The impact of viral gastroenteritis on public health in Greece

Infectious diarrhea is a major public health issue not only in the developing world, where it causes high mortality especially among children, but also in the developed world. Moreover, and in contrast to the developing world where bacterial infections (salmonellosis, shigellosis, cholera, etc.) are the main target of preventive efforts, in the western world viruses, and especially rota-, noro-, entero- and astroviruses, are responsible for up to 70% of all diarrhea cases, particularly among children.

More specifically, rotavirus is the main cause of gastroenteritis in children in both the developing and western worlds. The main cause of gastroenteritis in the USA is norovirus, which usually causes outbreaks in social gatherings such as occur on cruise ships and in hospitals and restaurants, being responsible for up to 90% of the cases.

In Greece not many epidemiological studies have tackled the issue of identifying the cause of non-bacterial gastroenteritis, a fact possibly arising from the difficulty of routine laboratory diagnosis. However, it seems that norovirus is the main cause of community-acquired diarrhea in children in both sporadic cases as well as in outbreaks.

In contrast, the incidence of rotavirus infection, although also a significant cause of disease in Greece, seems to be declining (at least among children that seek hospital treatment), possibly as a result of increased vaccination rates.

Water and food are the most common vehicles for outbreaks in this country, making the study of non-bacterial infectious diarrhea an important public health priority.

This issue of the monthly Hellenic Center for Disease Control and Prevention (HCDCP)’s e-bulletin is dedicated to the analysis of various aspects of infectious non-bacterial diarrhea.

Professor Alikiviadis Vatopoulos

Highlights

Viral gastroenteritis is not just the main theme of the current e-bulletin, but it is an issue that is currently high on the agenda for public health, given its rising frequency. Read about this issue and about the preventive measures that can be taken against these viral infections.

More on page 2

Dr Athanasios Tsakris, Professor of Microbiology at the University of Athens, is this month’s interviewee. He provides in-depth answers regarding concerns about the viral gastroenteritis outbreaks, and the challenges regarding their handling and prevention, and provides essential comments on the role of the public health services during the current economic crisis.

More on page 34
Investigation of viral gastroenteritis outbreaks, Greece, 2004-2012

Introduction

Viral gastroenteritis is an intestinal infection characterized by watery diarrhea, abdominal cramps, nausea, vomiting and sometimes fever [1]. Except for infants, elderly people and immunocompromised individuals that may experience severe illness, patients usually recover without complications. The disease is usually transmitted through the consumption of contaminated food or water and by person to person. Viral gastroenteritis is generally more common during winter, while bacterial gastroenteritis has a higher incidence during summer [1]. As the majority of countries only include outbreaks of viral gastroenteritis in their surveillance systems, and not sporadic cases, the exact incidence of viral gastroenteritis is unknown.

Norovirus, rotavirus, adenovirus and sapovirus are the most common etiological agents of viral gastroenteritis. Mainly norovirus and secondarily rotavirus and adenovirus cause gastroenteritis outbreaks [2-4]. Norovirus causes approximately 90% of non-bacterial outbreaks of gastroenteritis around the world and is responsible for many foodborne and waterborne outbreaks recorded in developed countries [3].

Viral gastroenteritis outbreaks: recent epidemiological data

In recent years, the reported incidence of viral gastroenteritis outbreaks has increased. This increase reflects, to some extent, the improvement of laboratory techniques in detecting viruses in clinical and environmental samples. At the same time, the importance of investigating (by epidemiological, laboratory and environmental means) these outbreaks, which would lead to the implementation of appropriate control measures, has been recognized [3,5,6]. Nowadays, the results of the investigation of such outbreaks are frequently presented in the literature [7-9].

According to the latest reported data of the European Food Safety Authority (EFSA), 697 foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3]. In the USA, almost half of the foodborne outbreaks that occurred between 2006 and 2010 were attributed to norovirus [10], and in 2009 and 2010 a total of 2,259 outbreaks as a result of foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3]. In the USA, almost half of the foodborne outbreaks that occurred between 2006 and 2010 were attributed to norovirus [10], and in 2009 and 2010 a total of 2,259 outbreaks as a result of foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3]. In the USA, almost half of the foodborne outbreaks that occurred between 2006 and 2010 were attributed to norovirus [10], and in 2009 and 2010 a total of 2,259 outbreaks as a result of foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3]. In the USA, almost half of the foodborne outbreaks that occurred between 2006 and 2010 were attributed to norovirus [10], and in 2009 and 2010 a total of 2,259 outbreaks as a result of foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3]. In the USA, almost half of the foodborne outbreaks that occurred between 2006 and 2010 were attributed to norovirus [10], and in 2009 and 2010 a total of 2,259 outbreaks as a result of foodborne viral outbreaks were reported by 18 European countries in 2008 [3]. The overall notification rate was 0.14 outbreaks per 100,000 population. In 2008, the total number of foodborne outbreaks of viral etiology had increased by 3.3% compared with 2007 [3].

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Viral gastroenteritis outbreaks in Greece

In Greece, foodborne/waterborne gastroenteritis outbreaks are included in the Mandatory Notification System (MNS). In total, 36 viral gastroenteritis outbreaks were reported from 2004 to 2012. Table 1 summarizes the reported outbreaks with at least ten cases.

### Table 1: Reported outbreaks of viral etiology with at least 10 cases, MNS, Greece, 2004-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Region</th>
<th>Number of recorded cases</th>
<th>Number of hospitalized patients</th>
<th>Number of deaths</th>
<th>Cause of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Peloponnese</td>
<td>38</td>
<td>38</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2005</td>
<td>Eastern Macedonia &amp; Thrace</td>
<td>702</td>
<td>0</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2006</td>
<td>Eastern Macedonia &amp; Thrace</td>
<td>721</td>
<td>0</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2007</td>
<td>Thessaly</td>
<td>37</td>
<td>10</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2010</td>
<td>South Aegean</td>
<td>200</td>
<td>0</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2010</td>
<td>Thessaly</td>
<td>124</td>
<td>1</td>
<td>0</td>
<td>Norovirus</td>
</tr>
<tr>
<td>2010</td>
<td>South Aegean</td>
<td>166</td>
<td>37</td>
<td>0</td>
<td>Norovirus</td>
</tr>
</tbody>
</table>

*Most of the above outbreaks were attributed to a specific causative agent after the laboratory testing of clinical samples. In order to confirm that a particular pathogen is the etiological agent of an outbreak, its detection both in clinical and food/water samples is required.

As shown in Table 1, the majority of the outbreaks were attributed to norovirus. Some of the viral gastroenteritis outbreaks that have been investigated by the foodborne and waterborne diseases unit of HCDCP in the last few years are presented in detail below.

a) **Elassona, March 2012**. In total 986 gastroenteritis cases were recorded, 552 by the health center of Elassona and 434 by private doctors in Elassona and adjacent areas. It was estimated that in Elassona city alone there were more than 3,600 cases (attack rate >50%). Symptoms were mild and compatible with viral gastroenteritis. Thirty-eight out of 45 clinical samples that were tested were positive for rotavirus, but the virus was not detected in water samples. Based on the results of a case-control study that was conducted, the consumption of tap water was a statistically significant risk factor [odds ratio (OR) 2.18, 95% confidence interval (CI) 1.11-4.28] for developing gastroenteritis symptoms. Evidence such as: a) the occurrence of heavy rainfall the week before the appearance of cases, b) comments by several patients that a few hours/days before they became ill the water of the public supply system was colored, along with c) the results of laboratory testing of the water, supported the hypothesis of a waterborne outbreak.

b) **Kilkis, 2012**. In January 2012, two parallel gastroenteritis outbreaks were investigated in Nea Santa Kilkis: one in a primary school and one in an adjacent kindergarten. Two retrospective cohort studies were conducted, one in each school. Regarding the primary school, the consumption of water from the school taps was a statistically significant risk factor [relative risk (RR) 9.01, 95% CI 3.33-24.41] for developing gastroenteritis symptoms. The hypothesis of a mixed (concerning the pathogens), viral, common point source, waterborne outbreak with secondary cases in the primary school was compatible with: a) the shape of the epidemic curve and other descriptive data, b) the results of the multivariate analysis, and c) the detection of norovirus GI and GII in four clinical samples and adenovirus in four samples from primary school students. Further information about the quality of the tap water was not acquired because its prompt laboratory testing was not possible. Regarding the kindergarten, the shape of the epidemic curve was indicative of person-to-person transmission. Univariate analysis did not reveal any statistically significant risk factor. However, adenovirus was detected in the water samples collected from the kindergarten’s taps. The connection between the two outbreaks could not be confirmed.

c) **Athens, Special Olympics, 2011** [12]. The 2011 Special Olympics World Summer Games were conducted in Greece from 25 June to 4 July. During the Games a gastroenteritis outbreak occurred in members of the Greek team. The case-cohort study that was carried out showed a statistically significant association between prior contact with a symptomatic person and the appearance of gastroenteritis symptoms (OR 14.6, 95% CI 1.81-118.1). Two stool samples were positive for norovirus. Epidemiological and laboratory data were indicative of a common point source norovirus outbreak. The source was probably the first athlete who developed symptoms, exposing the other members to the virus, during a trip from Skiathos to Athens before the Games began.

d) **Agios Efstratios, 2010** [13]. In February 2010, a concurrent increase in gastroenteritis cases was observed in Limnos, Lesvos and Agios Efstratios (islands in the Northern Aegean). The retrospective cohort study held in Agios Efstratios revealed that the consumption of shellfish that had been introduced to the island from Kavala was statistically significantly...
associated with the development of gastroenteritis symptoms (RR 21.5, 95% CI 8.9-51.8). The fact that clinical and environmental samples were not collected meant there was no opportunity to link the Agios Efstratios outbreak with the increased gastroenteritis cases on Lemnos and Lesvos. The causative agent of the outbreak, based on Kaplan criteria, was considered to be norovirus. This investigation highlighted the importance of epidemiological investigation in remote areas of the country and revealed the challenges of laboratory testing.

e) Kalammbaka, 2007. In a gastroenteritis outbreak among high school students during a school excursion to Kalammbaka in 2007, although the retrospective cohort study did not reveal any statistically significant risk factor, descriptive data were suggestive of a common point source outbreak followed by secondary cases. The mild symptoms of patients along with the fact that the stool samples were negative for the common enteropathogens and that one sample was positive for norovirus GI1 were indicative of a viral outbreak.

Challenges of the investigation of viral gastroenteritis outbreaks: conclusions

Viral gastroenteritis is highly contagious and results in large-scale outbreaks, with high direct (doctor consultations, hospitalizations, etc.) and indirect (lost working hours, disruption of social role, etc.) costs. The main objective of the investigation of such outbreaks is the prompt implementation of control measures, as well as assessment of the extent of the outbreak and the identification of the mode and vehicle of transmission and of the possible source of infection.

A common problem for surveillance systems of many countries is that these outbreaks are not notified or are notified with delay, usually after a lot of people have become ill. This happens mainly because the symptoms are mild and self-limited, therefore many patients do not visit the health-care services. Additionally, the general belief that, in the case of viral gastroenteritis, public health measures and further epidemiological investigation are not required, contributes to the problem.

Another limitation of the investigation is the lack of widely available, reliable, specialized diagnostic tests for the detection of viruses in clinical and environmental samples [14]. In Europe in 2008, only 5.5% of the reported foodborne viral outbreaks were confirmed [9]. In Greece, there is no officially appointed reference center for viruses that cause gastroenteritis, a fact that leads to incomplete investigation of many outbreaks.

In a nutshell, improvement of the detection and notification systems and of the laboratory investigations is required.

Tips

In order to protect yourself against viral gastroenteritis you are advised to implement the following.

A) Follow the basic hygiene rules

- Wash hands thoroughly with soap and water (i.e. after toilet use, changing diapers, contact with ill people, before, during and after food handling). Make sure that children do the same.
- Clean surfaces used for meal preparation along with the utensils used throuroughly with soap and water before, during and after food handling.
- Use household bleach for cleaning the kitchen and the toilet, and carefully wash fabrics contaminated with feces or vomit (clothes, underwear, towels, etc.).
- Avoid using the same utensils (cups, plates, etc.) as other people.

B) Make sure that the food and water you consume are as safe as possible (remember that contaminated food may look and smell normal)

- Wash all foodstuffs properly before cooking and before consumption (when they are consumed raw).
- Use safe water (of known origin) for drinking and cooking.
- Avoid eating raw shellfish.

Finally, if you develop symptoms of gastroenteritis it is recommended, to prevent transmission of the disease to other people, for as long as the symptoms last and for at least 2 days after they resolve, to refrain from food handling and to avoid visiting crowded places or places that host vulnerable people, such as kindergartens, hospitals, nursing homes, etc.

References:

Table 1: Number of notified cases in December 2012, median, minimum and maximum number of notified cases in December 2004–2011, Mandatory Notification System, Greece

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Botulism</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chickenpox with complications</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Anthrax</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Arbo-viral infections</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malaria</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rubella</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Smallpox</td>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Echinococcosis</td>
<td>2</td>
<td>1.5</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>8</td>
<td>12</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>Hepatitis B, acute &amp; HBsAg (+) in infants &lt;12 months</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Hepatitis C, acute &amp; confirmed anti-HCV positive (1st diagnosis)</td>
<td>1</td>
<td>0.5</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Measles</td>
<td>0</td>
<td>0</td>
<td>107</td>
<td>0</td>
</tr>
<tr>
<td>Haemorrhagic fever</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pertussis</td>
<td>6</td>
<td>0.5</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Legionellosis</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>2</td>
<td>4.5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>1.5</td>
<td>1</td>
<td>0</td>
<td>4</td>
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<tr>
<td>Listeriosis</td>
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<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>EHEC infection</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rabies</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Meningitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Meningitis aseptic</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bacterial (except meningococcal disease)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>unknown etiology</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Meningococcal disease</td>
<td>1</td>
<td>0s</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q Fever</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Salmonellosis (non-typhoid/paratyphoid)</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Typhoid fever/paratyphoid</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2: Number of notified cases by place of residence (region), December 2012, Mandatory Notification System, Greece (place of residence is defined according to the home address of patients)

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of notified cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Macedonia and Thrace</td>
<td>Eastern Macedonia and Thrace</td>
</tr>
<tr>
<td>Central Macedonia</td>
<td>Central Macedonia</td>
</tr>
<tr>
<td>Western Macedonia</td>
<td>Western Macedonia</td>
</tr>
<tr>
<td>Thrassia</td>
<td>Thrassia</td>
</tr>
<tr>
<td>Ionian islands</td>
<td>Ionian islands</td>
</tr>
<tr>
<td>Western Greece</td>
<td>Western Greece</td>
</tr>
<tr>
<td>Sterea Greece</td>
<td>Sterea Greece</td>
</tr>
<tr>
<td>Northern Aegean</td>
<td>Northern Aegean</td>
</tr>
<tr>
<td>Southern Aegean</td>
<td>Southern Aegean</td>
</tr>
<tr>
<td>Crete</td>
<td>Crete</td>
</tr>
<tr>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Table 3: Number of notified cases by age group and gender, December 2012, Mandatory Notification System, Greece (M, male; F, female)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number of notified cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickenpox with complications</td>
<td>Eastern Macedonia and Thrace</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Central Macedonia</td>
</tr>
<tr>
<td>Pertussis</td>
<td>Western Macedonia</td>
</tr>
<tr>
<td>Legionellosis</td>
<td>Thrassia</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>Ionian islands</td>
</tr>
<tr>
<td>Typhoid fever/paratyphoid</td>
<td>Western Greece</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Sterea Greece</td>
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<tr>
<td>Meningitis</td>
<td>Northern Aegean</td>
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<tr>
<td>Bacterial (except meningococcal disease)</td>
<td>Southern Aegean</td>
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<tr>
<td>unknown etiology</td>
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<td>Meningococcal disease</td>
<td>Unknown</td>
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<tr>
<td>Q Fever</td>
<td>Eastern Macedonia and Thrace</td>
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<tr>
<td>Salmonellosis (non-typhoid/paratyphoid)</td>
<td>Central Macedonia</td>
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<tr>
<td>Shigellosis</td>
<td>Western Macedonia</td>
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<tr>
<td>Typhoid fever/paratyphoid</td>
<td>Thrassia</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Ionian islands</td>
</tr>
</tbody>
</table>

Surveillance data
The data presented are derived from the Mandatory Notification System (MNS) of the Hellenic Center for Disease Control and Prevention (HCDCP). Forty-five infectious diseases are included in the list of the mandatory notifiable diseases in Greece. Notification forms and case definitions can be found at the website of HCDCP (www.keelpno.gr).

It should be noted that the data for December 2012 are provisional, and could be slightly modified/corrected in the future, and also that data interpretation should be made with caution as there are indications of under-reporting in the system.

The increasing incidence of norovirus gastroenteritis world-wide

According to a recent Eurosurveillance article [1], there are indications of world-wide increased norovirus activity during the past few months compared with previous years. The United Kingdom, the Netherlands and Japan are among the countries that have reported an increase [2-4]. Given the limited surveillance of norovirus gastroenteritis in most countries, it is difficult to come to a safe conclusion about whether this increase is real or suggests an early seasonal activity.

During the last decade, GII.4 norovirus strains have been proven to be responsible for the majority of acute gastroenteritis outbreaks and sporadic cases. Since 1995, epidemic GII.4 norovirus strains, which seem to appear every 2 or 3 years, have been associated with an increased incidence of norovirus gastroenteritis [5,6-8].

Molecular data shared through the NoroNet network suggest that the late increase of norovirus activity is related to the emergence of a new norovirus genotype II.4 variant. This variant has evolved from previous norovirus GII.4 variants and has a common ancestor with the dominant norovirus GII.4 variants Apeldoorn_2007 and NewOrleans_2009, but it is phylogenetically distinct. Changes in norovirus strains may have led to an escape from existing herd immunity and might explain the observed increased outbreak activity. The first report of this variant was from Australia in March 2012, so it was named norovirus GII.4 Sydney 2012. In the USA, the variant was detected in September 2012 in five of 22 (23%) laboratory-confirmed outbreaks, and in November in 37 of 71 (52%) laboratory-confirmed outbreaks [9]. This new variant has also been found in outbreaks that have occurred in Belgium and Denmark.

It is recommended that health services should be prepared for a high seasonal activity of norovirus gastroenteritis and probably for more severe cases this season.

Outbreak control measures, such as strict implementation of hygiene rules and the isolation of symptomatic patients, may help to reduce the size of outbreaks that may occur [10,11].

Currently, more data are needed to confirm the association between a higher norovirus incidence and the new norovirus GII.4 2012 variant.

References:


**Information regarding the prevention of viral gastroenteritis**

**What can we do to protect ourselves from viral gastroenteritis?**

In order to avoid getting sick from viral gastroenteritis you are advised to follow the recommendations below.

**Adhere to basic hygiene rules**

Wash hands thoroughly with soap and water, especially:

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>consumption of food</td>
<td>toilet use/changing diapers</td>
</tr>
<tr>
<td>food preparation</td>
<td>handling objects contaminated with vomit or feces</td>
</tr>
<tr>
<td>food handling</td>
<td>handling fabrics contaminated with feces or vomit (clothes, underwear, towels, etc.).</td>
</tr>
<tr>
<td></td>
<td>contact with ill people</td>
</tr>
<tr>
<td></td>
<td>food handling</td>
</tr>
</tbody>
</table>

Make sure that children follow the hygiene rules as well.

Clean surfaces used for meal preparation, along with the utensils used, thoroughly with soap and water before, during and after food handling.

Use household bleach for cleaning the kitchen and the toilet.

Avoid using the same utensils (cups, plates, etc.) as other people.

Make sure that the food and water you consume are as safe as possible (remember that contaminated food may look and smell normal)

Wash all foodstuffs properly before cooking and before consumption (when they are consumed raw).

Use safe water (of known origin) for drinking and cooking.

Avoid eating raw shellfish.

**What can a sick person do to prevent the transmission of gastroenteritis to other people?**

When someone develops gastroenteritis they should adhere to the following for as long as the symptoms last and for at least 2 days after they resolve.

- Refrain from food handling or providing health care to other people, to limit direct contact with relatives.
- Refrain from attending kindergarten or school (both students and staff).
- Avoid visiting crowded places or places that host vulnerable people, such as kindergartens, hospitals, nursing homes, etc.
- Refrain from activities such as swimming in a pool, spa visits and team sports.
World Cancer Day, 4 February 2013

The message for 4 February 2013 can be seen at http://www.worldcancerday.org/

One year of operation for the Hellenic Cancer Registry (HCR)

Within the framework of the development of the Hellenic Cancer Registry (HCR) and as described by the ministerial decisions with protocol numbers Y4α/οικ.136216/9-12-2011 and 1010/12-2011, cancer notification is based on a network of health professionals, the so-called ‘cancer registrars’, all working in hospitals and private clinics in Greece.

Cancer registrars, mainly health visitors and nurses, are part of the public hospital and private clinic personnel, are directly linked to the HCR and are appointed to collect cancer data, from patients diagnosed or treated at their institutions.

In 2012, 186 health professionals in 143 public and military general hospitals and private clinics throughout the country were appointed as cancer registrars (regular and substitutes).

The first short training course for the cancer registrars was carried out on 1 February 2012, in Athens, as part of a 1-day conference entitled Cancer Prevention and Public Health Promotion: From the HCR to Today. A second series of courses was organized and supported by the Hellenic Center for Disease Control and Prevention (HCDCP), and took place in the cities of Athens, Thessaloniki, Heraklion and Patra, during the period May to June 2012.

In addition, and with the aim of continuously training the appointed registrars, HCDCP initiated and fully financed a 3-month collaboration with the Hellenic Society of Pathologists, providing on-the-job training. The program was designed to address primarily specialized cancer hospitals and those hospitals and private clinics with a pathology laboratory. Forty-two public general hospitals and two specialized hospitals participated in the program.

Furthermore, to encourage and advance communication between registrars, an intranet area was developed on HCDCP’s website, accessible only to registrars holding a password, given to them by HCR.

With decision 594/22-2-2012 of the Secretary General for Health of the Hellenic Ministry of Health, Mr N. Polyzos’ approval was gained officially for funding the development of the HCR as part of the National Strategic Reference Framework Program 2007-2013, for the next 2 years of operation, and the project (‘Development of the HCR’) has commenced. Despite this delay, the sub-project ‘Provision of laptops’ to public hospitals participating in cancer notification, for the exclusive use of cancer registrars, was completed in 2012. The laptops will be sent to the hospitals as soon as their set-up is complete.

In the next period, the call for the sub-project ‘Integration of information systems for the electronic notification and codification of neoplasms’, in accordance with the requirements of the Data Protection Act by the Hellenic Data Protection Authority, will be announced. The aim is to develop an information system for the collection, electronic notification and codification of the collated cancer cases, which will assist cancer registrars in their work and, at the same time, minimize data entry errors.

With the decision of protocol number 953/13-07-2012 of the Hellenic Data Protection Authority, according to law number 2472/1997, the Hellenic Data Protection Authority has provided the terms for the lawful processing of personal data from cancer patients. Because of the particular nature of such data, the security measures taken in relation to the information systems and data storage and transmission must be reinforced and therefore strict procedures according to international standards, such as user authentication and data encryption procedures through SSL protocols and the use of virtual private networks (VPN), have been incorporated. The HCDCP Office for Informatics and Telecommunication has already completed the above actions and all laptops ready to be sent to the registrars have been parameterized accordingly.

Despite the difficulties encountered during the first year of HCR’s operation, because of the economic crisis and all the associated problems, such as a lack of collaboration and support for the registrars by hospital administrations and the scientific community, the registrars’ overlapping tasks, etc., cancer notification did progress satisfactorily within 2012. A number of registrars have responded positively to our collaboration and support the operation of the HCR. To all these people and colleagues, we would like to express our sincere thanks.

The development of HCR is undoubtedly a huge and challenging project for our country that requires the support of all parties and stakeholders related to cancer, including political support, in order to evolve.

HCR team, HCDCP
Norovirus on cruise ships: SHIPSAN

Introduction

Gastroenteritis is the most common health problem for travelers (http://www.who.int/ith/en/). When gastroenteritis caused by the highly persistent norovirus and travelers are brought together in closed or semi-closed accommodation facilities, including cruise ships and land-based premises, there is a high risk of an outbreak occurring.

Floating accommodation facilities, such as cruise ships, can facilitate case-to-case norovirus transmission (hand-to-hand, then hand-to-mouth) and transmission from surfaces to hand and then to mouth [1]. This is relatively easy because of traveler interaction, common activities, self-service buffets, use of communal toilets and other facilities, and hand contact with commonly touched surfaces. Infection after swallowing vomit-aerosolized particles containing the virus is also possible. Even 18 virus particles can cause infection [2] and it is possible that the virus is spread to the environment from symptomatic and asymptomatic travelers if proper personal and environmental hygiene is not taking place [3]. Consumption of contaminated food or water is also possible. Consequently, this infectious agent has the ability to spread quickly in the environment and there is the potential to affect a large number of travelers if control measures are not in place. Implementation of control measures in order to stop further transmission and to prevent recurrent outbreaks should start as early as possible.

A large number of people travel with cruise ships. As indicated on the European Cruise Council website: ‘27.8 million passengers visited a European port in 2011; 5.6 million passengers joined their cruise in Europe in the same year with the industry generating €36.7 billion of goods and services and providing more than 300,000 jobs’. In the same year, ‘there were at least 171 cruise ships active in the Mediterranean and 102 in Northern Europe, ranging in size from 4,200 passengers to less than 100’ (http://www.europeancruisecouncil.com).

The ‘key players’ in prevention: ship companies, travelers and authorities

There are three ‘key players’ in the prevention of gastroenteritis outbreaks: the ship operators, the travelers and the health authorities at ports. Ship companies, as well as public health authorities at ports, need to be prepared to confront untoward public health events, including norovirus outbreaks. It is important for both cruise ship operators and public health authorities to be able to recognize when there is the potential for an outbreak to occur, when it is occurring, when it is under control and when it is not. On the other hand, effective prevention of outbreaks demands the education of travelers (both passengers and crew members) and their strict compliance with the prevention and control policies of ships, including hand washing, reporting of symptoms and isolation.

To prevent the adverse consequences of outbreaks, including health impacts that can be serious for susceptible travelers, bad publicity and economic loss, cruise ship companies and public health authorities have developed and implemented sophisticated and effective plans to prevent and control norovirus outbreaks.

Centers for Disease Control and Prevention): Vessel Sanitation Program

The USA’s Vessel Sanitation Program (VSP) has the longest experience in gastroenteritis surveillance, conducting hygiene inspections based on the standards of the VSP operations manual (http://www.cdc.gov/nceh/vsp/operationsmanual/opsmanual2011.pdf) and investigating outbreaks on cruise ships since the 1970s. The impact of the USA’s VSP in preventing outbreaks has been evaluated in epidemiological studies from 1975 to 2006. After looking at incidents and gastroenteritis outbreaks on cruise ships over the last four decades, published by Addiss et al. [4], the World Health Organization [5], Cramer et al. [6], Lawrence [7] and Cramer et al. [8], one can assume that, especially after 2000, outbreaks with a bacterial etiology are rarely reported or published [9]. Compliance with the Centers for Disease Control and Prevention (CDC)’s operations manual [10] has decreased bacterial gastroenteritis outbreaks among passengers and crew, as described by Neri et al. [11]. However, norovirus outbreaks continue to occur, sometimes to a greater extent because of genetic drifts in the virus resulting in epidemic strains [12]. Two articles published recently in Eurosurveillance and CDC MMWR reported that the latest surveillance data in Europe and the USA demonstrate an increased activity of norovirus in late 2012 that relates to a new norovirus genotype II.4 variant, tentatively named Sydney 2012 [13,14]. In the forthcoming months it will be interesting to explore the impact of this new strain on outbreaks in recreational accommodation facilities, including cruise ships.

European guidelines for the prevention and control of norovirus outbreaks on passenger ships: EU SHIPSAN

Actions at a European Union (EU) level for the prevention of norovirus outbreaks on passenger ships were started in 2006 by the European Commission with the implementation of the SHIPSAN and SHIPSAN TRAINET projects (www.shipsan.eu). A manual was developed, comprising a compilation of existing European legislation, procedures and best practices for medical facilities, food safety, potable and recreational water safety, pest management, housekeeping and facilities, hazardous substances, waste management, ballast water and surveillance of communicable diseases (www.shipsan.eu). Moreover, it includes guidelines for the management of gastroenteritis and other infectious diseases on passenger ships. In particular, it provides guidance on how to differentiate influenza from gastroenteritis outbreaks, how to develop a plan for prevention and control, every-day preventive measures and guidelines for outbreak management. The manual provides a combination of measures to stop the chain of infection. The prevention strategy begins before the embarkation of passengers, by providing information leaflets advising about symptom identification, personal hygiene and case management. A key point in the prevention strategy is the determination of thresholds to trigger control measures, which can be rates of gastroenteritis cases per hour or percentages of ill passengers (14).

In summary, the required measures comprise the following: isolation of all individuals reported symptoms until 48 hours after the last symptom of gastroenteritis, with special attention to food-handling crew; on-board surveillance and alertness of crew and medical personnel to identify new cases of gastroenteritis, such as reporting vomiting episodes in public places or cabins and isolation of new cases as identified; cleaning and disinfection of cabins, commonly touched surfaces, vomit, medical and other facilities with effective products and in such a manner as to avoid cross contamination; education of the crew on implementing measures; communication to encourage immediate reporting of symptoms; the importance, frequency and method of hand washing; encouragement of hand hygiene by all travelers; waste management in a manner to avoid cross-contamination; effective cleaning of linens at temperatures sufficient to destroy the virus and in a manner avoiding cross-contamination; use of personal protective equipment (PPE) by people that clean areas after vomiting and diarrhea episodes; stopping the self-service of food to eliminate possibilities for food contamination [10,15,16].

A web-based communication platform has been developed by the SHIPSAN TRAINET project providing health authorities at ports or at national or European levels and ship captains with the ability to communicate public health information, including outbreak management. This communication platform has been used to facilitate authorities in gastroenteritis outbreak management. The added value of the communication tool has been the rapid exchange of appropriate information between authorities, the follow-up of outbreaks and the avoidance of duplication of effort in interventions.

Conclusion

The occurrence of symptomatic or asymptomatic norovirus cases among passengers on
cruise ships is unavoidable, because such a large number of people travel on them and the pathogen is endemic world-wide. However, outbreaks can be preventable and manageable with co-ordinated efforts by ship companies, travelers and health authorities.

References:


Varvara Mouhtouri

Viral gastroenteritis: norovirus
Prevention and control measures in health-care settings

Norovirus is the most frequent cause of outbreaks of adult and child viral gastroenteritis. The incubation period is 24-48 hours and the symptoms develop suddenly and last from 12 to 60 hours. Approximately 10% of patients will require medical care including hospitalization. Attributable mortality mainly applies to specific categories of hospitalized patients and elderly patients in long-term care facilities. Because of the prolonged survival of the virus on inanimate surfaces, in closed and crowded places such as hospitals, the spread of the virus rapidly affects the delicate hospital population and increases morbidity and mortality.

Actions to control the spread of the virus effectively should focus on the following areas.

- Timely diagnosis of the first cases in a hospital setting.
- Timely recognition of a potential influx of cases.
- Documentation of the onset of an outbreak (pathogen, possible source of transmission, time of onset, mode of transmission, high-risk departments).
- Increased awareness of inter-hospital structures (administration, infection control committees, nursing departments).
- Information and training of employees on the proper implementation of the necessary measures.
- Information for and co-operation with public health stakeholders.
- Communication with reference laboratories for the identification of specific pathogens.
- Defining the end of an outbreak and removal of contact precautions.

Timely diagnosis is primarily based on clinical symptoms and is documented by molecular and immunohistochemistry methods and from patient stools or vomit. An increased incidence of gastroenteritis in the community helps in the early diagnosis of the disease, because epidemic waves affecting both children and adults occur during the autumn and winter months. The clinical criteria of Kaplan are used for the timely diagnosis of the disease and the identification of clusters, in case the direct application of specific laboratory methods for detecting the pathogen are not available. In the case of an outbreak, efforts have to focus on controlling the spread of the pathogen, and include the monitoring of:

- patients
- health-care workers
- visitors
- the inanimate environment
- potentially contaminated food and water.
The basic principle of controlling an outbreak of norovirus is limiting the number of people who will be in contact with the virus. The physical separation of infected patients from non-infected patients, and limiting visitors to a clinical department who have been exposed to the virus and can become a vehicle for its transmission, are the most important measures that must be implemented immediately. Patients with disease should be isolated or cohorted.

Hand hygiene is the most important measure for controlling the spread of norovirus in a health-care facility. It should be performed by hand washing with soap (20 s) under running warm water before and after contact with a patient, regardless of the use of gloves. Studies have shown that antiseptics with ethanol (70%) may be more effective against the virus compared with other antiseptics, with or without alcohol. Contact with a patient also demands the application of personal protective equipment, particularly the use of gloves and cons.

Health-care workers who develop symptoms should be removed from the workplace immediately and not return until at least 48 hours after the complete absence of clinical symptoms. After their return to the workplace or in case they return earlier than 48 hours, they should care for patients with gastroenteritis. This should be intensified for health-care professionals who work in places that manufacture or distribute food in the hospital.

Finally, an important issue is the disinfection of a contaminated environment with emphasis on a patient's ward, even after their discharge from the hospital, and also areas in which health professionals and visitors gather. The decontamination process should be frequent, starting with clean areas and ending up at the most contaminated. Food and drink that are likely to be contaminated should be removed.

Removal of contact precautions should be instigated 48 hours after the complete resolution of patient symptoms. For special patient groups (patients with renal and cardiopulmonary failure or immunosuppression) and children (especially those that are <2 years), who retain the virus for longer than other patients, an extended application of the prevention measures is recommended, usually for more than 48 hours (for children up to 5 days). The epidemiological end of an outbreak requires no new appearance of a case during a period of 7 days. The proper application of the above recommendations requires daily monitoring for new cases, as well as strict monitoring of the compliance of health-care workers (HCWs) for the implementation of contact precautions. However, the most effective training process is the updating of information for the staff and in general for all those who are involved in patient care (family, dedicated nurses) as well as the patients themselves.

### Table 1: Prevention and control measures for a norovirus gastroenteritis outbreak in health-care settings

<table>
<thead>
<tr>
<th>A. Contact precautions</th>
<th>B. External visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient isolation</td>
<td>Patient visitors</td>
</tr>
<tr>
<td>This is highly recommended</td>
<td>They are not allowed</td>
</tr>
<tr>
<td>Cohorting</td>
<td></td>
</tr>
<tr>
<td>In case there are no rooms available for isolation</td>
<td></td>
</tr>
<tr>
<td>Personal protective equipment (PPE) for HCWs</td>
<td></td>
</tr>
<tr>
<td>Loading trolleys out of the patient room with PPE, and frequent cleaning of the roller</td>
<td></td>
</tr>
<tr>
<td>Hand hygiene for HCWs who take care of patients</td>
<td></td>
</tr>
<tr>
<td>Wash with soap and water after the removal of gloves</td>
<td></td>
</tr>
<tr>
<td>Hand hygiene for HCWs who visit clinical departments</td>
<td></td>
</tr>
<tr>
<td>Wash hands or use antiseptic in accordance with instructions</td>
<td></td>
</tr>
<tr>
<td>HCWs cohorting for patients with gastroenteritis</td>
<td></td>
</tr>
<tr>
<td>This measure should be applied to all shifts, and staff already infected must occupy wards with patients with gastroenteritis</td>
<td></td>
</tr>
<tr>
<td>Inanimate surfaces</td>
<td></td>
</tr>
<tr>
<td>As few as possible</td>
<td></td>
</tr>
<tr>
<td>Patient visitors</td>
<td></td>
</tr>
<tr>
<td>They are not allowed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Food and liquid transportation</th>
<th>D. Management of the inanimate environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meals for patients</td>
<td>Medical equipment (not critical)</td>
</tr>
<tr>
<td>Disposable utensils have to be discarded prior to their exit from the patient room. Equipment carried out on a special trolley that will be disinfected</td>
<td>Exclusive for patients with gastroenteritis</td>
</tr>
<tr>
<td>Waiters</td>
<td>Medical equipment (critical)</td>
</tr>
<tr>
<td>They must not be admitted into a patient's room. The transfer of meals into a patient's room must be performed by the nursing staff</td>
<td>Mechanical cleaning and disinfection after their use for patients with gastroenteritis</td>
</tr>
<tr>
<td>Staff</td>
<td>Medical equipment used by para-clinical departments</td>
</tr>
<tr>
<td>Avoiding use of common refrigerator- freezers</td>
<td>Patient area</td>
</tr>
<tr>
<td>Surfaces of clinical wards</td>
<td>Commonly used surfaces</td>
</tr>
<tr>
<td>Cleaning without using the same equipment as the rest of the clinical ward</td>
<td>Frequent cleaning without using the same equipment as the rest of the clinical ward</td>
</tr>
<tr>
<td>E. HCWs that are patients</td>
<td>F. Removal of contact precautions</td>
</tr>
<tr>
<td>Immediate removal from the workplace. After their return it is recommended that they work with patients with gastroenteritis</td>
<td>At least 48 hours after the symptoms have resolved. In cases where a patient will be discharged, continue applying contact precautions until after he or she leaves the hospital. Extend this for special patient populations and children</td>
</tr>
<tr>
<td>G. Public areas</td>
<td></td>
</tr>
<tr>
<td>Active surveillance in public areas such as canteens, dining rooms, rest rooms for staff, in order to identify new cases</td>
<td></td>
</tr>
</tbody>
</table>
Viral gastroenteritis

Viral gastroenteritis is one of the leading causes of morbidity and mortality globally [1]. In western Europe and the rest of the industrialized world, morbidity and mortality have increased in recent decades as a result of the acute clinical symptomatology of these infections, mainly expressed as acute episodes of diarreal stools. Therefore, the appearance of acute diarrhea is the most serious and more frequent factor for admission to hospital accompanied with increased morbidity, especially in children under 5 years of age and elderly people over 60 years of age [2].

In recent decades, the incidence of infectious gastroenteritis caused by bacteria and parasites has been reduced as a result of comprehensive public health surveillance, in particular through monitoring, maintenance and improvement of water and sanitation infrastructures. However, the incidence of viral gastroenteritis does not follow the same rate of decline. More specifically in some developed countries, an increase in the incidence of the disease is recorded [3,4].

Viral gastroenteritis is the second most frequent clinical entity after respiratory infections and the most frequent cause of diarrhea in children and adults. The frequency depends on the age, country and welfare of the patient. In the developed world, one to three episodes per person per year occur on average, while in developing countries these figures increase to one to 18. According to the World Health Organization (WHO), in the developing world mortality from gastroenteritis amounts to 2.2 million deaths per year. The distribution of viral gastroenteritis shows that the incidence rates peak during the winter months, unlike bacterial or parasitic gastroenteritis, which show exacerbation during the summer months and are more likely to be associated with improper maintenance of food and drink.

Most studies focus on revealing the explanatory factors of acute diarrhea in children, but also in adults [5]. Rotaviruses are the leading cause of acute diarrhea in children worldwide (30–60%), followed by noroviruses (8–30%), astroviruses (6–9%) and adenoviruses (group F) (6-9%) [6]. In particular, rotaviruses are responsible for 50% of epidemic diarrheal syndromes in infants and children, while in recent years noroviral infections have shown increasing trends in both children and adults. Other viruses that cause gastroenteritis are the enteroviruses and coronavirus.

The clinical manifestations of acute viral gastroenteritis include diarrhea, vomiting, fever, anorexia, headache, abdominal cramps and muscle aches. None of these symptoms is helpful for the differential diagnosis of viral from bacterial or parasitic causes of gastroenteritis.

The age of the child and the accompanying symptoms, the appearance of the stool, seasonal variations or the knowledge of any exposure to causative factors may help differentiate viral from bacterial and parasitic gastroenteritis.

In general, bacterial infections are associated more with older children and are often accompanied by the appearance of mucous with the stool, or a bloody stool, characteristics that are not consistent with a viral attack. Epidemiological data on rotavirus infections show that their impact is at around 10% of incidents, with episodes of diarrhea requiring medical intervention and progressing to severe disease in children. Children with rotavirus infection show more vomiting and high fever (>39.8°C) than those with other causes of acute gastroenteritis [7,8].

Gastroenteritis caused by rotaviruses

Rotaviruses owe their name to their appearance, which simulates a trolley wheel (rota) and is transmitted by the oral-enteric pathway, while transmission is independent of hygienic conditions, because they are highly resistant RNA viruses and can remain for weeks in water, on hands and on other surfaces. They are transferred to the gastrointestinal tract through consumption of contaminated food (most frequently vegetables), which in turn is contaminated after washing with contaminated water.

After an incubation time of 2-4 days, the disease manifests abruptly with afebrile stools, fever, vomiting and abdominal pain. The duration of symptoms varies from 3 to 7 days. The most serious complication and cause of high mortality is dehydration, this being the biggest threat for infants and children aged from 6 to 24 months. The outcome is worse in developing countries, while in the developed world patients can be treated in a hospital setting and the results are better. There is no special antiviral treatment and the main concern is the prevention of dehydration of the patient. In the late 1990s the first vaccine against rotaviruses (Rotashield®) was released, which was associated with elevated rates of intussusception and withdrawn quickly. In the mid-2000s, two more vaccines were released (Rotarix® and Rotateg®), which are safe and co-administered with other infantile vaccinations at the ages of 2, 4 and 6 months [9–11].

Gastroenteritis caused by noroviruses

These viruses acquired their name from an outbreak at a school in the city of Norwalk, Ohio, USA, in 1968, which not only affected 50% of children but also a large number of their relatives. Originally all viruses that were isolated from that incident were named Norwalk viruses.

Studies using electron microscopy revealed other Norwalk-like viruses, and the whole genus was named Norovirus. Modern classification places the norovirus group along with the Sapovirus family of Calicivirus. Noroviruses affect mainly adults, while sapoviruses affect mainly children.

They are both transmitted by the oral-enteric route and are particularly virulent because they are excreted in large numbers from the feces and vomit of patients; they can still be detected 2 weeks after the easing of symptoms. Transmission can be from person to person, but it is more common from contaminated food or water. More rarely mentioned is airborne transmission.

The incubation time is usually 1-2 days and symptoms include nausea, vomiting, non-bloody diarrhea, malaise, muscle pain, abdominal pain and fever. Similar to rotavirus infections, the disease appears more frequently in the winter months and the duration of symptoms is 24–48 hours. The most frequent complication is dehydration, although its severity is less than the dehydration that occurs with rotavirus-caused gastroenteritis.

Therapeutic actions are limited to avoiding transmission of the virus and preventive measures involving good hand washing, isolation of patients and the recommendation to avoid work for 3-4 days after withdrawal of the symptoms [12,13].

References:

Flora Kontapidou, Helena Maltezou
Laboratory diagnosis

Most of the viruses that cause gastroenteritis cannot multiply in cell cultures. In contrast, they can be easily distinguished by electron microscopy (EM) on the basis of their diverse morphology. However, the sensitivity of the method is very low (requiring at least 106 viral particles/mL solution). Detection of rotaviruses is easier because they are excreted in high numbers at the time of outbreak in diarrheal stools (up to 1011 viral particles/mL feces). Astroviruses are also present in large numbers in the feces and are detected easily.

Other viruses, especially caliciviruses, multiply in small quantities and are very difficult to trace by EM. The use of EM is therefore generally difficult for clinical diagnosis of viral infections. The same is true for PPAT methods because they show extremely low sensitivity. In recent years, molecular methods and more specifically polymerase chain reaction (PCR) with reverse transcription (RT-PCR) have provided excellent specificity (99.9%) and sensitivity (up to 20–100 viral particles per reaction). Therefore, RT-PCR combined with serological techniques [detection of antibody in the serum of patients using enzyme-linked immunosorbent assay (ELISA) methods] is used for laboratory diagnosis and epidemiological surveillance of viral gastroenteritis [14] (Table 1).

Table 1: Diagnostic methods for the detection of viruses that cause acute gastroenteritis

<table>
<thead>
<tr>
<th>Virus</th>
<th>EM</th>
<th>ELISA</th>
<th>PPAT</th>
<th>PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotavirus</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>+++ (RT)</td>
</tr>
<tr>
<td>Adenovirus</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>+++</td>
</tr>
<tr>
<td>Norovirus (calicivirus)</td>
<td>+/-</td>
<td>++</td>
<td>-</td>
<td>+++ (RT)</td>
</tr>
<tr>
<td>Astrovirus</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+++ (RT)</td>
</tr>
</tbody>
</table>

Sensitivity:
- EM: 10^5–10^6 viral particles/mL
- ELISA: 10^4 molecules of antigen or antibody/mL
- PPAT: 10^4 molecules of antigen or antibody/mL
- PCR/RT-PCR: 10^2–10^2 viral particles/mL

The scale of (-)→(+++) indicates the relative levels of sensitivity and relative diagnostic value of the method.

References:
methods. However, in the case of slow-growing bacteria and viruses, the long incubation period that is needed to identify the pathogen can significantly delay the appropriate preventive measures for the protection of public health. In these cases, molecular identification significantly reduces the time needed for identification of the micro-organism and thus to implement appropriate measures. The reduction in time helps to reduce costs significantly by avoiding the use of inappropriate measures, while reducing the stay of patients in the hospital.

In the control of outbreaks, particularly of waterborne and foodborne outbreaks, molecular techniques play an important role in the rapid detection and identification of the micro-organism responsible, especially in food and water samples and in the correlation of the virus isolated from a clinical sample, and thus in the full epidemiological investigation. This allows for rapid, reliable and appropriate measures to address an outbreak, such as interrupting the production of food and water disinfection. Because of their significant sensitivity (in many cases >10), molecular techniques allow the detection and identification of a small number of viruses in environmental samples, which contributes significantly to the protection of public health against viruses for which hitherto reliable and sensitive detection methods did not exist. In addition, molecular techniques, by determining the sequence (microbial sequence typing), have provided great opportunities for the standardization (genotype determination) and creation of appropriate phylogenetic trees for micro-organisms, greatly improving our knowledge in the field of molecular epidemiology.

For the laboratory testing of food and water samples during the investigation of a foodborne or waterborne outbreak of viral gastroenteritis, the process comprises the following steps: concentrating and isolating micro-organisms from the sample, purifying the micro-organism, and detecting the micro-organism. If molecular techniques are to be performed, the last step requires isolation of nucleic acids. Some of the molecular techniques that are most frequently used in the testing of environmental samples and thus outbreaks, are the polymerase chain reaction (PCR) and its applications (such as RT-PCR, nested-PCR, RFLP and AFLP), hybridization, microbial sequence typing, real-time PCR, and new systems of genome sequencing (metagenomics systems) and chip-DNA techniques. These techniques have shown a very high specificity and sensitivity. Also, they have been applied to a large group of viruses and the results are easy to read. With the development of real-time PCR, the role and importance of human error in the results has decreased significantly (usually false positives as a result of contamination), and quantification of the results has been achieved. In environmental samples, the techniques based on PCR have been applied extensively in the detection of viruses, replacing time-consuming culture techniques.

The importance of the use of molecular techniques has been demonstrated by the fact that the European Union (EU) through the European Organization for Standardization (CEN) has begun the process of standardization of molecular techniques for monitoring viruses in the environment and food samples. The use of molecular techniques clearly has a dominant role to play in public health as we move into the 21st century, giving a major boost to the improvement of the protection of the human population from major health problems.

The capacity for rapid identification of pathogens during an emerging outbreak significantly increases the chances of success of any intervention measures. Many countries, with the help of global organizations (the World Health Organization and the European Center for Disease Prevention and Control) or through research projects, have made great efforts in developing integrated surveillance networks to monitor foodborne and waterborne pathogens, such as noroviruses, rotaviruses and enteroviruses. They have also made systematic efforts to identify the genetic structure, geographical distribution and presence in food or water of viruses involved in outbreaks. The environmental surveillance of pathogenic viruses is an important sector in the control of a viral gastroenteritis.

References:

Vaccines for rotavirus gastroenteritis

Prevention of rotavirus gastroenteritis among infants and young children is important. Rotavirus infection is responsible for approximately half a million deaths among children aged less than 5 years old, mainly in low-income countries. Moreover, in all countries, rotavirus is the causative agent of 10% of acute gastroenteritis episodes in children under 5 years. Nearly 80% of children are affected by rotavirus by the age of 5 years. Infants and young children with rotavirus gastroenteritis have more severe symptoms than infants and young children with gastroenteritis caused by other pathogens. Among these symptoms, rotavirus gastroenteritis may cause severe dehydration in children aged 4-23 months. Rotavirus is responsible for 30-50% of diarrheal hospitalizations in children under 5 years old and 70% during the seasonal peaks. Of note, after the first rotavirus infection there is a partial protection from other episodes and a reduction in the severity of subsequent infections.

A rotavirus vaccine was studied in the 1990s and a tetravalent rotavirus vaccine was introduced in the USA in 1998. This was a Rhesus-based tetravalent rotavirus vaccine (RRV-TV, Wyeth, Rotashield®). It was recommended to be administered in three doses, given at the ages of 2, 4 and 6 months. However, a year after its introduction, it was withdrawn because of its association with an increased frequency of intussusception.

Today there are two live, oral vaccines recommended by the World Health Organization (WHO) for the prevention of rotavirus infection globally, including Greece.

1) A monovalent vaccine containing a human rotavirus (RV1, GSK, Rotarix®). This is an oral vaccine administered in a two-dose series (1 mL per dose).

2) A pentavalent vaccine containing reassortant rotaviruses developed from human and animal rotaviruses, which is administered in three doses (1 mL per dose).
bovine parent strains (RV5, Merck, Rotateq®). This is an oral vaccine administered in a three-dose series (2 mL per dose).

The characteristics and administration schedules of these two vaccines are shown in Table 1.

**Table 1: Characteristics of rotavirus vaccines**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Rotarix®</th>
<th>Rotateq®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent strain</td>
<td>Human strain 89-12</td>
<td>Bovine strain WC3</td>
</tr>
<tr>
<td>Vaccine titer</td>
<td>&gt;10^8</td>
<td>2-2.8 x 10^8</td>
</tr>
<tr>
<td>Administration schedule</td>
<td>2 doses 4 weeks</td>
<td>3 doses 4 weeks</td>
</tr>
</tbody>
</table>

**Administration of rotavirus vaccines in Europe and USA include the following.**

- Rotavirus vaccines can be administered together with all other vaccines given in infancy. Available data suggest that rotavirus vaccines do not interfere with the immune response to other vaccines.
- Infants with a history of rotavirus gastroenteritis should be vaccinated according to the administration schedule. An initial acute gastroenteritis caused by rotavirus might provide only partial protection against subsequent rotavirus infections.
- Infants with mild acute illness, with or without fever, can be vaccinated.
- Pre-term infants can be vaccinated according to their chronological age (minimum chronological age for the first dose is the sixth week of life).
- Both breast-fed and non-breast-fed infants should be vaccinated.
- Rotavirus vaccines may be administered at any time before, concurrent with and after administration of any blood product. This recommendation is the same for antibody-containing products including gamma globulin.
- During hospitalization of vaccinated infants no precautions in addition to standard precautions are needed.

- The presence of a pregnant woman in an infant’s household is not a contraindication for rotavirus vaccination. Most of the women at this age have pre-existing immunity to rotavirus.
- The presence of an immunocompromised person in an infant’s household is not a contraindication for rotavirus vaccination. However, although the risk is low, hand hygiene is always recommended after diaper changing.
- In the case of vomiting or regurgitation during or after administration of rotavirus vaccine, this dose should not be re-administered. Vaccination should follow the routine schedule.
- Vaccination should be completed with the same product (RV1 or RV5). If one vaccine product is not available, vaccination should be completed with the available product.
- During vaccination, if the previous vaccine product is unknown, a total of three doses should be administered.

Evidence suggests that the efficacy of the rotavirus vaccine correlates with mortality quartiles in various countries. While the efficacy of rotavirus vaccine is reduced in countries with high mortality rates in children aged less than 5 years old, the absolute benefits are higher in these countries. Table 2 depicts the efficacy of rotavirus vaccines in countries according to WHO mortality strata.

**Table 2: Efficacy of rotavirus vaccines according to WHO mortality strata**

<table>
<thead>
<tr>
<th>WHO mortality strata</th>
<th>Percentile mortality in children ≤5 years</th>
<th>Estimated vaccine efficacy (%)</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Highest (&gt;75th percentile)</td>
<td>50-64</td>
<td>Ghana, Kenya, Mali, Malawi</td>
</tr>
<tr>
<td>Intermediate</td>
<td>High mid (50th–75th percentile)</td>
<td>46-72</td>
<td>Bangladesh, South Africa</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Low mid (50th–75th percentile)</td>
<td>72-85</td>
<td>Vietnam, Region of the Americas</td>
</tr>
<tr>
<td>Low</td>
<td>Least (&lt;25th percentile)</td>
<td>85-100</td>
<td>Region of the Americas, Europe and Western Pacific</td>
</tr>
</tbody>
</table>

The impact of rotavirus vaccines on mortality rates as a result of acute gastroenteritis has been studied in Brazil and Mexico. The impact of rotavirus vaccine on deaths for all causes of acute gastroenteritis among children aged less than 5 years is depicted in Table 3.

**Table 3: Annual reduction of mortality after the introduction of rotavirus vaccine**

<table>
<thead>
<tr>
<th>Country (nationwide)</th>
<th>Vaccine</th>
<th>Annual reduction of mortality as a result of acute gastroenteritis of all causes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>Rotarix</td>
<td>30-39</td>
</tr>
<tr>
<td>Brazil</td>
<td>Rotarix</td>
<td>22</td>
</tr>
<tr>
<td>Mexico</td>
<td>Rotarix</td>
<td>4</td>
</tr>
</tbody>
</table>

**Administration of rotavirus vaccines is contraindicated in the following situations.**

- Infants with a severe allergic reaction (e.g. anaphylaxis) after a previous dose of vaccine or to a vaccine component. Latex rubber is contained in Rotarix® and should not be administered to infants with severe allergy to latex.
- Infants with severe combined immunodeficiency. Gastroenteritis with severe diarrhea and long-term viral shedding in the stools has been reported in children vaccinated with rotavirus vaccine and then diagnosed with severe combined immunodeficiency.
- Infants with a history of intussusception.
Special precautions for rotavirus vaccination should be taken in the following circumstances.

- Altered immunocompetence (other than severe combined immunodeficiency), moderate or severe illness (including acute gastroenteritis) and pre-existing chronic gastrointestinal disease.
- Infants with spina bifida or bladder extrophy, who are at risk of acquiring latex allergy, should be vaccinated with Rotatet® instead of Rotarix®. If Rotarix® is the only available vaccine, it should be administered because the benefit of vaccination is considered to be greater than the risk of sensitization.

Post-marketing studies have documented a small increase in the incidence of intussusception in Mexico and Australia in 2010. More specifically, it was estimated that there was an excess of one to two cases of intussusception per 100,000 vaccinations. Based on the available evidence, WHO reported in 2012 that rotavirus vaccination has been associated with a small (5-fold) increase in risk of intussusception in some populations. This risk is lower than the risk of rotavirus vaccine administration with Rotashield®, which was withdrawn. However, the benefits of rotavirus vaccination are substantial and outweigh any small increase in the risk of intussusception.

In 2010, DNA from a porcine circovirus was detected in both rotavirus vaccines. Available evidence suggests that this porcine circovirus poses no risk in humans and that these viruses have not been associated with human infection.

References:


E. Jiosfidis and E. Roilides, Infectious Disease Unit, 3rd Pediatric Department, Aristotle University, Hippokration Hospital, Thessaloniki

Hellenic Cancer Registry and Office for Rare Diseases: December 2012 Activities concerning rare diseases

1. A congress in the context of EUROPLAN II, the European program on national planning for rare diseases, was held on Saturday 1 December at the Eugenides Foundation. This activity was co-ordinated by EURORDIS (the European organization for rare diseases); national patient organizations are responsible for the organization of the congress in the member states. For Greece, PESPA (the Greek alliance for rare diseases) prepared and organized the congress; Antoni Montserrat Moliner, policy officer for rare diseases and neurodevelopmental disorders, the Directorate of Public Health (SANCO C-2) and the European Commission, also participated.

The Hellenic Center for Disease Control and Prevention (HCDCP), as a relevant stakeholder in the field of rare diseases, participated in the congress, as well as the two preparatory meetings that took place at the Ministry of Health. Dr Lia Tzala, Head of the Hellenic Cancer Registry and Office for Rare Diseases, and Dr Ioanna Laina, the pediatrician for the office, represented HCDCP.

2. The 3rd National Conference of the Public Health and Social Medicine Forum was held at the Royal Olympic Hotel in Athens from 30 November 2012 to 1 December 2012. On Saturday 1 December, a roundtable discussion with the theme ‘HCDCP: registries and their role in public health’ took place, with the following lectures.

- Diseases registries and their usefulness, by Professor Tz. Kouria-Kremastinou, President of HCDCP.
- Hellenic Cancer Registry at HCDCP, by L. Tzala, Head of the Hellenic Cancer Registry and Office for Rare Diseases.
- Rare Diseases Registry at HCDCP, by I. Laina, Pediatrician of the Hellenic Cancer Registry and Office for Rare Diseases.

3. The 8th Pan-Hellenic Congress on Health Management, Economics and Policy took place in the amphitheater of the National School of Public Health, from 13 December 2012 to 15 December 2012. Lia Tzala, Head of the Hellenic Cancer Registry and Office for Rare Diseases, gave a lecture on ‘Rare diseases: actions for harmonization of Greece with European Union policy’.

L. Tzala, I. Laina, Hellenic Cancer Registry and Office for Rare Diseases, HCDCP
Gastroenteritis is a well-known contributor to mortality among children worldwide, but there are limited data regarding adult mortality. The researchers aimed to describe trends in gastroenteritis deaths across all ages in the USA and specifically estimate the contributions of Clostridium difficile and norovirus.

Gastroenteritis-associated deaths in the USA during 1999-2007 were identified from the National Center for Health Statistics multiple-cause-of-death mortality data. All deaths in which the underlying cause or any of the contributing causes was listed as gastroenteritis were included.

Gastroenteritis mortality averaged 39/1,000,000 person-years (11,255 deaths per year) during the study period, increasing from 25/1,000,000 in 1999-2000 to 57/1,000,000 in 2006-2007 (P<0.001). Adults aged ≥65 years accounted for 83% of gastroenteritis deaths (258/1,000,000 person-years).

Norovirus contributed to an estimated 797 deaths annually (3/1,000,000 person-years).

In conclusion, gastroenteritis-associated mortality has more than doubled during the past decade, primarily affecting the elderly population. Clostridium difficile is the main contributor to gastroenteritis-associated deaths and norovirus is probably the second leading infectious cause. These findings can help guide appropriate clinical management strategies and vaccine development.


Norovirus is considered to be a major cause of acute gastroenteritis in children world-wide. This prospective study was undertaken to investigate the frequency and clinical features of norovirus infections in children aged less than 5 years with acute gastroenteritis in Greece.

Routine stool samples were obtained from 227 children with acute gastroenteritis who attended a tertiary pediatric hospital in Athens during the period November 2008-October 2009. All specimens were tested for the presence of norovirus, rotavirus and adenovirus antigens by enzyme-linked immunosorbent assay (ELISA).

In the total sample, norovirus was detected in nine (4.1%), rotavirus in 56 (24.7%) and adenovirus in five (2.2%) children. Three (1.3%) samples grew Campylobacter jejuni, while six (2.6%) samples grew Salmonella. In all cases, norovirus was detected as a unique viral pathogen. In norovirus-positive children who required hospitalization, the median duration of intravenous fluid administration was 3.5 days, and the median duration of hospitalization was 4 days, as in rotavirus-positive children.

These results suggest that norovirus is the second most common cause of community-acquired acute gastroenteritis in children in Greece, following rotavirus. We highlight the need to implement norovirus detection assays for the clinical diagnosis and prevention of viral gastroenteritis in pediatric departments.


In order to evaluate the effectiveness of rotavirus vaccination among young children in Belgium, researchers designed a prospective case-control study using a random sample from 39 Belgian hospitals. The study population consisted of 215 children admitted to hospital (February 2008 to June 2010) with rotavirus gastroenteritis, confirmed by polymerase chain reaction (PCR), and 276 age- and hospital-matched controls. All children were aged ≥14 weeks.

Ninety-nine children (48%) admitted with rotavirus gastroenteritis and 244 (91%) controls had received at least one dose of a rotavirus vaccine (P<0.001). Regarding hospital admissions, the unadjusted effectiveness of two doses of the monovalent rotavirus vaccine was 90% overall. The G2P[4] genotype accounted for 52% of cases confirmed by PCR. Vaccine effectiveness was 85% against G2P[4] and 95% against G1P[8]. In 25% of cases confirmed by PCR, there was reported co-infection with adenovirus, astrovirus and/or norovirus. Vaccine effectiveness against co-infected cases was 86%. Effectiveness of at least one dose of any rotavirus vaccine was 91%.

In conclusion, rotavirus vaccination is effective in preventing hospital admissions of rotavirus gastroenteritis among young children in Belgium, despite the high prevalence of G2P[4] and viral co-infection.


Post-infectious irritable bowel syndrome (PI-IBS) may develop in 4-31% of affected patients following bacterial gastroenteritis (GE), but limited information is available on the long-term outcome of viral GE. During summer 2009, a massive outbreak of viral GE associated with contamination of municipal drinking water (norovirus) occurred in San Felice del Benaco (Italy). To investigate the natural history of a community outbreak of viral GE, and to assess the incidence of PI-IBS and functional gastrointestinal disorders, the scientists carried out a prospective population-based cohort study with a control group.

Baseline questionnaires were administered to the resident community within 1 month of the outbreak. Follow-up questionnaires of the Italian version of the Gastrointestinal Symptom Rating Scale (GSRS) were mailed to all patients responding to a baseline questionnaire at 3 and 6 months, and to a cohort of unaffected controls living in the same geographical area, 6 months after the outbreak. The GSRS items were grouped into five areas: abdominal pain, reflux, indigestion, diarrhea and constipation. At month 12, all patients and controls were interviewed by a health assistant to verify Rome III criteria of IBS.

The study group consisted of 348 patients with a mean age 45 ± 22 years, 53% female. During the outbreak the most common symptoms were nausea, vomiting and diarrhea (66, % 60% and 77% respectively). On follow-up surveys returned at month 6 by 186 patients and 198 controls, the mean GSRS score was significantly higher in patients than in controls for abdominal pain, diarrhea and constipation. At month 12, 40 patients were identified with a new diagnosis of IBS, in comparison with three in the control cohort (P=0.0001).

In conclusion, this study provides evidence that norovirus GE leads to the development of PI-IBS in a substantial proportion of patients, similar to that reported after bacterial GE.
February 2012

22-24 February, 2013
Title: 13th Pan-Hellenic Congress of the Hellenic Society for Infectious Diseases
Country: Greece
City: Athens
Venue: Divani Caravel
Phone: +30 210 7223046
Website: http://www.infections2013.gr/

25-28 February, 2013
Title: Legionnaires' disease: risk assessment, outbreak investigation and control
Country: Hungary
City: Budapest
Venue: Health Protection Agency
Phone: +46 (0)8 586 010 00
Website: http://www.ecdc.europa.eu/en/Pages/home.aspx

27 February-1 March, 2013
Title: 6th National Congress of Clinical Microbiology & Hospital Infections
Country: Greece
City: Athens
Venue: Royal Olympic Hotel
Phone: +30 210 7213225

Outbreak news, January 2013

Cholera
Cuba [1]
As of 6 January 2013, there was an increase in acute diarrheal disease in the municipality of Cerro and other municipalities of Havana related to food handling. As of 14 January 2013, 51 cholera cases had been confirmed, all of which were characterized as *Vibrio cholerae* toxigenic serogroup O1, serotype Ogawa, biotype El Tor.

Dominican Republic [1]
Since the beginning of the epidemic in 2012, the total number of suspected cholera cases has reached 29,433, of which have 422 died. At the end of December 2012, cases were reported in the provinces of Duarte, Espaillat, La Romana, La Vega, Puerto Plata, San Pedro de Macoris, Monte Plata, Santa Domingo and the National District.

Haiti [2]
Since the beginning of the epidemic (October 2010) to 31 December 2012, the total number of cholera cases has reached 635,980, with 7,512 deaths. Cases have been reported officially in all 10 departments of Haiti. In Port-au-Prince, the country’s capital, 173,485 cases have been reported since the beginning of the outbreak. Cases in Port-au-Prince have been reported from the following neighborhoods: Carrefour, Cite Soleil, Delmas, Kenscoff, Petion Ville, Port-au-Prince and Tabarre.

References:
What are the steps to be taken in order to confront any type of epidemic, large or small. For this reason, according to the standards set by different state authorities in public health, the use of protective methods within the food industry or in places where processed, pre-cooked meals are prepared. The use of the afore-mentioned measures should be an integral part of the procedure for food preparation and dispatch and we must not forget that in this way we avoid many infections, not only viral gastroenteritis. Given that there is no vaccine for the prevention of noroviral gastroenteritis, the use of preventive measures becomes of even greater importance.

What is the role of HCDCP, especially when it comes to research, confrontation and prevention of viral epidemics?

HCDCP plays a very important role when it comes to confronting all epidemics, regardless of origin or cause. I remind you of the motivation for and the significant implication of confronting and diminishing epidemics and serious problems in public health, such as influenza, malaria and West Nile infection. But the role of HCDCP should not and is not restrained to large climax epidemics. It should co-ordinate all the efforts to monitor, research and carry out surveillance of smaller climax epidemics, such as viral gastroenteritis epidemics, and it should have a strategic plan for every pathogen that could cause small or large climax infections.

Let’s expand the subject a little bit. Do you consider it is possible to defend public health effectively now, during this economic crisis?

I believe that, particularly during such difficult times, the defense of public health is even more important because personal income is reduced and the government has cut back on expenses in public health. These cutbacks have to do mainly with expensive medication and hospitalization. In contrast, preventive measures for public health should be re-enforced. For this reason we should inform the public more regarding the preventive measures that are indicated for serious health problems, problems that can prove to be more expensive and difficult. We should all learn that prevention, apart from anything else, is cheaper than the cure. Imagine the cost of a seat belt in your car and compare that with the cost of the consequences if you don’t use it and have a serious car accident. Maybe the economic crisis is a chance for us to start using the much cheaper preventive measures that, unfortunately, we have forgotten all about.

How significantly can HCDCP and the university medical schools contribute in the above-mentioned move?

HCDCP, as we all know, has a mission, among other things, to co-ordinate all the authorities involved in order to prevent, monitor and confront infections and other diseases that can spread in the population. Its role, in times of economic crisis, should be re-enforced so that the diminished resources given for public health are divided better, thus stressing the application of preventive measures. The university medical schools could cover the gaps that could arise in the remit of public hospitals. Furthermore, they can provide the know-how and train health professionals in new methods and techniques that can be applied to prevention, diagnosis and control as far as infections and other epidemics are concerned.

What are the challenges, do you think, in these times of economic crisis, for health professionals and those who work in the field of public health?

The challenge is to be trained so that we can provide good-quality health services with less financial resources. We can definitely find cost-effective ways to confront disease without...
having to cut down on the quality of the health services. Within this framework it is important
to re-enforce prevention effectively, and the health services as well as the health professionals
should inform the public about that direction.

Finally, as we thank you for your time, could you please share with us some thoughts
about the future? What would you advise the younger scientists in the field of
microbiology and public health?

Microbiology in Greece has expanded, especially in laboratories. I wish and hope that this
continues, especially now that everything is automated and there is a stronger need to
approach problems more efficiently via clinical and diagnostic paths. I would urge young
microbiologists to become very well educated regarding the requirements of laboratory
medicine and to maintain a continuous co-operation with all clinical doctors and other
scientists in the field of public health. This would benefit the patient, as they could opt for the
best health controls and the best evaluation of the results. Thus the laboratory doctor can be
more efficient in the prevention, diagnosis and surveillance of any disease.

<table>
<thead>
<tr>
<th>Myths</th>
<th>Truths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral gastroenteritis is usually caused by enteroviruses</td>
<td>There are different types of viruses that can cause gastroenteritis. We most commonly come across rotavirus (especially type A), norovirus, adeno-virus (especially for serotypes 40 and 41) and astrovirus</td>
</tr>
<tr>
<td>Most gastroenteritis is caused by bacteria and parasites</td>
<td>Most is caused by viruses</td>
</tr>
<tr>
<td>Adults are most infected by viral gastroenteritis</td>
<td>People of all ages can be infected by viral gastroenteritis, but some viruses attack certain age groups. Rotavirus usually causes gastroenteritis in children under the age of 5, adeno- and astrovirus in children and adults. Noroviruses can attack all ages, most often in the form of an epidemic</td>
</tr>
<tr>
<td>Patients with viral gastroenteritis only suffer from diarrhea</td>
<td>Patients do have diarrhea, which is usually accompanied by abdominal pain, vomiting and fever. Usually the symptoms present 1-2 days after infection and normally last a few days</td>
</tr>
<tr>
<td>Viral gastroenteritis is a serious, health-threatening disease</td>
<td>For most people it is not a serious disease. It does not require treatment or hospitalization. Patients usually self-heal. However, older people, children and some immunosuppressed patients are in danger of dehydration, which is the most common complication</td>
</tr>
<tr>
<td>It is not contagious</td>
<td>Viral gastroenteritis is a contagious disease. It spreads directly from one patient to another through the entero-oral route. Furthermore, it can spread through infected food and water</td>
</tr>
<tr>
<td>Gastroenteritis appears more often during the summer period and usually in quite warm climates</td>
<td>Viral gastroenteritis spreads world-wide but each virus has its own seasonal distribution. In mild climates, during winter months, most cases are caused by rotavirus and astroviruses, whereas infections by adeno-viruses appear the whole year round. On the other hand, gastroenteritis caused by noroviruses does not seem to have a seasonal distribution</td>
</tr>
<tr>
<td>Diagnosis of viral gastroenteritis is carried out by a clinical doctor</td>
<td>The suspicion of gastroenteritis is raised by the clinical doctor. Confirmation of a viral cause comes from microbiological laboratories, via methods of instant detection of the virus in patient excrement</td>
</tr>
<tr>
<td>We do not have to take any steps towards its prevention</td>
<td>Observing rules of personal hygiene and sterilizing infected surfaces are the main factors in the elimination of gastroenteritis infection. For the prevention of infections caused by rotavirus in children, there is a vaccine</td>
</tr>
</tbody>
</table>
The customary ‘cutting of vasilopita’ in HCDCP

The traditional celebration of the cutting of vasilopita, associated with the feast of New Year’s Day, was held on 18 January 2013 at the conference center of the Hellenic Center for Disease Control and Prevention (HCDCP). The event was attended by the President of HCDCP, Mrs J. Kremastinou, the General Secretary of the Ministry of Health, Mrs Ch. Papanikolaou, members of the board and numerous associates.

References:

S. Levidiotou-Stefanou, Professor of Microbiology, University of Ioannina
Quiz of the month

How did norovirus come by its name, and when was it detected?

Send your answer to the following e-mail: info-quiz@keelpno.gr

The answer to December’s quiz was: The question referred to fatality, and many of our readers gave influenza as the answer. However, influenza has a low fatality but a high mortality because of its high morbidity. The disease with the highest fatality rate is pneumococcal pneumonia.

One person answered correctly.