University of Basel

One Health: Connecting Humans, Animals and the Environment
Video Transcript

Moving towards real time integrated surveillance

[Jakob Zinsstag]: Emerging diseases, among which many are zoonoses, keep threatening the economy of the countries in which they break out, as well as other parts of the world. The past Ebola outbreak in Guinea, Liberia, and Sierra Leone is an appalling example of low sensitivity and slow response. Thousands of patients died, and those deaths could have been prevented. The outbreak reveals the persisting vulnerability of local and global surveillance and response capacity to emerging diseases. At the same time, it demonstrates how innovation is urgently needed. This is especially true for innovation in near real time surveillance and response, which has become most relevant both on a local and global level.

Changes in the agroecosystem from subsistence to increasingly industrialised farming are suspected to have contributed to a higher exposure to reservoir hosts. This probably led to a fatal spill over of Ebola to humans. The situation calls for integrated research approaches explicitly combining human and animal health. Habitat changes disrupt the way of life of this mona monkey and this forest antelope, but these are not reservoir species for Ebola, because they die too quickly to sustain the disease.

Social-cultural practises like burial rites seemed to have contributed to the rapid spread of the disease. This is true at least for the beginning of the outbreak. The late response was in addition due to inadequate surveillance and the lack of diagnostic capacity in the affected countries. This shows that we urgently need to develop faster, near real time surveillance. A deep anthropological understanding of illness experience and resilience processes may significantly contribute to locally acceptable and adequate responses and interventions. This understanding may ultimately prevent the global spread of emerging diseases as part of an integrated approach facing dynamic drivers of disease.

Now let us have a look at the architecture of a future near real time surveillance and response system. It should combine pathogen diagnostics and stakeholder processes. Thereby, anthropological studies assess local health perception and practises as locally perceived syndromes. This is combined with epidemiological surveillance using mobile communication with participant sentinels and can send quickly a field team to collect fresh biological samples for molecular diagnostics of emerging or reemerging pathogens, resulting in an etiological diagnosis. This process can be optimised iteratively. We express this here with the arrows between the illness perception and the biomedical aetiology.

The aim is to curtail the time necessary for the process between perceiving illness, mobile communication, and the field sample collection. It should be less than 24 hours so that fresh samples can be collected in order to etiologically diagnose them. Very likely, this will happen using chip technology that includes an array of suspected pathogen sequences. In addition, the period necessary for planning an effective response can be reduced so that outbreaks can be stopped within the shortest possible time. In the future, drones might play an increasingly important role in such systems. All this makes a lot of sense, not only as it prevents suffering of humans and animals alike, but also as it helps saving financial resources.

In the second volume on the economics of One Health, the World Bank points out an interesting fact. The cost of control of an emerging or reemerging zoonoses is low when the disease is only in animals. But it rises exponentially when the disease starts to cause illness in humans. With the advent of mobile communication, social networks, and unmanned air transport, a revolution in surveillance of infectious

disease has just started. It would not be an exaggeration to say that we can soon move towards dense surveillance response systems which will be sensitive enough to report emerging diseases within 24 hours and in which and etiological diagnosis can be made within 48 hours. In this way, the appallingly slow response to the last Ebola outbreak will become an element of the past.