A Five Year Synopsis of Norovirus and Other Gastrointestinal Disease Outbreaks in British Columbia

J. K. Wong*[1], J. Fung[1], J. Isaac-Renton[1,2]

1. B.C. Centre for Disease Control, Vancouver, BC, Canada; 2. University of British Columbia, Vancouver, BC, Canada

Background

Norovirus is the major causative agent of gastrointestinal disease in British Columbia (B.C.) and is on the rise. Other bacterial, viral and parasitic agents have also been documented to cause gastrointestinal outbreaks over the last five years, but the frequency of these outbreaks has been much lower. Norovirus is very highly infectious and causes symptoms of vomiting and diarrhea. It is easily transmitted person-to-person and can quickly spread by aerosols, causing large outbreaks in community settings. Occurrences of outbreaks are no longer restricted to winter months and are seen throughout the year and in many different types of facilities and institutions, impacting especially the acute care sector of the B.C. health care system.

Methods

Collection and submission of outbreak samples is coordinated through the B.C. Centre for Disease Control (BCCDC) Laboratory Services. Information is gathered from environmental health officers and infection control practitioners regarding the patient symptoms, number of persons ill, incubation period, duration of illness and attack rate and is applied to an algorithm which directs the testing to be performed. A Reverse Transcription PCR (RT-PCR) method has been in use since 2001. If clinical specimens test negative for Norovirus by RT-PCR, they are examined by routine culture methods for enteric pathogens, for other viruses by an enzyme immunosorbant assay and for parasites by concentration and microscopy.

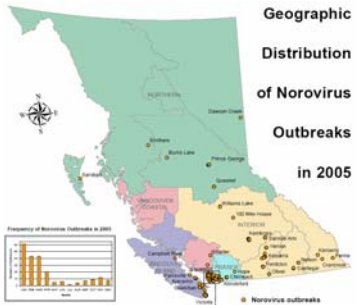

Figure 1A. Seasonal distribution of Norovirus

Figure 1. Geographic distribution of Norovirus around BC in 2005.

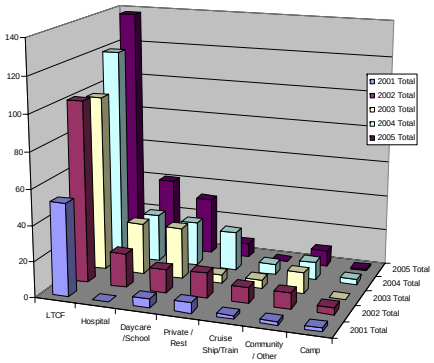

Figure 2. Facility types affected by outbreaks in BC.

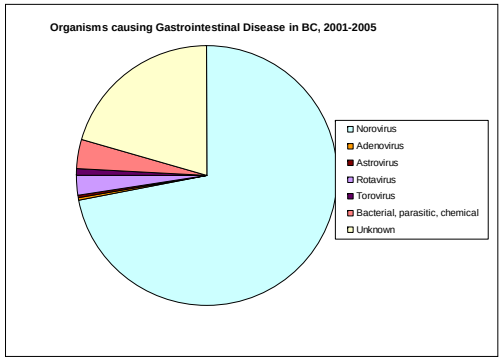

Figure 3. Norovirus was responsible for 95% of the viral outbreaks investigated in BC.

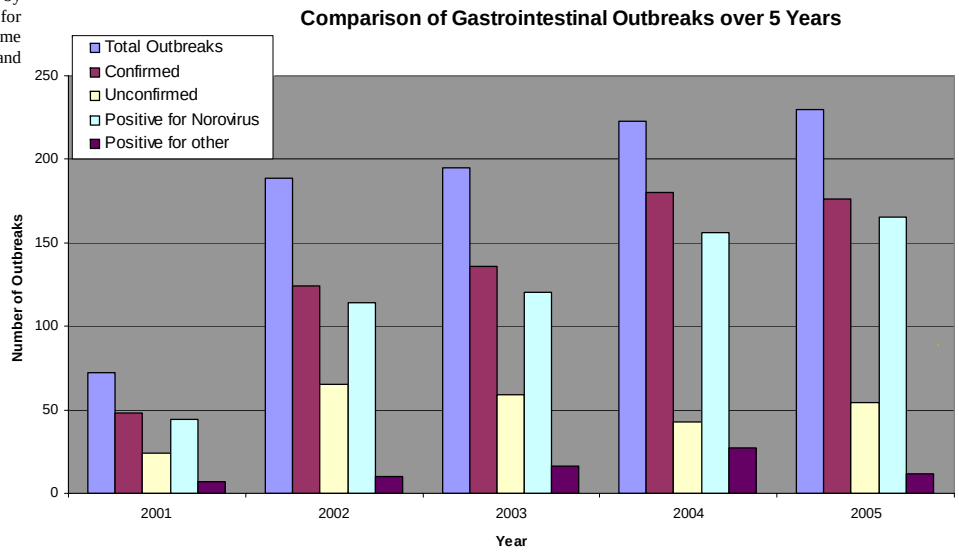

Figure 2. Gastrointestinal illness, separated by year, shows an upward trend of total outbreaks of those that have been confirmed as Norovirus.

Results

Between 2001 and 2005, the BCCDC Environmental Microbiology Laboratory investigated a total of 910 outbreaks causing gastrointestinal illness in BC. Illnesses were widespread around the province (Figure 1) and prevalence was not restricted to the winter months as shown in Figure 1A. The majority of these outbreaks have largely been affecting long term care facilities and acute care settings (Figure 2). Daycares and schools have also been significantly impacted by gastrointestinal outbreaks. In total, 27 different strains were responsible for the outbreaks (Table 1) and the etiology of 73% of these outbreaks was confirmed (Figure 4). Only 5.0% of the outbreaks were caused by bacterial agents, chemical contamination or parasites. 70% were caused by viruses and Norovirus accounted for 95% of all the viral outbreaks (Figure 3). Other viruses also causing outbreaks were Rotavirus (3%), Torovirus (1%), and both Astrovirus and Adenovirus accounted for less than one percent of outbreaks.

Adenovirus	Norovirus
Astrovirus	Rotavirus
Bacillus cereus	*Salmonella Brandenburg*
Clostridium difficle	*Salmonella Enteriditis*
Campylobacter	*Salmonella Heidelberg*
Clostridium botulinum	*Salmonella Newport*
Clostridium perfringens	*Salmonella Stanley*
Copper poisoning	*Salmonella Typhimurium*
Cryptosporidium	Torovirus
Cyclospora	*Trichinella*
E. coli 0157:H7	*Yersinia enterocolitica*
Giardia lamblia	*Yersinia frederiksenii*
Listeria monocytogenes	

Table 1. Summary of all bacterial, parasitic, viral organisms and chemical agents responsible for gastrointestinal outbreaks.

Conclusions

This synopsis of gastrointestinal outbreaks from 2001-2005 clearly shows that Norovirus is the major causative agent of outbreaks in British Columbia. The impact of viral gastroenteritis has been substantial in facilities such as long term and acute care settings ensuing in an enormous economic burden on the B.C. health care system. These facilities continue to have the highest frequency of gastrointestinal outbreaks. Outbreaks have not been limited to large, populated, metropolitan areas and have affected even small communities in B.C. such as in camps and schools. Outbreaks have also been occurring more frequently during the warmer months and Norovirus can be seen now all year round. This has been happening at an increasing rate (data not shown) since 2001.

The occurrence of gastrointestinal disease has been severely impacting all communities in B.C and will continue to have a significant impact on the B.C. health care sector if rates of infection continue to rise as shown over these last five years.

References

British Columbia Centre for Disease Control. (2007). *Manual of Services*. Vancouver, BC: BC Centre for Disease Control.

*Contact Author: Phone – (604) 660-6079 ; Email – julie.wong@bccdc.ca