

Provincial Foodborne Outbreak Investigations

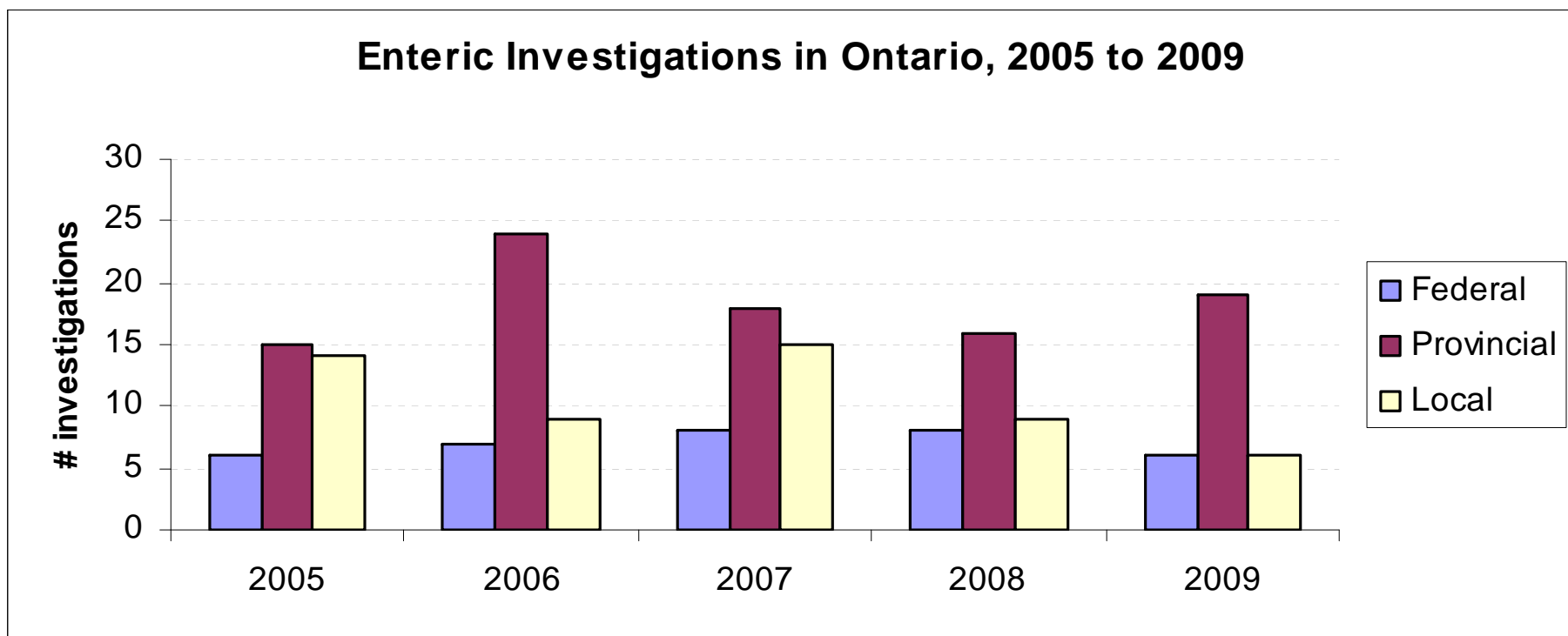
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Overview

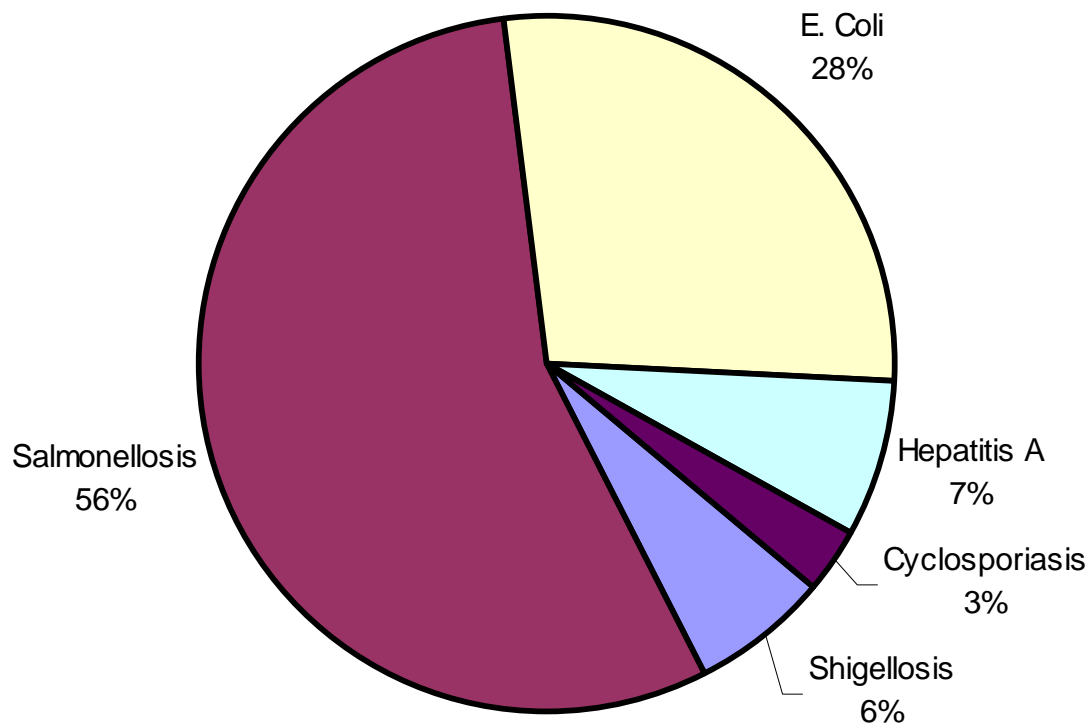
- **Provincial foodborne outbreaks 2005-2009**
- **Identification and investigation of outbreaks**
- **Challenges of outbreak investigations**
- **Recommendations**

Foodborne Outbreaks/Clusters in Ontario



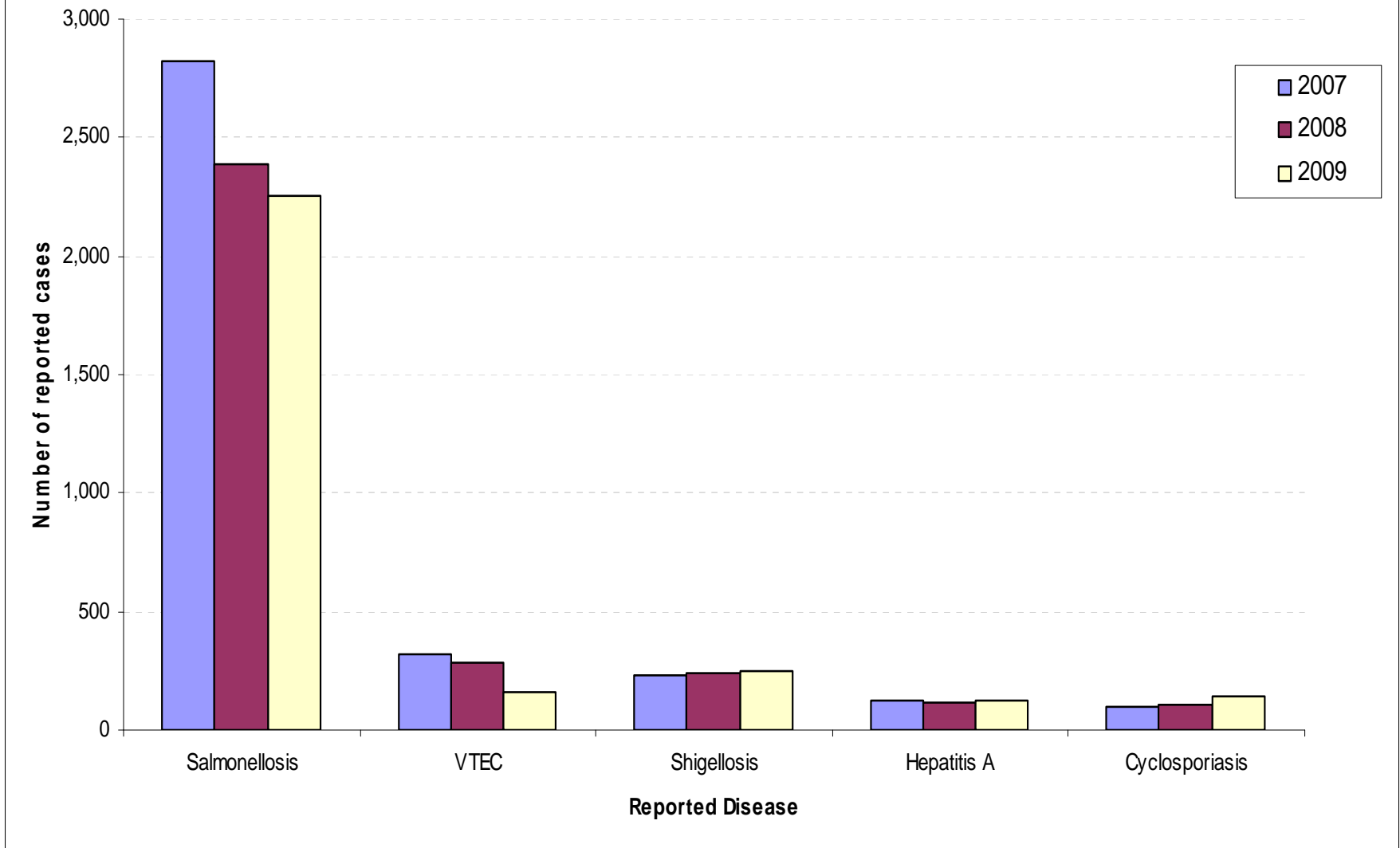
Source: MOHLTC- Enteric Diseases Files

Foodborne Pathogens Most Commonly Associated with Outbreaks in Ontario, 2005-2009



Source: MOHLTC - iPHIS

Reported Cases of Leading Foodborne Pathogens in Ontario, 2007-2009



Source: MOHLTC - iPHIS

Purpose of the Investigation

- **Guide immediate public health prevention and control measures:**
 - **Identify source or vehicle of infection**
 - **Characterize outbreak (person, place and time)**
 - **Identify unreported or unrecognized cases**
 - **Prevent future outbreaks**

Types of Investigations by Lead Agencies

- **Local**

Provincial

- **Multiple health units affected**
- **Outbreak response coordinated by the Ontario Ministry of Health and Long-Term Care (MOHLTC) in conjunction with Ontario Agency for Health Protection and Promotion (OAHPP)**

- **National**

- **Multiple provinces/territories**
- **Outbreak response coordinated by the Public Health Agency of Canada (PHAC)**
- **Involves multiple agencies (i.e. CFIA, PHAC, provincial ministries of health and/or local health units, ministry of agriculture, Ministry of Natural Resources)**

Notification of Foodborne Outbreaks

- **Notification to MOHLTC by health units**
- **Notification by Federal/Provincial Partners to MOHLTC**
 - **National Enteric Surveillance Program**
 - **Canadian Integrated Outbreak Surveillance Program**
 - **Verbal notification**
- **MOHLTC and OAHPP surveillance**
 - **iPHIS - routine surveillance initiatives using the Early Aberration Reporting System (EARS) to identify statistically significant increases in reportable diseases**
 - **Monitoring of data provided by Ontario Public Health Laboratory**
- **Other sources**
 - **Recall notifications/health hazard alerts**
 - **Other ministries**
 - **Acute care settings**

Role of the MOHLTC in Outbreak Investigations

- **Coordinate outbreak investigation at a provincial level in conjunction with OAHPP**
 - **Create an outbreak response team**
 - **Conduct surveillance and monitoring**
 - **Data gathering tools**
 - **Data collection tools**
 - **Outbreak Case Definition**
 - **Investigate to determine source and cause**
- **Provide guidance, direction and consultation to health units**
 - **Make recommendations about preventing and/or controlling the spread of disease**
 - **Assist with the assessment of the outbreak**
- **Communication and notification**
 - **Stakeholders, provincial and federal partners and media**

MOHLTC Surveillance

- **Evaluate and analyze iPHIS information**
- **Assess information provided by health units and outbreak partners**
- **Determine if other tools are required to gather additional information**

Data Collection Tools

- **Used to collect pertinent information related to cases and exposures**
- **Requires strong alignment with mandatory and required iPHIS data fields**
- **Most health units routinely use case report/management forms**
- **Detailed questionnaires and interviews are used when additional information is required for hypothesis generation**
- **Primary components of a questionnaire are: identifying information, demographic information, clinical information and exposure or risk factor information**

Examples of questionnaires used in foodborne outbreaks

- **Open ended food history**
 - Used for hypothesis generation
 - Requires strong interviewing techniques (probing, asking the right questions).

Open-ended Food History. Please try to remember what you may have eaten in the 5-day period before you started feeling sick. We'll start with the day (or day before) you got sick and work backwards. (If a meal was eaten out, specify where.)

Day 1 _____ / /			
Breakfast home or out _____	Lunch home or out _____	Dinner home or out _____	Other/snacks
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Day 2 _____ / /			
Breakfast home or out _____	Lunch home or out _____	Dinner home or out _____	Other/snacks
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Day 3 _____ / /			
Breakfast home or out _____	Lunch home or out _____	Dinner home or out _____	Other/snacks
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Examples of questionnaires used in foodborne outbreaks (cont.)

- **Shotgun**
 - **Used for hypothesis generation and usually contains many possible food exposure**
 - **Questionnaire can be long, does not allow for additional probing, or frequency or time of food consumption**
 - **Usually compared to food consumption atlas values**

VEGETABLES (5)	Y	N	?
celery A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
carrots B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cucumbers C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
broccoli D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cauliflower E	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
green bell peppers F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
red bell peppers G	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other fresh peppers H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
asparagus I	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fresh corn J	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
radishes K	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fresh peas L	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fresh beans M	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
eggplant N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
zucchini/"soft" squash O	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
"hard" squash/pumpkin P	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
white or yellow onions Q	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
green onions (scallions) R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
leeks S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
avocado (or guacamole) T	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
uncooked tomatoes U	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cabbage V	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Examples of questionnaires used in foodborne outbreaks (cont.)

- **Focused**

- **Focused on food exposures of interest**
- **May not be representative of all exposures**

CS. Did you eat at the lunch buffet on Wednesday, July 16, 2008? Y N U R

What time did you eat (approximately): _____ PM

Did you eat or taste any of the following (PLS. READ EACH FOOD ITEM AND CIRCLE 1 FOR "YES, 2 FOR "NO", 7 FOR "UNKNOWN OR NOT SURE", AND 9 FOR "REFUSE TO ANSWER")

Food item	Yes	No	Don't know	Refuse	Comment
Caesar salad (IF YES, ASK IF THEY ATE THE FOLLOWING):	1	2	7	9	
Romaine lettuce _____	1	2	7	9	
Salad dressing _____	1	2	7	9	
Croutons _____	1	2	7	9	
Cheese _____	1	2	7	9	
Gorgonzola and sundried tomato tortellini (IF YES, ASK IF THEY ATE ANY OF THE FOLLOWING):	1	2	7	9	
Heirloom tomatoes _____	1	2	7	9	
Spinach _____	1	2	7	9	
Toasted pinenuts _____	1	2	7	9	
Grilled chicken breast with wild mushroom and tomato (IF YES, ASK IF THEY ATE ANY OF THE FOLLOWING):	1	2	7	9	
Mushroom _____	1	2	7	9	
Oven dried tomato _____	1	2	7	9	
Seasonal fresh vegetables (IF YES, ASK IF THEY ATE ANY OF THE FOLLOWING)	1	2	7	9	
Baby carrots _____	1	2	7	9	

Methods of Foodborne Outbreak Investigations

- **Multiple interviewers**
- **Single interviewer**

Methods of Foodborne Outbreak Investigations

- **Face-to-face**
 - **Gold standard**
 - **Not often feasible, time/ resource restrictions**
- **Mail out**
 - **Used for diseases not generally associated with foodborne outbreaks (e.g. amoebiasis, giardiasis)**
 - **Low response rate, late response, response misinterpretation**
 - **Literacy level**
 - **Response bias**

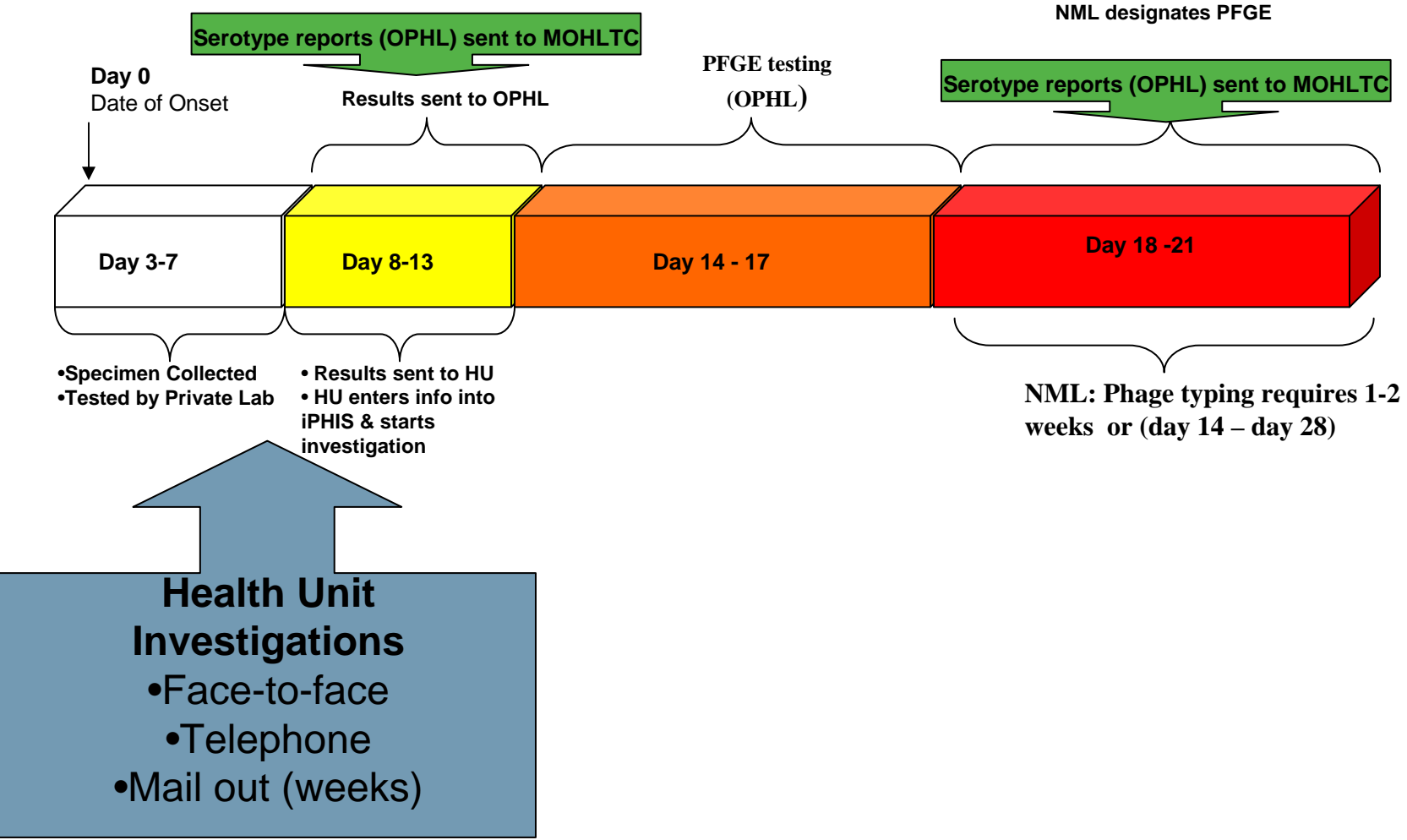
Challenges in Source Identification

- **Challenges of Detection**
- **Timely diagnosis and reporting**
- **Data quality / data gathering methodology**
- **Insufficient/ inconclusive evidence**

Challenges of Detection at the Local Level

- **Probing by healthcare practitioners for food-source and epi-links**
- **Rarity of disease**
- **Clinical specimen submission**
- **Notification to public health**

Time Line Challenges



Questionnaire Challenges

- **Recall bias**
- **Illegible writing**
- **Variation in interviewing skills**
- **Length and depth of questionnaire**
 - **Many food items listed**
 - **Missing information on time and frequency of food consumption**
 - **Does not allow administrator to probe**
 - **May not be representative of all exposures**

iPHIS Challenges

- **Timely entry/identification of case information**
- **Missing or incomplete exposure data**
- **Data entered into incorrect fields**
- **Limitations of iPHIS itself**

Insufficient/ Inconclusive Evidence Challenges

- **Mixed food items (i.e. melons outbreak)**
- **Epidemiological tools limitations (e.g. widely consumed food items, American Food Atlas)**
- **Trace-back/ trace-forward limitations (i.e. mung bean outbreak)**
- **Exposure history**
- **Difficulty isolating the pathogen from food items, (e.g. contaminated food already consumed)**

Gold Standard in Foodborne Outbreak Investigations

- **Collect food samples, specimens and supporting documents promptly**
- **Face-to-face interviews**
- **Enter data into iPHIS data without delay**
- **Capture as much exposure information in iPHIS as possible**
- **Notify MOHLTC immediately if:**
 - **Risk of multi-jurisdictional outbreak**
 - **Cluster or unusual finding**
 - **Serious/critical illness**

Recommendations

- **Share information on foodborne diseases with healthcare practitioners**
- **Encourage more testing of suspect cases**
- **Encourage healthcare practitioners to communicate findings with public health if clusters suspected even in the absence of laboratory diagnosis**

Recommendations

- **Limit mail-out of questionnaires to cases with pathogens not associated with enteric outbreaks:**
 - **Giardiasis**
 - **Ameobiasis**
 - **Campylobacteriosis**

Recommendations (cont.)

- **During an outbreak investigation, especially when collecting samples or lab specimens, conduct an in-person interview at the same time.**
- **Provide thorough and timely details regarding cases.**
- **Designate one or two investigators to review lab reports and completed interview forms.**
- **Share/discuss investigation findings with internal investigation team as much as possible.**

MOHLTC Wish List

- **Development of a Canadian Food Atlas**
- **Increase public health knowledge of cultural foods and food consumption patterns**
- **Ongoing training for frontline investigators**
- **Discussions with partners regarding shotgun questionnaires and other tools (e.g. C-EnterNet in Waterloo)**

Summary

- **Timely identification of foodborne disease outbreaks is important in ensuring that effective control measures are implemented.**
- **Public health investigators play a critical role in ensuring that relevant data is gathered and communicated to all levels of government.**
- **Despite the challenges and limitations encountered in an investigation, opportunities exist where this work can be strengthened.**
- **Continued collaboration with our local, provincial and federal partners will enhance our work in the future.**

Acknowledgements

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