Wildlife Health Surveillance Victoria

Pam WHITELEY, Ian BEVERIDGE, Andrew VIZARD and Barbara BACCI

Wildlife Health Surveillance Victoria, Faculty of Veterinary Science, The University of Melbourne,
250 Princes Highway, Werribee, Victoria, Australia, 3030

ABSTRACT

Wildlife Health Surveillance Victoria is a state-wide passive surveillance program based at the Faculty of Veterinary Science of The University of Melbourne. It has a bottom-up structure with the public and staff of the Victorian Departments of Environment and Primary Industry and Parks Victoria (state organisation responsible for national parks in Victoria) reporting mortality and morbidity events in free ranging endemic mammals, birds, reptile and amphibians for investigation. Pathologists, microbiologists, parasitologists, virologists and epidemiologists within the Faculty and collaborators from other institutions contribute to diagnoses. Wildlife Health Australia (a national body which collects and co-ordinates data on wildlife disease) provides a data base for reporting to the Australian Department of Agriculture, Forestry and Fisheries and the OIE (World Organisation for Animal Health). Factors that guided the development of Wildlife Health Surveillance Victoria are discussed.

Key words: Australia, disease, marsupials, surveillance, wildlife

— *Jpn.J. Zoo. Wildl. Med.* 19(2) : 37-40, 2014

Surveillance programs

Wildlife health surveillance is a key part of wildlife health management [1]. Wildlife health management components include: 1) Prevention of new disease problems, which involves international intelligence, border controls and risk assessment of internal threats, 2) timely detection of disease events by disease surveillance and 3) timely responses to disease events when required. All require decision-making and response planning in advance. Surveillance is 'the systematic on-going collection, collation, and analysis of information related to animal health and the timely dissemination of information to those who need to know so that action can be taken' (OIE Terrestrial Animal Health Code). Components of a surveillance program [1] are: 1) detection and reporting of dead or diseased wildlife or collection of samples from populations, 2) identification of pathogens and diseases, 3) information management involving data analysis, communication for mapping, statistics, reports, risk analyses and public meetings.

Disease and pathogen surveillance [1] can be "active" or "passive". Active surveillance is targeted, focusing on a

particular pathogen. Samples are collected using a statistically or probability-based design for the epidemiological analysis of prevalence data, but this approach does not detect emerging pathogens. On the other hand, passive surveillance is general, scanning surveillance. In passive surveillance, detection of pathogens and disease in wildlife begins with the detection of sick and dead wildlife, which in turn needs a network of people who are likely to observe sick and dead wildlife, and help to collect and transport carcasses or are trained to collect samples that are then investigated for pathogens and disease. Management of information, analysis of data and results that are obtained from the samples should be communicated to public health, domestic animal health, wildlife conservation and management and environmental departments (One Health framework).

Leighton [1] states that passive surveillance remains a powerful and essential tool in the national and international management of animal and human health, and should be carried out in every country. This type of surveillance is the most important component of a national wildlife health program. In addition, this is the only way a country can identify the pathogens that exist in its wildlife populations, and is the only available form of national vigilance for emerging diseases associated with wild animal pathogens. Wildlife

* Corresponding author :

Pam Whiteley (E-mail: pamw@unimelb.edu.au)

Health Surveillance Victoria is a general (passive) surveillance program and most samples are based on what is possible (convenience sampling); the sampling is non-random. Our sampling is biased to mortality and morbidity events, which is efficient. However, a major limitation is a lack of data on the population at risk (the denominator for prevalence).

Wildlife Health Surveillance Victoria

Wildlife Health Surveillance Victoria was established at the Faculty of Veterinary Science of The University of Melbourne in 2008 with support from the Hermon Slade Foundation, a charitable trust. Our objectives are to: 1) improve knowledge of the baseline health of free ranging endemic mammals, birds, reptiles and amphibians, 2) detect patterns of disease, 3) identify changed pattern and factors or drivers of change and 4) involve veterinary students and identify research needs and opportunities. Scientists within the Faculty of Veterinary Science provide major contributions to wildlife health investigations and diagnosis.

Wildlife Health Surveillance Victoria was established six years ago and undertakes approximately 100 investigations annually. This could easily be increased but is limited by the lack of sustainable funding. Anyone observing sick or dead wildlife can inform the Coordinator/Manager by mobile phone or email and an investigation may be undertaken. Significant in-kind support is received from state departments of environment, primary industry, health, national parks, wildlife carers, veterinary practitioners, bird observers, field naturalists, farmers, community groups and individuals across the state who report wildlife health mortality or morbidity events and assist with information, carcass collection and transport. Wildlife carcasses can be shipped overnight for necropsy from more than thirty locations across the state. Collaboration with state veterinary and human health laboratories, CSIRO (Commonwealth Scientific and Industrial Research Organisation) Australian Animal Health Laboratory, and colleagues at Zoos Victoria assists with diagnoses. Surveillance data is provided to the Australian Wildlife Health Network (now Wildlife Health Australia), a national body which collects and co-ordinates data on wildlife disease (and subsequently to the Australian Department of Agriculture, Fisheries and Forestry and to the OIE of the World Organisation for Animal Health), and pathology data to the Australian Registry of Wildlife Health at Taronga Zoo, Sydney.

Initially, an online syndromic survey of wildlife disease was undertaken. Examples of wildlife health investigations undertaken to date include:

- Field and laboratory investigation of mortality and morbidity of subadult Eastern Grey Kangaroos (*Macropus giganteus*) due to significant numbers of a blood sucking nematode in the small intestine (*Globocephaloides trífidospicularis*) identified by Professor Ian Beveridge. We are now identifying other locations across the state where mortality and morbidity occur.
- Infection of Eastern Grey Kangaroos with the common liver fluke (*Fasciola hepatica*) and the bacterial infections such as *Actinobacillus lignieresii* from domestic sheep and cattle.
- With Dr. Joanne Devlin, identifying Herpesviruses in kangaroos, bandicoots (Peramelidae), antechinus (*Antechinus* spp.) and koalas (*Phascogaleos cinereus*) [2-6].
- Investigating morbidity and mortality in >170 koalas and starting to test for possible impacts of koala retrovirus on health by comparing prevalence in sick and dead koalas with prevalence in apparently healthy koalas.
- Investigating mortality in threatened bandicoot species, including herpesviruses, internal and external parasites and possibly toxoplasmosis.
- Chronic Phalaris toxicity in Eastern Grey Kangaroos (*Macropus giganteus*) [7].
- Investigation of mortality events in Short-tailed Shearwaters (*Puffinus tenuirostris*) and Little Penguins (*Eudyptula minor*); mortality in King Parrots (*Alisterus scapularis*) due to the protozoan *Sporozoon*; Rainbow Lorikeets (*Trichoglossus haematodus*) with necrotic enteritis; waterbirds with suspect avian botulism; morbidity in parrots from psittacine circovirus and poxvirus.
- Understanding the wildlife reservoirs of zoonotic arboviruses including the Flaviviruses Murray Valley encephalitis and Kunjin virus with waterbird reservoirs and Alpha Togaviruses, Barmah Forest and Ross River viruses, with marsupial reservoirs.
- Few investigations of reptiles were undertaken.
- Amphibian investigations include diagnosis of chytrid fungus by PCR at the CSIRO Australian Animal Health Laboratory, and a mass mortality suspected to be due to a toxin and associated with heavy rain.

Factors that guided the development of Wildlife Health Surveillance Victoria

Wildlife Health Surveillance Victoria's main objective is to investigate clusters of sick and dead wildlife to increase our understanding of baseline health and normal patterns of disease and to identify change patterns and factors involved. Over the last six years several factors have informed the development of Wildlife Health Surveillance Victoria project.

One Health recognises health interconnections between people, domestic animals, wildlife and ecosystems. In 2004, the Wildlife Conservation Society helped launch One World – One Health™ to promote an international and interdisciplinary strategy for combating threats to the health of life on Earth. The initiative encourages health experts from around the world to discuss and share information regarding the movements of diseases among humans, domestic animals and wildlife. The Wildlife Conservation Society's mission is to save wildlife and wild places across the globe and was founded in 1895 as the New York Zoological Society. Wildlife health is therefore also important in biodiversity conservation. It also involves the health of human communities. We need to help, collaborate, educate, develop relationships with and sustain funding to link these areas.

The position paper of the International Association for Ecology and Health's 2012 EcoHealth conference in China, Kunming, states that "EcoHealth contributions to the Millenium Development Goals start as EcoHealth researchers, practitioners, and policy makers, we promote sustainable health and well-being by pursuing transdisciplinary approaches addressing interdependent causal factors of health and well-being, while engaging communities to achieve lasting intergenerational solutions, without compromising the natural, social and cultural capital required for the health of future generations." The value of these multidisciplinary approaches is imbedded in the Wildlife Disease Association (WDA), an international, multidisciplinary, scientific organisation. The WDA has geographic sections that host some of their international meetings so that we have had the opportunity to learn from colleagues in Nordic, European, Latin American, and North American countries in addition to our Australasian Section. The African and Middle East Section is reforming.

International meetings such as those of the Asian Society of Zoo and Wildlife Medicine help us learn from colleagues and

sometimes provide insight to prevent wildlife health problems or their early detection. We can compare our surveillance systems and identify opportunities to improve them by networking, attending conferences and visiting with colleagues. Developing relationships and trust can make our work more efficient, productive and enjoyable.

The Canadian Cooperative Wildlife Health Center is based at the Canadian Veterinary Colleges and was established by 1992. Wildlife Health Surveillance Victoria is based at the Veterinary Faculty of the University of Melbourne and we find this very effective as specialists in pathology, microbiology, parasitology and epidemiology contribute, and there is capacity building as students are involved.

During recent years, the US Agency for International Development's (USAID) Predict program has undertaken major surveillance on several continents. The USAID Emerging Pandemic Threats program has four parts: Predict, Identify, Respond, and Prevent. Predict is about building global surveillance to detect and prevent spillover of pathogens of pandemic potential that can move between wildlife and people. The Wildlife Conservation Society and EcoHealth Alliance are involved with Predict.

EcoHealth Alliance integrates innovative science-based solutions and partnerships that increase capacity to achieve two interrelated goals: protecting global health by preventing the outbreak of emerging diseases, and safeguarding ecosystems by promoting conservation.

ACKNOWLEDGMENT

Pam Whiteley is grateful to the Japanese Society of Zoo and Wildlife Medicine for the opportunity of meeting with them, talking at their conference and visiting Japan.

REFERENCE

1. Leighton FA. 2010. Training manual on wildlife diseases and surveillance. *Workshop for OIE National Focal Points for Wildlife*. OIE World Organisation for Animal Health.
2. Wilcox RS, Vaz P, Ficorilli NP, Whiteley PL, Wilks CR, Devlin JM. 2011. Gammaherpesvirus infection in a free-ranging eastern grey kangaroo (*Macropus giganteus*). *Aust Vet J* 89: 55-57.
3. Vaz P, Whiteley PL, Wilks CR, Duignan PJ, Ficorilli N, Gilkerson JR, Browning GF, Devlin JM. 2011. Detection of a novel gammaherpesvirus in koalas (*Phascolarctos cinereus*). *J Wildl Dis* 47: 787-791.

4. Vaz P, Whiteley PL, Wilks CR, Browning GF, Gilkerson JR, Ficorilli N, Devlin JM. 2012. Detection of a second novel gammaherpesvirus in a free-ranging koala (*Phascolarctos cinereus*). *J Wildl Dis* 48: 226-229.
5. Vaz P, Motha J, McCowan C, Whiteley PL, Wilks CR, Hartley CA, Gilkerson JR, Browning GF, Devlin JM. 2013. Isolation and characterization of a novel herpesvirus from a free-ranging Eastern Grey Kangaroo (*Macropus giganteus*). *J Wildl Dis* 49: 143-151.
6. Amery-Gale J, Vaz P, Whiteley P, Tatarczuch L, Taggart DA, Charles JA, Schultz D, Ficorilli NP, Devlin JM, Wilks CR. 2014. Detection and Identification of a Gammaherpesvirus in *Antechinus* spp. in Australia. *J Wildl Dis* 50: 334-319.
7. Bacci B, Whiteley PL, Barrow M, Phillips PH, Dalziel J, El-Hage CM. 2014. Chronic Phalaris toxicity in Eastern Grey Kangaroos (*Macropus giganteus*). *Aust Vet J* (in press).

豪ビクトリア州における野生動物疾病サーベイランスシステム

Pam WHITELEY, Ian BEVERIDGE, Andrew VIZARD and Barbara BACCI

Wildlife Health Surveillance Victoria, Faculty of Veterinary Science,
The University of Melbourne, 250 Princes Highway, Werribee, Victoria, Australia, 3030

要 約

Wildlife Health Surveillance Victoria とは、メルボルン大学獣医学部を拠点とする、一般的な受動型監視サーベイランスプログラムである。本サーベイランスでは、調査対象となる野生動物（オーストラリア固有の哺乳類、鳥類、は虫類、両生類）における死亡事故および疾病発生について、一般市民、州の環境部および第一次産業部、州立公園管理局（Parks Victoria）の協力のもと、下位上達型（ボトムアップ式）の情報管理体制をとっている。発見された野生動物の死因および病因の診断は、メルボルン大学獣医学部に所属する病理学者、微生物学者、寄生虫学者、ウイルス学者のほか、外部機関の協力者らによって行われる。これらの情報は、Wildlife Health Australia（野生動物の疾病情報を管理している NPO 組織）によってデータベース化され、オーストラリア政府農林水産省へと報告される。本稿では、ビクトリア州における野生動物疾病サーベイランスの基本的な仕組みを紹介し、本サーベイランスを普及・発展へと導いた要因について考察する。

キーワード：オーストラリア、感染症、有袋類、サーベイランス、野生動物 ー日本野生動物医学会誌 19(2)：37-40, 2014