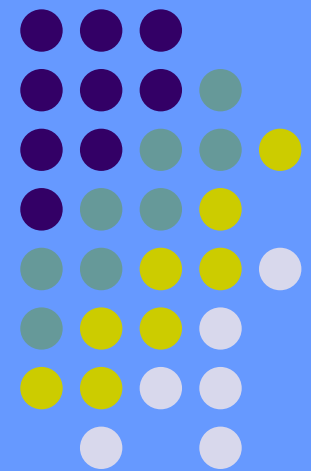


BASIC CONCEPTS OF INFECTION CONTROL

Food Hygiene

International Federation of
Infection Control





Nosocomial Food Poisoning in Developing Countries

- Surveillance generally lacking
- Infectious intestinal diseases prevalent in the community
- HIV-infected patients at a greater risk
- Kenya: prevalence of nosocomial
Salmonella: 3.0%; Shigella: 2.5%
- India: 20% of hospitalised children
run the risk of an enteric infection

Paton et al

Kamalaratnam et al





Nosocomial Food Poisoning in Developed Countries

- 248 outbreaks of Salmonella in U.K. over a 10 year period

Joseph et al

- Nosocomial infectious intestinal diseases account for 15% of all national outbreaks of food poisoning

Wall et al

- Direct costs of nosocomial Salmonella outbreak = AU\$ 120,000

Spearing et al



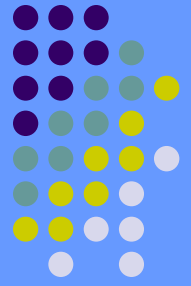
Viral Gastroenteritis



Norovirus Clinical Illness

- Incubation: 1-2 days
- Duration: 2-3 days
- Abrupt onset of nausea and vomiting with prostration and malaise
- Nausea, vomiting, diarrhea, and headache >50%





Hospital Management of Viral Gastroenteritis

- Symptomatic individuals cohorted or isolated
- Healthcare workers
 - wear gloves and apron for contact with an affected patient or environment
 - wash hands with soap and water after contact and after removing gloves and apron
- Affected staff excluded from the ward immediately and until they have been 48 hours symptom-free





Hospital Management of Viral Gastroenteritis

- If epidemiological evidence of continued spread:
 - Close ward
 - Patients should not be transferred to unaffected wards
 - Minimise visitors
 - Wash their hands on leaving the unit





Hospital Management of Viral Gastroenteritis

- If epidemiological evidence of continued spread:
 - Spillages of vomit and faeces spillages must be cleaned and disinfected promptly
 - The ward should not be re-opened until 72 hours after the last new case and /or uncontained vomiting and diarrhoea
 - Perform terminal disinfection of the ward and changing of the bed curtains before re-opening

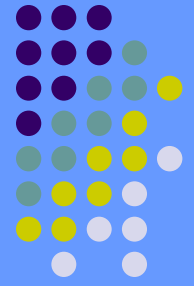


ICT Input in Food Poisoning Outbreaks

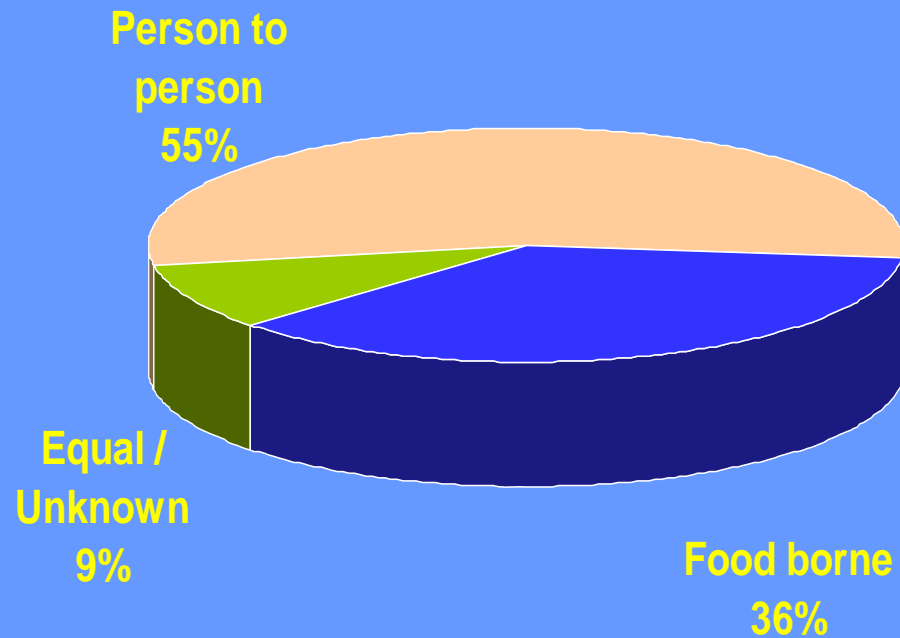


- Cohort isolation
- Supervision of patient placement
- Surveillance
 - Workload increases by 800% during outbreak
- Education
- Employee health
- Public and media relations





Epidemiology



Rushdy et al

Person-to-person:

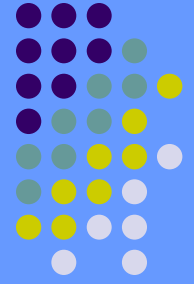
- Exact source often difficult to determine
- Admission of patient with unrecognised community acquired infection

Foodborne outbreaks carry 3.22 greater mortality risk

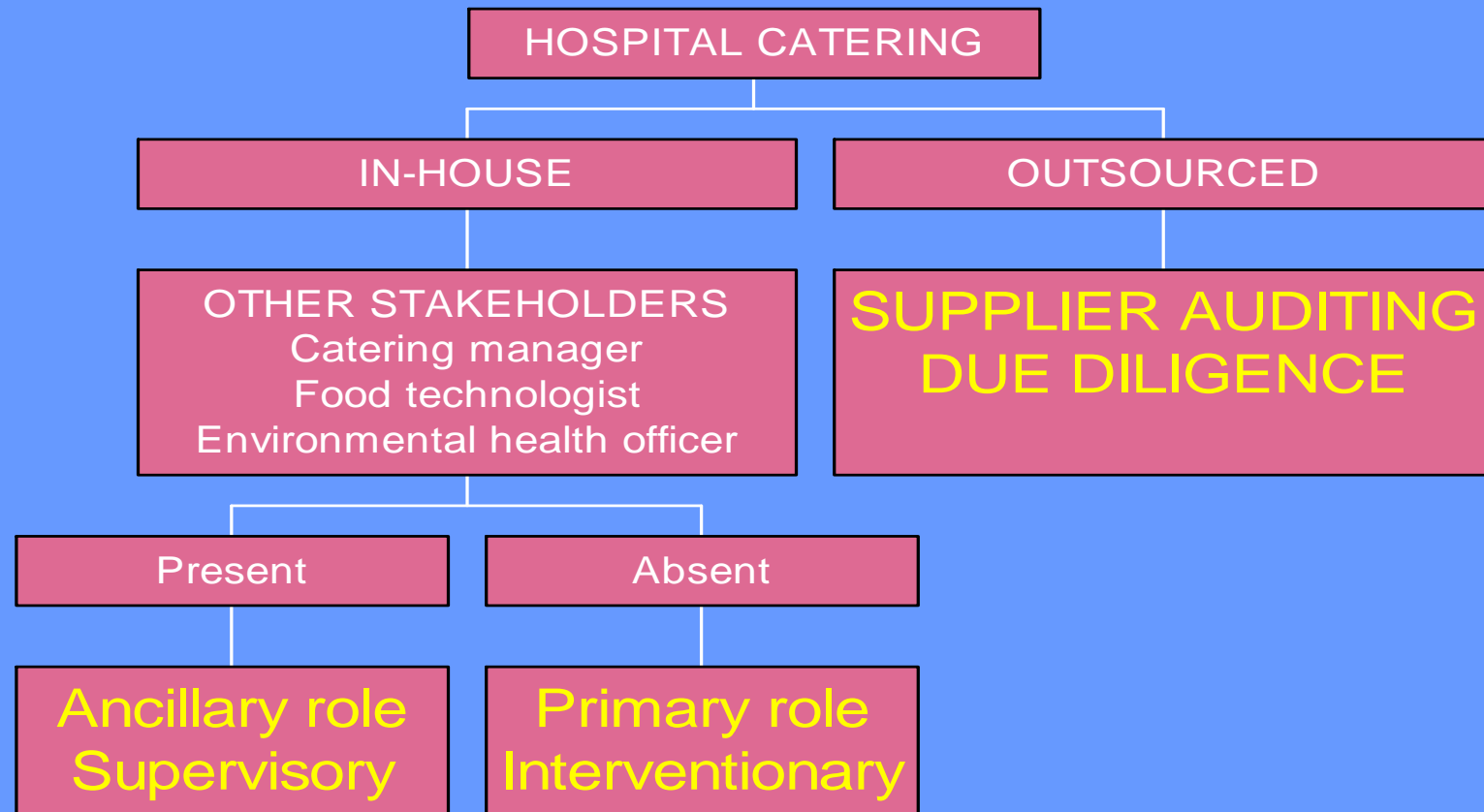


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Meakins et al



Role of ICT in Food Hygiene



ICT and Food Hygiene



- Intervention in suspect or confirmed food-borne gastroenteritis
- Auditing of food contractors
- Collaboration with in-house kitchen managers and environmental health officers
- Monitoring of hospital kitchen
- Extensive involvement in hospital food hygiene policy



The Food Hygiene Pyramid

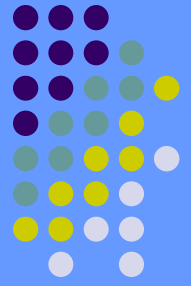


Hygiene Training

Numerous educational tools available

Concentrate on:

- Risk foods
- Bacterial growth & temperature danger zone
- Cross-contamination
- Personal & environmental hygiene





Hygiene Training

- Address common causes of food poisoning
 - Preparing food too long in advance
 - Storing food at ambient temperatures
 - Cooling food too slowly before refrigeration
 - Not reheating food to sufficient temperatures
 - Using contaminated food



Hygiene Training



- Address common causes of food poisoning
 - Undercooking meat, meat products and poultry
 - Ineffective thawing frozen poultry and meat
 - Cross contamination between raw & cooked food
 - Keeping hot food below 63°C
 - Infected food handlers





Hazard Analysis Critical Control Points

HACCP

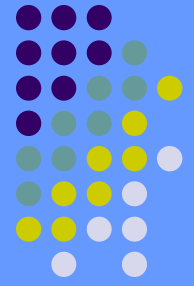
- Analysis of potential hazards and possible preventive measures
- Identification of Critical Control Points
- Establish critical limits
- Introduce monitoring requirements and procedures
- Determine corrective actions
- Record keeping procedures
- Verification procedures



Principles of HACCP

- Derived from engineering system - “Failure Mode & Effect Analysis”
- Pillsbury / NASA - American Space Program - 1960’s
- 1971 - Presented at 1st American National Food Protection Conference
- HACCP Principles now incorporated into Food Safety Legislation in US and EU





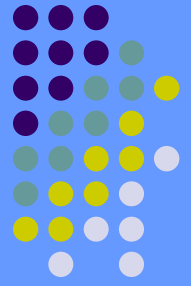
Pre-requisites

- Statement of intent
- Skills base
- Training
 - HACCP
 - Food Hygiene
- Approved Suppliers
 - Supplier auditing schemes
- Good hygiene practices
 - Premises and layout
 - Equipment
 - Staff hygiene
 - Cleaning & disinfection
 - Pest control



Good Hygiene Practices

- Equipment cleaning SOPs and logs
- Hand hygiene facilities
- Insect control
- Pest activity sighting
- Food hygiene training
- Equipment maintenance
- Cleaning check
- Employee health questionnaire
- Staff sickness reports



Hazards in Food

- Biological
 - Bacteria, viruses, parasites
- Chemical
 - Sanitizers, pesticides, antibiotics
- Physical
 - Bone, rocks, metal





Control of Biological Hazards

Cooking kills microbes

- $>75^{\circ}\text{C}$ for poultry, eggs, ground beef
- $>70^{\circ}\text{C}$ for pork
- $>65^{\circ}\text{C}$ for fish

Holding at low temperatures ($<4^{\circ}\text{C}$)
prevents microbes from growing

Cooling from 60° - 4°C quickly prevents
microbes from growing



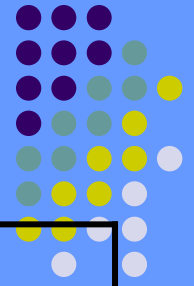
Control of Biological Hazards



Procedure	Hazard	Control
Purchase	Contamination with food poisoning bacteria or toxins	Buy from reputable supplier only. Specify temperature at delivery
Receipt of food	Contamination with food poisoning bacteria or toxins	Visual/sensory checks. Temperature checks



Control of Biological Hazards



Procedure	Hazard	Control
Storage	Growth of food poisoning bacteria; toxins on high risk (ready to eat) foods. Further contamination.	High risk foods stored at safe temperatures. Store wrapped. Date label high risk foods. Rotate stock; use by recommended date.
Preparation	Contamination of high risk (ready to eat) foods. Growth of pathogenic bacteria	Limit exposure to ambient temperatures during preparation. Prepare with clean equipment used for high risk (ready to eat) foods only. Separate cooked and raw foods. Wash hands before handling food.



Control of Biological Hazards



Procedure	Hazard	Control
Cooking	Survival of pathogenic bacteria	Cook food to at least 75°C in the thickest part
Cooling	Growth of any surviving spores or pathogens. Toxin production. Contamination with pathogenic bacteria	Cool foods as quickly as possible. Do not leave out at room temperatures to cool unless cooling period is short



Control of Biological Hazards



Procedure	Hazard	Control
Hot holding	Growth of pathogenic bacteria. Toxin production	Keep food hot, e.g., above 63°C
Reheating	Survival of pathogenic bacteria	Reheat to above 75°C



Control of Biological Hazards



Procedure	Hazard	Control
Chilled storage	Growth of pathogenic bacteria	Temperature control. Date code high risk (ready to eat) foods. Use in rotation & within shelf life
Service	Growth of pathogens. Toxin production. Contamination	<i>Cold service</i> - serve high risk foods as soon as possible after removing from refrigerated storage. <i>Hot foods</i> - serve high risk foods quickly.



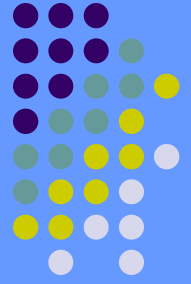
Environmental Testing



- Expensive & labour intensive
- Routine pathogen testing useless
- Limit to total count and indicator organisms
- Look for trends not single results
- Semi-quantitative swabbing of surfaces and hands probably more useful
- Don't neglect the psychological spin-offs of results



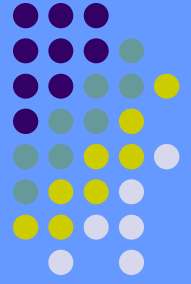
Understanding the Jargon



- Total Bacterial count
 - Not an indication of hygiene
 - More useful as quality indicator
- *E. coli* count
 - Normally present in intestines
 - Indicator organism of poor hygienic state
- *Staphylococcus aureus* count
 - Contamination from a human food handler
- *Salmonella and Campylobacter*
 - Most common food poisoning organisms



Environmental Swabbing



- May be more cost effective than food testing
- Semi-quantitative methods simple to perform
- Useful tool to monitor hygiene of production areas, equipment and hands
- More likely to detect anomalies

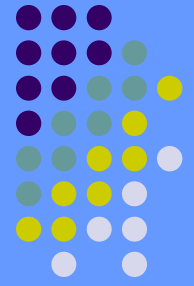


Routine Testing of Food Handlers



- Screening for pathogens in faeces specimens from food handlers:
 - Is not cost-beneficial
 - Identification of a carrier is not likely to make a significant contribution
 - Infection may also occur after testing
 - May lead to a false sense of safety
 - Can cause negligence with regard to general and personal hygienic practices



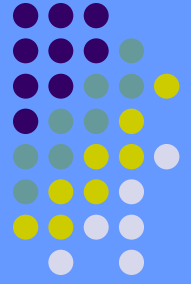


Kitchen auditing

- Look for evidence of:
 - Preparation too far in advance
 - Storage at room temperature
 - Cooling too slowly before refrigeration
 - Insufficient reheating of cook-chill meals
 - Meat and meat products undercooked
 - Frozen poultry insufficiently thawed
 - Xs-contamination from raw to cooked
 - Hot food stored below 63°C
 - Food handlers with gastroenteritis



Ward Kitchens & Refrigerators



- Should be:
 - Clean
 - Sited out of direct heat or sunlight
 - Temperature monitored regularly
 - Unlabelled or outdated items discarded
 - No items exposed or unwrapped
 - Cooked items separate and above raw



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Key Points

- ICT to provide input into management of outbreaks of food borne illness and promote safe practices in food hygiene
- Proper food hygiene training of staff is important
- Control of microbiological hazards in food production is usually undertaken using temperature control



Key Points

- Routine testing of food handlers faeces, blood or rectal swabs is neither cost effective nor generally indicated
- Inspection and auditing of kitchen practices often reveals deficiencies in catering practices and allows corrective action to be taken in time
- All refrigerated items should be labeled, dated and used within 72 hours



References and Further Reading



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