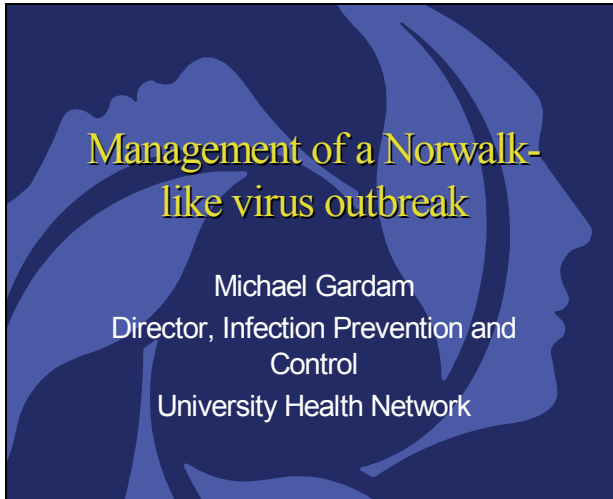


# Management of Norwalk-Like Virus Outbreak

**Management of a Norwalk-like virus outbreak**


Michael Gardam  
Director, Infection Prevention and Control  
University Health Network



Slide 1

**Outline**

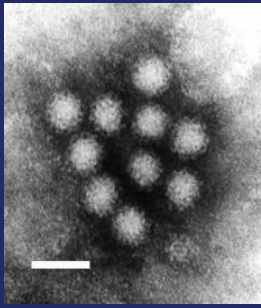
- Norwalk basics
  - The virus
  - Illness
  - Transmission
- Review of epidemiology
- Norwalk outbreak case studies
- General recommendations for Norwalk-like outbreaks




University Health Network

Slide 2

**The Norwalk-like viruses (Noroviridae)**



- Members of the Caliciviridae ("cup-like")
- Norwalk first characterized in 1972
- Many other Noroviruses have been described since




University Health Network

Slide 3

**Human Caliciviridae**

- Non-enveloped viruses
- 3 large groups based on genetic sequencing
  - 90-95% genetic homology within groups,
  - 60-65% homology between groups
- Groups 1, 2 infect humans
- Group 3 infect pigs and cows
- Difficult to propagate *in vitro*




University Health Network

Slide 4

**Clinical features**

- Symptoms 12-48 hours prior to illness
- Illness lasts 12 to 60 hours
- Viral shedding begins prior to onset of illness and can last for <14 days after the end of symptoms
- Viral shedding can occur without symptoms




University Health Network

Slide 5

**Diagnosis**

- Abrupt onset of compatible clinical symptoms
  - Nausea/vomiting (more common in children)
  - Watery diarrhea
  - Abdominal cramps
- Detection based on:
  - Electron microscopy
  - PCR
  - EIA, ELISA



University Health Network

Slide 6

# Management of Norwalk-Like Virus Outbreak

## Pathogenesis

- Reversible damage to the jejunum
  - Blunting of the villi, widened intracellular spaces.
- No enterotoxin production
- Xylose and fat malabsorption
- Jejunal damage usually resolves within 2 weeks but can last longer.



University Health Network

Slide 7

## Immunity

- Infection results in protective immunity to the same strain for 4-6 months
  - Protection essentially gone within 2 years
  - Protection correlates poorly with antibody titres
- Infection with calciviruses from another genogroup possible even if recently infected
- Multiple exposures tend to increase resistance to reinfection



University Health Network

Slide 8

## Relative resistance to disinfection

- Chlorine sensitive (5000 to 10000ppm)
- 2% glutaraldehyde sensitive
- Accelerated hydrogen peroxide (Virox)
  - Cidal for vaccine strain of polio 1
  - 4 log reduction in feline calicivirus at 0.5% for 5 minutes
- Heat resistant (60°C for 30 min)
- Sensitive to boiling
- Phenols, Quaternary ammoniums not reliable



University Health Network

Slide 9

## Relative resistance to antiseptics

- As non-enveloped viruses, Norwalk-like agents are more resistant to antiseptics
- 60% ethanol agents not always effective against non-enveloped viruses, may require more prolonged contact times.
- Chlorhexidine ineffective



University Health Network

Slide 10

## Hand washing

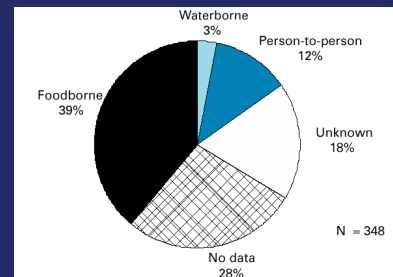
- Hand washing with soap and water may be more effective than alcohol-based hand rinses
  - Physical removal of viral particles
- Hand rinses remain widely used and likely to increase compliance



University Health Network

Slide 11

## Mode of transmission in 348 outbreaks



University Health Network

MMWR 2001, vol 50

Slide 12

# Management of Norwalk-Like Virus Outbreak

## Infectious Dose

- <100 viral particles required



Steamed clams a la "Norwalk"



Slide 13

## Foodborne transmission

- Oysters and clams (Norwalk virus not killed by steaming)
- Contamination by food handlers
- Uncooked, ready to eat foods pose the greatest risk



Slide 14

## Waterborne transmission

- Municipal drinking water
- Well water
- Lakes and streams
- Commercial ice
- Swimming pools
- Water testing assesses coliform count, there is no assay for Norwalk



Slide 15

## Person to person transmission

- Fecal-oral through direct contact with stool and vomitus
- Indirect contact via fomites, environmental contamination
- Projectile vomiting and explosive diarrhea mean that transmission can occur over longer distances (? > 1 metre)



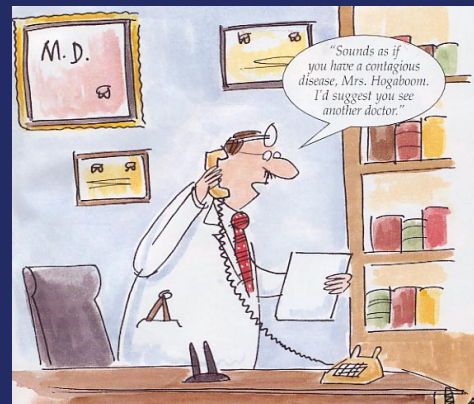
Slide 16

## Summary

- Low infectious dose
- Infectious before, during, and after symptoms
- Multiple modes of transmission
- Stable, resistant to disinfection
- Multiple antigenic types, poor immunity



Slide 17



Slide 18

# Management of Norwalk-Like Virus Outbreak

## Case study 1

- December 2000, 2 Medical units
- Patient presented with symptoms December 5th
- >70 patients and staff developed infection within a 3 week period
- Infection in staff >> patients
  - Nurses, physicians, house staff, consultants, housekeeping, radiology, support staff



University Health Network

Slide 19

## Continued

- Transmission facilitated by:
  - Food sharing at the nursing station
  - Most ill staff used 1 washroom
  - Staff cross-covering wards
  - Non-medical staff socializing with patients



University Health Network

Slide 20

## Control measures

- One medical unit closed to new admissions for 2 weeks
  - No admissions
  - Discharge only to home
  - No transfers in or off the ward
- No food at the nursing station, common areas
- Potluck lunch cancelled



University Health Network

Slide 21

## Control measures

- All patients and staff presumed infectious
- Gowns and gloves for any patient contact
- Enhanced use of alcohol-based hand rinses
- Education:
  - Inservices
  - pamphlets



University Health Network

Slide 22

## Control measures

- Ill staff allowed to return to work 48 hours after end of symptoms
- Aggressive environmental cleaning:
  - Housekeeping team cleaned nursing unit and staff washroom multiple times per day
  - Patient rooms repeatedly cleaned
  - Use of accelerated hydrogen peroxide cleaner/disinfectant (Virox: 1:16 dilution of 5% hydrogen peroxide)



University Health Network

Slide 23

## Outcome

- No appreciable spread to patients off the outbreak unit
- No further cases in staff or patients after two weeks



University Health Network

Slide 24

# Management of Norwalk-Like Virus Outbreak

## Lessons learned

- Get hospital administration, public relations involved early
- Environmental cleaning played an important role
- Using the same precautions for symptomatic and asymptomatic also likely important



Slide 25

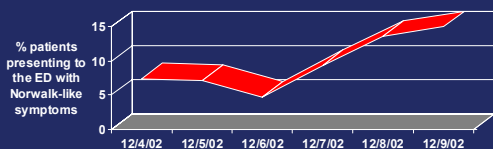
## Case study 2

- December, 2002 involving two Emergency Departments
- Dramatic increase in the number of patients with Norwalk-like symptoms began visiting the ED in early December
  - Vomiting in the waiting room, triage, patient care areas, nursing station



Slide 26

## TGH exposure to Norwalk



Slide 27

## Staff illness

- TWH: 1-2 ED staff ill with Norwalk-like symptoms each day for >1 week in early December
- TGH: ED staff not ill until December 4<sup>th</sup>-9<sup>th</sup> when 18 staff became ill.
- The TGH ED was closed December 9<sup>th</sup> due to a lack of staff



Slide 28

## Patient illness

- Between December 5<sup>th</sup> and 9<sup>th</sup>, 22 patients with Norwalk-like symptoms were admitted to the TGH ED.
  - All believed to be community acquired
- 2 patients who were seen during that time for other illnesses, returned with Norwalk-like symptoms



Slide 29

## Outbreak team

- Twice daily meetings
- Chaired by Operations
  - Infection Control
  - Infectious Disease
  - Housekeeping
  - Public Relations
  - ED staff
  - Mount Sinai and Toronto Western ED staff
  - Public Health



Slide 30

# Management of Norwalk-Like Virus Outbreak

## Control measures: TGH

- With ED closure, no patient admissions from the ED
  - 2 were admitted after closure without isolation.
  - 2 patients and their contacts were subsequently isolated after admission for 48 hours
- Staff greeted by security, required to wash hands on entry and exit



Slide 31

## Control measures: TGH

- Access to ED restricted
  - Only one consultant from each team
- All areas of the ED considered contaminated
- All patients and staff considered infectious
- Gowns and gloves for all patient contact
- Food prohibited in the ED except for patients



Slide 32

## Control measures: TGH

- Aggressive housekeeping
  - Cleaning and re-cleaning of all ED areas.
  - Use of accelerated hydrogen peroxide
  - Once patients discharged home, disposable items discarded and rooms cleaned and closed.
- Hand washing with soap and water or alcohol based hand rinse used
- Limited visitors



Slide 33

## Norwalk activity elsewhere in the hospital

- 44 patients admitted from the ED between December 5<sup>th</sup> and 8<sup>th</sup> were monitored for Norwalk symptoms
- Many sporadic cases in staff, little evidence of clustering except:
  - Medicine residents
  - CCU staff
  - Dialysis staff and patients



Slide 34

## Impact on the TWH ED

- With the TGH closure, the TWH received even more patients with viral gastroenteritis
- Concern that increased pressure may force the TWH ED to close as well



Slide 35

## Control measures: TWH

- Division of the waiting room into gastroenteritis and non-gastroenteritis areas
  - Dedicated washroom
- Restricted admittance to ED
- Security at the entrance enforced hand washing
- Cohorting of gastroenteritis patients in one area



Slide 36

# Management of Norwalk-Like Virus Outbreak

## Control measures: TWH

- Limited visitors
- Volunteer “runner” to update visitors about patient status
- No food allowed except for patients
- Overstaffing to ensure staff have the time to follow precautions
- Education:
  - Inservices, flyers, signage
  - Daily updates



Slide 37

## Outcome

- TGH ED reopened after 5 days when staff were able to return to work and ED completely cleaned
- Outbreaks in other areas of the hospital never materialized
- TWH ED managed to avoid closure



Slide 38

## Outcome

- TGH adopted similar containment measures as those at TWH
- Over the following two weeks, the burden of disease in the community seemed to decrease
- Addition ED precautions discontinued in the following weeks
- The outbreak had minimal negative impact on patient care



Slide 39

## Lessons learned

- Having administration run outbreak meetings helps get the job done.
- We need a Norwalk plan for hospital for next year
- Close communication with other hospitals helped keep them open



Slide 40

## Summary

- Norwalk outbreaks occur suddenly and can spread quickly
- Aggressive measures can prevent outbreaks from spreading to other areas however, it is difficult to prevent transmission within the outbreak area



Slide 41

## Questions?

- Thanks to:
  - IPAC staff
  - TGH and TWH ED staff
  - Housekeeping
  - The UHN administration



Slide 42