

HUMAN CASE SURVEILLANCE

Introduction

The purpose of human case surveillance is to quickly detect human illness due to the West Nile Virus. Human illness due to WNV acquired in Peel occurred for the first time in 2002, when there were 112 residents with laboratory evidence of WNV (55 suspect cases, 20 probable cases and 37 confirmed cases, including two deaths). Most of these cases occurred in August and September. Many cases required hospitalization and intensive care.

While most human WNV infections are without symptoms, about one in five people (20%) develop a less severe illness (West Nile fever).³⁰ The incubation period is estimated to be three to 14 days, with symptoms lasting approximately three to six days. This form of WNV infection is described as a sudden onset of fever that is often accompanied by malaise, headache, nausea, vomiting, anorexia, eye pain, myalgia, and less commonly, rash and/or swollen lymph nodes.³⁰

Approximately one case in 150 will develop severe neurological disease, with encephalitis being reported more often than meningitis. Additional symptoms among those with severe disease include muscle weakness and a change in mental status. Other symptoms include seizures, optic nerve involvement, cranial nerve abnormalities, paralysis and ataxia (difficulty coordinating movement or body functions).³⁰

As there is no cure for WNV, treatment is supportive in nature, and involves hospitalization, administering intravenous fluids, providing respiratory support and preventing secondary infections for patients with severe disease.³⁰

The 2002 WNV epidemic in North America included the first documented cases of person-to-person WNV transmission through organ transplantation,³¹ blood and blood product transfusion³¹ and breastfeeding,³² as well as a case of intrauterine infection (the mother passing the infection to her unborn child).³³ A poliomyelitis-like syndrome was first recognized among some West Nile patients with onset of acute flaccid paralysis (AFP) during the early stages of infection in the United States.³⁴ Parkinsonism and Rhabdomyolysis³⁵ were also occasionally seen.

Modifiable risk factors for WNV include known travel in an area previously identified as having WNV activity, acquiring the infection through occupational exposure,¹ or having received blood, blood products or organ transplants from an infected donor. Since July 1, 2003, Canadian Blood Services have screened all donations of blood for WNV.³⁶



Methods

In 2003, human case definitions in Canada became more complex than in 2002, classifying human WNV illness according to the severity of symptoms and the level of clinical and laboratory evidence.³⁵ The three main categories of infection from lowest to highest severity were: WNV Asymptomatic Infection, WNV Fever and WNV Neurological Manifestations. The first category was sub-classified into “probable” or “confirmed”. The latter two categories were divided into four levels: “suspect”, “possible”, “probable” or “confirmed”.

Any individuals with symptoms suspected of being related to WNV infection were to be investigated and reported to the Ontario Ministry of Health and Long-Term Care (MOHLTC). This differed from 2002, when only those cases with encephalitis or laboratory confirmation were to be reported.

Peel Health updated local physicians about the importance of immediately reporting all suspected cases of viral encephalitis and viral meningitis, and submitting appropriate laboratory samples to determine if the cause was a mosquito-borne virus. Public Health Inspectors and the Communicable Disease Infection Control Specialist collaborated with Infection Control Practitioners from the three area hospitals regarding case definitions as defined by the MOHLTC and the process of reporting suspect, probable and confirmed cases.

Physicians and Infection Control Practitioners identified patients with suspected WNV infection causing viral encephalitis, viral meningitis or other illnesses consistent with WNV infection based on their clinical symptoms and patient histories. Preliminary blood tests were ordered which tested for antibodies to WNV, but may also detect other flaviviruses.

The main test used for front-line testing was the ELISA test (Enzyme-Linked Immunosorbent Assay). The HI test (Haemagglutination Inhibition) was also used in some cases. Confirmatory testing to ensure the virus was in fact WNV was done using the PRNT test (Plaque-Reduction Neutralization Test).

After the first five cases within a given Health Unit were confirmed by PRNT, all cases for that health unit that met the “probable” laboratory criteria were classified as “confirmed” cases. In 2003, all testing was conducted at the Ontario Central Public Health Laboratory in Toronto, rather than at Health Canada’s National Microbiology Laboratory in Winnipeg as in the previous year. This allowed for a very fast turn-around time for test results, often within 48 hours.

Once suspected cases were identified, they were immediately reported to public health officials for notification and follow-up. Peel Health staff investigated all possible,



probable and confirmed cases among residents in Peel. Standardized medical information including demographics, symptoms, risk factors (such as travel history or having received blood products), and test results were entered into an Access database. This was later linked to the person's address information in a geographic information system so that the incidence of the disease could be mapped by postal code area.

Results

As of December 2, 2003, there were 10 residents of Peel who had laboratory evidence of WNV infection stemming from the 2003 season, nine of whom were confirmed as having West Nile Fever (WNF) and one having a diagnosis of West Nile Neurological Manifestations (WNNM). There were no deaths due to WNV in 2003. Each of the 10 cases reported onset of symptoms having occurred in August or September. An additional 56 residents were assessed but either they had had a previous infection (49) or it was determined that they did not meet the case definition (7).

With the caveat that case definitions and laboratory testing methods differed between 2002 and 2003, these results are still much lower than the 112 residents with laboratory evidence of WNV identified in 2002, 37 of whom were "confirmed" and 20 were classified as "probable" cases. Onset of symptoms for the cases in 2002 also occurred predominantly in August or September of that year.

In 2003, all of the confirmed human cases of WNV disease in Peel were residents of Mississauga. There were no confirmed or probable cases among residents of Brampton or Caledon.

Numbers of WNV-confirmed and probable cases were mapped by Forward Sortation Area (FSA – the first three-digits of the postal code) and are depicted in Figure 16. As in 2002, more cases occurred in the southern parts of Mississauga. Postal code area L5G had two cases in 2003, and also posted the highest rate of WNV infection in humans in 2002 (35.1 cases per 100,000 population). The only other area with more than one human case was postal code area L5N in north-west Mississauga, with two cases.

The median age of confirmed human cases was 51.2 years (range 25 to 82 years), compared to 60.3 years (range: seven to 82 years) in 2002. As in 2002, there were slightly more females (6) than males (4) among the confirmed cases in Peel. Half of these cases (50%) were aged 40 to 59 years. In 2002, contrary to initial expectations, about half of the confirmed and probable cases of WNV occurred among the 50 to 69 year age groups as opposed to being limited to older adults or the infirmed.

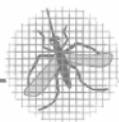
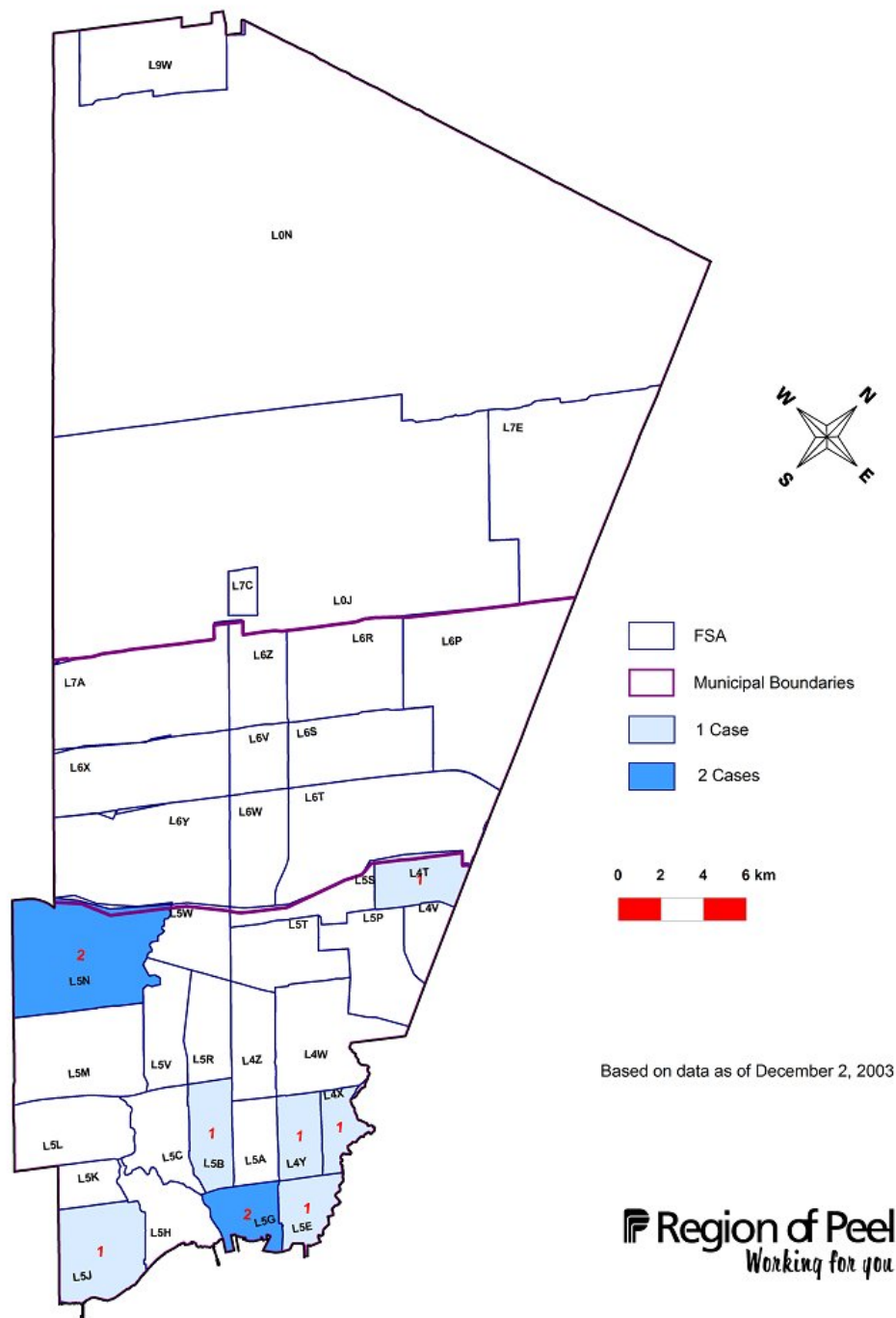
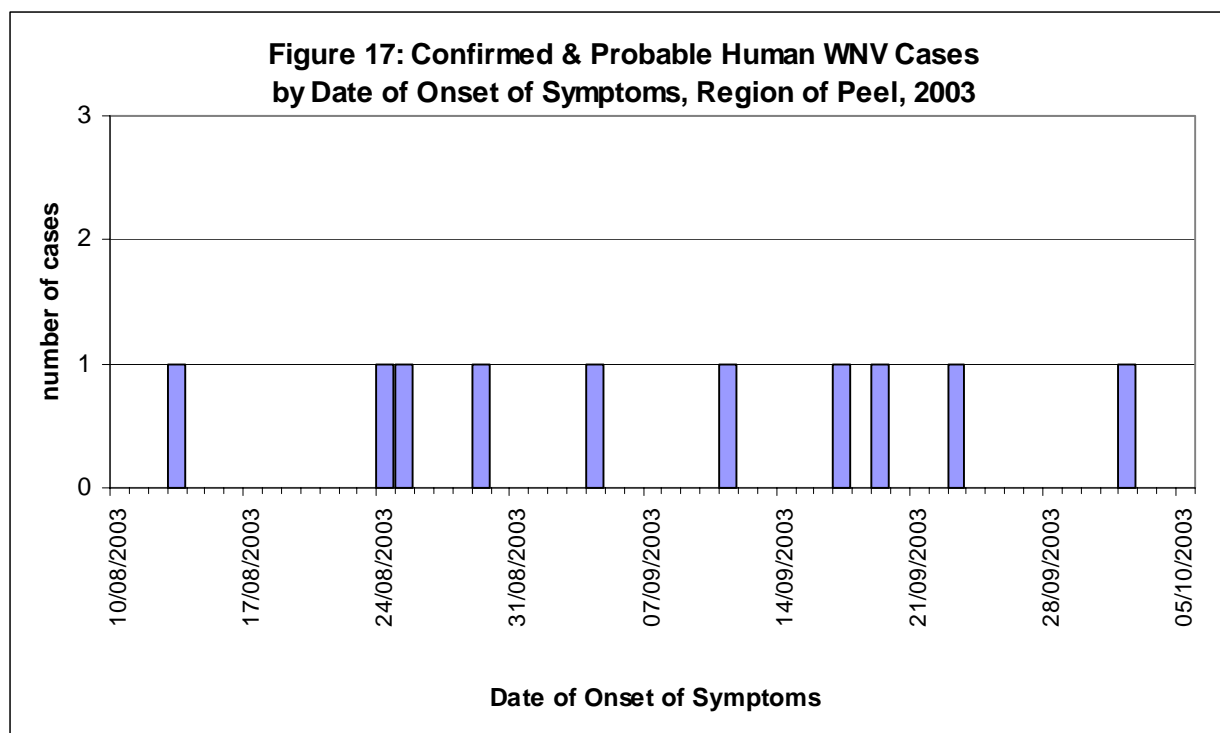


Figure 16: Number of Confirmed and Probable Human WNV Infections by Forward Sortation Area, Region of Peel, 2003





The first confirmed human case reported to Peel Health, a 51 year-old female from north Mississauga, had onset of symptoms on August 24, 2003; however, a later case had even earlier onset of symptoms, reported to have started on August 13. The latest date of onset of symptoms in a Peel human case was on October 2, 2003 (Figure 17).



Confirmed or probable WNV cases were asked if they had traveled or spent time outdoors in the three weeks prior to the onset of their symptoms. Only one person stated that they had traveled (to a cottage within Ontario); this individual was the only case to recall being bitten by a mosquito in the three weeks prior to the onset of symptoms. Two cases reported having spent time outdoors during the day, and one reported walking outdoors at dusk. No WNV cases in Peel had been recipients of blood products.

Symptoms of those with confirmed WNV infection are listed in Table 8. As in 2002, the most frequently reported symptoms were fever, headaches and fatigue. Other common symptoms included muscle pain, confusion or forgetfulness and sensitivity to light.

Four (40%) of the WNV human cases required hospitalization for their symptoms; all recovered and were released. Two stayed in hospital for 9 days, another for 16 days and the fourth for a total of 39 days, giving an average length of stay of 18.3 days.



Table 8: Confirmed and Probable Human WNV Cases by Reported Symptoms*, Region of Peel, 2003

| Symptom | Confirmed & Probable | |
|----------------------------|----------------------|---------|
| | number | percent |
| Fever | 8 | 80.0 |
| Headache | 8 | 80.0 |
| Fatigue | 8 | 80.0 |
| Muscle pain | 5 | 50.0 |
| Confusion or forgetfulness | 5 | 50.0 |
| Eyes sensitive to light | 5 | 50.0 |
| Visual distortion | 4 | 40.0 |
| Muscle weakness | 2 | 20.0 |
| Rash | 3 | 30.0 |
| Enlarged glands | 3 | 30.0 |
| Stiff neck | 3 | 30.0 |
| Parkinsonism | 2 | 20.0 |
| Change in mental status | 2 | 20.0 |
| Vomiting | 2 | 20.0 |
| Nausea | 2 | 20.0 |
| Encephalitis | 1 | 10.0 |
| Chills | 1 | 10.0 |
| Joint Pain | 1 | 10.0 |
| Total | 10 | 100.0 |

* More than one symptom is possible. Numbers do not sum to total.

In 2002, Halton Region to the west of Peel had 56 confirmed and three probable WNV cases for a total of 59, most of which occurred in the southern municipalities of Oakville and Burlington.³⁸ In 2003, Halton had no WNV cases reported in any of their area municipalities.³⁹

Meanwhile in Toronto to the east, there were 127 confirmed and 41 probable cases of WNV among their residents in 2002, but only 44 cases in 2003.³⁹ In all of Ontario in 2002, there were 307 confirmed cases of WNV, with an additional 83 probable cases; this number dropped to 89 confirmed cases in 2003 (Appendix F).

In 2003, the disease spread westward across Canada, causing a total of 1,220 confirmed and 115 probable human cases of WNV in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia and the Yukon Territory; however, cases reported in Nova Scotia, New Brunswick, British Columbia and the Yukon were likely related to travel outside of that province or territory.⁵ The vast majority of these cases occurred in Manitoba (141), Saskatchewan (792) and Alberta (272).⁵ Ontario had 89 confirmed cases of WNV in 2003, British Columbia and the Yukon Territory combined for 21 human cases and only 20 cases occurred in all of



Quebec and the eastern provinces.⁵ This is similar to the western predominance of WNV in the United States in 2003.¹⁷

Summary

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In 2003, half of the WNV confirmed cases in Peel were aged 40 to 59 years. This was similar to findings in 2002, where contrary to initial expectations, approximately half of the confirmed and probable cases of WNV occurred among the 50 to 69 year age groups as opposed to being limited to older adults or the infirmed.

As in 2002, the most frequently reported symptoms among the confirmed cases in 2003 were fever, headaches and fatigue. Other common symptoms included muscle pain, confusion or forgetfulness and sensitivity to light.

Identification of WNV in humans underscores the importance of active, hospital-based human surveillance programs starting in July through to September, as well as the need to consider WNV as a possible diagnosis when clinicians encounter patients with encephalitis, meningitis, AFP or non-specific fevers occurring throughout this time period.^{6,22}

Presently, there is no vaccine available for use in humans.¹⁰ A human vaccine against WNV is under development, with commercial availability some years away.