“The true strength of C-EnterNet lies in its ability to compare and integrate the pathogen profiles amongst the surveillance components.”

Editor’s Note

In 2011, C-EnterNet remained true to its core - targeting surveillance where Canadians need it most. Ever responsive and evolving, new components were added including recreational water sampling in Fraser Health Authority (FHA), BC, and sampling new items at retail (chicken nuggets, ground poultry, leafy greens and berries).

The true strength of C-EnterNet lies in its ability to compare and integrate the pathogen profiles amongst the surveillance components, and in 2011 this expanded to include VTEC. With the expertise of Dr. Roger Johnson, from the Laboratory for Foodborne Zoonoses (LFZ), C-EnterNet is now efficiently isolating VTEC from retail meats and water as well as subtyping the isolates. The characterization of these organisms will help to more clearly understand the occurrence of non-O157 VTEC and the resulting human exposure.

C-EnterNet contributed to the groundbreaking work of Dr. Ed Taboada and Dr. Cliff Clark and their teams who developed and validated a subtyping method - Comparative Genomic Fingerprinting (CGF) for Campylobacter.

C-EnterNet will miss one of its founders and a core team member, Dr. André Ravel, who has accepted a position as professor at the Faculty of Veterinary Medicine, Université de Montréal. We wish him success in his new venture and look forward to collaborating in the future.

I hope that you enjoy reading about the activities highlighted in this newsletter. Feel free to contact us for further information.

Dr. Frank Pollari
C-EnterNet Program Lead

Note from C-EnterNet Central

In the spring of 2011, the team initiated a study funded by the Ontario Ministry of Agriculture and Rural Affairs. The project involves field work, sampling and testing for Campylobacter transmission, for which data are scarce in Canada and worldwide. The main objective is to quantify the exposure of Ontarians to Campylobacter through various potential transmission routes and to compare and rank them. The study targets fifteen transmission vehicles: foodborne (beef, pork, chicken, seafood/fish, vegetables, firm and soft fruits), waterborne (drinking water and recreational water), and contact with animals (dog/cat, petting zoos, chicken, pig, beef, and dairy farms). Sampling and testing was conducted in the summer of 2011 and will continue in the summer of 2012, with the current focus on the modelling of chicken and water to develop the templates for each of the sources to be considered. Involving end users at the beginning and throughout the process is integral to the research.

C-EnterNet contributed to the groundbreaking work of Dr. Taboada and Dr. Clark and their teams to develop and validate a new subtyping method - Comparative Genomic Fingerprinting (CGF) - for Campylobacter. This high-throughput and discriminatory method allows for detection of clusters of cases as well as comparison of profiles across sources. It is an important addition to C-EnterNet as it is incorporated into routine surveillance activities.
The C-EnterNet program is benefitting from the expertise of Dr. Johnson. His laboratory is now efficiently isolating VTEC from retail meats and water as well as subtyping the isolates. This allows us to begin looking at the non-O157 issue with Canadian data on the prevalence and serotypes in these sources.

Data from the Healthy Control Survey in Region of Waterloo, with a cumulative of 1,200 respondents over a twelve month period, have been described and the results prepared for publication. The valuable data on healthy people are being used in a case-control analysis of sporadic, domestically acquired campylobacteriosis cases that occurred over the same period of time. There have been limited case-control studies on campylobacteriosis conducted in Canada and we hope this work will provide new insights into the non-food risk factors for this most common bacterial enteric infection in Canada.

Long-time team member, Dr. Ravel is moving on after ten years with PHAC, and C-EnterNet. He begins a new position as professor at the Faculty of Veterinary Medicine, Université de Montréal where he will lecture on veterinary public health and develop graduate courses. About his move, Dr. Ravel remarked, “It has been a wonderful time and I am sad to leave. I have been privileged to contribute to the design, implementation and development of two integrated surveillance systems (CIPARS and C-EnterNet) that are recognized internationally as models. My new research activities will be based on my past interests with the possibility to expand to other public health issues, and I hope to continue collaborating with my PHAC colleagues in the near future.”

C-EnterNet focused on knowledge mobilization presenting at key meetings in 2011 including the CDC FoodNet Vision meeting, Atlanta, USA; Canadian Institute of Public Health Inspectors National Conference, Halifax, NS; 15th International Workshop on Campylobacter, Helicobacter and Related Organisms meeting, Vancouver, BC; PulseNet Foodborne Epidemiology FPT meeting, Toronto, ON; Canadian Meat Council meeting, Toronto, ON and the Canadian Water Network, Ottawa, ON.

Note from C-EnterNet Sentinel Site 1: The Region of Waterloo and Public Health Ontario’s Toronto Public Health Laboratory

Region of Waterloo Public Health (ROWPH) welcomed David Young as the new Director of Health Protection and Investigation (HPI). Dave also chairs the ROWPH and C-EnterNet Steering Committee. Associate Medical Officer of Health, Dr. Hsiu-Li Wang was congratulated for her dedication to overseeing C-EnterNet while the Director’s position was vacant. Nancy Sittler (site coordinator) participated in C-EnterNet’s questionnaire review in January 2011 and completed the final revision of the standardized questionnaire which aligns with Fraser Health, Sentinel Site 2. Public health inspectors began using the revised questionnaire for their investigations in August 2011.

At the HPI divisional meeting in May, Dr. Katarina Pintar presented highlights of her recreational water research. The information will be included in a ROW Community Service Council report highlighting the achievements of the unique partnership between ROWPH and PHAC. The diligent work of the ROW public health inspectors is featured in a new publication, “Informing source attribution of enteric disease: an analysis of public health inspector’s opinions into the ‘Most Likely Source of Infection’”. Open text data from 2006 to 2010 on the most likely source of infection identified by public health inspectors investigating sporadic endemic cases of enteric illness in the Region of Waterloo, Ontario were analyzed. The ‘Most Likely Source of Infection’ data were classified under nine categories and analyzed using 5 disease groups consisting of overall enteric disease,
campylobacteriosis, salmonellosis, verotoxigenic *Escherichia coli* (VTEC) infection and parasitic disease. The paper has been published in the inaugural issue of the Environmental Health Review, January 2012 at [http://pubs.ciphi.ca/journal/ehr](http://pubs.ciphi.ca/journal/ehr). Anne Maki, of the Public Health Ontario (PHO) Toronto Public Health Laboratory, and Nancy Sittler established a bi-monthly teleconference to review the process of data exchange between PHO and ROWPH in efforts to continue to improve data quality for C-EnterNet.

**Note from C-EnterNet Sentinel Site 2: Fraser Health Authority and BC Public Health Microbiology Research Laboratory**

Glen Embree and Jason Stone participated in C-EnterNet’s questionnaire review in Guelph in January 2011 and launched the revised standardized questionnaire in FHA in May. FHA was pleased to have Dr. Pintar present her research on recreational water at the annual Environmental Health Officers’ in-service session in March, while Barb Marshall presented at the *Promoting a Culture of Food Safety in BC 2011 Symposium* in November. Prior to the symposium reception, Barb presented twenty-six certificates of appreciation to those who have helped with C-EnterNet’s success in BC.

BCCDC epidemiologists, C-EnterNet and FHA are planning to analyze C-EnterNet case data to assess potential risk factors and exposures for campylobacteriosis in BC. FHA Site Coordinator, Rod Asplin continues to work with Dr. Natalie Prystajecky at BC Public Health Microbiology Research Laboratory (BCPHMRL) to integrate epidemiological and laboratory information. This linked human case data is one of the powerful and unique contributions of C-EnterNet. Dr. Prystajecky manages the data extractions, in coordination with laboratory staff, interacts with C-EnterNet and oversees and performs research activities. At BCRPHL, Dr. Prystajecky and team have been busy overseeing the extraction of PFGE and serotyping data from BCCDC PHMRL databases, validation and implementation of *Campylobacter* subtyping method, preliminary analysis of C-EnterNet *Campylobacter* isolates, planning for non-O157 STEC study in the spring, and collection of parasites isolates for future typing.
Note from C-EnterNet’s Retail Food and Agriculture Component

The retail component was fully implemented in both sentinel sites in 2011. Alyssia Sunnucks who works on the retail program is very enthusiastic about C-EnterNet’s retail sampling, “C-EnterNet is going beyond core raw meat sampling and looking at frozen chicken nuggets and ground poultry - targeting new items and producing interesting data.” In January, 2012 the produce monitoring program will begin a year long study on fresh cut herbs which follows the completion of a leafy green study (2010) and soft berries (2011).

C-EnterNet’s non-O157 E. coli testing on ground beef (piloted in FHA in 2011) will provide valuable policy information, as world-wide this is an area of great interest.

The C-EnterNet farm component, which began in 2005, has sampled swine, beef, dairy and poultry operations. Manure samples are tested to identify the abundance and types of enteric pathogens that have potential to affect humans. The majority of these pathogens are considered to be normal inhabitants of food animals and their environment. Mollie Campbell, the primary field sampler works through the University of Guelph to ensure producer anonymity. C-EnterNet is not only interested in the number of positive farms but also the type of bacteria and their link to human cases reported in Canada. This information is designed to help policy makers understand what risks exist at the source of food and with potential water contamination. The producers and their supporting industries have been very accommodating to the project. Farmers recognise that they are part of a complex system and are motivated to be a part of a voluntary project that not only gives them a sense of security in the farm to fork system but a sense that they are doing all they can to make sure what they are producing is safe. In 2012, the dairy and beef operations will be also be tested for non-O157 E. coli providing valuable baseline data to support Canadian policy development.
Note from C-EnterNet’s Water Component

Based on surveillance data on risk factors from the C-EnterNet program and published literature reports, in 2011 the C-EnterNet water component made an effort to focus their sampling in the summer months at recreational beach sites to better understand the occurrence of enteric pathogens that have been associated with swimming. Collaboration with Dr. Janis Thomas at the Ontario Ministry of the Environment and Dr. Martin Lanthier at Agriculture and Agri-Food Canada made this a great success in Ontario. In British Columbia, collaboration with Dr. Prystajecky at BCCDC and Marc Zubel from the Fraser Health Authority were integral to the implementation of the water component in Sentinel Site 2.

In both sites, from June to September, a new Campylobacter MPN method was validated and implemented for beach water testing, in addition to traditional Cryptosporidium and Giardia testing. Four beaches were sampled in both Sentinel Sites on a weekly or biweekly basis. This sampling of common swimming areas supplements the on-going monitoring of untreated surface water in Sentinel Site 1 in the Grand River Watershed.

Continued collaborations with colleagues in Agriculture and Agri-Food Canada and the SAGES program have resulted in enhanced analyses of both environmental Campylobacter and Cryptosporidium data within a QMRA framework. Dr. Philip Schmidt continues to work on this program as an NSERC Postdoctoral fellow and will stay with us until March of 2012. We hope to publish a number of manuscripts from this work, and further collaborate with these groups in future.

Note from C-EnterNet’s Source Attribution Component

The application of the Danish model for human salmonellosis attribution resumed in 2011. The model, developed in 2003, was the first to quantitatively assess the contribution of food animal reservoirs to human cases based on the subtyping approach (comparing the distribution of type within the human cases to the distribution of the types within each of the relevant reservoirs). It has been used annually in Denmark and several attempts have been made to apply this model in various countries with some adaptations, for example in the US, France (Julie David’s PhD thesis), Sweden, and New Zealand. The goal for this Canadian attempt is to use the existing data on Salmonella serotypes and phagetypes available through the National Microbiology Laboratory for the human side and the LFZ (OIE Reference laboratory for Salmonella) for the non-human side. The quality of this data may not be as ideal as that collected in Denmark through its integrated Salmonella surveillance system, but the exercise will provide a sense of what is possible and what would be possible to achieve for source attribution with some relevant changes in our surveillance systems.

Between surveillance and source attribution, Dr. David is leading the analysis of temporal trends in human campylobacteriosis and in Campylobacter in sources based on C-EnterNet surveillance data. She is using advanced methods for describing these temporal trends, their relation with meteorological data, and, ultimately, to link temporal variations observed in human cases to variations in the contamination of the sources, if such link exists. C-EnterNet will organize the results in two papers; the first one will deal with the description of the temporal cycles and trends in the human cases and source data, and assess the link between the main sources of contamination and the human case dynamics. The second paper attempts to provide insight into the impact of meteorological data on the sources of contamination, the human case dynamics and the source-case relationship.

The integrated analysis of PHAC surveillance data related to Salmonella Enteritidis lead by Andrea Nesbitt and Dr. Ravel has been published. This exemplifies how the analysis of data coming from several programs can shed a greater light on a public health issue compared to the separate analyses of the data.
Knowledge Translation
Publications and Reports (authored or co-authored by C-EnterNet)


Looking Ahead:
2010 Short and Long Report
2011 Short Report
*Look for these on our website, newly formatted for easier access to reports.

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