



MEETING REPORT

Expert forum on communicable disease outbreaks on cruise ships

Stockholm, 28–29 September 2009

Executive summary

Outbreaks of communicable diseases on cruise ships have been detected with increasing prevalence among ships sailing in European waters and have been associated mostly with respiratory, enteric and vaccine preventable pathogens. Modes of transmission associated with cruise ship outbreaks include foodborne, waterborne, environmental and person-to-person. The recent emergence of new variants of *noroviruses* in Europe and worldwide have led to large scale and sustained *norovirus* outbreaks on cruise ships among crew and passengers.

Concurrently, the European cruise ship market and annual passenger embarkations have grown in recent years. In addition, the introduction by the World Health Organization (WHO) of International Health Regulations 2005 (IHR 2005) with enhanced reporting requirements for port health authorities (PHAs) has necessitated enhanced response to outbreaks with participation by multiple stakeholders.

In response to the growing need for coordinated measures to assess public health issues related to passenger ships, the European Centre for Disease Prevention and Control (ECDC) is supporting the European Commission (EC) as a collaborating member and part of the Advisory Committee of the SHIPSAN Training Network (SHIPSAN TRAINET) project. This collaboration aims to strengthen capacity for the prevention and control of infectious disease outbreaks on passenger ships.

Through the work of SHIPSAN and SHIPSAN TRAINET, the need for clear procedures for outbreak detection, reporting, investigation and control was demonstrated, which should be agreed upon at the European level and made available to the health authorities in the Member States as well as to the cruise ship industry. For this reason a meeting was organised by ECDC, with the participation of European and international experts, to identify the main elements required for outbreak detection and control on cruise ships in European waters.

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1 Scope and purpose

The purpose of the expert forum included the following:

- to review the main elements regarding the detection of, and response to, communicable disease outbreaks on cruise ships sailing in European waters in order to improve collaboration and structured communication in case of outbreak investigations on cruise ships;
- to discuss critical issues and identify gaps to improve detection, response and control of communicable disease outbreaks on cruise ships sailing in European waters; and
- to use findings from the meeting to propose a cruise ship-specific module for the 'Guiding Principles for Response to Public Health Threats related to Communicable Diseases at EU Level'.

1.1 Objectives

Specific meeting objectives included the following:

- to review relevant information and experience pertaining to infectious disease identification and outbreaks on cruise ships, in accordance to the EU legal framework for surveillance and control of communicable diseases;
- to review existing reporting and surveillance systems for the purpose of using established communication channels and communication networks where possible;
- to define the roles of the different stakeholders, and clarify responsibilities of all actors;
- to clarify communication structures, requirements and channels of information exchange, and identify gaps and areas for improvement; and
- to provide the main elements of guiding principles for the detection and response to communicable disease outbreaks on cruise ships.

2 Expert presentations

In the introduction, the ECDC's mandate and history of its three-year collaboration with SHIPSAN and SHIPSAN TRAINET were reviewed; the focus of the meeting was presented along the following themes:

- the improvement of cruise ship associated threat response;
- the coordination among stakeholders of outbreak detection; and
- the role of ECDC in supporting response.

2.1 Presentation summaries

2.1.1 Situational analysis of communicable diseases on cruise ships in Europe (Prof. Chris Bartlett)

The European cruise ship market and the number of annual embarkations have grown. By 2008 in Europe, there were 66 cruise lines comprised of 192 ships with the capacity for 187 000 passengers. Forty-two cruise lines are domiciled within EU Member States and 24 in non-EU countries, and from 2006 to 2009 the European market has grown by 41%. Approximately 320 million ferry passengers and 5.2 million cruise ship passengers passed through EU ports in 2007. The increase in the number of passengers embarking in Europe was 9% between 2007 and 2008.

A summary of recent outbreaks in Europe and associated pathogens was presented. Between 2005 and 2009 outbreaks of shigellosis, measles, Legionnaires' disease, *norovirus* and varicella were reported on cruise ships. In 2008, there were eight outbreaks of varicella reported on five ships. Additionally, there were two outbreaks of 2009 pandemic influenza A(H1N1) reported in the press in 2009: one on a Baltic cruise and one in the Mediterranean. Norovirus outbreaks on land and sea are increasingly associated with gastroenteritis and have been frequently detected on cruise ships. These events were reported through the Early Warning and Response System (EWRS).

The following factors contribute to the need for enhanced surveillance of communicable diseases on cruise ships: frequency of disease cases and outbreaks reported; increasing numbers of cruise ships and ferries sailing in European waters; inadequate surveillance of diseases on ships; and variability of ship inspection findings regarding sanitation and hygiene.

2.1.2 SHIPSAN TRAINET presentation on a proposed communication network for outbreak detection and alerts on cruise ships (Dr. Christos Hadjichristodoulou)

Under the revised International Health Regulations (IHR 2005, Article 28 p.4), cruise ships are obliged to report the occurrence of any unusual health event (any cases of illness indicative of a disease of an infectious nature or evidence of a public health risk on board) as soon as such illnesses or public health risks are known and before arrival at the next port of call. This is done by submitting, in advance, the maritime declaration of health (MDH) to the local PHA under IHR Article 37; however, this is not uniformly required by all EU Member States. In addition the MDH does not collect standardised information and it is difficult to retrieve and analyse the data collected. Additionally, information on case management or outbreak control measures is not systematically included in the MDH.

After receiving the MDH, PHAs may then investigate the event or initiate inspections, and report the event through the national reporting channels to the national surveillance system. A survey administered by SHIPSAN found that 51% of competent authorities investigated every reported outbreak on a ship, 75% stated that there were gaps in communicable disease surveillance, and 65% of the responding authorities within the EU stated that specific training on surveillance and outbreak management was needed. It was concluded that there is an overall underreporting of communicable diseases occurring on board of cruise ships and ferries in European waters.

In response to the findings of the survey, SHIPSAN TRAINET is developing web-based reporting and communication tools to facilitate ship-to-port reporting and port-to-port communication. Ships would report cases, clusters and outbreaks of defined diseases as well as influenza-like illness and gastroenteritis cases to the next port of call and to a central database created by SHIPSAN TRAINET. SHIPSAN TRAINET recommendations related to outbreak detection, surveillance and response include the establishment of an integrated surveillance system, specific outbreak definitions, specific guidelines for prevention and management of gastroenteritis, and general guidelines on outbreak management.

The planned communication network will go into a pilot phase including Greece, the United Kingdom, Germany, France, Spain, Poland, Estonia and the Netherlands. The issues to be addressed during this pilot phase include the following: the coordination of the network; the legal basis for network activities and for sharing public health information among PHAs; outbreak investigation and management support; and further guidance by WHO on IHR implementation as it relates to cruise ships and reporting.

2.1.3 An overview of the United States' program for outbreak detection and response related to cruise ships sailing into the US (Dr. Elaine Cramer)

Since 2002, with the emergence of *noroviruses* linked with person-to-person and environmental transmission, there has been an associated rise in the incidence rates of gastroenteritis on cruise ships. Concurrently, the fleet sizes of major cruise lines have grown, with increasing numbers of passenger embarkations per year and larger, more complex vessels at sea. Bacterial foodborne outbreaks continue to occur as well; still, outbreak incidence associated with bacterial pathogens has declined since the 1990s.

In the United States, half of the approximately 10 million passenger embarkations occur in the state of Florida. The Vessel Sanitation Program inspects more than 200 cruise ships annually and approximately 118 unique vessels. Median cruise ship inspection scores continue to improve in the US, with a median inspection score of approximately 97 (out of 100) since 2008. The Vessel Sanitation Program is transparent; scores, inspection violations and corrective action statements all appear on the CDC web site for the general public*.

Authority for the collection of public health information from cruise ships falls under Foreign Quarantine Regulations in the United States. Radio reports of deaths or illnesses are required by the master of a ship destined for a US port. There are recent updates to federal quarantine laws allowing for the expansion of communicable disease reporting. States traditionally invite federal authorities to investigate cruise-ship related cases when cases of disease are identified among passengers who have already returned to their home states at the time of identification.

In the United States, both State laboratories and the CDC laboratory in Atlanta can conduct analyses of diagnostic specimens collected from passengers and crew on cruise ships. Protocols are standardised and national databases are used to store and compare results (e.g. PulseNet compares pulsed field gel analysis patterns among bacterial isolates).

* Information is available at <http://www.cdc.gov/nceh/vsp/operationsmanual/OPSMannual2005.pdf>.

3 Case studies

Two case studies were presented as a springboard to discuss the steps and elements to be undertaken for identification, response, and control of cruise ship outbreaks.

An outbreak of *Salmonella* Oranienburg aboard a vessel sailing on a six-day itinerary from Florida through the Caribbean was presented. It affected passengers that had been identified retroactively through laboratory-confirmed reports from three US states. The outbreak highlighted the limitations of conducting retroactive outbreak investigations including recall bias, difficulty compiling a passenger manifest, low response rates, and the inability to collect additional diagnostic specimens.

A second case study of a 2009 pandemic influenza A(H1N1) outbreak among crew members was also presented. The outbreak highlighted the challenges associated with processing large quantities of clinical specimens. It also identified the following key components for outbreak control: the rapid response required to investigate an outbreak in real-time aboard a vessel; the coordination required to collaborate with the cruise industry during an outbreak response; and the efforts of the cruise industry.

Multiple levels of authorities and numerous agencies and stakeholders are required for communication during a large scale effort to transport investigators to a ship. Furthermore, in order to conduct hypothesis generating interviews with crew and passenger cases to compile a survey tool and disseminate and collect a survey in real-time, participation by the cruise line is crucial.

4 Participants' discussions

4.1 Specificity of the European context

One of the main challenges in Europe is the amount of diverse approaches from the 27 Member States. While in the US the number of ports involved in the traffic of cruise ships is small—with one main port that receives half of the total number of ships—in Europe the traffic is more dispersed and one route can often include several countries.

Reporting of and response to communicable disease outbreaks on passenger ships in Europe include various levels (member state public health and PHAs, regional authorities, national authorities, EWRS and the EC). While responsibility for intra-country outbreaks is clear for the respective Member States, this is not the case when several countries are involved depending on the itinerary of the ship and the nature of the disease. Efforts to effectively respond may lead to multiple requests to cruise lines for similar information from different Member States' authorities.

Criteria for notification to national authorities may differ amongst countries, as well as guidelines for response and control measures including quarantine, screening or disembarkation restrictions. Individual regulations for onboard inspections also vary from country to country and are the responsibility of Member States.

4.2 Cruise industry comments

A number of local and port authorities in the Member States do not necessarily notify national authorities when infectious diseases and outbreaks are reported on vessels. Decisions for notification from PHAs to additional, higher in-country authorities vary significantly among Member States and are not always based on science or epidemiology. There is a need for consistency at each level of reporting and response. Cruise lines are discouraged from disclosing accurate case counts and specific diseases associated with passengers and crew for fear of public health quarantine or denial of disembarkation of passengers in scheduled ports of call.

Some cruise line companies have their own medical services and public health staff to deal with outbreaks on their fleet. Often their interventions are very timely and already in place before the national systems can react. However, ship medical services and cruise line companies would appreciate additional feedback from the competent authorities in order to coordinate their response and satisfy public health authority requests. The cruise industry would also appreciate guidance on media management and press releases during investigation of and response to outbreaks by public health authorities.

4.3 Port health authorities' capacities and experience

While some local PHAs are very experienced in both ship inspection and outbreak response, other authorities rarely see outbreaks and have less expertise in public health responses to communicable diseases threats. The communication between authorities in different ports as well as the reporting of communicable disease information to next ports of call by Member State authorities is not standardised or systematic. Some ports are not always available at short notice to respond to emergent public health events while others have more manpower and staff that can be mobilised to respond. The participants therefore welcomed and supported the web-based communication tool that SHIPSAN has proposed to facilitate ship-to-port and port-to-port communication.

4.4 Reporting, assessment and response

So far the only mandatory standardised reporting form for health events is the MDH (ship to next port of call) that is a requirement under IHR 2005 Article 37, but not uniformly required at all EU ports, especially not in large harbours with intensive traffic. Port health authorities will then decide on further reporting through the national surveillance system on inspections and possible outbreak investigations, and give interim recommendations for control measures to the ship. However, the MDH provides limited information and does not necessarily trigger any response from the PHAs. Further guidance on which actions to take in accordance to the information provided on the MDH would be useful to ensure rapid assessment and response to outbreaks.

Criteria requiring in-country PHAs to report an event to the next level of national authorities are not always clear or practiced uniformly by participating PHAs. In case of a ship touching multiple ports in more than one country during an onboard outbreak, it is not always clear which authority in which country will have the responsibility or take the lead in investigation and control measures. For multi-Member State outbreaks in general (not specifically related to passenger ships), ECDC developed "Guiding principles for response to public health threats related to communicable diseases", which were agreed upon by the Member States and the European Commission. These guiding principles lay out the key issues for providing support to the countries involved in an event, for facilitating the coordination of the investigation and the exchange of communications between the countries, as well as the mobilisation of European expertise as needed.

SHIPSAN TRAINET is developing a program to facilitate the inspection and reporting of ships to PHAs to facilitate the exchange of inspection data among PHA in different countries on surveillance and response issues (for better coordination of control of outbreaks on ships and PHA response). However, experts estimated that this programme could not replace a binding EU guidance regarding criteria for an initial assessment of the public health importance of a reported event by the PHAs or for the decision on reporting to the national authorities and agreed procedures for investigations and control measures. These criteria, including methods and thresholds for assessment for most pathogens, would need to be developed and agreed upon by all relevant stakeholders.

The experts emphasised that reporting should, in any case, be done within already existing systems like IHR (2005) with the MDH, national surveillance systems, the European surveillance system (TESSy), and EWRS. The experts suggested that separate reporting systems are to be avoided in order to prevent duplication of work, to ensure coherent reporting and compatibility of data collected, and, with a long-term view, to guarantee the sustainability of any reporting scheme relating to outbreaks on cruise ships.

4.5 Proportionality and timeliness

The expert forum emphasised that control measures need to be proportionate to the threat posed by the event; therefore assessment criteria need to be evidence based and transparent. Timeliness of decisions, investigations, and response is important and needs to be guaranteed in order to minimise the impact on cruise ships and passengers, and to be able to contain and control outbreaks of public health importance or with the potential of international spread.

4.6 Training

Training needs of PHAs are assessed by SHIPSAN in order to ensure adequate assessment and reporting and coherent implementation of appropriate control measures. This can be done by national authorities with the support of the SHIPSAN TRAINET project and ECDC. In the area of surveillance and outbreak investigation, ECDC could provide support in the development of training materials and in the identification of facilitators that can teach in the courses that SHIPSAN TRAINET will organise.

4.7 Cooperation with the cruise line industry

It was also stressed that the communication about outbreaks, investigations and measures should include the cruise ship companies and their medical and public health services. They can be strong partners for investigations and are often on the frontline collecting data and implementing measures.

5 Conclusions, recommendations and next steps

5.1 Network and information exchange

A number of challenges are inherent to the coordination of response and control of outbreaks on ships sailing in European waters. Given the complexity of the European context regarding common standards, guidelines, and communication between authorities at different levels in different countries, coherent procedures are considered necessary.

ECDC, SHIPSAN TRAINET and Member State connections and collaborations need to be further strengthened in order to ensure that what is developed is consistent with the existing reporting framework in the EU, and could provide training and support to PHAs. Both the EWRS and any new platform for exchange of epidemic intelligence information are potentially viable networks that can enhance communication from Member States to EC, ECDC and other Member States.

In addition, ECDC can draw on the existing laboratory and disease specific networks to provide support to the Member States and their public health authorities regarding the response to outbreaks on passenger ships.

5.2 Coordination

The expert meeting agreed that coordination at the European level to oversee and coordinate outbreak detection and control on passenger ships was felt to be useful and needed. The focus of this coordination would include building relationships among network stakeholders, collaborating closely with the Competent Bodies in the Member States, stimulating transparency and facilitating communication and dissemination of information for public health action. In addition the need for common guidelines, epidemiologic and laboratory capacity within the cruise network, risk assessment capacity and collaboration with environmental and occupational health agencies and other players, was expressed.

5.3 Training

Because of the variability in capacities, experience and resources available in Member State PHAs, education and training are critical to the coordination of cruise ship outbreak detection, reporting and response in Europe. SHIPSAN TRAINET will produce training materials and training modules to be used by the Member States, and can be supported by ECDC, the European Program on Intervention Epidemiology Training (EPIET), and national field epidemiology training programs.

5.4 Guidance documents

The expert forum suggested that communications between PHAs and national authorities in each Member State are supported through technical guidance and procedures on communication among authorities, management of diagnostic specimens, establishment of thresholds for outbreak response, and interim recommendations for containment and control of outbreaks. Industry and PHAs would welcome receiving guidance for coordinated media management.

5.5 Next steps

As part of the “Guiding principles for response to public health threats related to communicable diseases”, ECDC will develop a module on the specifics for cruise ship settings.

SHIPSAN will update the database of points of contact for Member State PHAs, national authorities, competent authorities, stakeholders, cruise and ferry industry contacts and laboratory and pathogen-specific network contacts.

A simulation exercise between the main stakeholders will be organised to test the specific roles and responsibilities in the EU during an outbreak on cruise ships.

Appendix 1: List of participants

Name	Organisation	Country
Chris Bartlett	Health Protection Agency	United Kingdom
Helen Bernard	Robert Koch-Institut	Germany
Nicol Black	EU SHIPSAN TRAINET Project	Greece
Denis Coulombier	Preparedness and Response Unit	ECDC
Alex Cox	Preparedness and Response Unit	ECDC
Elaine H Cramer	US Centers for Disease Control and Prevention	USA
Miguel Dávila Cornejo	Ministry of Health and Social Policy	Spain
Evelyn Depoortere	Preparedness and Response Unit	ECDC
Art Diskin	Royal Caribbean Cruises Ltd	USA
Christos Hadjichristodoulou	EU SHIPSAN TRAINET Project	Greece
Boris Kopilovic	National Institute of Public Health	Slovenia
Barbara Mouchtouri	EU SHIPSAN TRAINET Project	Greece
Gordon Nichols	Health Protection Agency	UK
Androula Pavli	Hellenic Centre for Disease Control and Prevention	Greece
Sybille Rehmet	Preparedness and Response Unit	ECDC
Jelena Rjabinina	Health Protection Inspectorate	Estonia
Marianne Siebbeles	National Institute for Public Health and the Environment,	The Netherlands
Mel Skipp	Public Health Manager	UK
Johanna Takkinen	Surveillance Unit	ECDC
Carmen Varela Santos	Preparedness and Response Unit	ECDC
Steve Williams	Royal Caribbean Cruises Ltd	USA

Appendix 2: Meeting agenda

Tuesday, 28 September 2009

Day 1

09:00—09:30	Welcome and introduction
09:30—10:00	Communicable diseases on cruise ships in Europe: situation analysis
10:00—10:30	EU rules and regulations for infectious disease reporting requirements on ships
10:30—11:00	<i>Coffee break</i>
11:00—12:00	ShipSAN TRAINET: update and results of the pilot testing of the manual
12:00—13:00	<i>Lunch</i>
13:00—14:30	Outbreaks on cruise ships—what are the essentials for successful detection, investigation and control?
14:30—17:30	Gastroenteritis Case study

Wednesday, 29 September 2009

Day 2

09:00—09:30	US program overview
09:30—11:00	Case study on H1N1v outbreak investigation on a cruise ship in Alaska
11:00—11:30	<i>Coffee break</i>
11:30—12:30	Discussion
12:30—13:00	Conclusions, next steps

Appendix 3: List of abbreviations

CDC	US Centers for Disease Control and Prevention
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
EPIET	European Program on Intervention Epidemiology Training
EU	European Union
EWRS	Early Warning and Response System
IHR	International Health Regulations
MDH	Maritime Declaration of Health
PHAs	Port health authorities
SHIPSAN TRAINET	Ship sanitation training network
TESSy	the European surveillance system
WHO	World Health Organization