

Emergency management: e-learning as an immediate response to veterinary training needs

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Summary

Veterinary training plays a crucial role in increasing effectiveness of veterinary response to epidemic and non-epidemic emergencies. Being able to assess learning needs and to deliver training is acknowledged as a strategic priority in veterinary public health activities. The validation of an e-learning system that is able to respond to the urgent needs of veterinary professionals to ensure the despatch of rapid teaching methods on emerging and re-emerging animal diseases and zoonoses was the core of a research project developed in the Mediterranean Basin between 2005 and 2009. The project validated a new transferable, sustainable and repeatable learning model, the main components of which are described. The model is applied to an emergency situation that occurred in Italy in 2008, when West Nile disease outbreaks were reported in northern Italy. Approximately 450 official veterinarians were trained, using an e-learning system that showed adaptability and effectiveness in transferring knowledge, skills and competence to face the situation. The case was used to validate the effectiveness of the model and proved that it can be applied in any emergency situation, i.e. every time that rapid dissemination of knowledge and skills is required.

Keywords

Arthropod-borne disease, e-learning, Emergency management, Emergency preparedness, Italy, Training, Veterinary training.

La gestione delle emergenze: l'e-learning come strumento per la risposta immediata al bisogno di formazione veterinaria

Riassunto

La formazione dei veterinari sta assumendo un ruolo sempre più strategico nella gestione delle emergenze epidemiche e non epidemiche e la capacità di identificare i fabbisogni di apprendimento costituisce una priorità strategica per le attività di sanità pubblica veterinaria. Un progetto di ricerca sviluppato nel Mediterraneo tra il 2005 e il 2009, è stato sviluppato per soddisfare questi bisogni e con lo scopo di attivare un processo di ricerca destinato all'innovazione dei sistemi formativi del bacino mediterraneo attingendo alle moderne tecnologie dell'informazione e comunicazione. La conferma che dell'appropriatezza di tale scelta è giunta nell'agosto del 2008 quando un focolaio di West Nile si è diffuso nel nord Italia e circa 450 veterinari italiani sono stati formati on line. Lo scopo del presente lavoro è dimostrare l'efficacia di un modello formativo dotato di un sistema rapido di rilevazione dei fabbisogni di formazione collegati alle emergenze e di risorse formative in grado di soddisfare con tempestività tali fabbisogni, nonché creare un sistema permanente trasferibile a livello internazionale. Il modello validato è applicabile a qualsiasi tipo di situazione di emergenza, in cui la diffusione rapida di conoscenze e competenze è un fabbisogno imprescindibile.

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Parole chiave

e-learning, Formazione veterinaria, Gestione delle emergenze, Italia, Malattie trasmesse da artropodi, Risposta rapida alle emergenze.

Introduction

Scientific research, methodology and technological innovation: the effective synergy for veterinary training

Veterinary public health is characterised by rapidly evolving scenarios in which emerging and re-emerging diseases constantly threaten public and animal health. It is critical that research, advisory, management and control institutions are able to offer immediate training response in regard to learning needs, which, if satisfied, provide a direct impact on human and animal safety and health (Fig. 1).

The availability of a strategic and operative management system is a prerequisite to the effective link between health risks and the capacity to face them is what links them. This system should be based on the following:

- collection and analysis of data on a defined problem
- preparation of a scientific-based response to face that problem
- use of training as tool for rapid emergency response preparedness
- methodological choices for the rapid dissemination of information and knowledge
- availability of human, technological and economic resources that are appropriate to response delivery
- maintenance of training and information flows through clear and defined communication processes with the beneficiaries of training actions
- ongoing monitoring and result assessment (4).

The validation of an e-learning system that is able to respond to the urgent needs of veterinary professionals to provide information on emerging and re-emerging animal diseases and zoonoses, was the core of a research project developed in the Mediterranean Basin, from 2005 to 2009 (eMed

project). Funded by the Italian Ministry of University and Research, the project focused on arthropod-borne diseases which were considered a re-emerging health problem in that area (2). Risk analysis tools were used to identify learning priorities, focusing in particular on the outbreak risk of vector-borne diseases.

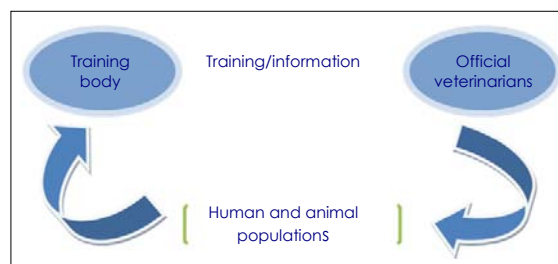


Figure 1
Training flow in veterinary public health activities

Six of the twelve climatic conditions prevail in the Mediterranean. This fact, combined with climate change increase the risk of the spread of diseases that previously affected limited geographic and environmental niches. The Mediterranean Sea is also an important crossroads for many migration routes of birds that are capable of transmitting diseases to livestock and to humans. As a consequence of the climate and trade changes, many ecosystems are possibly becoming able to host and/or to amplify a number of pathogens, thereby posing a severe threat to public health, while the significant increase in animal and human populations and commodity trade, facilitates the passive transportation of vectors or animal/human reservoir movements from the areas where such diseases are endemic.

Appropriate management systems of veterinary public health emergencies imply that expertise and skills of health professionals must always to be kept up-to-date and e-learning provides the ideal tool to respond to this need (7).

Materials and methods

Methodological practices for emergency preparedness

The contribution that the eMed project made to the innovation of the veterinary training systems, at an international level, was the implementation, experimentation and validation of new, transferable, sustainable and repeatable learning models, as described in Figure 2.

Step 1

During an international ad hoc workshop organised in April 2008, privileged witnesses (the chief veterinary officers of the beneficiary countries or their delegates, the World Organisation for Animal Health [Office International des Épizooties: OIE], and the Food and Agriculture Organization of the United Nations) were interviewed by training experts of the *Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (Istituto G. Caporale)*, to collect the following data:

- general information on vocational training needs within veterinary public health and animal health sectors, focusing strengths and weaknesses and also opportunities and treatments, so as to strategically guide future training initiatives towards the priorities established by social and economical policies

- the real need of training courses on arthropod-borne diseases, their degree of urgency and the best methodological approach to adopt.

Results are presented in Figures 3 and 4.

Those interviewed showed great interest in e-learning as innovative methodology for training on vector-borne diseases.

Step 2

Giunti Labs Srl, as our technological project partner, implemented learn eXact®, a powerful learning content management system (LCMS), for the *Istituto G. Caporale* to accelerate the processes of managing e-learning and mobile learning content for new generation digital personal media. The product facilitates the design, management and delivery of content, based on learning objects, XML, standards and international specifications. It offers optional modules for skills and media-based learning content, personalisation, adaptable to the different backgrounds of learners, varying levels of expertise and portfolio (7). The platform is flexible and makes learning methods available anywhere, anytime, to anyone and, in record time.

Step 3

A scientific team of experts authored training materials on the diseases identified (African

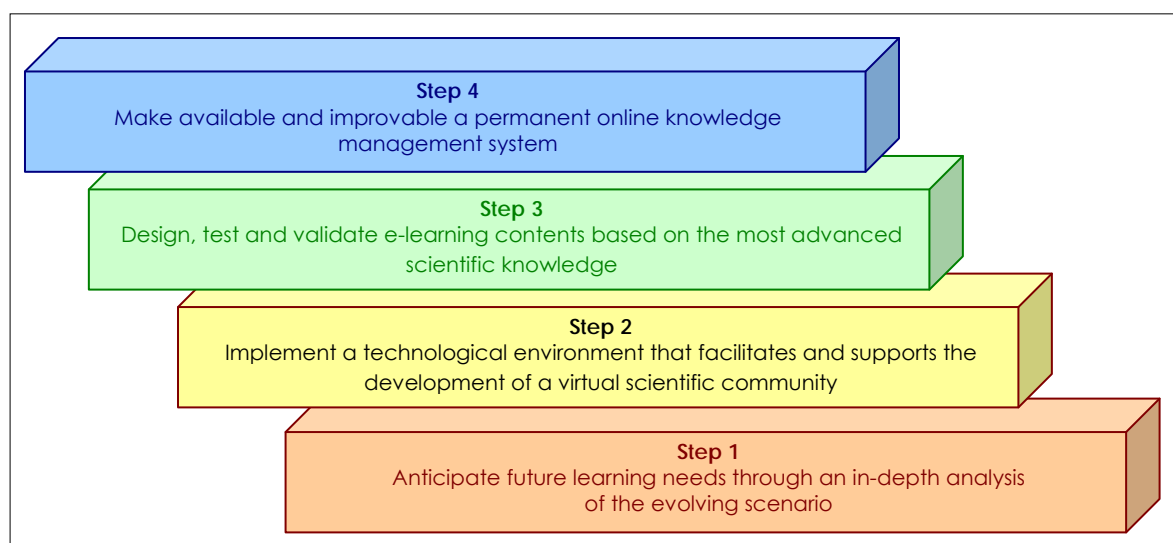


Figure 2
Methodology for the development of e-learning

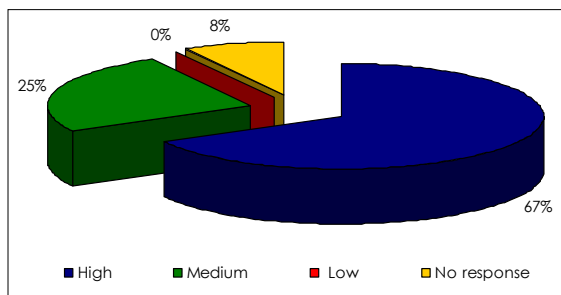


Figure 3
Urgency in satisfying learning needs on arthropod-borne diseases

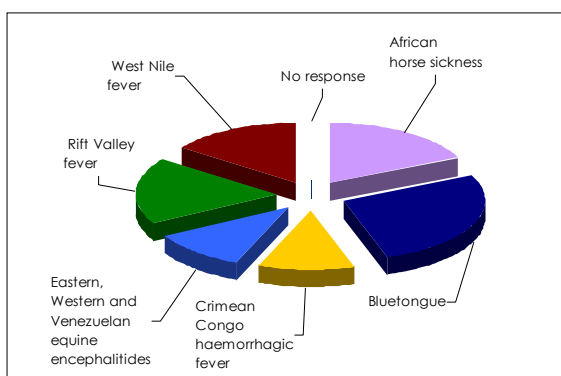


Figure 4
Priority learning needs on arthropod-borne diseases

horse sickness, bluetongue, Congo Crimean haemorrhagic fever, Eastern, Western and Venezuelan equine encephalitis, Rift Valley fever and West Nile disease), with the support of e-learning methodological experts. Team work aimed at the most coherent content output with the assessed learning needs and

interactive platform usability. All materials were peer-reviewed by an ad hoc group of international scientists, selected from the OIE experts. Special attention was paid to the selection of original images and the production of graphic representations. Collaborative learning activities and individual assignments were also developed.

Step 4

A model to implement e-learning tools that would satisfy the need for emergency preparedness and that would be capable of satisfying urgent training demands for disease outbreak management was developed on the basis of the following:

- constant scientific and methodological analysis of changing scenarios
- monitoring of veterinary learning needs at a global level
- features of the implemented e-learning platform
- definition of accurate implementation standards.

This model is presented in Figure 5.

Practical implementation: online West Nile disease training in Italy

Risk analysis on the possible spread of arthropod-borne diseases in Mediterranean countries encouraged us to choose a number of pathologies that should be considered for online training of official veterinarians. West Nile disease was one of these. Over the past

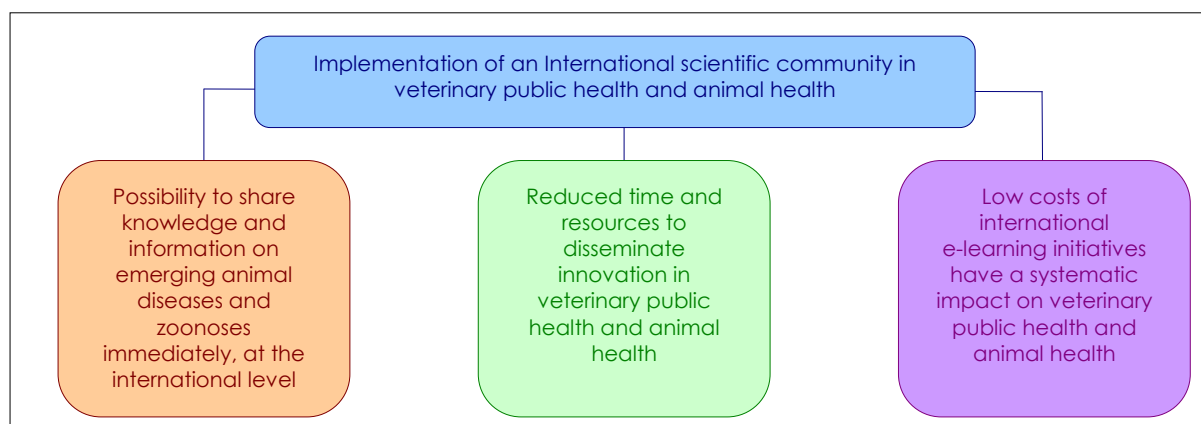


Figure 5
Model for the implementation of e-learning tools

30 years, many cases of West Nile virus infection have been reported in horses and humans in Europe and in the Mediterranean Basin (2).

Confirmation that the model developed was effective came in August 2008 when a West Nile virus outbreak occurred in north-east Italy, involving humans, birds and horses. This epidemic occurred in an area covering approximately 34 000 km², with a population of 30 000 horses and 7 million people (3).

The clinical signs of disease were almost unknown by official veterinarians as the infection had been reported in the country only once before, in 1998 (1). The National Reference Centre for Exotic Diseases of Animals at the *Istituto G. Caporale* provided an immediate response, delivering the e-learning course on West Nile disease to 453 Italian official veterinarians, just 40 days after the report of first case.

History of the disease, aetiology and pathogenesis, epidemiology, symptomatology and pathology, diagnosis, prevention and control measures were all part of the project framework. The course was provided in five sessions, each lasting eleven days and divided into 14 h of online material, in-depth documents, case studies and collaborative learning (5). Learning achievements, satisfaction levels, quality of learning materials were assessed using a number of tools including on line tests, a case study and a checklist to assess the quality of training materials (6).

The consistency of learning needs that arise following an emergency situation and how this can affect learning achievements, the emotional approach to e-learning and confidence with methodologies were also investigated. A number of variables were examined, including, problems encountered, perceived advantages, the limitations of e-learning, self and collaborative learning, support tools, learning environment.

Results

Relevant results that arose from the assessment are given below:

- 65% of participants had never worked on West Nile disease, whilst 68% had never been trained on this disease
- 94% reported that they used the skills acquired from the course, while 86% declared that they passed on that information to their teams
- impressions gained during the course are given in Figure 6.

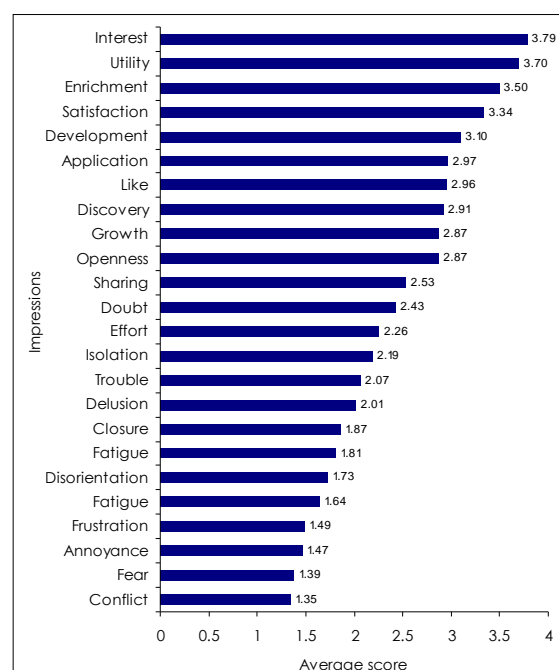


Figure 6 Impressions perceived whilst attending the course

The checklist designed by SCIENTER, a non-profit organisation, specialising in educational research and innovation (www.scienter.org/), for an external assessment of the quality of training materials, was used not only to monitor the project outputs, but also to validate it as standard assessment tool. The students' guide, the entry test, and the online modules were analysed from a methodological perspective. The results are provided in Figure 7.

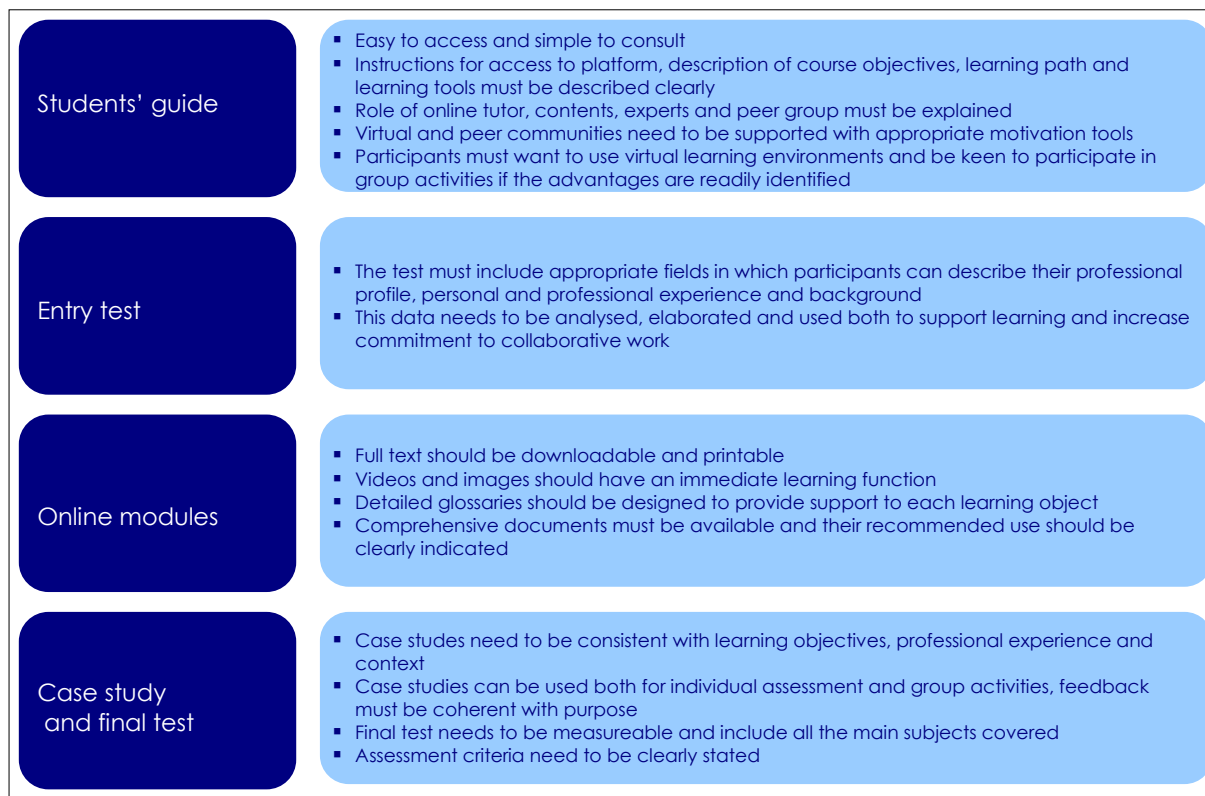


Figure 7
Assessment of training materials

Discussion

Several major veterinary emergencies have occurred across the globe during the past 10 years, either zoonoses and epizootics or natural and technological disasters, which require a ready-to-use training system that is based on flexibility and immediate usability, so as to promptly respond to urgent learning needs that may arise from an ever-changing scenario.

Traditional methods, such as training courses, workshops, seminars and conferences are undoubtedly accompanied by certain weaknesses if and when a very large-scale approach has to be adopted, such as:

- limited number of participants per session to ensure effective knowledge transfer
- logistical barriers
- duplication of costs for each session.

On the contrary, e-learning appears to offer the most appropriate tool to satisfy the great variety of needs, particularly in the light of the following:

- unlimited number of simultaneous trainees involved
- flexibility in terms of location and time
- economies of scale generated by redeeming initial costs (technological platform) into many smaller cash flows, one for each delivered open-distance learning initiative.

This method works if the following conditions are respected:

- data from information systems, risk analysis studies, disease surveillance and control programmes and emergency plans, at a global level, are used to define training priorities
- learning needs are continuously monitored at a global level and through a number of appropriate tools that involve competent authorities, privileged witnesses and beneficiaries

- contents are consistent with the skills that are to be improved and have a solid scientific basis
- learning is guided by adequately skilled tutors and specifically designed materials
- standards for quality implementation are available and a monitoring process is in place
- quality management is used to implement training activities
- availability of human, technological and economic resources.

The model we validated offers several opportunities to implement training that will enable attaining learning goals in a short period of time and involve large numbers of

beneficiaries. Its design obviously leaves room for improvement and adaptation: collaborative learning dynamics in virtual classes can be explored to support the process of enhancing effective virtual relationships that then generate best practices based on knowledge sharing. It can also generate and spread new knowledge and expertise even after the completion of the training session.

References

1. Autorino G.L., Battisti A., Deubel V., Ferrari G., Forletta R., Giovannini A., Lelli R., Murri S. & Scicluna M.T. 2002. West Nile virus epidemic in horses, Tuscany region, Italy. *Emerg Infect Dis*, **8** (12), 1372-1378
2. Calistri P., Giovannini A., Hubalek Z., Ionescu A., Monaco F., Savini G. & Lelli R. 2010. Epidemiology of West Nile in Europe and in the Mediterranean Basin. *Open Virol J*, **4**, 29-37.
3. Calistri P., Giovannini A., Savini G., Monaco F., Bonfanti L., Ceolin C., Terregino C., Tamba M., Cordioli P. & Lelli R. 2010. West Nile virus transmission in 2008 in north-eastern Italy. *Zoonoses Public Health*, **57** (3), 211-219 (doi: 10.1111/j.1863-2378.2009.01303.)
4. Granić A. 2008. Experience with usability evaluation of e-learning systems. *Univ Access Inf Soc*, **7**, 4, 209-221.
5. Mason R. & Rennie F. 2008. E-learning and social networking handbook: resources for higher education. Routledge, New York, 193 pp.
6. Norman G. 2008. Effectiveness, efficiency, and e-learning. *In Advances in health sciences education*. Springer, New York, **13** (3), 249-251.
7. Orellana A., Hudgins T.L. & Simonson M.R. (eds) 2009. The perfect online course: best practices for designing and teaching. Information Age Publishing, Charlotte, New Carolina, 558 pp.