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Research Management

Development of SPatial risk assessment framework for Assessing exotic disease incuRsion and spread through Europe (SPARE)

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Key words
Spatial risk assessment, disease surveillance, biosecurity, data exchange, risk management, decision making

Aim of the study
The global objective of SPARE was to develop an overarching model to make rapid use of available metadata to identify pathways of potential risk for classes of disease transmission (e.g. vector borne). SAFOSO was the project leader of WP4 (Biosecurity and Surveillance measures) and WP5 (Communication and Information networks) and provided technical support to WP1 (Release assessment) and WP2 (Exposure and Consequence assessment). WP4 main objectives were to develop a catalogue of risk-based biosecurity measures and surveillance scenarios (Tasks 4.1 and 4.2) and to provide guidance for optimal risk mitigation for hazard incursions considering effectiveness and efficiency attributes (Task 4.3). Objectives of WP5 were to select case studies to be used in all WPs (Task 5.1), to facilitate rapid exchange and sharing of data required to parameterise the models (Task 5.2) and to inform decisions on organisational solutions for transboundary emerging risks (Task 5.3).

Material and methods (focus on WP4 and WP5)
As a first task a multi-criteria risk ranking methodology was developed to select case studies for the project (T5.1). A range of studies were designed and implemented to gather the data relevant to other tasks in WP4 (T4.1, T 4.2) and WP5 (T 5.2, 5.3): literature reviews, questionnaire-based surveys and experts elicitation activities. Tools developed in other projects were also used (e.g. RiskSur design tool). A technical advisory group on data exchange (TechADE) was established and active in WP5. As part of WP4, a stochastic model to assess the cost-effectiveness of the Swiss prevention system for CSF was developed in close cooperation with CIRAD (T4.3). While BLV provided necessary data available in CH for the different tasks, experts from consortium and decision makers from EU member States were actively engaged in surveys and elicitation processes.

Results and significance
The overarching risk assessment framework developed in SPARE will provide invaluable information for risk assessors as it integrates information on potential routes of entry and assess potential for spread and impact of exotic pathogens in EU. Three case studies were selected and used to focus the work of the project: traded products (classical swine fever), vector borne (bluetongue) and movement of pets and people (rabies). The multi-criteria framework developed to select the case studies is publicly available as RStudio shiny apps (T5.1) and can be adapted to different needs https://spare-europe.shinyapps.io/Prioritising_livestock_diseases/
The inventory on biosecurity measures (T4.1) gathers different approaches in EU to prevent the incursion and spread of rabies, BT and CSF. Measures are categorized at different level (farm, regional, national) and stratified according to transmission patterns. The inventory represents a relevant source of information for risk managers to compare and revise current practices to prevent the introduction and spread of the targeted diseases. The inventory of surveillance scenarios (T4.2) provided valuable information about surveillance practices for rabies, BT and CSF in IT, CH and UK. The current surveillance practices are described and evaluated against different criteria (including effectiveness and efficiency). The study highlighted differences between countries in the organisation of the surveillance systems even when objectives are similar (e.g. early

detection). Data gathered in T 4.1 and T 4.2 were also used for T4.3 which aimed to assess the Swiss prevention system against the incursion and spread of CSF. This system is based on a passive surveillance component for domestic pigs and the implementation of different intervention measures according to the epidemiological situation. The cost-effectiveness of the system was influenced by the performance of specific parameters of the surveillance component (e.g. the time needed to detect the infection in a farm) and was evaluated as medium. However data limitation was also acknowledged. The effectiveness could be improved by increasing awareness among stakeholders or by integrating active components. The model provides a relevant and flexible tool to integrate both prevention and surveillance scenarios including economic parameters.

In T5.2 (data sharing), the selected case studies were used to describe hurdles and obstacles the consortium members were faced with when accessing data for the SPARE model. The challenges faced by institutions required to access and exchange data were organizational (i.e. extent of access permitted and terms of data use etc.), legal (i.e. data ownership etc.) and technical (i.e. data standardization etc.). Further elements related to data sharing are also described in the Data Interface Protocol, developed with the support of TechADE, that describes the key elements that are required for the implementation of a sustained, reliable and rapid data exchange for trans-boundary disease management. From the interviews performed with selected European countries as part of T5.3 (organizational solutions), it was clear that already mechanisms are in place where information with regards to both risk identification and risk management is being shared. However, these systems do not fully cover the needs of decision makers, if it comes to risk management strategies. This survey documented the interest of risk managers in Europe to expand the efforts to exchange information (i.e. on biosecurity) and joint decision making on transboundary hazards. The concept of a European Framework for Risk Management (EFRM) as a repository of shared information among European (and not European) MSs on risk management's measures was introduced and discussed. The framework should allow smooth access to detailed information at country level, such as to evidence-based risk assessments and risk management strategies. Furthermore, this framework could provide a set of established tools or guidelines, which could inform the risk management process.

Publications, posters and presentations

Only peer reviewed publications are shown in the following list. More publications are under development. Complete list of posters and presentations is available in the project website https://www.spare-europe.eu/library:

V. Horigan, M. De Nardi, R.R.L. Simons, S. Bertolini, M. I. Crescio, A. Estrada-Peña, A. Léger, C. Maurella, G. Ru, M. Schuppers, K.D.C. Stärk, A. Adkin, 2018, Using multi-criteria risk ranking methodology to select case studies for a generic risk assessment framework assessing exotic disease incursion and spread through Europe, Preventive Veterinary Medicine, 153, p47-55

Anaïs Léger, Marco De Nardi, Robin Simons, Amie Adkin, Giuseppe Ru, Agustín Estrada-Peña, Katharina D.C. Stärk, 2017, Assessment of biosecurity measures to prevent incursion and limit spread of transboundary animal diseases in Europe, Vaccine, 35(44):5956-5966

S. Robin, V. Horigan, M. De Nardi, G. Ru, A.E. Pena, A. Adkin (2017). Mighty Models from little data grow: Estimating animal disease prevalence. Proceedings paper, Society of Preventive and Veterinary Medicine (www.svepm.org.uk), Inverness on 29-31 March 2017

Crescio M.I., Maurella C., Bertolini S., Mastrantonio G., Ingravalle F., Bona M.C., Simons R., De Nardi M., Adkin A., Estrada-Peña A. et Ru G., (2017). Exposure assessment in the context of the SPARE project: a model to spatially assess exotic diseases incursions and spread throughout Europe. Épidémiologie et santé animale, 2017, 71, 139-148.

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