

Preparedness and Control of Mosquito-Borne Diseases: Experiences from Northwestern Italy

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Abstract : Mosquito-Borne Diseases (MBDs) are dangerously increasing in prevalence, geographical distribution and severity, representing an emerging threat for both humans and animals. Interaction between multiple disciplines is needed for an effective early warning, surveillance and control of MBDs, according to the One Health concept. This work reports the integrated surveillance system enforced by IZSPLV in Piedmont, Liguria and Valle d'Aosta regions (Northwestern Italy) in order to control MBDs spread. Veterinary services and local human health authority are involved in an information network, to connect the surveillance of human clinical cases with entomological surveillance and veterinary monitoring in order to implement control measures in case of outbreak. A systematic entomological surveillance is carried out during the vector season using mosquitoes traps located in sites selected according to risk factors. Collected mosquitoes are counted, identified to species level by morphological standard classification keys and pooled by collection site, date and species with a maximum of 100 individuals. Pools are analyzed, after RNA extraction, by Real Time RT-PCR distinctive for West Nile Virus (WNV) Lineage 1 and Lineage 2, Real Time RT-PCR USUTU virus (USUV) and a traditional flavivirus End-point RT-PCR. Positive pools are sequenced and the related sequences employed to perform a basic local alignment search tool (BLAST) in the GenBank library. Positive samples are sent to the National Reference Centre for Animal Exotic Diseases (CESME, Teramo) for confirmation. With particular reference to WNV, after the confirmation, as provided by national legislation, control measures involving both local veterinary and human health services are activated: equine sera are randomly sampled within a 4 km radius from the positive collection sites and tested with ELISA kit and WNV NAT screening of blood donors is introduced. This surveillance network allowed to detect since 2011 USUV circulation in this area of Italy. WNV was detected in Piedmont and Liguria for the first time in 2014 in mosquitoes. During the 2015 vector season, we observed the expansion of its activity in Piedmont. The virus was detected in almost all Provinces both in mosquitoes (6 pools) and animals (19 equine sera, 4 birds). No blood bag tested resulted infected. The first neuroinvasive human case occurred too. Competent authorities should be aware of a potentially increased risk of MBDs activity during the 2016 vector season. This work shows that this surveillance network allowed to early detect the presence of MBDs in humans and animals, and provided useful information to public authorities, in order to apply control measures. Finally, an additional value of our diagnostic protocol is the ability to detect all viruses belonging to the Flaviviridae family, considering the emergence caused by other Flaviviruses in humans such as the recent Zika virus infection in South America. Italy has climatic and environmental features conducive to Zika virus transmission, the competent vector and many travellers from Brazil reported every year.

Keywords : integrated surveillance, mosquito borne disease, West Nile virus, Zika virus

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