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Use of a modified Delphi panel to identify and weight criteria for prioritization of zoonotic diseases in Switzerland

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ABSTRACT

Zoonotic diseases have a significant impact on public health globally. To prevent or reduce future zoonotic outbreaks, there is a constant need to invest in research and surveillance programs while updating risk management strategies. However, given the limited resources available, disease prioritization based on the need for their control and surveillance is important. This study was performed to identify and weight disease criteria for the prioritization of zoonotic diseases in Switzerland using a semi-quantitative research method based on expert opinion. Twenty-eight criteria relevant for disease control and surveillance, classified under five domains, were selected following a thorough literature review, and these were evaluated and weighted by seven experts from the Swiss Federal Veterinary Office using a modified Delphi panel. The median scores assigned to each criterion were then used to rank 16 notifiable and/or emerging zoonoses in Switzerland. The experts weighted the majority of the criteria similarly, and the top three criteria were Severity of disease in humans, incidence and prevalence of the disease in humans and treatment in humans. Based on these weightings, the three highest ranked diseases were Avian Influenza, Bovine Spongiform Encephalitis, and Bovine Tuberculosis. Overall, this study provided a preliminary list of criteria relevant for disease prioritization in Switzerland. These were further evaluated in a companion study which involved a quantitative prioritization method and multiple stakeholders.

1. Introduction

Zoonoses are defined as bacterial, viral or parasitic infections that are naturally transmitted between vertebrates, including humans (World Health Organization WHO, 2013). Zoonotic diseases have a significant impact on public health globally, accounting for more than 60% of all communicable diseases causing illness in humans (Jones et al., 2008). Furthermore, some negatively impact animal production and hinder international trade of animals and their products (WHO, 2013).

As resources for research, surveillance, prevention, and control of diseases have become more limited in recent years, the need for disease prioritization to optimize the efficiency of available resources has been emphasized (WHO, 2006). Several working groups have already published their prioritization methods (Havelaar et al., 2010; Mourits et al., 2010; World Organization for Animal Health (OIE), 2010; Balabanova et al., 2011; Humblet et al., 2012,b; Ng and Sargeant, 2012a,b). In Switzerland, the Swiss Food Safety and Veterinary Office (FSVO) and the cantonal veterinary offices have identified the need to prioritize zoonotic diseases in their recently published document Animal Health Strategy 2010+ (Swiss Food Safety and Veterinary Office, 2010). As this prioritization list needs to take into consideration the local situation and the opinion of Swiss policy-makers and stakeholders, results published by other countries such as Canada (Ng and Sargeant, 2013), or Germany (Balabanova et al., 2011), cannot be directly transferred to Switzerland. It is, therefore, important that a re-classification of the current list of notifiable zoonoses in Switzerland is founded on a prioritization exercise based on the opinion of Swiss stakeholders and policy-makers.

One frequently described method for this purpose is the Delphi panel, which allows one to obtain expert opinion on a specific topic in a structured process (WHO, 2006). For this research method, the experts are first asked to provide their thoughts on questions in a field they are familiar with, either individually or within a group discussion, and their responses are noted. Subsequently, each expert is informed of the other experts' responses, and is given the opportunity to revise their own answers based on this feedback. This process may be repeated either until a consensus is reached,

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Table 1
The 28 criteria classified under 5 domains (burden of disease, epidemiology, prevention and control measures, economy and society), and their respective median, minimum, and maximum scores assigned by seven experts (six in the second round of the interview) involved in a modified Delphi panel on zoonotic disease prioritization in Switzerland.

Criteria	Weighting score from second expert interview		
	Median	Min	Max
Burden of disease			
Burden of disease in humans	4.25	**3**	**5**
Severity of disease in humans, including long-term disability	5	4.5	5
Availability and effectivity of diagnostic tools in humans	3.5	2	4.5
Treatment in humans	4.25	4	5
Burden of disease in animals	**2**	**2**	**3**
Severity of disease in animals	2	1	3.5
Availability and effectivity of diagnostic tools in animals	3	2	5
Treatment in animals	2	1	3
Impact of disease and control measures on animal welfare and biodiversity	1	0.5	3.5
Epidemiology	**4**	**2**	**5**
Number of animal species susceptible to the disease	3	1	4
Persistence of the agent in the environment	3	3	4
Epizootic potential/potential of spread to susceptible species	4	2	5
Probability of introduction, transmission routes	3	2	4
Incidence and prevalence in humans in Switzerland and in neighbouring countries	5	4	5
Disease trend	4	3	4.5
Incidence and prevalence in animals, including wildlife and vectors	3.75	2	4.5
Speed of disease spread	4	2	5
Impact of climate change on animal hosts and vectors, potential of risk change, variability of disease, change of vectors	2	1	4
Knowledge	4	1	5
Prevention and control measures	**4**	**3**	**5**
Prevention in humans	4	3	5
Prevention in animals	3	2	4
Effectiveness of control measures and surveillance in animals	3.5	2	5
Biosafety	2.5	2	4
Economy	**3.5**	**2**	**4.5**
Direct economic losses (cost for each human case)	3	3	4
Indirect economic costs	2	1	4
Impact on international trade of live animals and animal food products	3.75	1	5
Economic damage in animal reservoir (costs for each year)	3.25	1	5
Society	**4**	**1**	**5**
Public awareness	4	2	5
Social perception of the disease	3.5	1	5
Potential impact on media	3.5	1	5

or until sufficient information is obtained, depending on the study objective.

The aims of this pilot study were therefore to: (i) identify criteria relevant for the prioritization of zoonotic diseases in Switzerland; (ii) determine the weights assigned to these criteria based on expert opinion obtained using a modified Delphi panel; and (iii) illustrate the use of these weights by ranking a set of example zoonoses. These results were then further investigated in a follow-up study which used a quantitative method for prioritization and involved multiple stakeholders (Stebler et al., submitted for publication).

2. Materials and methods

2.1. Selection of the criteria

Initially, a search was performed in PubMed using the search terms priorit* and zoono*/disease*, and relevant articles were identified. Subsequently, these articles were reviewed and their references manually searched for additional articles assessing disease prioritization. In total, 38 relevant articles were retrieved, and the following information was extracted: (i) the country or organization involved; (ii) the method used; and (iii) the number, levels assigned, and type (qualitative, semi-quantitative or quantitative), of each criterion (Supplementary material S1). This information was then used to compile several possible lists of criteria for disease prioritization, and preference was given to those criteria that were described in numerous papers and/or that were assigned a high weighting score. The goal was to select the minimum number of criteria that sufficiently covered the most important characteristics concerning the surveillance and control of zoonoses. Following consultation with experts from the Veterinary Public Health Institute at the University of Bern, and from the Swiss Food Safety and Veterinary Office (FSVO), a list with 28 criteria was chosen, and these criteria were classified under 5 main domains: Burden of disease, epidemiology, prevention and control measures, economy and society (Table 1).

A five-tiered measurement scale was then developed for each criterion, and the levels for each criterion were defined based on literature (Council of the European Union (EU), 2008; OIE, 2010; O'Brien and Delavergne, 2012), and adapted to the current situation in Switzerland. As an example, the criterion Severity of disease in humans was classified as: (1) asymptomatic, very mild course of disease; (2) symptomatic, therapy is recommended, hospitalization is rare; (3) symptomatic, therapy is necessary, hospitalization is rare; (4) severe illness, hospitalization is necessary, fatal if complications, persisting handicaps may occur; and (5) fatal or severe long term damages. A full list of the levels assigned to each criterion may be found in the Supplementary material (S2).

2.2. Evaluation and weighting of the criteria using a modified Delphi panel

For the modified Delphi panel, seven veterinarians working at the FSVO and involved in veterinary public health policy-making