“Outbreaks of norovirus gastroenteritis:

An emergent health issue”

Shedding of norovirus in patients and in persons with asymptomatic infection

Dra. Rosa Bartolomé.

Laboratory of Microbiology.

University Hospital Vall d’Hebron.

INTRODUCTION

Norovirus (NoV) is transmitted when virions are excreted in stool or vomit.

More than 10^9 virions per gram of stool can be shed during an acute infection (1-2).

Transmission takes place from direct person-to-person contact or indirectly through aerosols, food, water or environmental contamination (3-6).

NoV particles in the environment can be infectious for several weeks, possibly months (7-8).

In water NoV remained infectious for at least 61 days and detectable for more than 3 years (7).

INTRODUCTION

The infectious dose is 200 NoV particles (9).

Shedding for up to 29 days after clearance of symptoms has been described (10).

Asymptomatic infections have been described.
In England, >5% of asymptomatic adults were infected with Norovirus (11).

Healthy adults usually excrete NoV for about 10 days (12).

Case reports have shown that asymptomatic and post-symptomatic food handlers can cause foodborne norovirus outbreaks (1, 13-15).

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MAJOR ARTICLE

Sources of Calicivirus Contamination in Foodborne Outbreaks in Denmark, 2005–2011—The Role of the Asymptomatic Food Handler

Kristina T. Franck,[1,2] Morten Lisby,[3] Jannik Fonager,[1] Anna C. Schultz,[4] Blenda Böttiger,[1,5] Annette Villif,[3] Helle Absalonsen,[3] and Steen Ethelberg[6]

[1]Microbiological Diagnostics and Virology, Statens Serum Institut, Copenhagen, [2]Research Unit for Clinical Microbiology, University of Southern Denmark, Odense, [3]Danish Veterinary and Food Administration, Glostrup, and [4]National Food Institute, Technical University of Denmark, Søborg, Denmark; [5]Medical Microbiology, Lund University, Malmö, Sweden; and [6]Infectious Diseases Epidemiology, Statens Serum Institut, Copenhagen, Denmark

The purpose of this study is to estimate the proportions of outbreaks caused by asymptomatic and symptomatic food handlers.

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RESULTS

64 (34%) of the 191 outbreaks, contamination from food handlers took place during preparation or serving of food.

Most of these outbreaks (n=41; 64%), the food handlers were asymptomatic during food handling.

-22 food handlers had been in contact with ill household members before handling the food and remained asymptomatic.

-11 food handlers developed symptoms shortly after handling the food and remained asymptomatic (Post-symptomatic food handlers).

-9 food handlers developed symptoms shortly before handling the food and remained asymptomatic (Pre-symptomatic food handlers).

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CONCLUSIONS

Transmission by food handlers who are asymptomatic while processing the food causes a substantial number of outbreaks.

Virus contamination may occur during all steps of food processing, from production to preparation and serving.

This has important implications for advice on public health and regulation of food handling advice.

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JUSTIFICATION

Besides transmission from patient to patient, transmission from a food handler to an uninfected person has been documented

95 outbreaks (40%) norovirus positive

Major public health problem.

Recommendations to avoid transmission:

When the direct involvement of the food handler is discovered in the course of a food poisoning outbreak, and the said person is suffering from a determined sickness though not directly related to an outbreak, the person may be asked to take a leave of absence from work.

If the infected person must suspend his/her regular work, he/she will have to take a leave of absence from work while having the symptoms for at least a period between 2 and 7 days after the symptoms disappear.

Guia per a la prevenció i el control de les toxiinfeccions alimentaries.
Quadern de Salut Publica.
Generalitat de Catalunya. Departament de Salut

OBJETIVES

Knowing the duration of excretion of noroviruses in stool samples of handlers and/or caregivers of institutionalised people in which the stool sample, obtained in the context of the research on a gastroenteritis outbreak, is tested positive for the virus.

To improve prevention recommendations if it is adequate.

MATERIAL AND METHODS

Years
2010/2011
Cataluña

→

30 outbreaks positive for norovirus.

→

109 handlers/caregivers positive for norovirus.

Handlers	**37**	**Waiter/waitrees**	**4**
Cook	**21**	**Caregiver**	**16**
Kitchen assistant	**13**	**Not to know**	**18**

↓

Serial samples in five time periods

1-10d 11-22d 21-30d 31-40d >40d

MATERIAL AND METHODS

Norovirus research by Real Time PCR:
- Genogrupo I (Primers: COG1F y COG1R y sonda: RING1(a)-TP).
- Genogrupo II (Primers: COG2F y COG2R y sonda: RING2-TP) .

Demonstration of the similarity between the strains of handlers and caregivers and of those patients was conducted by studying the sequence of genotype.

Quantification of viral load by real-time quantitative PCR.

Statistical analysis of the results.

RESULTS

109 handlers/caregivers of institutionalised people with first sample positive for norovirus

27 (25%) with symptoms of acute gastroenteritis

82 (75%) were asymptomatic

RESULTS

Norovirus research conducted in five different time periods on handlers and caregivers with or without the symptoms after the first positive sample.

Norovirus research	>1-10 days	11-22 days	21-30 days	31-40 days	>40 days
Positive	46 (42%)	35 (32%)	17 (16%)	9 (8%)	5 (5%)
Negative	25 (23%)	61 (56%)	72 (66%)	80 (73%)	85 (80%)
Unfinished	38	13	20	20	19

Throughout the period of the study, it is observed that the percentage of handlers and/or caregivers with positive controls and with or without symptoms ranges from 42% in the first monitoring (>1-10 days) to 5% accomplished to > 40 days after the first positive result.

Fecal shedding of norovirus and therefore its transmission can extend from 11 to 22 days in 32% of cases and a month in 16% of cases after the onset of the infection.

RESULTS

Norovirus research conducted in five different time periods on handlers and/or caregivers with symptoms after the first positive stool sample in the context of an gastroenteritis outbreak.

Norovirus research	>1-10 days	11-22 days	21-30 days	31-40 days	> 40 days
Positive	**11 (41%)**	**7 (26%)**	**2 (7%)**	**0**	**0**
Negative	**4 (15%)**	**15 (55%)**	**21 (78%)**	**22 (81%)**	**23 (85%)**
Unfinished	**12**	**5**	**4**	**5**	**4**

Throughout the period of the study, it is observed that the percentage of handlers and/or caregivers with positive controls is 41% in the first monitoring (> 1-10 days) to 0% accomplished to> 40 days after the first positive result.

Fecal shedding of norovirus transmission and therefore can extend between 11 and 22 days in 26% of cases and until a month at 7%.

RESULTS

Norovirus research conducted in five different time periods on handlers and/or caregivers without symptoms after the first positive stool sample in the context of a gastroenteritis outbreak.

Norovirus research	>1-10 days	11-22 days	21-30 days	31-40 days	> 40 days
Positive	35 (43%)	28 (34%)	15 (18%)	9 (11%)	5 (6%)
Negative	21 (26%)	46 (56%)	51 (62%)	58 (71%)	61 (74%)
Unfinished	26	8	16	15	16

Throughout the period of the study, it is observed that the percentage of handlers and/or caregivers with positive controls ranges from 43% in the first monitoring (> 1-10 days) 6% accomplished to > 40 days after the first positive result

Fecal shedding of norovirus transmission and therefore can extend between 11 and 22 days in 56% of cases and until a month at 18%.

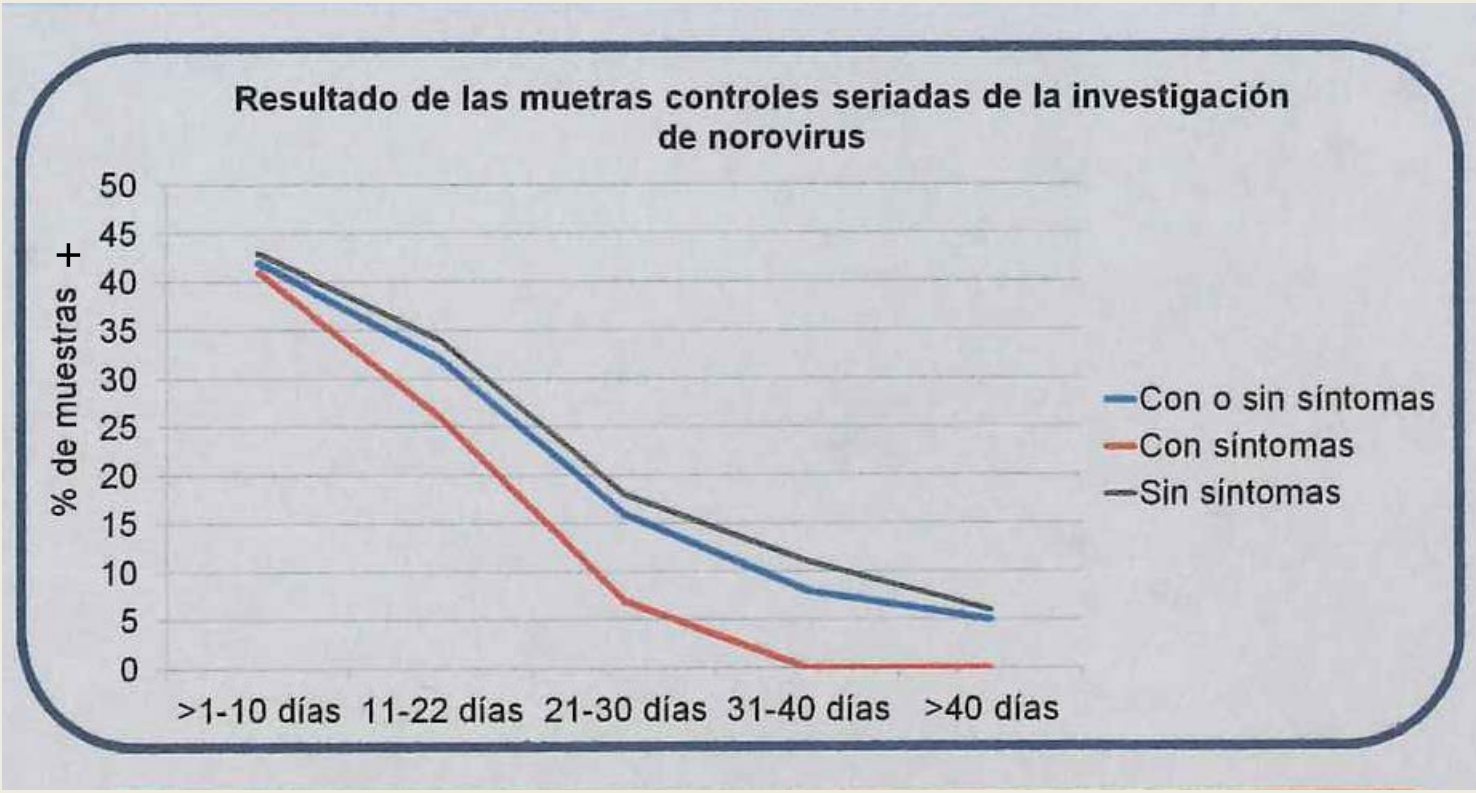
RESULTS

Comparison of the norovirus research conducted in five different time periods on handlers and/or caregivers with and without symptoms after the first positive stool sample in the context of a gastroenteritis outbreak

Handlers and or caregivers	With and without symptoms N=109	With symptoms N=27	Without symptoms N=82
>1-10 días	46 (42%)	11 (41%)	35 (43%)
11-22 días	35 (32%)	7 (26%)	28 (34%)
21-30 días	17 (16%)	2 (7%)	15 (18%)
31-40 días	9 (8%)	0	9 (11%)
> 40 días	5 (5%)	0	5 (6%)

No significant differences at the time of viral shedding among staff with symptoms and asymptomatic.

RESULTS

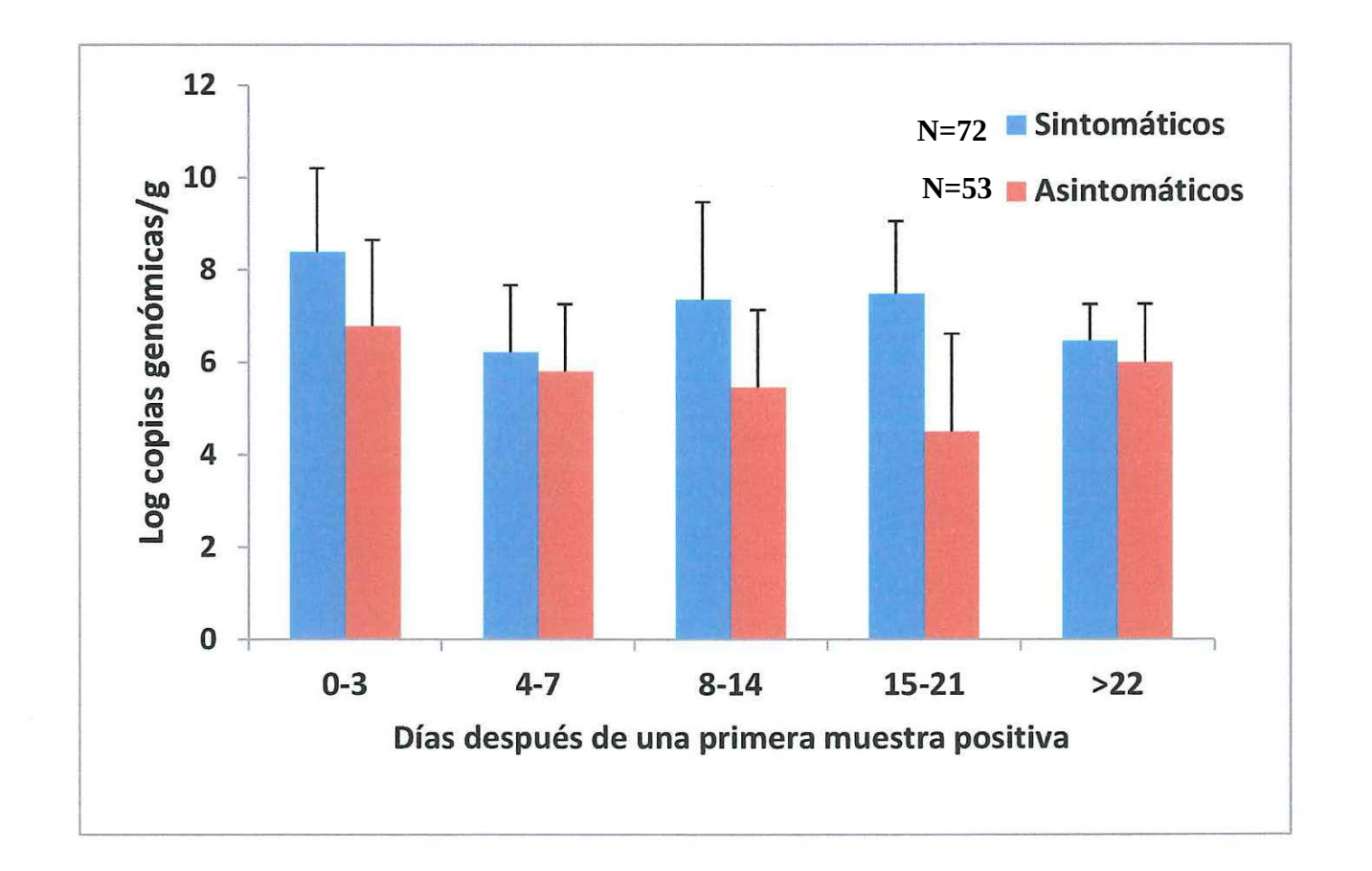


As the days go by a statistically significant trend (p = <0.001) a negative result for the presence of the virus in feces.

RESULTS

Quantification of viral load

Load Range: $7x10^2$ y $7x10^{11}$



Detection limit of the method: $5x10^2$ genomic copies per gram of fecal material

RESULTS

Of the total 30 outbreaks norovirus genogroup II was detected and in only one of them had both genogroup I and II. It was an outbreak in which nine handlers/caregivers were monitored and 7 of them showed norovirus genogroup I and the other 2 had norovirus genogroup II.

Lorsdale (GGII.4)	**16**	**Norwalk (GGI.1)**	**1**
GGIIb	**2**	**ND**	**6**

Total: 25

In 10 outbreaks, out of 30 positive for norovirus, the identity between strains of handlers and caregivers and patients has been detected.

CONCLUSIONS

Taken as a whole, fecal elimination of norovirus can extend to a relatively high percentage of cases (16%) to the month after the onset of the infection.

The clearance time is not related to the presence or absence of symptoms.

The duration of preventive measures applied on handlers and caregivers should exceed 48 hours as stipulated.

¡Moltes gracies!