

Case-case studies: an innovative tool in the field of outbreak investigation

Article from Knoblauch et al.: Cross-border outbreak of *Salmonella enterica* ssp. *enterica* serovar Bovismorbificans: Multiple approach investigation in Germany and Switzerland

Aurélie Mayet

Centre d'épidémiologie et de santé publique des armées, GSBdD Marseille, France

Food-borne disease outbreaks (FBDOs) are defined as the occurrence, observed under given circumstances, of two or more human cases of the same disease and/or infection, or a situation in which the observed number of human cases exceeds the expected number and where the cases are linked to the same food source [1]. FBDOs account for 76 million cases per year in the United States [2] and also impact European countries [3]. Symptoms of food-borne illnesses are generally benign but severe complications can occur in certain patients, including hospitalisation due to sepsis, haemolytic uraemic syndrome, Reiter's syndrome, Guillain-Barré syndrome, and/or death [4]. Moreover, as a result of international exchanges, large cross-border outbreaks can occur, often reflecting a break in food safety that has to be addressed early in order to eliminate contaminated food sources [5–6]. For these reasons, reporting of investigated FBDOs has been mandatory for European member states since 2005 [3]. Investigation of FBDOs, aiming both to identify the causes of sporadic illnesses and to investigate outbreaks, usually includes case-control studies. However, this methodology requires much time and resources, particularly in international investigations, and is prone to selection and recall biases. Case-case studies have been proposed as alternatives [7]. Cases from a given infectious disease can generally be divided into subgroups according to pathogen subtype. A case-case design aims to compare exposure history between cases related to the pathogen studied with cases related to another pathogen subtype in place of controls. The main advantage is that most of surveillance systems or infectious diseases reference centres usually collect detailed information about cases, pathogens and exposures. Thus, data from two subgroups of cases are easier to obtain and less subject to selection and recall biases than control data that need additional investigations.

Knoblauch and colleagues [8] present an original investigation of a FBDO related to *Salmonella enterica* ssp. *enterica* serovar Bovismorbificans, across Switzer-

land and Germany. They used a case-case analytic approach, comparing cases related to serovar Bovismorbificans with cases of other serovars, which appears well adapted to the data issued by the Swiss surveillance system. This paper clearly presents the chronology of the investigation and addresses the importance of international cooperation. Further to this, the authors underline that a complete outbreak investigation has to mix several methods including descriptive epidemiology, analytic group comparison and biology.

A recent review about case-case studies describes the standardised procedures for selection of comparison cases and interpretation of association measures [9]. It also suggests that the case-case design should bring economic benefits such as reduced staff time, as well as potential public health benefits such as an earlier identification of a contaminated food source. Thus, this design should be considered by field epidemiologists and public health agencies in order to be implemented routinely. However, further research is needed to assess the advantages of the case-case design compared with case-control studies in terms of validity and cost-effectiveness: the two methods could be concurrently performed during the same investigation and then compared. Settings where the case-case design appears to be the most appropriate should also be identified in order to determine the best method to use in a given investigation. Lastly, if Knoblauch and colleagues underline the advantages of a case-case design in their investigation, they also report that some recall biases were likely to occur owing to a long investigation time and the need to collect retrospective data about food exposure. Indeed, field investigations need some resources and time, and are often delayed by logistical issues: time lapse from outbreak to alert, characteristics of the surveillance network, availability of public health personnel and patients, etc. For these reasons, even if the case-case design proved useful, it is illusory to think that this new tool would resolve all

problems and replace the other components of field investigation.

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Correspondence: Aurélie Mayet, MD, PhD, Centre d'épidémiologie et de santé publique des armées. GSBdD Marseille Aubagne, 111 avenue de la Corse – BP 40026, FR-13568 Marseille cedex 02, France, [aurelie_marie\[at\]hotmail.fr](mailto:aurelie_marie[at]hotmail.fr)

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