

## Case definitions for investigation of international FWD outbreaks

### ***Constructing a case definition***

A case definition is needed to conduct effective case finding and establish whether a patient is linked to the outbreak under investigation or not. A case definition should include the following components:

- A restriction by “time”, to define a period of time during which cases of illness are considered to be associated with the outbreak.
- A restriction by “place” – for example, limiting the group to patrons of a particular restaurant, attendees of a conference or meeting, or residents of a particular town
- A restriction by “person” which may include:
  - personal characteristics – such as defined population groups, for example certain age groups
  - A restriction by clinical and laboratory criteria that define whether a person has the illness under investigation; the clinical features should be significant or hallmark signs of the illness
  - Restrictions based on demographic criteria such as age or sex

### ***Case definitions for international FWD outbreak investigations***

International FWD outbreak investigations pose some specific challenges compared to local or national outbreaks;

- restriction by place is difficult, when cases occur in several countries
- a sensitive clinical case definition will be ineffective since the most common FWD symptom is diarrhoea.

Therefore, compared to case definitions used at the national or sub-national level which can be rather sensitive (i.e. based on clinical symptoms and some laboratory results), case definitions in international FWD outbreaks will almost always depend on laboratory results in order to establish a link between cases from different countries. Mostly case definitions will only include laboratory confirmed cases, and results from molecular typing methods are also often needed in the criteria to give a sufficiently specific case definition (see also [tool 7](#) on laboratory considerations). In some situations, such as in the case of an outbreak at a hotel or mass gathering, laboratory confirmation may not be included in the case definition. Similarly, outbreaks of botulism or HUS will often have case definitions based on clinical description rather than laboratory confirmation.

## Procedure for making case definition in international FWD outbreaks

Some descriptive epidemiology data is already available when a possible international FWD outbreak is declared. Additional information can be collected in the outbreak information template ([Tool 2](#)), such as recent travel history or specific population characteristics (i.e. age group, gender, risk population).

Review of this data should enable a provisional definition of an outbreak case to be formulated, in terms of:

- TIME: the beginning of the outbreak period,
- PLACE: the countries affected.
- PERSON: the characteristics of the pathogen

The different contexts in which food- and waterborne outbreaks with an EU dimension occur also have implications for determining case definitions, and the case definitions may need to be revised if new information becomes available during the investigation about the pathogen or suspected sources. Some specific considerations concerning these are briefly outlined below:

### ***FWD incidents related to exposure in multiple countries***

An outbreak may occur in one country while the incriminated food originates in another country. Including the subtype in the case definition may be needed to confirm whether cases occurring in other countries belong to the same outbreak. This is especially important for pathogens that are isolated frequently, such as certain salmonella serovars and Listeria serotypes. If a suspected food product is distributed to some specific countries, information about the outbreak may be sent to countries potentially experiencing the outbreak to check whether they have observed a recent increase in number of cases caused by the outbreak specific pathogen (see also tool 4 on case finding).

Countries may simultaneously unknowingly initiate separate outbreak investigations on the same outbreak, resulting in different case definitions being used. The recognition of connected outbreaks may be delayed due to inconsistent laboratory practices between countries (such as some microbiological tests routinely performed in some countries while not in others). In order to combine results from several countries, different case definitions for laboratory confirmation may be used. For instance:

- Confirmed: include molecular typing data. This can include different typing methods (MLVA, PFGE etc) as long as they are in use nationally (ideally internationally) and standardized. If different methods are used in different countries, it may be necessary to send a subset of isolates between countries in order to check that the typing results are consistent (i.e. that the MLVA outbreak pattern in one country is consistent with the PFGE outbreak pattern in another country)
- Probable: depending on background level; only species or subspecies

Until the source is determined, there might be outbreak related cases occurring that are not included in the original case definition. In order to measure if cases are still occurring linked to a suspected

product, the case definition may be revised in order to include also those related to other pathogens that have been identified in the product (see example in box 3 below).

**Examples from FWD outbreak investigations linked to contaminated internationally distributed products illustrating the above mentioned issues:**

**Box 1. Example of a case definition used in the investigation of an E. coli O157 VTEC outbreak linked to an internationally distributed product (lettuce).**

Netherlands: An isolate matching the outbreak fingerprint (typed by PFGE, using XbaI as the restriction enzyme) for at least 95% and the date of onset of symptoms later than 1 September 2007.

Iceland: all domestically acquired STEC O157 infections with onset of symptoms after 1 September 2007, pending PFGE and testing for stx1 and stx2 genes.

*\* Netherlands case definition missing 'place'*

[Friesema et al. Eurosurveillance 2008, 13:50](#)

**Box 2. Example of a case definition used in the investigation of a Salmonella outbreak linked to an internationally distributed product (rucola lettuce).**

Norway: a person with a laboratory confirmed Salmonella Thompson infection, between October 1 and December 31, 2004, in Norway.

Other countries: Salmonella Thompson submitted to Salm-Gene database (STMPXB.0001, STMPXB.0002, STMPXB.0003, STMPXB.0004 and STMPXB.0005\*).\*\*

*\* These profiles are all very similar (95% similarity, UPGMA), but with significant band differences occurring within specific regions of the gel. However, other isolates (mainly related to travel to Asia and Africa) were markedly different.*

*\*\* Other countries case definition missing 'place' and 'time'*

[Nygård et al. Foodborne Pathogens and Disease 2008, 5;2: 165-173](#)

**Box 3. Example of a case definition used in the investigation of a Salmonella outbreak linked to an internationally distributed product (peanut products).**

Australia: any person reported to health authorities infected with *S. Stanley* or *S. Newport* who had acquired their infection in Australia after May 2001, and the isolate was sensitive to all antibiotics tested.

Canada: cases with symptoms of vomiting, abdominal cramps, fever or diarrhoea and a stool culture positive for *S. Stanley* with the SSTAXB.0002 PFGE profile.\*

England, Wales and Scotland: someone who had acquired *S. Stanley* or *S. Newport* with the characteristic SSTAAXB.0002 or SNWPXB.0030 profiles in England, Wales or Scotland after July 2001.

Investigators in each country reviewed national Salmonella surveillance data-sets for cases infected with other serotypes isolated from peanut products that were potentially related to this outbreak.

\* *Canada case definition missing 'time' and 'place'*

[Kirk et al. Epi Inf 2004; 571-7](#)

**Box 4. Example of case definitions used in two investigations of a Hepatitis A outbreak linked to an internationally distributed product (sun-dried tomatoes).**

France: Confirmed: Resident of France and infected with the outbreak strain.

Probable: Resident of south-western France and with a locally acquired infection positive for HAV immunoglobulin M against HAV with onset during November 1, 2009-February 28, 2010.

[Gallot et al., Emerging Infectious Diseases 2011;17\(3\)](#)

Netherlands: all reported hepatitis A infections in the Netherlands with date of onset of disease from 15 December 2009 until present, with viruses with an identical sequence in a fragment of the VP1-2A region.

[Petrigani et al. Eurosurveillance 2010; 15\(11\)](#)

\* *France confirmed case definition missing 'time'*

***FWD outbreak related to exposures in one country***

FWD outbreaks related to exposures in one country include those related to food and water consumed or sold at tourist locations, international mass gatherings or events, transportation vehicles or on other international travel.

In addition to person characteristics and laboratory results, case definitions for FWD outbreaks linked to international travel may be more specific on time and place:

### **Tourist location / specific travel destination / transportation vehicle**

Should include the location of suspected infection (hotel, resort, area, restaurant, marketplace, transportation vehicle etc) and time of visit

### **Mass gatherings or events**

Should reflect the location of the event and the timeframe in which cases could have been infected. In addition, the case definition may need to provide for the fact that mass gathering participants will potentially be dispersed before detection of an outbreak.

#### **Example from FWD outbreak at a tourist location:**

##### **Box 5. Example of a case definition used in the investigation of an E. coli O157 VTEC outbreak linked to a tourist location.**

Confirmed case: An individual who had stayed in Fuerteventura during March 1997 and had any one of the following: VTEC O157 (same as STEC O157) isolated in stool, clinical HUS or serological evidence of recent VTEC O157 infection.

Probable case: An individual who had stayed in Fuerteventura during March 1997 who presented with bloody diarrhoea with no laboratory confirmation of VTEC O157 infection

[Pebody et al. Epidemiol. Infect. 1999 123: 217-223](#)

#### **Example from a FWD outbreak at a mass gathering:**

##### **Box 6. Example of a case definition used in the investigation of a suspected Salmonella outbreak linked to mass gathering or event.**

A case was defined as diarrheal illness in a conference attendee or accompanying family member, with illness lasting 2 or more days and onset occurring from 6 November 1996 to 9 November 1996.

[Shane et al. Int J Infect Dis 2002; 6: 98-102](#)

**Example from a FWD outbreak in connection with international travel:****Box 7. Example of a case definition used in the investigation of a *Shigella sonnei* outbreak linked to international travel.**

Confirmed case: Illness in a passenger who departed Honolulu by air on 22-24 August 2004, and who had *S. sonnei* stool culture-positive diarrhoea within 7 days afterwards.

Probable case: Diarrhoea during the 7 days after departure from Honolulu in a passenger who was on a flight on which at least one confirmed case had been identified.

[Gaynor et al. Epidemiol. Infect 2009 137:335-341](#)

More examples of case definitions extracted from scientific publications of international FWD investigations are included in the [outbreak overview table](#).