The early warning committee was established in order to recognise threats to public health caused by infectious diseases in the Netherlands in a timely and complete fashion. This article describes the outcome of a retrospective and descriptive evaluation into the completeness of the recognitions made by the early warning committee.

Information about outbreaks of infectious disease in the Netherlands in 2002 and 2003, as reported in the Nederlands Tijdschrift voor Geneeskunde (Dutch Journal of Medicine), and about infectious disease events in other countries, was compared with reports of the regular weekly meetings of the Dutch early warning committee. If an outbreak or a foreign event was not mentioned in the meetings of the early warning committee, the cause for this was established. For events in other countries, it was established on the basis of whether or not the event could have been a threat to public health caused by infectious diseases in a timely and complete fashion. If necessary, further outbreak investigation can be done, or mentions of outbreaks can be made by the early warning committee.

All outbreaks of infectious disease in the Netherlands, published or mentioned in the Nederlands Tijdschrift voor Geneeskunde were discussed by the early warning committee. Three of the events occurring in other countries in 2002 had not been discussed by the committee although, based on the criteria for a potential threat to the Netherlands, they should have been: the outbreak of avian influenza A/HSNI in domestic fowl in Hong Kong, the increase in the number of patients with carriers of extended-spectrum β-lactamase producing micro-organisms in Scotland, and outbreaks of measles in several countries. In 2003, all events in other countries that could have posed a threat to the Netherlands were discussed by the early warning committee.

In 2002 and 2003, the early warning committee recognised nearly all threats due to infectious diseases and outbreaks of infectious diseases which were of national importance and published in various sources of literature.

Key words: early warning, threats, public health, infectious diseases

Introduction

Threats to public health caused by infectious diseases usually appear without warning, but can have major consequences within a very short period of time. Recognition of these threats is essential [1]. The early warning committee was established in the Netherlands in 1999 under the authority of the Inspectie voor de Gezondheidszorg (Health Care Inspectorate). Its main task is to assess information from various sources, both foreign and national, in order to recognise threats to public health caused by infectious diseases in a timely fashion. If necessary, further outbreak investigation can be done, or measurements to control the outbreak can be taken [2, 3].

The weekly meeting of the early warning committee takes place at the Rijksinstituut voor Volksgezondheid en Milieu (RIVM, National Institute for Public Health and the Environment). The participants are microbiologists and epidemiologists from various departments of the RIVM, including the Landelijke Coördinatiestructuur Infectieziektebestrijding (LCI, National Coordination Centre for Outbreak Management), as well as representatives from the Voedsel en Waren Autoriteit (VWA, Food Safety Authority). Prior to the meeting, each participant selects, from various sources of information, items that could pose a threat to the Netherlands. The early warning committee discusses these events in a timely and complete fashion. If necessary, further outbreak investigation can be done, or mentions of outbreaks can be made by the early warning committee.

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(known as ‘signals’) which in his or her opinion are important to discuss at the meeting [TABLE 1] [4]. There can be several reasons for selecting a signal. These are outlined in a protocol and are based on previous experience gathered by the RIVM. A sudden change in the incidence or prevalence of an infectious disease (e.g. the upsurge of West Nile virus infections), the appearance of an infectious disease among certain groups of people or in certain places (e.g. the lymphogranuloma venereum outbreak among men who have sex with men), or the emergence of a completely new or unknown disease (e.g. SARS) are some of the reasons mentioned [3]. During the meeting, the various signals are discussed and interpreted by the participants in order to estimate the threat for public health in the Netherlands.

On the same day, the RIVM sends a report of the meeting to about 500 people engaged in the control of infectious diseases in the Netherlands. They include physicians and nurses of the municipal health services, microbiologists, specialists in infectious disease, infection control practitioners, the Ministry of Health and the Inspectorate of Health. The report is formulated in such a way that signals are not reducible to persons, institutions or locations.

To fulfill its task properly, the early warning committee must recognize all important threats caused by infectious diseases. This article describes the outcome of a study into the completeness of the recognitions made by the early warning committee.

Methods

Information from other sources than those used by the early warning committee, were compared with the reports of the meetings of the early warning committee in order to assess how completely the committee had performed its task. The sources used for this study were different from the sources of information used regularly by the early warning committee. We focused on the years 2002 and 2003, because they saw a greater mix of minor, major, foreign and national threats caused by infectious diseases than the years immediately preceding or following [5-7].

Infectious disease events in the Netherlands

Using articles and news items published in the Nederlands Tijdschrift voor Geneeskunde (Dutch Journal of Medicine, NTvG) between January 2002 and June 2003, we gathered information about outbreaks of infectious diseases in the Netherlands that constituted a potential threat to public health. This is the only peer-reviewed general medical journal published in the Netherlands that has a wide distribution nationally. All outbreaks of national importance are published in this journal, either as an article or as a news item. We compared the information with the reports of the meeting of the early warning committee. If an outbreak had not been mentioned during the meeting, we tried to determine the reason for this.

Infectious disease events in other countries

Information about infectious disease events in other countries was gathered from the following sources:

- weekly bulletins from Belgium, England and Wales, Scotland, Norway and Germany, in which reports about infectious diseases were given. These bulletins are similar to the report of the early warning committee and are available on the internet (http://www.eurosurveillance.org/links).
- The ‘Infectious diseases surveillance update’ section in The Lancet Infectious Diseases. This is the only international journal with such a section, and is not one of the sources used by the early warning committee. The International Journal of Infectious Diseases has a similar section, but uses information based on ProMED-mail. ProMED-mail is one of the regular sources for the early warning committee, and therefore we did not use this journal for our investigation.

Information about events in other countries gathered from these sources was compared with the reports of the early warning committee. Subsequently, we determined whether those events that were not discussed during the meeting of the early warning committee could have been a threat for public health in the Netherlands, by answering two questions:

1) was there a possibility of importation and further dissemination in the Netherlands of the micro-organism mentioned? and/or

2) was there a possibility that the (potential) source of the infection mentioned was present in the Netherlands?

Results

Infectious disease events in the Netherlands

An overview of the outbreaks of infectious diseases which occurred in the Netherlands in the years 2002 and 2003, based on the information in the NTvG, and which constituted a potential threat to public health, is given in table 2. All outbreaks were also discussed in the meetings of the early warning committee.

Infectious disease events in other countries

Based on information from various sources as described above, for the year 2002 we found 122 infectious disease events in other countries. We compared these 122 events with the information from the reports of the early warning committee. Forty eight of these events were discussed during the meetings of the early warning committee. For the remaining 74, we tried to determine whether or not they represented a threat to public health in the Netherlands, defined by the two questions mentioned above. For three events, the answer to one or both questions was ‘yes’. These events thus represented a threat

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**Table 1**

**Sources of information used by the early warning committee**

<table>
<thead>
<tr>
<th>Domestic sources of Information</th>
<th>Foreign sources of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISIS (Infectious disease Surveillance Information System, an electronic system for notifiable diseases reported by Municipal Health Services, and for laboratory surveillance)</td>
<td>WHO Weekly Epidemiological Record</td>
</tr>
<tr>
<td>Weekly Virological Surveillance reports</td>
<td>WHO Disease Outbreak News</td>
</tr>
<tr>
<td>Surveillance of Influenza</td>
<td>WHO Outbreak Verification List (confidential)</td>
</tr>
<tr>
<td>National Reference Laboratory for Bacterial Meningitis (NRBM)</td>
<td>Eurosurveillance weekly release</td>
</tr>
<tr>
<td>Laboratories of the RIVM</td>
<td>European Early Warning and Response System (confidential)</td>
</tr>
<tr>
<td>National Coordination Centre for Outbreak Management (LCI)</td>
<td>ECDC Weekly Communicable Disease Threats Report (confidential)</td>
</tr>
<tr>
<td>Electronic reporting system Inf@ct (confidential)</td>
<td>Morbidity and Mortality Weekly Report (MMWR)</td>
</tr>
<tr>
<td>Food Safety Authority (VWA)</td>
<td>Other scientific literature (since February 2005)</td>
</tr>
</tbody>
</table>

* Besides these formal sources, people engaged in infection control in the Netherlands themselves can put forward signals to be discussed during the meeting of the early warning committee.
to public health in the Netherlands and ought to have been discussed by the early warning committee. The events were:

a) the outbreak of avian influenza A/H5N1 among poultry in Hong Kong;

b) the outbreak of extended-spectrum-β-lactamase (ESBL)-producers among hospitalised patients in Scotland;

c) outbreaks of measles in various countries (Republic of Ireland, Denmark, United Kingdom, Lithuania).

Seventy one of the 74 events not mentioned during the meetings of the early warning committee did not meet the criteria for a threat to public health in the Netherlands.

For the year 2003, 106 infectious disease events were identified in the various sources of information. Forty six of these 106 were discussed by the early warning committee. None of the remaining 60 events met the criteria for a threat to public health in the Netherlands and ought to have been discussed by the committee, each committee member represents a scientific network. These networks, and other people who regularly receive reports from the early warning committee, all contributed to the completeness of the information discussed during the meetings.

Our study into infectious disease events in other countries found that during the year 2002, three events that met the criteria for a threat to public health in the Netherlands were not discussed by the early warning committee. Together with the committee members who participated during 2002, we tried to reconstruct the reasons why these events were not discussed. The outbreak of avian influenza A/H5N1 among poultry in Hong Kong was probably not discussed because at the time there were no human cases. Today, with advanced understanding of the impact of avian influenza, such an event would most probably be discussed.

Another event that was not discussed during the early warning committee were the problems with ESBL-producing organisms in Scotland. ESBL is an enzyme capable of inactivating a broad spectrum of antibiotics. It is mainly produced by Gram negative bacteria, especially nosocomial Klebsiella spp [17,18]. This specific event was important, because ESBL production had spread among species, including E. coli and Enterobacter spp, as well as klebsiellas. Because of the restrictive usage of antibiotics, ESBL is not yet of major concern in the Netherlands, where incidence is low. However, it is an emerging problem, and in that sense, it should have been discussed during by the early warning committee. The results of this study were discussed with the participants of the early warning committee. During this discussion it was mentioned that, besides a lack of attention for emerging resistance to antibiotics, the early warning committee also does not give enough attention to hospital acquired infections.

A third event that met the criteria of a threat to public health in the Netherlands, but was not discussed by the committee, were various outbreaks of measles in different countries. These events were not discussed because they were limited in size, with only regional spread. Information about the outbreaks appeared most of the time at a fairly late stage of the outbreak, so that it was not useful any more to take any measures related to these outbreaks in the Netherlands.

Our study has some limitations. A threat to public health is not a well defined concept. We compared the signals mentioned in the reports of the early warning committee with published data in order to make completeness plausible. However, only major or unusual outbreaks or events are likely to be published. Events that were not published in the sources of information used in this study were not taken into account, nor was information about events that were not published at all. We cannot know whether or not such events could have been of national importance. However, health threats other than those mentioned in this study may have existed.

### Table 2

Overview of the outbreaks of infectious diseases which occurred in the Netherlands in 2002 and 2003, based on the information in the Dutch Journal of Medicine

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Outbreak of meticillin-resistant Staphylococcus aureus (MRSA) in two hospitals in the Rotterdam region [8]</td>
</tr>
<tr>
<td></td>
<td>Increase of infections due to Klebsiella pneumoniae serogroup C, [6,9]</td>
</tr>
<tr>
<td></td>
<td>Increase in the amount of outbreaks of gastro-enteritis (mainly caused by norovirus infection) [10]</td>
</tr>
<tr>
<td></td>
<td>Rise in sexually transmitted diseases (STD) [11,12]</td>
</tr>
<tr>
<td></td>
<td>Shigellosis as an STD among men having sex with men (MSM) [13]</td>
</tr>
<tr>
<td></td>
<td>Increase of pertussis [14]</td>
</tr>
<tr>
<td></td>
<td>Increase in the amount of cases of tick bites and Lyme borreliosis seen by general practitioners [15]</td>
</tr>
<tr>
<td>2003</td>
<td>Outbreak of avian influenza A/H7N7 [1]</td>
</tr>
<tr>
<td></td>
<td>Outbreak of lymphogranuloma venereum among MSM [16]</td>
</tr>
</tbody>
</table>

### Table 3

Examples of foreign events in the area of infectious diseases discussed at the meeting of the early warning committee and mentioned in several other sources of information, 2002 and 2003

- West Nile virus infections, United States (2002, 2003)
- Outbreak of respiratory tract infections combined with myocarditis/pericarditis caused by Coxsackie B virus, Greece (2002)
- Outbreak of measles, southern part of Italy (2002)
- First documented case of vancomycin resistant Staphylococcus aureus, United States (2002)
- Outbreak of legionellosis, with a cooling tower as source of infection, United Kingdom (2002)
- Outbreak of Q fever among 28 persons living in Chamonix and its surroundings, France (2002)
- Outbreak of monkeypox related to the import of prairie dogs, United States (2003)
- Two human cases of infection with avian influenza A/H5N1, Hong Kong (2003)
- Outbreak of MRSA among men having sex with men, due to strains with the Panton-Valentine-Leucocidin gene, United States (2003)
- Five cases of tetanus among injecting drug users, United Kingdom (2003)
In order to make an early warning system more sensitive, additional sources of information, formal (e.g. information from surveillance systems) as well as informal (e.g. information based on media reports), may be necessary [19, 20]. We included scientific literature as a source of information, partly because of the lack of attention paid to antibiotic resistance and hospital acquired infections by the early warning committee. However, more signals do not automatically make a better early warning system. More study into the methodology of early warning and into defining threats to public health, both in the Netherlands and abroad, is needed.

This study was undertaken during a period in which there were many developments, both nationally and internationally. At a national level, the Centre for Infectious Disease Control was recently established to prevent and control infectious diseases through effective prevention, greater vigilance, and rapid response to potential outbreaks (http://www.rivm.nl/en/aboutrivism/organization/cib/index.jsp). One of the main tasks is clear and reliable communication with professionals engaged in the control of infectious diseases. The reports of the early warning committee play an important role in this.

At the international level, several developments should be mentioned. The European Centre for Disease Prevention and Control (ECDC) in Stockholm, Sweden, has been established to help strengthen Europe’s defences against infectious diseases. Surveillance of communicable disease and keeping track of emerging health threats inside and outside Europe are a few of its main tasks [21]. The ECDC could itself become a major source of information for countries in Europe. For as the early warning committee in the Netherlands, it will be necessary to identify criteria to be used for selecting source information [22].

The implementation of the revised International Health Regulations (IHR) is another relevant international development [23]. In 1995, the World Health Assembly decided that the IHR should be thoroughly revised. One major change is that a member state must report all events that possibly could endanger public health in other countries, regardless of the cause of the event. For this, timely and complete recognition of health threats at a national level is of importance.

The conclusion of this study is that, in 2002 and 2003, the early warning committee in the Netherlands recognised nearly all threats due to infectious diseases and outbreaks of infectious diseases which were of national importance and published in various sources of literature. The early warning committee can serve as an example to other countries or organisations in recognising threats to public health caused by infectious diseases.

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