



FOOD HANDLERS AS SOURCE OF NOROVIRUS INFECTION

No. 5, 2006

Norovirus (formerly known as Norwalk-like virus) is a frequent cause of acute gastroenteritis. Denmark, where this infection is known as "Roskilde disease", like a number of other countries, has seen an increase in the number of registered cases, owing partly to an improvement in diagnostic methods, EPI-NEWS 15/03.

Norovirus, which is highly contagious, is transmitted via contact with fomites or hands contaminated with virus from vomitus or faeces, or via contaminated food. Airborne transmission by aerosolised vomitus and transmission of contaminated drinking and bathing water have also been reported. A considerable part of recorded outbreaks occur in hospitals, nursing homes, institutions and other closed environments such as barracks and cruise ships. Outbreaks are also common where shared meals are consumed, e.g. in canteens and restaurants.

Foodborne outbreaks

Foodborne norovirus outbreaks are in some cases caused by food made from virus-contaminated produce, e.g. oysters, EPI-NEWS 4/02 or raspberries, EPI-NEWS 35/05 and 38/05. More frequently, though, food are contaminated when handled in kitchens. In the period 2003-2005, the North-East Zealand Regional

Food Inspectorate, which covers the Danish counties of Frederiksborg, Copenhagen and Roskilde (1.2 million inhabitants) received reports of 12 outbreaks in canteens, etc.; probably all caused by food contaminated by food handlers, [table 1](#). The number of cases in these outbreaks were 74 (2003), 95 (2004) and 357 (2005). Furthermore, an unknown number of persons fell ill due to secondary person-to-person transmission to relatives, colleagues, etc.

Results

Stool samples were tested for norovirus in six of the 12 outbreaks. In the remaining outbreaks, diagnosis was based on the so-called Kaplan criteria: Mean incubation period of 24-48 hours (range 15-77 hours), mean duration of illness 12-60 hours, vomiting in >50% of patients, and negative stool tests for pathogenic intestinal bacteria.

A high rate of secondary cases following person-to-person transmission is also characteristic. In three outbreaks (D, F and I), identical norovirus types were found in dining guests, food handlers and/or their children. In five outbreaks (D, F, I, K and L), the food handlers' children were the suspected primary cases. In three of these outbreaks, the food handler had not experienced any symptoms, when the food was

handled. In other outbreaks (B, C, G, I and J), food handlers had returned to work less than 48 hours after their symptoms had ceased.

Recommendations

Food handlers:

- Should be excluded from working when experiencing gastrointestinal symptoms.
- Should be kept on sick leave for 48 hours following disease cessation, EPI-NEWS 50/03.
- Should wash their hands thoroughly with soap and water following contact with persons suffering from acute gastroenteritis. Particular attention is required when changing sick infants' diapers.

Physicians:

- Should consider norovirus infection when assessing patients With gastrointestinal symptoms.
- Should have stool samples checked for norovirus on suspicion of a viral gastroenteritis outbreak.
- Should advise personnel in food-stuffs companies to abide by the guidelines stated above.
- Must notify the Medical Office of Health in case of a suspected food-borne infection.
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1 February 2006

Table 1. Food handlers as source of infection for norovirus outbreaks, North-East Zealand, 2003-2005

Out-break	Date (mth/yr)	Place	Attack rate *) (sick/exposed)	Norovirus positive **)	Comment ***)
A	02/03	Restaurant	63% (22/35)	-	Cook returned to work less than 2 days after D/V.
B	03/03	Company canteen	37% (11/30)	-	Cook returned to work despite diarrhoea the previous night.
C	05/03	Restaurant	71% (25/35)	-	Cook returned to work 1 day after D/V.
D	06/03	Company canteen	76% (16/21)	F+P+child	Food handler contaminated sandwich after contact with sick child before experiencing D/V personally.
E	04/04	Bakery	71% (10/14)	-	Shop assistant vomited shortly after handling bread which was sold to 14 persons. Then went home.
F	10/04	Restaurant	42% (19/45)	P+child	Cook started working while nauseous and experiencing abdominal cramps. Had child with D/V at home.
G	12/04	Restaurant	35% (66/188)	P	Cook went to work despite D/V.
H	09/05	Restaurant	82% (27/33)	P	No food handlers reported D/V or similar symptoms.
I	10/05	Conference centre	48% (141/294)	F+P+child	Cook, whose child had been vomiting, was nauseous and experienced abdominal cramps (no D/V).
J	10/05	Civil service canteen	28% (84/300)	F	Food handler with abdominal cramps (no D/V) was suspected source of infection.
K	11/05	Company canteen	20% (80/400)	-	Two food handlers had sick children at home, one of whom vomited shortly after cooking.
L	12/05	Company canteen	8% (25/300)	-	Food handler contaminated buffet after contact with sick child, before contracting D/V.

*) Based on cases occurring within 12-48 hours after exposure. The number of exposed persons is partly estimated.

**) - = No norovirus stool samples available. F= Positive sample from food handler, P= Positive sample from patron.

***) D/V = Diarrhoea and vomiting.

Individually notifiable diseases

Number of notifications received in the Department of Epidemiology, SSI (2006 figures are preliminary)

Table 1	Week 5 2006	Cum. 2006 ¹⁾	Cum. 2005 ¹⁾
AIDS	0	6	7
Anthrax	0	0	0
Botulism	0	0	0
Cholera	0	0	0
Creutzfeldt-Jakob	0	3	0
Diphtheria	0	0	0
Foodborne diseases	6	38	27
of these, infected abroad	2	7	7
Gonorrhoea	12	39	90
Haemorrhagic fever	0	0	0
Hepatitis A	0	1	11
of these, infected abroad	0	0	2
Hepatitis B (acute)	1	2	5
Hepatitis B (chronic)	3	12	9
Hepatitis C (acute)	0	0	1
Hepatitis C (chronic)	4	18	17
HIV	7	14	26
Legionella pneumonia	3	10	10
of these, infected abroad	0	1	2
Leprosy	0	0	0
Leptospirosis	1	3	1
Measles	0	0	0
Meningococcal disease	0	2	12
of these, group B	0	1	10
of these, group C	0	0	1
of these, unspec. + other	0	1	1
Mumps	0	4	0
Neuroborreliosis	2	7	10
Ornithosis	1	4	2
Pertussis (children < 2 years)	3	9	29
Plague	0	0	0
Polio	0	0	0
Purulent meningitis			
Haemophilus influenzae	0	0	0
Listeria monocytogenes	0	0	0
Streptococcus pneumoniae	0	1	18
Other aethiology	0	0	0
Unknown aethiology	0	0	1
Under registration	5	18	-
Rabies	0	0	0
Rubella (congenital)	0	0	0
Rubella (during pregnancy)	0	0	0
Shigellosis	1	10	6
of these, infected abroad	1	8	5
Syphilis	2	8	6
Tetanus	0	0	2
Tuberculosis	3	28	23
Typhoid/paratyphoid fever	0	3	3
of these, infected abroad	0	3	3
Typhus exanthematicus	0	0	0
VTEC/HUS	1	9	14
of these, infected abroad	0	2	7

¹⁾ Cumulative number 2006 and in corresponding period 2005

Selected laboratory diagnosed infections

Number of specimens, isolates, and/or notifications received in SSI laboratories

Table 2	Week 4 2006	Cum. 2006 ²⁾	Cum. 2005 ²⁾
Bordetella pertussis (all ages)	6	26	83
Gonococci	8	30	35
of these, females	2	6	4
of these, males	6	24	31
Listeria monocytogenes	0	4	3
Mycoplasma pneumoniae			
Resp. specimens ³⁾	15	85	307
Serum specimens ⁴⁾	11	55	161
Streptococci ⁵⁾			
Group A streptococci	0	10	10
Group B streptococci	0	8	2
Group C streptococci	0	4	1
Group G streptococci	0	14	13
S. pneumoniae	26	153	124

Table 3	Week 2 2006	Cum. 2006 ²⁾	Cum. 2005 ²⁾
Pathogenic int. bacteria ⁶⁾			
Campylobacter	30	58	128
S. Enteritidis	0	4	9
S. Typhimurium	10	20	15
Other zoon. salmonella	10	24	19
Yersinia enterocolitica	3	7	13
Verocytotoxin-producing E. coli	2	5	5
Enteropathogenic E. coli	6	11	8
Enterotoxigenic E. coli	4	8	7

²⁾ Cumulative number 2006 and in corresponding period 2005

³⁾ Resp. specimens with positive PCR

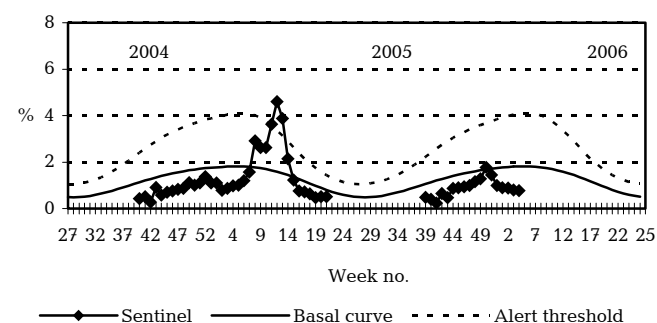
⁴⁾ Serum specimens with pos. complement fixation test

⁵⁾ Isolated in blood or spinal fluid

⁶⁾ See also www.germ.dk

Sentinel surveillance of the influenza activity

Weekly percentage of consultations, 2004/2005/2006



Sentinel: Influenza consultations (as percentage of total consultations)

Basal curve: Expected frequency of consultations under non-epidemic conditions

Alert threshold: Possible incipient epidemic