VECTORS AND VECTOR BORNE DISEASES SESSION

This is a report of the session on vectors and vector borne diseases that took place on 6th October 2016 in Brussels, in the framework of the European OneHealth/EcoHealth workshop organised by the Belgian Community of Practice Biodiversity & Health which is facilitated by the Belgian Biodiversity Platform

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INTRODUCTION

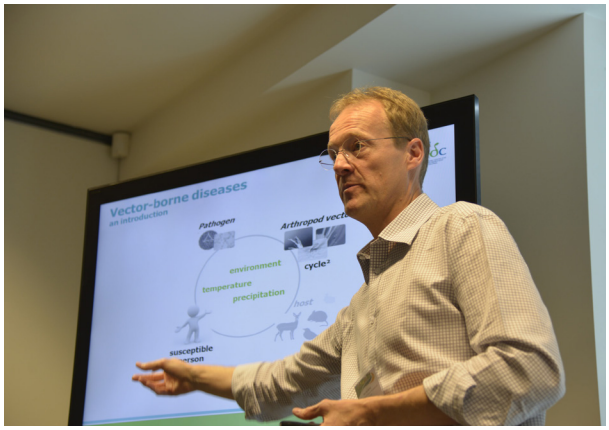
The session focused on the complex transmission cycle used in our interacting living world by some microbes and other organisms, involving various hosts for their survival, reproduction and spread. This is the case for what is called *vector borne diseases* (VBD). Such pathogens are transferred between hosts by invertebrate vectors that do not suffer from their presence but they *(occasionally)* cause harmful effects to their human and/or animal host.

Current environmental changes linked to human activities *(e.g. climate change, landscape changes)* together with increased globalisation and the use of antimicrobial products and insecticides can rapidly change the distribution, composition, abundance and dynamics of pathogens and vectors. This can result in changes at the pathogen - vector - host interface and could potentially be accompanied by changes in host spectrum and pathogen virulence.

The session illustrated these changes through actual examples and participants discussed how this evolution requires to develop or adapt monitoring and management plans towards vectors and VBD, in particular in Belgium and Europe but also through *One Health/EcoHealth* approaches on the field in developing countries, and through adequate and coherent international collaboration of concerned actors in different sectors.

PRESENTATIONS

Albert Godal presenting



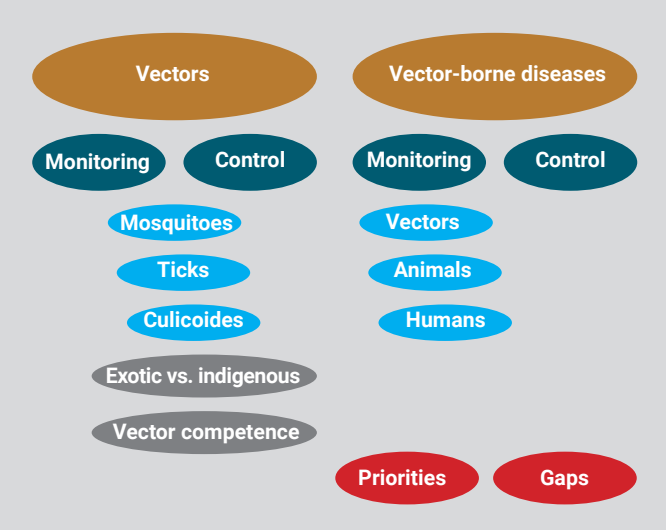
Wim Van Bortel presenting

The session started with introductory presentations by Albert Godal *(Ministère de la Santé, France)* on *Entomological surveillance in France and vector control around imported cases*, and by Wim Van Bortel (*ECDC*) on *Challenges of vector-borne disease surveillance and control from a European perspective*. Veerle Vanlerberghe (ITM) then presented the *Epidemiological aspects of the current Zika virus outbreak and the Belgian response strategy*, after which presentations on specific diseases followed.

Veerle Vanlerberghe presenting

DISCUSSIONS

The graph shown below was used as a reference to structure the discussion session.



It shows that the terms *'vectors'* and *'vector borne diseases'* encompass a very broad domain including different vector groups, different vector species within each group, many different diseases of viral, bacterial, parasite origin, different host species... making it impossible to address all items during the discussion session. Therefore, participants tried to identify gaps in the current policy against VBD and find out what priorities should be addressed.

General remarks and questions emerging from the discussions:

- To enable spread of a VBD, there is a need of a vector *(host)* disease agent, and appropriate environmental conditions. This should also be taken into account.
- How to decide to conduct vector monitoring and which vectors *(species)* are going to be targeted?
- For policy, vector monitoring is only interesting if there is a specific goal, and if it can be combined with specific *(control)* actions.
- The goal of vector monitoring is mostly not to gain information about the vector itself, but is related to implications for public health *(e.g. tick monitoring in The Netherlands since they can transmit pathogens that cause risks to public health; exotic mosquito monitoring and control in France is done to prevent spreading of VBD).*

- The actions related to vector monitoring can be vector control, installation of preventive measures, getting contingency plans in place.
- Not all problems can be tackled at the same time and rational decisions on vector groups to be monitored have to be made.
- A frequently met problem is that vector monitoring is only installed at the moment that an autochthonous spread of a VBD is observed. Policy *(makers)* often act in a reactive way while it is important to take pro-active decisions to build the necessary capacity and install the necessary action and control plans. In this context, it is a pity that only few *(Belgian)* policy makers are present at this congress in general and in this session in particular.
- Besides autochthonous disease spread, political pressure imposed by activist groups can get things moving.
- Besides monitoring for exotic mosquitoes, monitoring of indigenous mosquitoes can be interesting, provided there is a goal for this monitoring. Mostly, it can be interesting during a targeted surveillance.
- The control of mosquitoes often relies on the use of chemicals and is associated with several problems:

  -Lack of knowledge on the available control products and the legislation

  -Biocides do exist, but the availability and permits for use can be problematic

  -Commercial companies do not register the biocides in countries where only limited use is expected. Therefore derogations for use need to be asked. Policy should treat this problem in a pro-active way.

  -Questions can be asked regarding the application of mass spraying of insecticides against mosquitoes as e.g. was done during the outbreak of Zika in South-America: Has this spraying no adverse effects on public health *(e.g. microencephaly)*?

  -The mass spraying is often done for

political visibility, even if it has no proven effect to reduce disease transmission.
-Other mosquito control techniques should be evaluated.

- Mosquito control can delay the installation of an exotic mosquito species in a specific region for a certain time and thereby be of benefit for public health by the reduction of disease transmission, but in the long term, more introductions will occur and exotic species will get established.
- Is it interesting to invest in vector competence studies of local/indigenous vectors in order to verify if they are capable to transmit VBD under certain conditions.
-This is certainly interesting and it is good that this is done with local populations of the same vector species in different countries. It is important to repeat such experiments in different countries to show the reproducibility of the obtained results.
-It has to be taken into account that important differences can exist between lab strains and field strains of vectors.
-Vector competence studies could be a very interesting subject to tackle at the European level, in European research programs.
- Currently, most attention goes to mosquito monitoring and control, but also ticks are an important vector species regarding VBD threatening public health:
-Ticks need another approach than mosquitoes, most important is to minimize contact with humans.
-Sensibilisation seems to be the most important in the context of this vector group, awareness should be created about the risks related to ticks.
-Little is currently done in Belgium, while The Netherlands have strongly invested in tick monitoring and prevention.
-As for mosquitoes, there is also a need for a long-term strategy and plan.
-Lyme disease and activist groups targeting this subject have been a strong driver to implement tick monitoring in The

Netherlands. Even if the scientific evidence is a matter of debate, it can convince policy makers to take action.

- How to choose the wanted/needed VBD to monitor?

  -As with vector monitoring, there should be a clear goal for the monitoring.

  -From an epidemiological point of view, it is possible to do a prioritisation of diseases to monitor based on their chance of introduction. It remains however difficult to predict which disease will be introduced *e.g. the unpredicted introduction of Bluetongue virus and Schmallenberg virus.*

- Does it make sense to monitor VBD in vectors?

  -It might be interesting if you do it for a specific goal, if it occurs project based *(specific risk areas, a targeted surveillance).*

  -e.g. TBE screening in ticks in regions where seropositive cases were found.

  -Not if one has to do a random screening without having an idea of diseases that might be around.

  -Cost/benefit should be taken into consideration.

  -Next generation sequencing could make non-targeted disease screening in vectors more interesting in the future; it will however remain costly due to bio-informatics.

  -Sometimes more information can be gained from seroprevalence studies. *e.g. serological monitoring of potential reintroduction of bluetongue virus in Belgium instead of BTV monitoring in Culicoides.*

CONCLUSIONS

For researchers:

Surveillance and control of vectors and vector-borne diseases is a very broad, complex and multi-disciplinary domain, since all vectors and diseases have their own peculiarities and no unique solution is available to tackle all of them. Therefore, researchers should try to define priorities more clearly and work together with policy makers to define clear goals for surveillance activities.

For policy-makers:

Policy makers should be aware that vector-borne disease are an important upcoming threat and that there is not only an urgent need for permanent and structured surveillance programs, but also for a clear control policy with protocols that allow immediate action and availability of the necessary control products. Being pro-active, and not to wait for an autochthonous spread of a vector-borne disease of human importance to react is key.

Nick De Regge presenting session results to the plenary

For field practitioners:

There is a need for an improved collaboration and communication between different stakeholders: medical doctors, veterinarians, entomologists, researchers, policy makers, etc.

Videos and presentations accessible at:
http://www.biodiversity.be/health/58