

Bacterial food poisoning

*Seminar on Infectious Diseases
~ Community Acquired Infection with Outbreak Potential*

Jointly organized by PMH, HKMA, HKSID
13th January, 2007

Microbiology Division,
Public Health Laboratory Services Branch,
Centre for Health Protection,
Dept. of Health, Hong Kong

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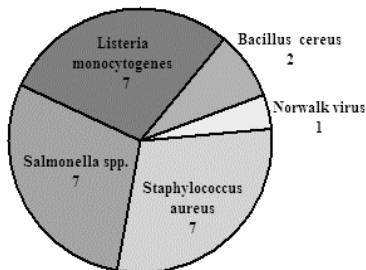
Outline of this presentation

1. Recent microbiological concerns on food safety and health
2. Review of Public Health Laboratory investigations in 2004 – 5
3. Basis of microbial growth in foods
4. Lessons from outbreak investigations
5. What is outside Hong Kong (can become inside)

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Food Poisoning Organisms- 2004, Hong Kong

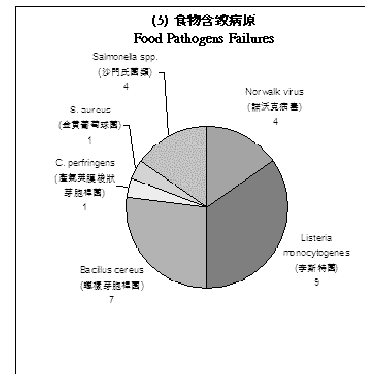
(5) 食物含致病原
Food Pathogens Failures



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Food Poisoning Organisms- 2005, Hong Kong

(5) 食物含致病原
Food Pathogens Failures



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Summary on causative agents for food poisoning outbreaks in 2005 (Information as at 10 September 2006)

Months	Causative Agents											
	Bacteria		Chemicals		Biotoxins		Viruses		Others*		Total	
	Outbreaks	Persons affected	Outbreaks	Persons affected	Outbreaks	Persons affected	Outbreaks	Persons affected	Outbreaks	Persons affected	Outbreaks	Persons affected
Jan-Mar	142	617	4	8	46	78	49	178	5	14	246	895
Apr-Jun	168	730	6	21	34	105	18	148	15	41	241	1045
Jul-Sep	285	993	7	14	9	19	3	23	14	52	318	1101
Oct-Dec	121	356	3	4	11	27	32	114	0	0	167	501
Total	716	2696	20	47	100	229	102	463	34	107	972	3542

Notes :

- 1) Figures include both confirmed and suspected outbreaks.
- 2) * Others include agents other than bacteria, chemicals, biotoxins, viruses, unknown agents and outbreaks pending classification.

CHP – Statistics on Communicable Diseases- Food Poisoning Outbreaks

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Jan-Mar	254	1042	5	13	14	34	121	522	3	7	397	1618
Apr-Jun	182	656	7	11	11	25	27	110	2	5	229	806
Jul-Sep	237	758	2	2	5	14	5	19	75	235	324	1028
Oct-Dec												
Total	673	2455	14	26	30	73	153	651	80	247	950	3452

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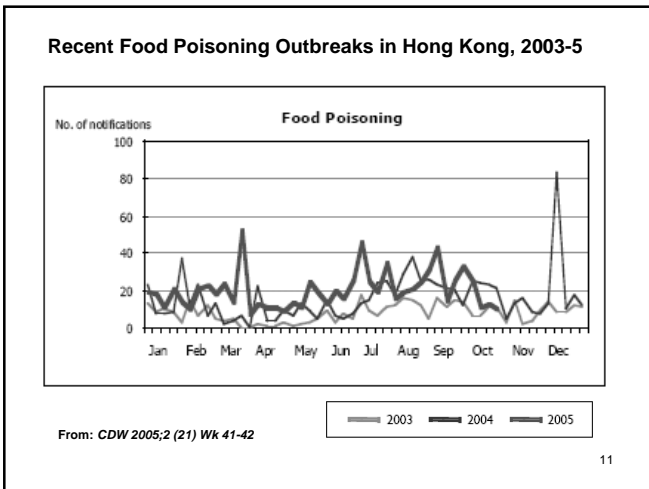
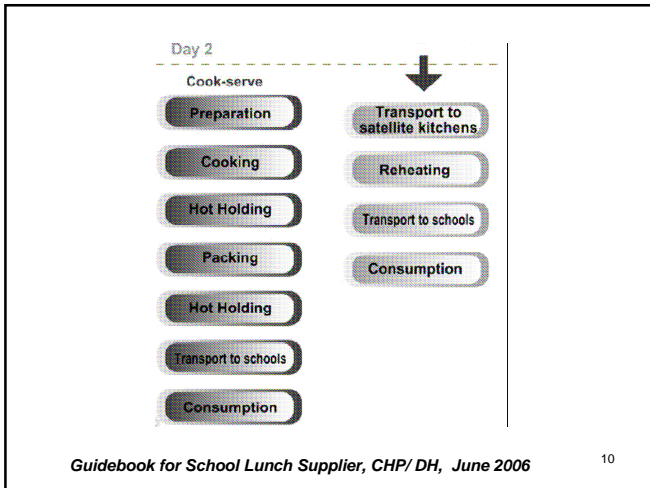
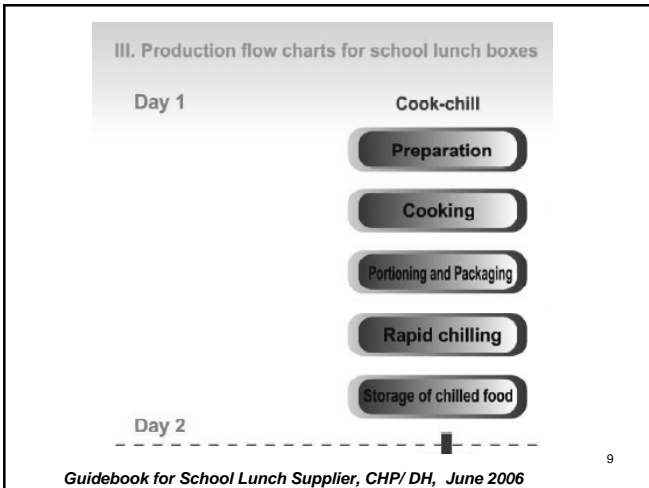
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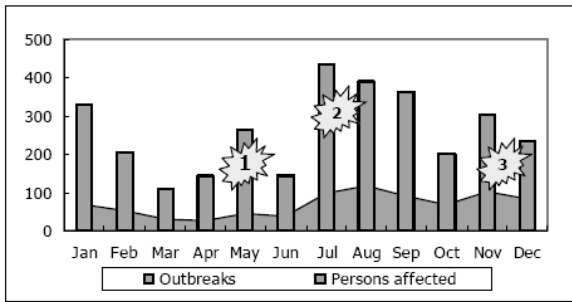
Food Safety Measures on School Lunch

Over the years, there have been cases of food poisoning at school and other venues arising from lunch supplied in bulk by food manufacturers. To ensure that lunch supplied is safe and hygienic, school lunchbox providers should be aware of the following food safety issues -

Guidebook for School Lunch Supplier, CHP/ DH, June 2006



- In 2004, Department of Health in Hong Kong received notification of 825 food poisoning incidents affecting more than 3000 people.
 - This figure was comparatively higher than the average 400 – 700 food poisoning incidents affecting around 2200 to 3000 people each year in the previous five years.
 - Similar to previous years, the peak occurrence was in summer.
 - Three major locally acquired food poisoning outbreaks could be identified.
- From: CDW 2005;2 (21) Wk 41-42



Hong Kong- Monthly figures in 2004 for food poisoning outbreaks and number of people affected, with the three major outbreaks indicated.

From: CDW 2005;2 (21) Wk 41-42 13

- The first one occurred in May, involving more than 100 students and staff from a school related to consumption of lunch boxes supplied by a food company.
- All the patients recovered.
- The epidemiological and microbiological findings suggested the causative agent to be Staphylococcus aureus.

From: CDW 2005;2 (21) Wk 41-42

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- The second cluster involved 9 food poisoning outbreaks affecting 115 persons related to buffet meals at a hotel.
- All of the patients had recovered.
- Epidemiological and microbiological findings suggested the causative agent to be Vibrio parahaemolyticus.

From: CDW 2005;2 (21) Wk 41-42

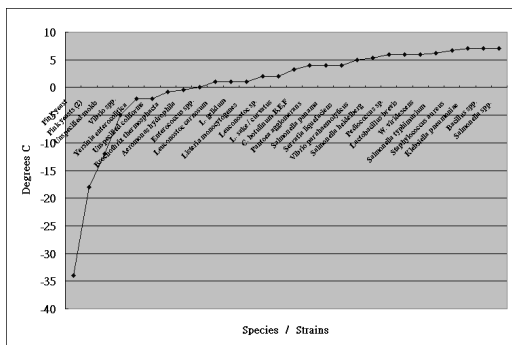
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- The third one involved a series food poisoning outbreaks related to a local district food premise in late November to early December.
- This outbreak affected 186 persons in 78 groups.
- It was suspected that more than one food item was responsible for this outbreak.
- Similar to the second cluster outbreaks, the causative agent was likely to be Vibrio parahaemolyticus.

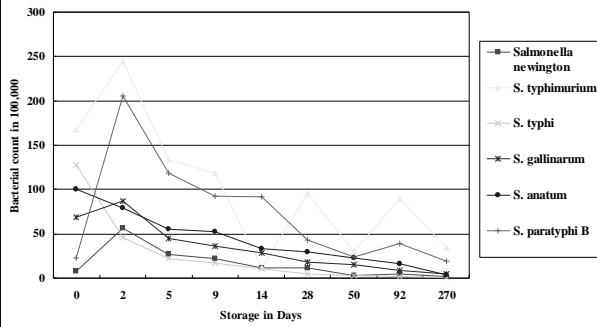
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Minimum Reported Growth Temperatures of Some Foodborne Microbial Species and Strains That Grow at or Below 7°C



Survival of Pure Cultures of Enteric Organisms in Chicken Chow Mein at minus 25.5 degrees C



Source: Data from Gunderson and Rose, 1948. Institute of Food Technologists.

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Top ten outbreak-related salmonella serotypes, Hong Kong

Sep. 04-Aug. 05

Serotype	Total	(%)
Salmonella Enteritidis	74	37.4
Salmonella Derby (Group B)	26	13.1
Salmonella Typhimurium	13	6.6
Salmonella Muenster	6	3.0
Salmonella Paratyphi A	6	3.0
Salmonella Typhi	5	2.5
Salmonella Virchow	5	2.5
Salmonella Meleagridis	4	2.0
Salmonella Newport	4	2.0
Salmonella Stanley	4	2.0

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Vibrio parahaemolyticus: investigation of O2: K:UT strains August 9, 2004, Hong Kong

Lane No.	Specimen Type	Enzyme	Serotype	PFGE pattern Number
1	Ref Std	XbaI		
2	Sushi	NotI	O:3:K:54	K16N09.0007
3	Sushi	NotI	O:3:K:UT	K16N09.0008
4	Sausage	NotI	O:2:K:UT	K16N09.0009
5	Ref Std	XbaI		
6	Sushi Salmon	NotI	O:11:K:UT	K16N09.0011
7	Sushi Salmon	NotI	O:3:K:UT	K16N09.0010
8	Sushi Salmon	NotI	O:1:K:UT	K16N09.0012
9	Sushi Salmon	NotI	O:1:K:UT	K16N09.0012
10	Ref Std	XbaI		
11	Sushi Salmon	NotI	O:2:K:UT	K16N09.0013
12	Sushi Salmon	NotI	O:2:K:UT	K16N09.0014
13	Sushi Salmon	NotI	O:2:K:UT	K16N09.0015
14	Internal control	XbaI		
15	Ref Std	XbaI		

Note: Thiourea added

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2002-2004

Food type	Staphylococcus aureus	Vibrio parahaemolyticus	Salmonella
Poultry	41	11	3
Meat	19	7	6
Sushi / sashimi	10	9	
Dessert / pastries	5	1	5
Chinese dishes	4	5	
Seafood	5	17	4
Rice / vermicelli	3	4	1
Sauce	2		
Salad	1		1
Fruits / vegetables	1	1	
Total	91	55	20

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2002-2004

Environmental swab	Staphylococcus aureus	Vibrio parahaemolyticus	Salmonella
Chopping board	45	4	1
Knife	30		
Work table	11		
Refrigerator	9	5	1
Towel	4	1	2
Utensils (tray, container, etc.)	5	1	
Unknown	17	7	1
Total	121	18	5

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Serology

- Lancefield group R, S, T (2, 1, 15)
- Lancefield group D (? cross reaction)
 - Genetically unrelated to other members of this group
- 35 serotypes
 - 1, 1/2, 2, 3,34
 - 1989: 9-22 ; 1991: 23-28 ; 1995: 29-34
- Serotype 2
 - Most frequently recovered from sick pigs
 - Causes serious infections in humans, especially in people in close contact with swine or pork products

Bacteriology of S. suis

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Virulence Genes

Gene	Code for
<i>epf</i>	Extracellular factor (EF)
<i>sly</i>	Haemolysin (suiysin)
<i>gapdh</i>	Glyceraldehyde-3-phosphate dehydrogenase (GDPDH)
<i>mrp</i>	Muraminidase-released protein (MRP)
<i>cps</i>	Capsular polysaccharide (CPS)

Bacteriology of *S. suis*

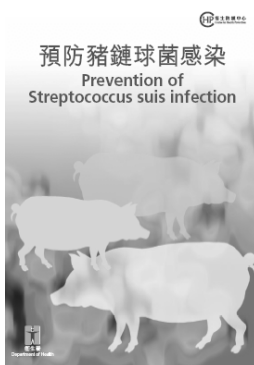
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Outbreak associated with *Streptococcus suis* in pigs in China:

July- August 2005

From WHO/WPRO

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Notifiable Disease in Hong Kong since 2nd August 2005

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Further details of the investigation

- The Ministry of Health of China has reported 215 cases of human disease associated with the outbreak. Of these human cases, 39 have been fatal.
- No new cases have been reported since 5 August. The data provided by China depict an outbreak that peaked from the second through the fourth week of July, and dwindled rapidly thereafter.
- Authorities say several human cases were discovered retrospectively, once the epidemiological investigation was underway.

From WHO/WPRO

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- Authorities add that based on their investigation so far there is no evidence of human-to-human transmission, and no healthcare workers tending to the patients have been infected.
- The Ministry of Health says further study is still needed, however, to try to determine why this outbreak was so large, including so many fatalities, especially compared to previous outbreaks in recent years.

From WHO/WPRO

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Thank you

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