- Send for molecular or other typing

What Advice Would You Give ?

	Actual	Spec
• ACC	4×10^4 cfu/g	1×10^5
• Enterobact.	90 cfu/g	< 100 cfu/g
• Coag+ve SA	2×10^4 cfu/g	10^2 cfu/g
• Salmonella	ND	Absent in 25g
• Campylobacter	ND	Absent in 25g
• L. monocytogenes	ND	< 100 cfu/g
• Clost perfringens	ND	< 10cfu/g

Staphylococcus aureus: Corrective Actions -Check

- Personal hygiene of operatives
- Temperature control
- Raw materials (dairy)
- Resample food /test food for toxin
- Check hands of operatives /food contact surfaces
- Consider product recall
- Send for molecular or other typing

Constructing Specifications

- Is it a safety or quality issue
- What is evidence(epidemiology) for the hazard and its “concern” (severity x probability)
- What are raw materials
- What processing will be used
- What is probability of PPC / growth
- How will product be stored/distributed at plant and during transport + storage

Constructing Specifications

- Survival of organism in food
- Treatment prior to consumption
- Who is consumer
- Reliability of test method
- Specify standard /reference method (ISO, AOAC, ICMSF)

What Advice Would You Give ?

	Actual	Spec
• ACC	10^6	1×10^5
• Enterobact.	55 cfu/g	< 100 cfu/g
• Coag+ve SA	10 cfu/g	10^2 cfu/g -
• Salmonella	Absent	ND in 25g
• Campylobacter	Absent	ND in 25g
• L. monocytogenes	Absent	< 100 cfu/g
• Clost perfringens	Absent	< 10cfu/g

Corrective Actions: Elevated ACCs

- Determine constituent organisms above 10^6 maybe dominant organism
- Quality issues –Investigate
- Raw materials
- Process step
- Temperature control
- Cleaning / cleanliness of surfaces

Testing requirements and interpretation of results for cook chill food

Hazard/Hygiene Indicator	Timing/ Frequency of Testing	Result	Interpretation
Aerobic Colony Count	Minimum requirement of monthly testing of a range of products. A rolling programme of testing to cover all menu items and catering processes is recommended. Approximately 100g of each item of food to be samples should be taken prior to reheating or regeneration.	$\geq 100,000$ /g	UNSATISFACTORY
		$< 100,000$ /g	SATISFACTORY
<i>Salmonella</i> species		Detected in 25 g	UNACCEPTABLE
		Not detected in 25g	SATISFACTORY
<i>Escherichia coli</i>		≥ 10 /g	UNSATISFACTORY
		<10 /g	SATISFACTORY

Testing requirements and interpretation of results for cook chill food (continued)

Hazard/Hygiene Indicator	Timing/ Frequency of Testing	Result	Interpretation
<i>Staphylococcus aureus</i>	Minimum requirement of monthly testing of a range of products. A rolling programme of testing to cover all menu items and catering processes is recommended.	≥ 100 /g	UNSATISFACTORY
		< 100 /g	SATISFACTORY
<i>Clostridium perfringens</i>	Approximately 100g of each item of food to be samples should be taken prior to reheating or regeneration.	≥ 100 /g	UNACCEPTABLE
		< 100 /g	SATISFACTORY
<i>Listeria monocytogenes</i>		Detected in 25g	UNSATISFACTORY
		Not detected in 25g	SATISFACTORY

Testing requirements and interpretation of results for ready-to-eat foods including sandwiches

Hazard/Hygiene Indicator	Timing/ Frequency of Testing	Result	Interpretation
<i>Listeria monocytogenes</i>	As indicated by local risk assessment	Detected in 25g	UNSATISFACTORY in foods likely to be served to vulnerable groups
Aerobic Colony Count; Enterobacteriaceae; <i>Escherichia coli</i> ; <i>Staphylococcus aureus</i> ; <i>Salmonella</i> species		Not detected in 25g	SATISFACTORY
		Results should be interpreted according to HPA Guidelines for Assessing the Microbiological Safety of Ready-to-Eat Foods Placed on the Market.	

Testing requirements and interpretation of results for ready-to-eat foods including sandwiches (continued)

Hazard/Hygiene Indicator	Timing/ Frequency of Testing	Result	Interpretation
<p><i>Clostridium perfringens</i> (for meat products and those including gravy/stock)</p> <p><i>Bacillus cereus</i> and other <i>Bacillus</i> species (for products including rice or spice ingredients)</p>	As indicated by local risk assessment		Results should be interpreted according to HPA Guidelines for Assessing the Microbiological Safety of Ready-to-Eat Foods Placed on the Market.

Microbiological Criteria, EU and HACCP -EC Regulation No 2073/2005

The use of Microbiological criteria should form an integral part of the implementation of HACCP based procedures and other hygiene control measures

Microbiological Criteria and EU

EC Regulation 2073/2005 on Microbiological Criteria (MC)

- MC give guidance on acceptability of food stuffs (manufacturing, handling, distribution)
- **Food Safety Criteria : Process Hygiene Criteria**
- Approach recommended by ICMSF
- Integral part of HACCP Used in Validation & Verification

Article 4 Regulation EC No 852/2004

- Food business operators to comply with microbiological criteria. Including testing and implementation of corrective actions.

Microbiological criteria and EU

- Breaching criteria NOT itself illegal
- Not taking action is i.e. must
 - Use criteria to show FSMS working
 - Notify / withdraw if NOT within direct control of produce if Food Safety Criteria exceeded.
 - Take internal corrective action if Process Hygiene Criteria exceeded

Food Safety Criteria

- 3 apply to Lm
- 18 apply to Salmonella
- 2 apply to Histamine
- 1 applies to Staphylococcus (coag +ve)
- 1 applies to E. coli

Food Safety – Fishery products and shellfish

Food Category and criterion number	Micro-organisms/ their toxins, metabolites	Sampling plan n	Sampling Plan C	Limits m	Limits M	Analytical reference method	Stage where the criterion applies
1.16 Cooked crustaceans and molluscan shellfish	<i>Salmonella</i>	5	0	Absence in 25g	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf-life.
1.17 Live bivalve molluscs and live echinoderms, tunicates and gastropods	<i>Salmonella</i>	5	0	Absence in 25g	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf-life.
1.24 Live bivalve molluscs and live echinoderms, tunicates and gastropods	<i>E. coli</i>	1	0	<230 MPN / 100g of flesh and intra-valvular liquid	<230 MPN / 100g of flesh and intra-valvular liquid	ISO TS 16649-3	Products placed on the market during their shelf-life.
1.25 Fishery products from fish species associated with a high amount of histidine	Histamine	9	2	100 mg/kg	100 mg/kg	HPLC	Products placed on the market during their shelf-life.
1.26 Fishery products which have undergone enzyme maturation treatment in brine, manufactured from fish species associated with a high amount of histidine.	Histamine	9	2	200 mg/kg	400 mg/kg	HPLC	Products placed on the market during their shelf-life.

Food Safety – Milk & Dairy Products

Food Category and criterion number	Micro-organisms/ their toxins, metabolites	Sampling plan N	Sampling Plan C	Limits m	Limits M	Analytical reference method	Stage where the criterion applies
1.11 Cheese, butter and cream made from raw milk or milk that has undergone a lower heat-treatment than pasteurisation.	<i>Salmonella</i>	5	0	Absence in 25g	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf- life
1.12 Milk powder and whey powder	<i>Salmonella</i>	5	0	Absence in 25g	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf- life
1.13 Ice cream, excluding products where the manufacturing process or the composition of the product will eliminate the salmonella risk	<i>Salmonella</i>	5	0	Absence in 25g	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf- life
1.21 Cheeses, milk powder and whey powder, as referred to in the coagulase-positive staphylococci criteria.	Staphylococcal enterotoxins	5	0	Not detected in 25g	Not detected in 25g	European screening method of the CLR for Milk	Products placed on the market during their shelf- life

Scope – Process Hygiene

Quality – related, no reporting required under 178/2002, but corrective action required in terms of process, raw material chain.

- **Salmonella (not zero tolerance)**

- Carcasses of cattle, sheep, goats, pigs and horses
- Poultry carcasses of broilers and turkeys

- **Bacillus cereus (presumptive)**

- Dried infant formulae

- **Aerobic Colony Count**

- Carcasses of cattle, sheep, goats, pigs and horses
- Minced meat, MSM

- **Staphylococcal enterotoxin**

- Shelled and shucked products of cooked crustaceans and molluscan shellfish
- Cheese from raw/non-pasteurised milk
- Unripened cheese made from pasteurised milk
- Milk powder and whey powder

- **E. coli**

- Cheeses made from milk or whey that has undergone heat treatment
- Meat preparations, MSM
- Pre-cut fruit and veg, unpasteurised fruit and vegetable juices
- Shelled and shucked products of cooked crustaceans and molluscan shellfish

- **Enterobacteriaceae**

- Carcasses of cattle, sheep, goats, pigs and horses
- Egg products
- Ice cream & frozen dairy desserts
- Infant formulae
- Follow-on formulae
- Milk powder and whey powder
- Pasteurised milk and other pasteurised liquid dairy products

Process Hygiene Criteria (examples)

Food	Micro-organism	Sampling plan	Limits	Method	Where
Minced Meat	ACC	n = 5 c = 2	m = 5×10^5 M = 5×10^6	ISO 4833	End of production
Past Milk	Enterobacteria	n = 5 c = 2	m = <1 cfu/ml M = 5 cfu/ml	ISO 21528	End of manufacture
Pre cut fruit & veg RTE	E. coli	n = 5 c = 2	m 100 ctu/g M 10^3 cfu/g	ISO 16649	End of manufacture

Using Microbiological Data To Manage Food Safety

- Results monitored and used in trend analysis
- Results used to inform necessary corrective actions
- Inform you how well your system is functioning
- Don't forget environmental monitoring – especially for Listeria

Summary and Closing Comments

- Foodborne illness remains major public health problem
- Particular problems in providing safe quality food for hospital patients
- Distribution and production require careful management
- HACCP food safety management system of choice
- Adaptation of “Codex “ HACCP for food service
- MT + RA have a role to play

Testing requirements and interpretation of results for hot and cold water systems

Hazard/Hygiene Indicator	Timing/Frequency of Testing	Result	Interpretation
Legionella	As indicated by risk assessment	≥1000 cfu/l	UNSATISFACTORY
		≥100 - <1000 cfu/l	UNDESIRABLE
		<100 cfu/l	SATISFACTORY
<i>Pseudomonas aeruginosa</i>	In augmented care wards, as indicated by risk assessment (sample to be collected without pre-flushing)	>10 in 100 ml	UNDESIRABLE
		≤10 in 100 ml	SATISFACTORY

Major food poisoning microorganisms

Source: Gould *et al.*, 1995

Minimum growth temperature	Heat resistance	
	Low: Vegetative cells	High: Spores
Low	<i>Listeria monocytogenes</i> <i>Yersinia enterocolitica</i> <i>Vibrio parahaemolyticus</i> <i>Aeromonas hydrophila</i> <i>Salmonella</i> species	<i>Clostridium botulinum</i> E and non-proteolytic B <i>Bacillus cereus</i> <i>Bacillus subtilis</i> <i>Bacillus licheniformis</i>
Medium	<i>Escherichia coli</i> Enteropathogenic strains <i>Staphylococcus aureus</i>	<i>Clostridium perfringens</i> <i>Clostridium botulinum</i> A and proteolytic B
High	<i>Campylobacter jejuni</i> And <i>C. coli</i>	

Testing requirements and interpretation of results for endoscopy final rinse water

Hazard/Hygiene Indicator	Timing/ Frequency of Testing	Result	Interpretation
Aerobic Colony Count	Weekly	>100 in 100 ml	UNACCEPTABLE
		>10 - ≤100 in 100 ml	UNSATISFACTORY
		0 - ≤10 in 100 ml	ACCEPTABLE
		0 in 100 ml	SATISFACTORY
Environmental mycobacteria	Annually (or more frequently, depending on risk assessment)	>10 in 100 ml	UNSATISFACTORY
		0 in 100 ml	SATISFACTORY
<i>Pseudomonas aeruginosa</i>	Optional – to be determined in discussion with local microbiologist	>10 in 100 ml	UNSATISFACTORY
		0 in 100 ml	SATISFACTORY

Testing requirements and interpretation of results for cook chill food

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		$< 100,000$ /g	SATISFACTORY
<i>Salmonella</i> species		Detected in 25 g	UNACCEPTABLE
		Not detected in 25g	SATISFACTORY
<i>Escherichia coli</i>		≥ 10 /g	UNSATISFACTORY
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Testing requirements and interpretation of results for cook chill food (continued)

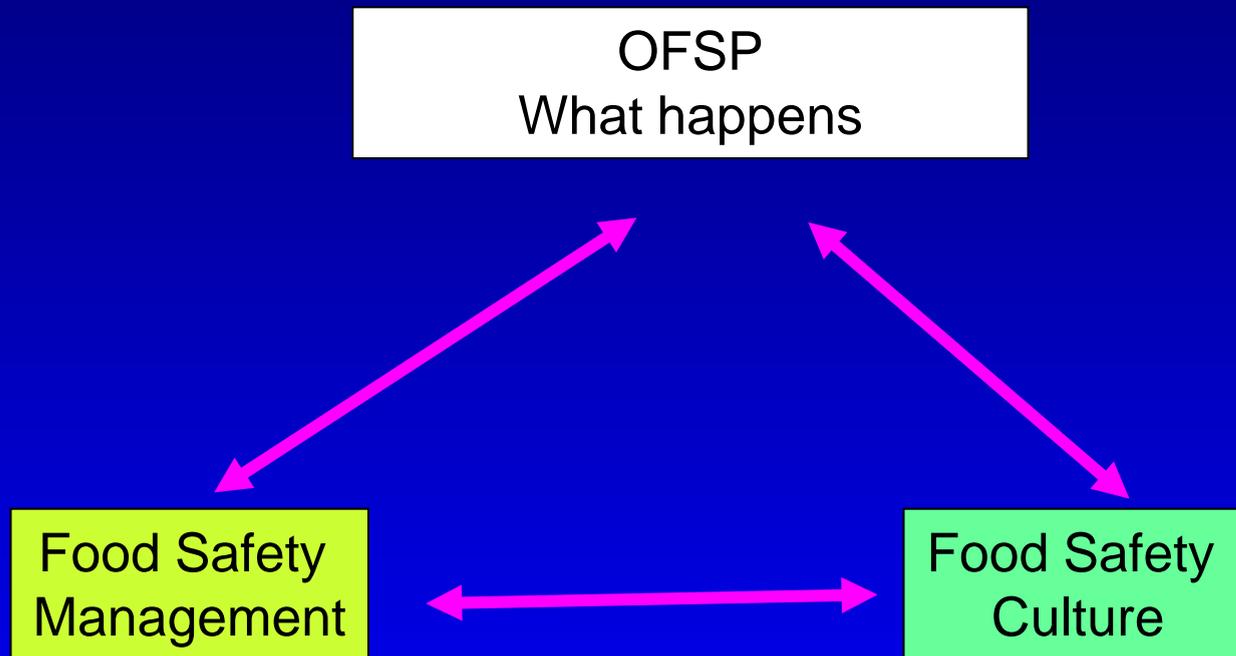
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Testing requirements and interpretation of results for ready-to-eat foods including sandwiches

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Hospital Food Safety and Risk

- Lots of food safety information available
- Lots of guidelines available
- Some extra problems with hospital food One solution –avoid certain foods
- Avoidance is part of a solution – but need to adopt the HACCP approach advocated for use in the food industry as part of a **MANAGEMENT** strategy

Hospital Food Safety and Risk

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Guidance on the interpretation of results for hygiene indicator organisms in ready-to-eat foods

Hygiene Indicator	Result/g	Interpretation
<i>Enterobacteriaceae</i>	$>10^4$	UNSATISFACTORY
	$10^2 - \leq 10^4$	BORDERLINE
	$<10^2$	SATISFACTORY
<i>Escherichia coli</i>	$>10^2$	UNSATISFACTORY
	$20 - \leq 10^2$	BORDERLINE
	<20	SATISFACTORY

Guidance on the interpretation of results for detection of pathogens (the hazard) in ready-to-eat foods

Hazard	Result/25g	Risk category	Interpretation
<i>Bacillus cereus</i>	>10	High	UNSATISFACTORY and Potentially injurious to health and/or unfit for human consumption
	$10^3 - \leq 10^5$	Moderate	UNSATISFACTORY
	$<10^3$	Low	SATISFACTORY

Guidance on the interpretation of results for detection of pathogens (the hazard) in ready-to-eat foods

Hazard	Result/25g	Risk category	Interpretation
<i>Bacillus</i> spp. (other pathogenic <i>Bacillus</i>)	$>10^5$	High	UNSATISFACTORY and Potentially injurious to health and/or unfit for human consumption
	$10^3 - \leq 10^5$	Moderate	UNSATISFACTORY
	$<10^3$	Low	SATISFACTORY

Guidance on the interpretation of results for detection of pathogens (the hazard) in ready-to-eat foods

Hazard	Result/25g	Risk category	Interpretation
<i>Clostridium perfringens</i>	$>10^4$	High	UNSATISFACTORY and Potentially injurious to health and/or unfit for human consumption
	$10 - \leq 10^4$	Moderate	UNSATISFACTORY
	<10	Low	SATISFACTORY