

two main groups—one familiar “sporadic” disease (that is, Jakob’s disease) and another affecting a younger age group, as in Creutzfeldt’s case. The differing features between the groups may reflect infection with a differently conformed prion with a particular pattern of spread throughout the central nervous system. Lymphoreticular system origins of, or infection by, this prion may contribute to the different clinical picture.

Creutzfeldt took seven years and considerable pains to determine the originality of the disease he described. We should emulate his rigour and acknowledge his primacy.

Conclusion

Without doubt, general anxiety about so dreadful a possibility as bovine spongiform encephalopathy causing a similar disease in humans resulted in many workers involved with bovine spongiform encephalopathy and Creutzfeldt-Jakob disease having to reach precipitate conclusions in which public safety was rightly the prime consideration. I believe that the evidence now available casts serious doubts on the case for a causal link between bovine spongiform encephalopathy and “new” variant Creutzfeldt-Jakob disease. The medical profession should, at least, be publicly debating this as an issue. The purpose of this paper is to start that process.

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Communicable disease outbreaks involving more than one country: systems approach to evaluating the response

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Introduction

The growth in international trade and travel has increased the likelihood that outbreaks of infection will involve more than one country. The response to such an international epidemiological emergency is complex, involving national and international agencies. We evaluated responses to five outbreaks, with various transmission routes, involving more than one member state of the EU. We examined the complex nature of the collaboration required for an effective response and identified critical weaknesses in coordination, funding, and reporting.

Methods

We studied five past outbreaks, selected primarily to capture different routes of disease transmission (table). We compiled these case studies using various data sources.⁸ Over 50 semistructured interviews were

Summary points

Increasing international trade and travel have led to concern that there will be outbreaks of infection involving more than one country

The detection of and response to international outbreaks needs to be international and coordinated

An analysis of the response to several international outbreaks has shown inadequacies in detection, coordination, funding, and reporting

Support for disease surveillance and control in less developed countries should be expanded to strengthen global surveillance

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Selected case studies

Case study	Infection routes	Incident features
Meningococcal disease ^{1 2}	Close/respiratory contact	International festival in one country; cases occurring later in four member states
Salmonella food poisoning ^{3 4}	Foodborne transmission	Food product produced in EU; cases found in four member states
Shigella food poisoning	Foodborne/person to person transmission	Unknown source associated with ferry transport between two member states
Legionnaires' disease ⁵	Airborne transmission, aquatic reservoir	Outbreak occurring outside the EU involving citizens from four member states
Influenza H5N1 ^{6 7}	Zoonotic transmission, chicken to human. Threat of person to person transmission	Potential for global epidemic beginning outside EU. Threat to all member states

undertaken to determine what happened, what should have happened, why the difference, and what improvements could be made. Interviewees were selected through the relevant European disease surveillance network(s), member states national communicable disease surveillance centres, the World Health Organization, and the Centers for Disease Control and Prevention (Atlanta, United States). The snowball method⁹ identified further interviewees. We reviewed published and unpublished material.

We undertook a postal survey with questions on preparedness for an influenza pandemic in Europe and the role of the European Programme for Intervention Epidemiology Training in international incidents. Our analyses included techniques of data triangulation⁸ and hazard analysis of critical control points (HACCP).¹⁰ The HACCP approach is designed to facilitate a methodical inquiry into a complex situation which is seen as a set of interacting systems, some of which can be made to work better.¹¹ We used this method to identify potential weaknesses where system components interact or where events are critical to the outcome. For each case study we developed flow charts of the management processes. These helped to identify obstacles to the effective management of emergencies.

Results

The common critical control points identified from the five case studies are described below.

Failure to identify and report cases—Failure to notify cases nationally¹² precludes international notification and may result in failure to recognise an incident that involves more than one country. Detection rates for

common diseases vary widely,¹³ and some national surveillance systems need improvement.

Failure to inform other countries—There are several channels through which information can flow, from informal contacts over rumours or unconfirmed events to formal reporting within EU surveillance networks or to WHO. At the early stages of a possible outbreak it may be important to exchange unconfirmed information. This requires access to secure communication channels. Development of common databases with shared access may enhance the power of surveillance to detect outbreaks.

Inadequate preparedness planning—The case study of H5N1 influenza included a questionnaire evaluation of preparedness planning. Of 51 (55%) people representing national influenza laboratories and surveillance institutes of 14 member states, 28 (55%) responded. Fewer than half the countries had plans in place at the time of the outbreak that would have prepared them for a pandemic influenza and no common EU plan was in place, a situation that contrasts with the high level of preparedness required by veterinary legislation in the event of emergence of avian flu.¹⁴ Informants were concerned about the lack of national and common international planning for outbreaks of influenza, including the issue of access to vaccine.

Inadequate funding arrangements—The case studies show that the responsibility for funding investigation of international outbreaks is unclear, and provision of funds has been problematic. In one outbreak funding was drawn from at least seven sources while in another outbreak funds could not be identified when they were needed. Inadequate links between surveillance networks and the European Commission programme for emergency aid were illustrated by failures to assist WHO in investigating outbreaks outside the EU.

Failure to link information to action—Surveillance goes beyond collection of information and includes ensuring appropriate public health action. One case study concerned an outbreak of legionnaires' disease in citizens from four member states that was linked to a location outside the EU. Although information was circulated within public health networks, action to alert the travel industry was delayed and further cases occurred. The meningococcal disease outbreak study incorporated an earlier review of national guidelines for managing outbreaks.¹⁵ Substantial differences in national responses to such outbreaks were revealed. Unfortunately the evidence base for many of these responses is weak, and further research is necessary if prevention is to be consistent across the EU.

Failure to provide capacity for international outbreak investigation—We considered the commitment to provide expert and financial resources to assist in international outbreaks at the EU level to be inadequate. Responsibilities for laboratory support, financing, and



Good Europe-wide surveillance and notification may help countries to prepare for epidemics such as flu

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coordination of expertise for outbreaks beyond EU borders is unclear. In some cases Europe has depended on the expertise of the US Centers for Disease Control and Prevention. Of 43 past and current participants in the European Programme on Intervention Epidemiology Training (designed to enable the development of a cadre of epidemiologists with common training within the EU), 27 responded to a questionnaire on participation in the management of an international outbreak. Only a third had been involved in European networks, and fewer than half had participated in managing an international outbreak. Those participating in the programme should be more involved in international incidents and networking for further development of capacity within the EU.

Failure to share lessons—Reports of lessons from international incidents have generally been inadequate. In only two of the four outbreaks with clinical cases in Europe were final reports shared with the organisations concerned. There is a need to disseminate best practice in reporting results of investigations. The difficult issue of ownership of data needs further consideration.

Discussion

Recent developments to facilitate international outbreak detection and management through the networking approach within the EU have been effective in improving recognition and response to international infectious threats.^{16–18} However, weaknesses remain and opportunities for strengthening collaboration were highlighted by this study. National surveillance, which is the basis for effective international surveillance, needs to be improved. The surveillance system in one member state failed to ascertain 60% of community acquired legionnaires' disease.¹² It is likely that the coverage achieved in other surveillance systems is similar or lower. Even for meningococcal disease, where it is commonly thought that almost all cases are notified, the best estimates suggest that only about 90% of cases are reported.¹⁹ There is a clear requirement for enhancement of many national surveillance systems.

From the results of our study we recommend that the European Commission further develops existing disease-related surveillance networks. This will need to be done within a framework in which organisational, financial, and legal uncertainties are clarified. The existing networks have shown their value, and we do not see any additional value in the development of a single, centralised European surveillance centre, though coordination at the European level is essential.²⁰ The capacity for effective surveillance is present across Europe, and available evidence shows that it can be harnessed effectively with the use of modern communications.

Untoward events, natural or deliberate, such as those due to terrorism or biowarfare may appear simultaneously in multiple locations. Recognition of the nature of the event requires alert clinical services and effective reporting to national surveillance authorities. Early recognition that the event is of international importance requires swift exchange of rumour, data, and information between national authorities.

Increasing globalisation is likely to lead to further international outbreaks. Responding effectively to

these requires coordination of national surveillance and response systems within the EU and support for enhanced surveillance and control activities in developing countries. We have shown how a systems approach to international surveillance and control of disease can reveal areas of concern and identify recommendations for improvement.

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Endpiece Before sildenafil

Why then send Lampreys? Fie, for shame!
 'Twill set a virgin's blood on flame.
 This to fifteen a proper gift!
 It might lend sixty-five a lift.

"To a Young Lady, with some Lampreys." *Poems on Several Occasions*, 1720, 1731, by John Gay (1685-1732).

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