

Outbreaks Where Food Workers Have Been Implicated In the Spread of Foodborne Disease

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Overview

- **Introduction**
- **Purpose**
- **Data sources and methods**
- **Summary data**
- **Categorization of outbreaks**
- **Recommendations**
- **Summary**

Impact of the Infected Food Worker

- **CDC estimates 76 million cases of foodborne illness each year in the United States**
- **Estimated that between 18-20% of foodborne illness associated with an infected food worker in the US and 7% of salmonellosis in the UK**

Difficulty Identifying the Role of the Infected Food Worker

Investigations are often hampered due to:

- **Delay between start of outbreak and start of investigation**
- **Person(s) involved are not available for further questioning or have forgotten details**
- **Information limited due to language difficulties or poor communication skills**
- **Ineffective questioning by the investigators**

Purpose of Study of Infected Food Workers Implicated in Outbreaks

- **Project of the Committee on Control of Foodborne Illness (CCFI) of the International Association for Food Protection (IAFP)**
- **Goal: to develop an understanding of the dynamics of transmission of infectious agents to and from the food worker in a variety of settings**
- **The CCFI approached the task with the premise that all foodborne illness is fundamentally preventable and that by influencing human behavior there will be fewer opportunities for spread of infectious disease agents by workers and others**

Definition of Food Worker

The term **food worker** is used in this context to describe individuals who harvest, process, prepare and serve food

It is broader in context than **food handler** although the two terms are used interchangeably

Data Sources

Outbreak data from:

- Michigan (2000-2003)
- Minnesota (1999-2004)
- New York (1985-2000)
- Washington (1990-2003)
- Line listings from annual reports of foodborne and waterborne disease outbreaks published by Health Canada (1976-1996)
- Outbreak reports from other countries and published literature including reviews (1927-present)

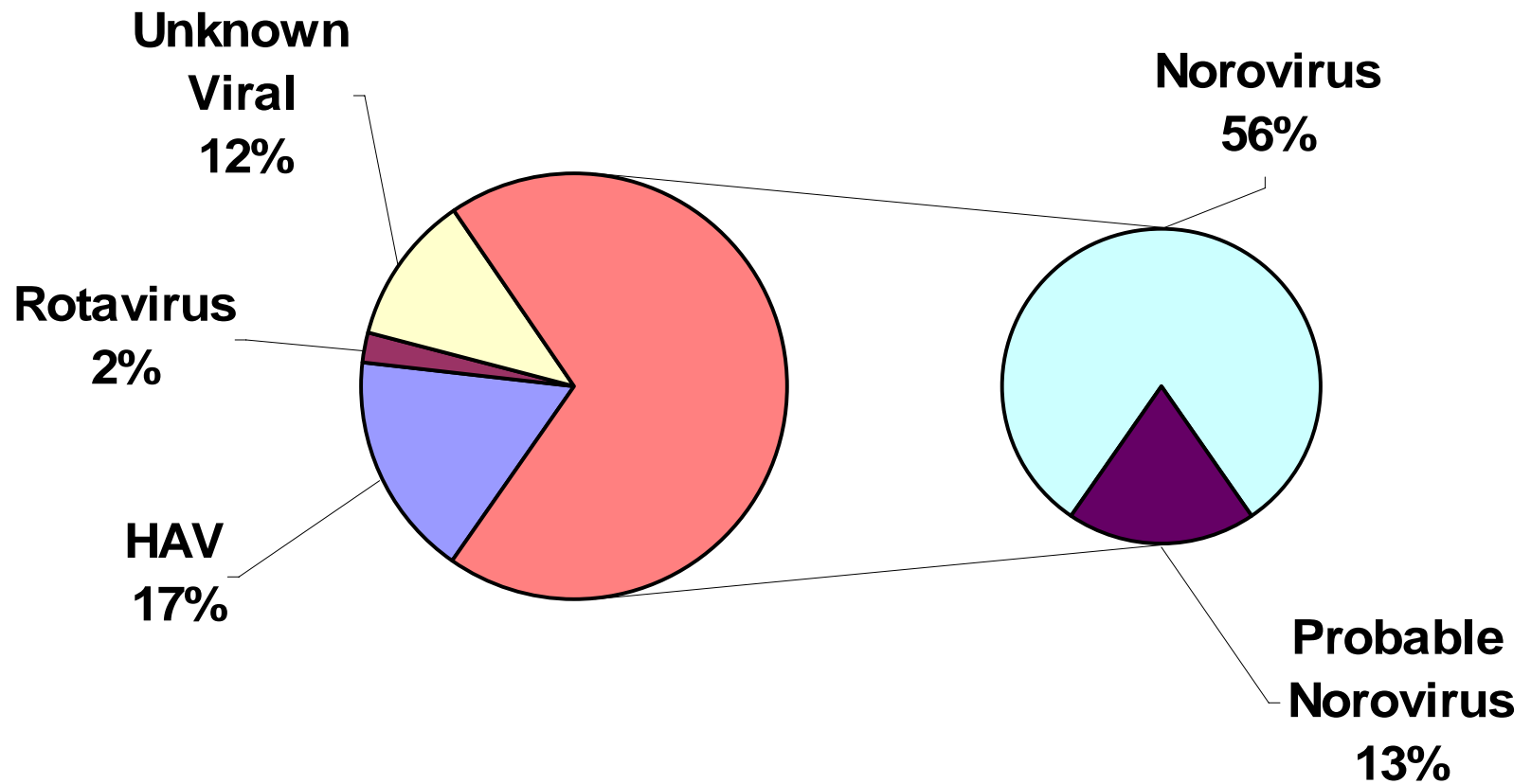
Database Fields

- **ID number**
- **Outbreak setting**
- **Year**
- **Country/province/state**
- **Food vehicle**
- **No. of persons exposed**
- **No of cases in outbreaks**
- **No. of cases hospitalized or died**
- **Pathogen isolated**
- **Pathogen/disease confirmation method: lab; epidemiological**
- **No. of cases lab confirmed**
- **No. of workers infected**
- **Workers symptomatic or asymptomatic**
- **Factors contributing to outbreak**
- **Outbreak narrative**
- **Reference/source**
- **Category code**

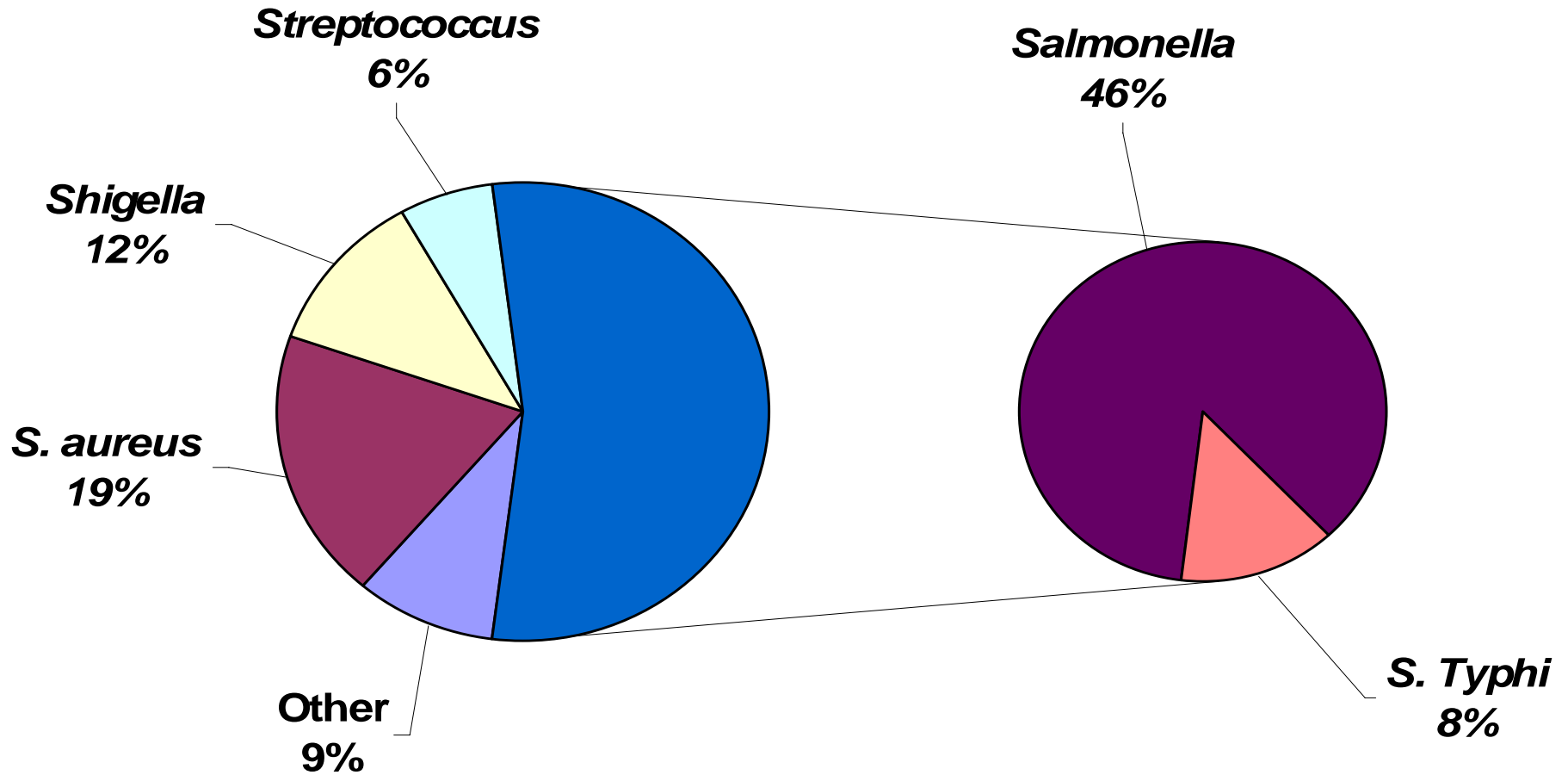
Outbreaks by Infectious Agent

- 816 outbreak reports with 80,682 cases
- Pathogens:
 - norovirus/probable norovirus (338)
 - *Salmonella enterica* (151)
 - hepatitis A virus (84)
 - *Staphylococcus aureus* (53)
 - *Shigella* spp (33)
 - *Streptococcus pyogenes* Group A (17)
 - Parasites *Cyclospora*, *Giardia*, and *Cryptosporidium* (23)

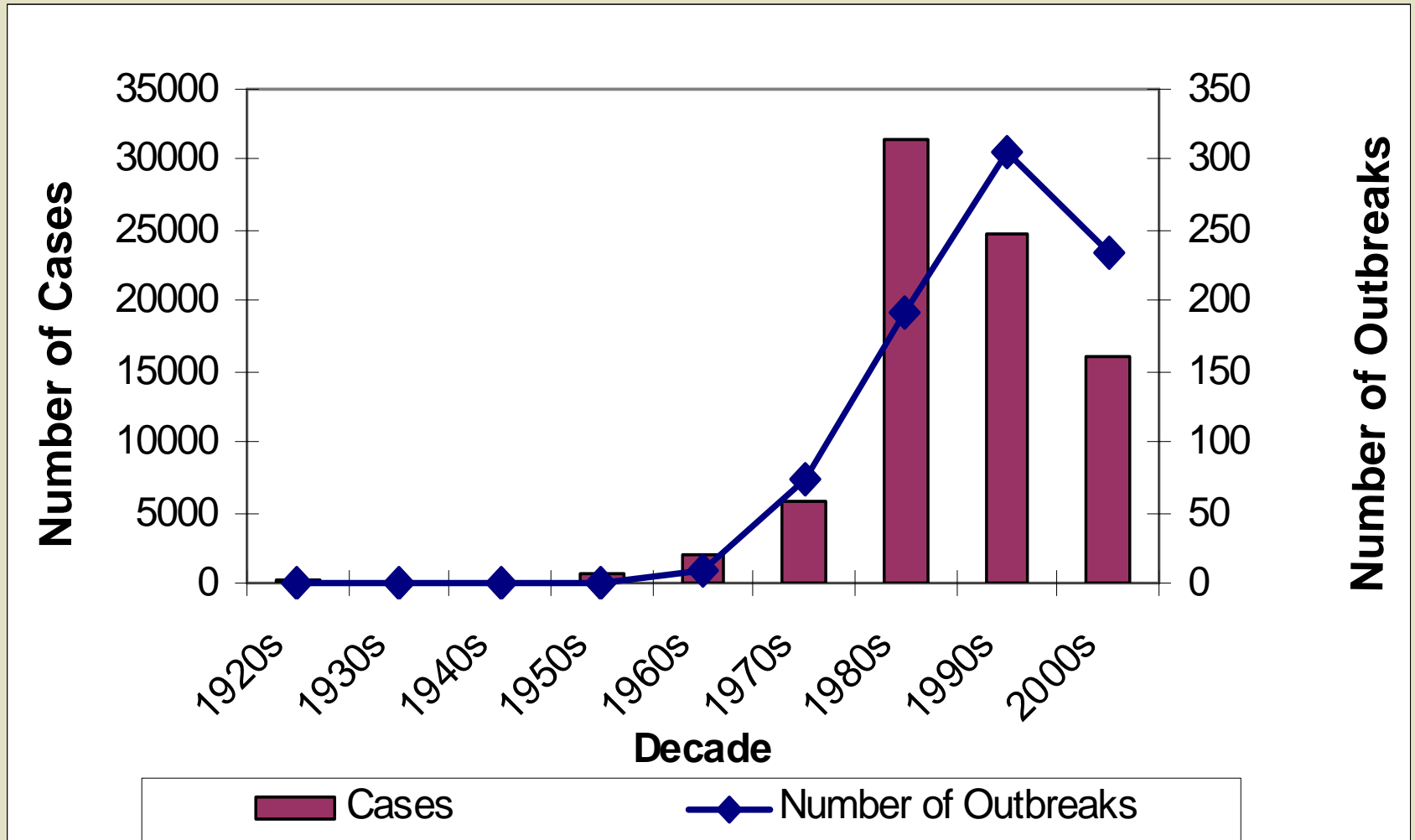
Outbreaks Associated With Viral Agents



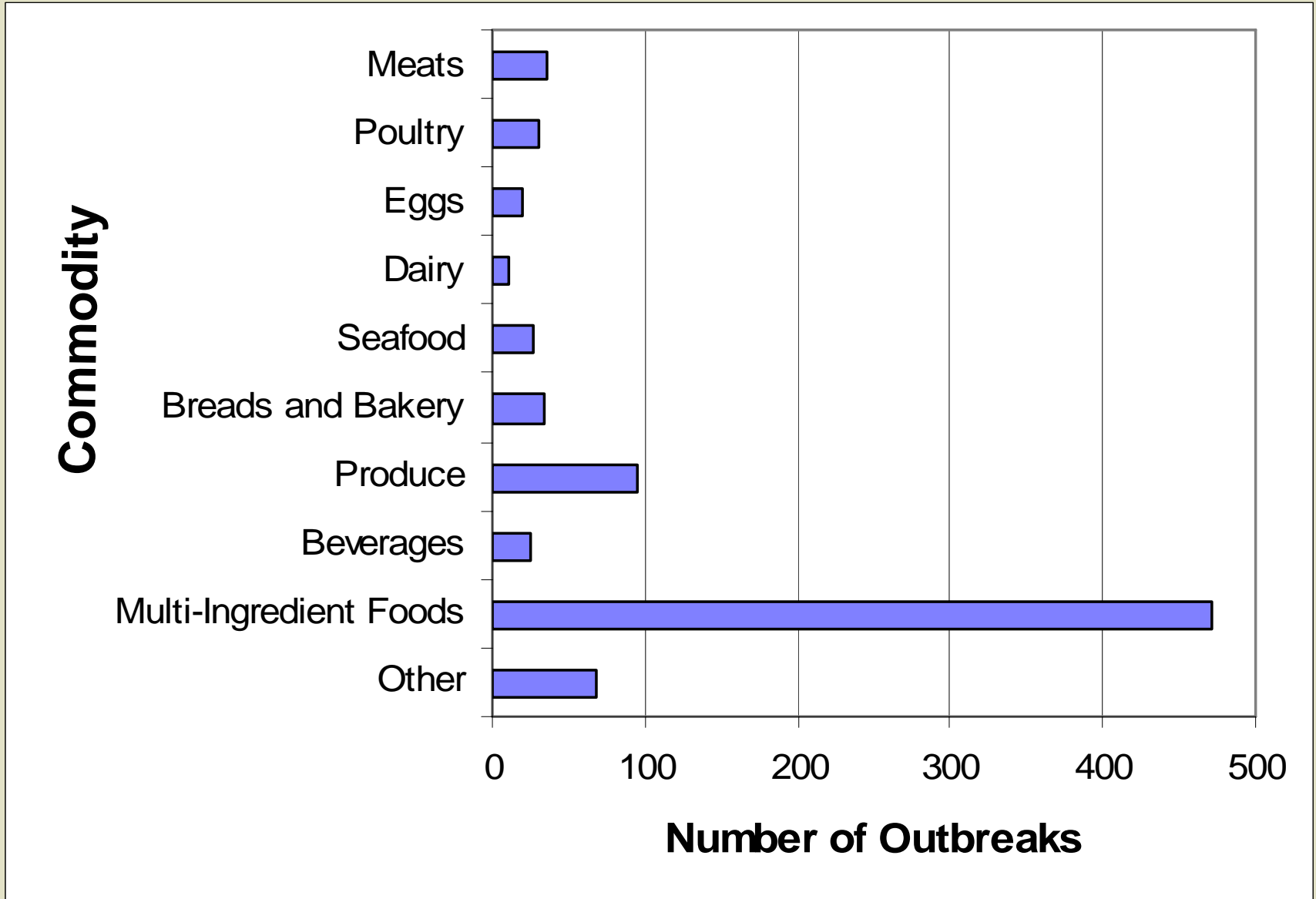
Outbreaks Associated With Bacterial Agents



Outbreaks and Cases by Decade



Outbreaks by Food Category



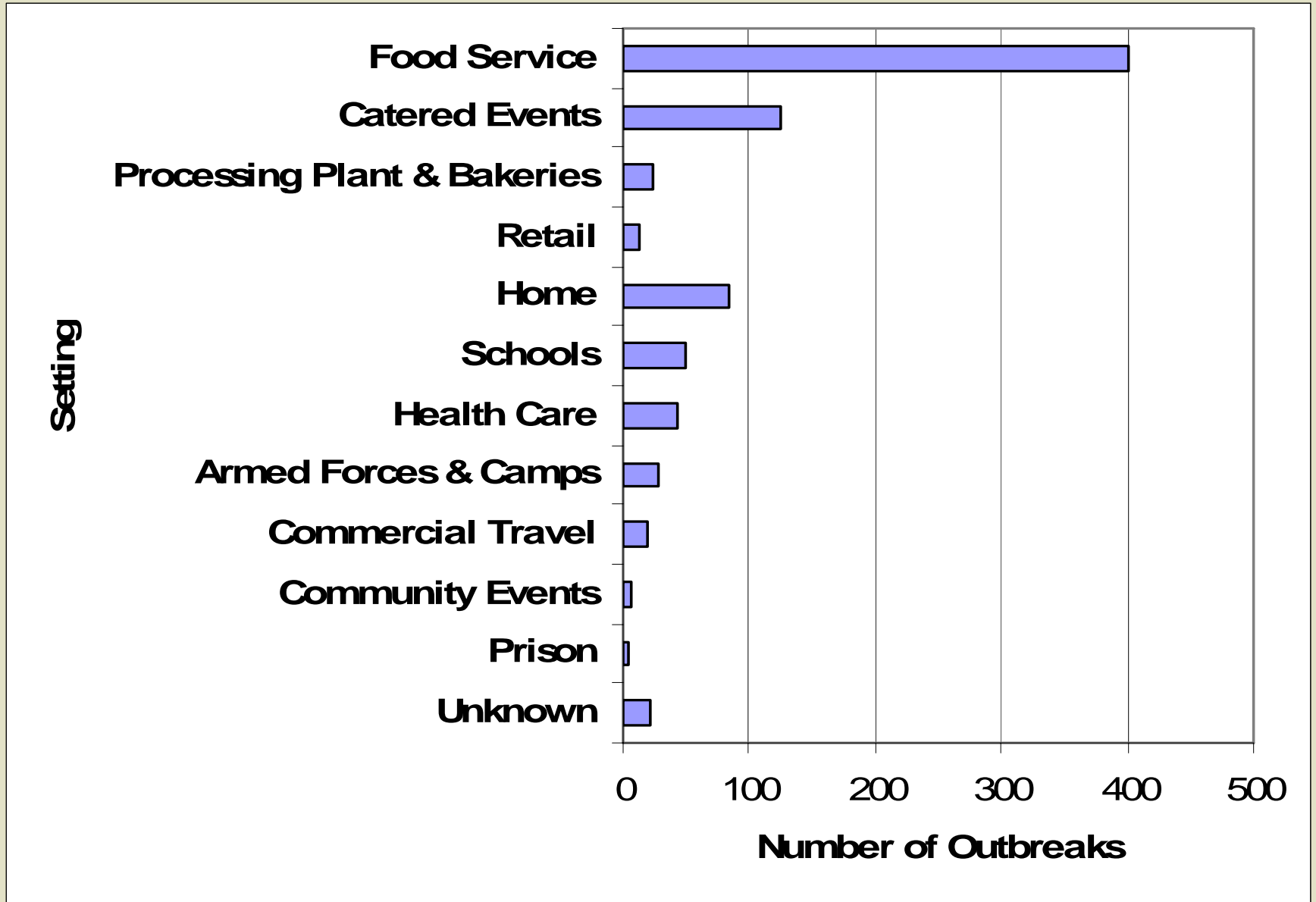
Foods Associated with Outbreaks Where Food Workers Were Implicated

- **Multiple foods - meal**
- **Multi-ingredient foods were noted most frequently**
 - **Salads: including potato, pasta and coleslaw (92)**
 - **Sandwiches (74)**
 - **Chinese, Mexican food and pizza (19)**
 - **Hors d'oeuvres and other RTE cold snacks with sauces and glazes (8)**

Outbreaks by Geographical Region

Geographical Region	Number of Outbreaks (%)	Number of Cases (%)
USA	647 (79.3)	54,888 (68.0)
Europe	63 (7.7)	7,694 (9.5)
Canada	62 (7.6)	3,320 (4.1)
Australia/Asia	27 (3.3)	4,680 (5.8)
Latin America/Caribbean	6 (0.7)	5,408 (6.7)
Africa	4 (0.5)	2,394 (3.0)
Middle East	3 (0.4)	400 (0.5)
Multiple Countries	2 (0.2)	1,843 (2.3)
Unknown	2 (0.2)	55 (0.1)
Totals	816 (100)	80,682 (100)

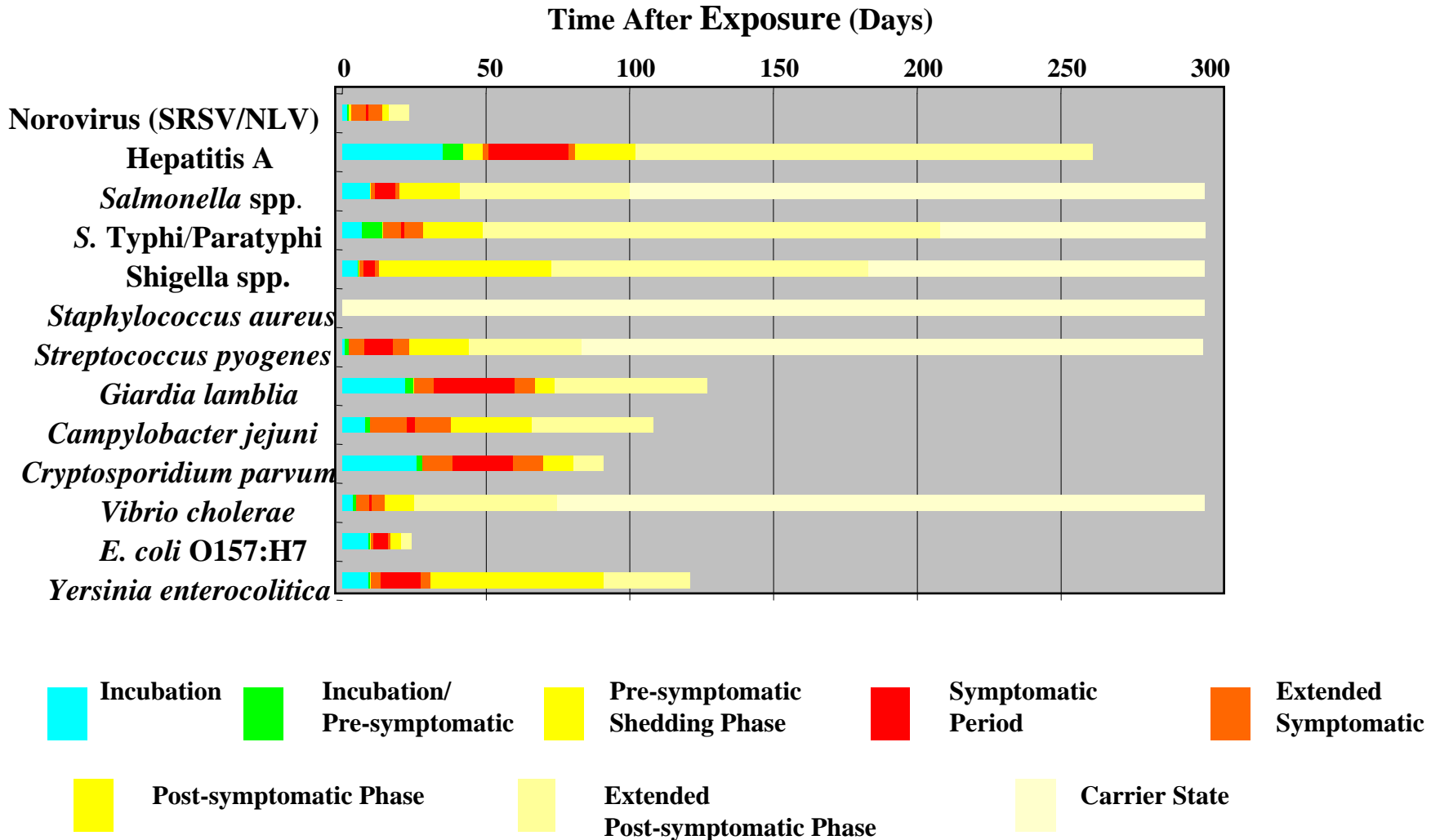
Outbreaks by Settings



Most Extreme Outbreaks

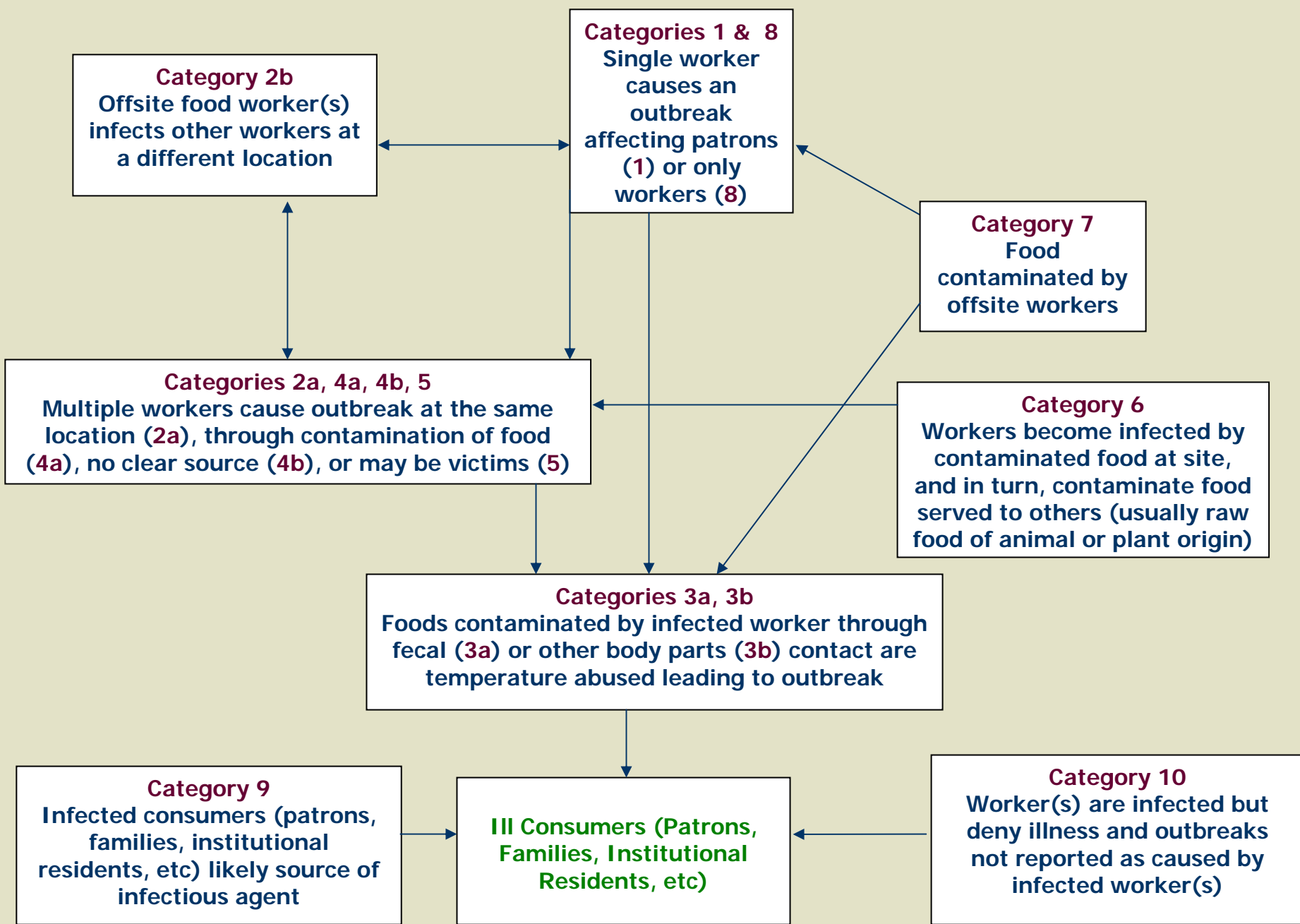
- **Largest outbreak:**
 - 6350 cases [1987, North Carolina: *S. sonnei*]
- **Largest number hospitalized:**
 - 396 [1998, Brazil: *S. aureus*]
- **Largest number of deaths:**
 - 68 [1990, Mozambican refugees in Malawi: *V. cholerae*]

Foodborne Pathogens Transmitted by Infected Food Worker and Periods of Infectivity



Factors Contributing to Outbreaks Where Food Workers Were Implicated (CDC)

- C-12 “handling by an infected person or carrier of a pathogen” [this factor or equivalent was assigned to almost all of the 816 outbreaks analyzed]
- C-10 “bare-hand contact by handler/worker/preparer with RTE foods)” (38%)
- C-15 “failure to properly wash hands when necessary” (0.8%)
- C-9 “cross-contamination from raw ingredient of animal origin” (0.2%)
- C-11 “glove-hand contact by handler/worker/preparer with RTE foods” (0.02%)



Code	Outbreaks	%		Cases	%
1	234	28.7		20935	25.9
2.a	29	3.6		1423	1.8
2.b	4	0.5		285	0.4
3.a	172	21.1		12882	16.0
3.b	70	8.6		10093	12.5
4.a	40	4.9		5707	7.1
4.b	162	19.9		10696	13.3
5	13	1.6		8783	10.9
6	1	0.1		29	0.0
7	41	5.0		8568	10.6
8	1	0.1		12	0.0
9	14	1.7		373	0.5
10	35	4.3		896	1.1
	816	100.0		80682	100.0

Category 1: Single Worker Causes an Outbreak

- **37 cases of viral GI illness associated with cold salad bar items from the cafeteria of a Minnesota college, 2000**
- **Index case a symptomatic food worker**
 - **Called in sick; symptoms resolved later that day**
 - **Returned to work next day; worked the remainder of the week in salad bar section, with extensive bare-hand contact of salad items**
 - **Call-in ill log useful to determine dates that employees were ill and to ascertain the responsible employee**

Category 1: Commercial Travel

- **Flight attendant and 196 passengers developed rapid onset of vomiting and diarrhea following ingestion of ham and cheese omelets served during a chartered flight for a tour group from Tokyo to Paris stopping en route in Alaska and Denmark**
- **Cook who had infected finger prepared ham**
- **Ham left at room temperature for six hours**
- ***S. aureus* isolated from food samples**

Category 3a: Foods Fecally Contaminated by Infected Worker Are Temperature Abused Leading to Outbreak

July 1981 New York:

***Y. enterocolitica* O:8 isolated from 37 persons including head cook and kitchen staff**

- **Five hospitalized for appendicitis**
- **Powdered milk and dispenser contaminated when food workers cleaned and repaired broken spigot**
- **Reconstituted milk held 24 hours under cool conditions but allowed growth of *Yersinia***

Category 3b: Foods Nasally Contaminated by Infected Worker are Temperature Abused Leading to Outbreak

**Convention in Florida 1979: outbreak of pharyngitis,
72/231 ill, including waiters and cooks**

- *Streptococcus pyogenes* Group G isolated from 10 of 16 with pharyngitis and 1 of 41 who did not
- Illness associated with chicken salad
- Cook prepared chicken salad a day prior to symptoms
- Cooked chicken refrigerated overnight in a deep container
- No indication she wore gloves or washed hands frequently
- Opportunity for growth of the Streptococcus

Category 4b: Multiple Food Workers are Linked to Outbreak But There is No Clear Initiating Source

July 1992, 46 patrons at 21 restaurants in Michigan and one in Ohio infected with *Shigella flexneri*

- **Associated with consumption of pre-prepared salads from a central commissary**
- **15 infected workers ill during the same time period and four prepared salad during the outbreak period**
- **Salad mixed with bare hands, bagged by machine, and employees added or subtracted from the bags to meet the weight standard**
- **Investigation failed to identify the infected employees**

Modify or Eliminate Human Contact with RTE Food

- **Use where appropriate:**
 - gloves, utensils, deli papers
- **Disinfect surfaces often**
- **Clean change of work clothing**
- **Wash hands thoroughly with disinfectant soap and water following:**
 - handing of raw foods
 - after going to the toilet
 - after contact with persons suffering from acute GI symptoms
 - after being in contact with infants and other incontinent persons

Wash and Dry Hands Appropriately

- **Have adequate and approved washing facilities**
- **Wash hands thoroughly with fingernail brush**
- **Minimize cross-contamination by using hand-free devices: foot or elbow operated faucet, paper towel dispensers, doorless entry or automatic doors**
- **Use appropriate rinsing and drying procedures**
- **Hand washing process should be monitored, documented and verified**

Management Supervision

- **Observe workers to insure proper cooking, hot holding, chilling and storage procedures and correct errors**
- **Note and report any worker absences**
- **Encourage workers to report personal and family illnesses**
- **Screen food workers (nasal & stool) if coming from a country with endemic enteric disease and when a contamination event has occurred or is suspected**
- **Immunize workers when recommended, e.g., against HAV**
- **Offer job security and paid medical leave**

Worker Exclusions

- Excluded from preparation and serving food when experiencing GI symptoms or with infected skin lesions or sore throats
- Excluded if found to be asymptomatic carriers based on screening
- Remain on sick leave for 48 h following disease cessation

Recommendations for Physicians

- Consider norovirus infection when assessing patients with GI symptoms, not just routine *Salmonella* and *Shigella*
- Have stool specimens analyzed for norovirus and rotavirus if viral GI is suspected
- Advise management of food operations to follow above guidelines
- Notify the Medical Officer of Health or responsible agency if a patient has a suspected foodborne infection

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QUESTIONS?