Wildlife Pathology Database As A Source Of Disease Surveillance Information

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ABSTRACT

A recent review of wildlife disease surveillance in New Zealand identified a major weakness being the lack of analysis of wildlife mortality data to produce meaningful surveillance information. The most significant source of wildlife disease data in New Zealand is 'HUIA', a stand-alone Access database that contains case records for wildlife fatalities submitted to the New Zealand Wildlife Health Centre at Massey University and to regional laboratories from 1968 to the present. This paper reports on results of descriptive temporal and spatial analyses of the case data as a way of generating wildlife disease surveillance information.

A total of 5107 wildlife cases was recorded in the database, with birds accounting for 87% of cases, and amphibian, cetacean, pinniped, reptile and bat cases accounting for the remaining 13%. An average 75% of bird cases were associated with disease and 25% with accidental death. Systemic, reproductive and gastro-intestinal were the most common presenting syndromes. Analysis of the monthly pattern and the spatial distribution of case submission identified lower submission rates during winter and some regions with a much lower submission rate.

These analyses enabled us to identify baseline patterns of case submission by taxonomic group and presenting syndrome, and to identify gaps in coverage of taxonomic groups, geographic areas, and seasons. Reasons for the gaps can be identified and strategies developed to increase submission rates. The analyses also identified improvements that could be made to the data stored in HUIA to make this valuable resource more useful for surveillance purposes in the future.

INTRODUCTION

HUIA is the major wildlife disease database currently available in New Zealand. It contains the histories and diagnostic records of dead wildlife cases, and is primarily considered as a pathology database. It is a stand-alone Access database situated at Massey University and is maintained by the New Zealand Wildlife Health Centre under contract to the Department of Conservation (DOC). A large proportion of cases recorded in HUIA are processed at Massey University. However it also includes wildlife cases from other laboratories, where the information has been sent to Massey University for entry into the database.

HUIA is the main source of 'scanning surveillance' data. This refers to the data collected through the activities of the wildlife disease investigation network that investigates morbidity and mortality events detected in wildlife throughout the country. Scanning surveillance generates a broad picture of the disease situation of wildlife in a country or region. Descriptive analyses of temporal and spatial patterns of case submissions by wildlife taxonomic groups, and by submitting syndromes and diagnostic outcomes within taxonomic groups can identify current wildlife health patterns. Regular analysis of future case data and comparison with historical data enables trends in submission patterns to be evaluated. Changes in these patterns may be the first indication of the emergence of a new disease or a change in pattern of existing diseases.

The aim of the analysis was to evaluate how the HUIA data could be more effectively utilised for surveillance purposes. This will provide guidance for future analysis of the data in the database and for obtaining adequate funding to cover the time and resources required for entry of adequate case data and analysis to produce meaningful surveillance information.

METHODS AND RESULTS

Descriptive analyses of the wildlife case data in the HUIA database were conducted during August 2005. Analyses included the distribution of cases by wildlife species, geographic areas and disease syndromes, plus an analysis of temporal and spatial trends of the case data.

A total of 5107 wildlife pathology cases have been recorded in the HUIA database over the period 1968 – August 2005. There has been a major increase in the number of cases recorded in the last four years. The average number of cases recorded per year has increased from 230 during the 3-year period 1999 – 2001 to 870 cases per year for the period 2002 – 2004. The taxonomic groups were: birds, cetacea (whales, dolphins, and porpoises), mammals (bats), pinnipeds (seals, sea lions, and walruses), reptiles, turtles and amphibians. Birds were the main taxonomic group, comprising 87% of cases recorded in the database.

The number of bird cases was categorised by disease or accidental death between 2000 and August 2005. A higher number of cases was associated with disease (75%) rather than accidental death (25%). However, the proportion of accidental death increased in the last 3 years, with an average of 34% compared with 17% for the previous 3 years.

The submitting syndromes for birds were classified into ten categories. Accidental death was the most common submitting syndrome for bird cases. Systemic, gastro-intestinal and reproductive syndromes also accounted for a substantial number of cases. There was no clear evidence of temporal trends in the percentage of cases by submitting syndrome (Figure 1). Accidental death, unknown, and systemic causes accounted for most cases in 2003, 2004 and the beginning of 2005. Reproductive syndrome was the main entry for 2001, but no particular species, location or aetiology was identified.

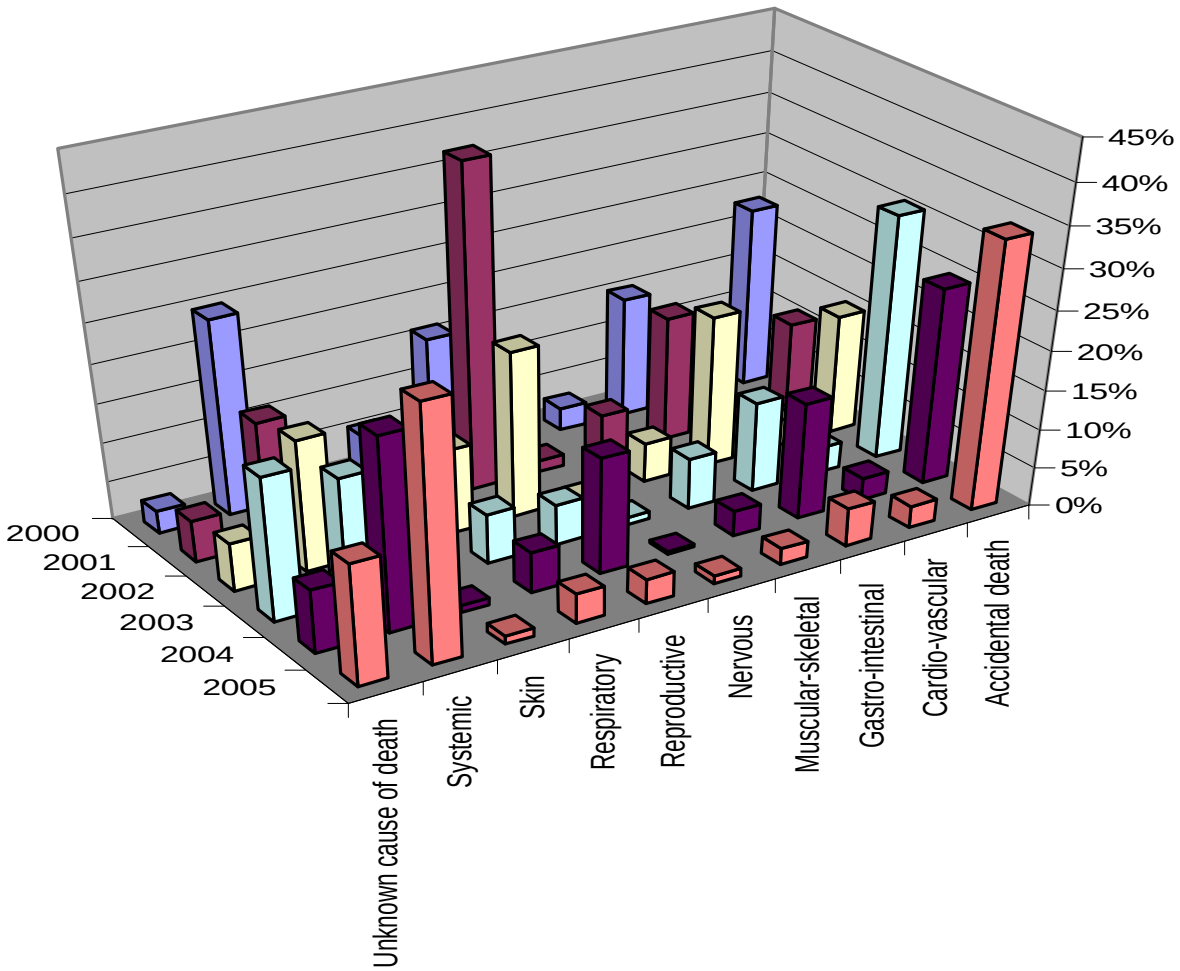

Figure 1 Three-dimensional bar-chart showing the percentage of bird cases (n=2202) by submitting syndrome for the years 2000 – August 2005.

Seasonal trends in the submission of cases for each taxonomic group showed an apparent decrease in bird submissions in the winter months. No seasonal pattern was detected for the other taxonomic groups.

Spatial patterns by DOC conservancy were analysed. Most submissions were received from the Auckland, Wellington, and Wanganui regions. This is most likely explained by the higher density of the human population in Auckland and Wellington, and the existence of wildlife parks, conservation areas, and islands populated with protected species in these areas.There are large differences in submission of bird cases by

geographical area. Anseriforme submissions were most frequently received from the Auckland Zoological Park where many research projects have been conducted. Most seabird, honeyeater and parrot submissions were received from the Wellington region, due to active monitoring of animals at the Karori Wildlife Sanctuary and on Mana and Kapiti Islands. A high number of parrot cases was also submitted from the Southland conservancy, reflecting the location of the Kakapo recovery programme. Most Kiwi submissions were received from Rainbow Springs, Rotorua in the Bay of Plenty, where there is a Kiwi hatching and rearing program in place. Most wader submissions were received from Riverbed Bird projects in Otago and Canterbury.

CONCLUSION

This study demonstrated the various ways in which the data stored in HUIA can be analysed for disease surveillance purposes. The analyses identified temporal and spatial patterns of cases by taxonomic groups. They also showed temporal patterns of cases by broad submitting syndrome categories, which separated disease-related syndromes from accident/injury and unknown submitting syndrome. While submission patterns are influenced by many factors, including funding, publicity and awareness, personal interests and others, they may also reflect real changes in disease patterns in wildlife populations. Analysis of the data provides an objective and possibly more rapid way of identifying these changes compared with relying on the awareness and observations of personnel handling the cases, which may lead to earlier detection of significant changes in disease patterns.

Analyses of this existing data can be considered to provide baseline patterns against which data on future submissions can be compared and evaluated for significant changes.

The majority of cases in HUIA are bird cases (87%) followed by marine mammals (8%). This reflects the relative abundance of wildlife species in New Zealand with the majority of NZ native wildlife being birds. It also reflects the sources of funding and access to carcases for investigation of wildlife morbidity and mortality cases. Most of the funding has been provided by DOC which has focused on investigation of endangered bird species and marine mammals. A high proportion of bird cases were submitted from wildlife parks and offshore islands where species' recovery programmes are located. Only 38% of bird cases originated from areas other than wildlife parks or offshore islands. This indicates that the cases being investigated are not representative of the general bird population in NZ. It is important that morbidity and mortality events in all species, regardless of whether native or not, endangered or not, are investigated as diseases identified in non-native species may represent a threat to native species.

Analysis of submitting syndrome data showed no significant disease-related patterns in existing data. The value of this database for disease surveillance lies in the ability to analyse patterns of cases by submitting syndrome and by diagnosis. Currently submitting syndrome data is only available for 400 of the 5107 cases in HUIA as the data is derived from the Topographic, Morphology and Aetiology (TMA) fields, which are very time-consuming for data entry. Part of the issue is the lack of standard categories within which to enter the data and considerable time is spent identifying a classification for the aetiology of cases. A similar issue was identified with the Diagnosis field, which was not analysed as there were 1300 different entries for 4000 cases. This could be rectified by a group of people who are familiar with wildlife cases and with disease surveillance needs identifying a standardised list of categories for each of the TMA fields. Retrospective entry of data into these fields for all cases is necessary for HUIA to be useful for wildlife disease surveillance, in order that baseline patterns can be identified against which future submissions are evaluated for emerging trends.

Recommendations to improve the usefulness of HUIA for surveillance and research purposes are:

1. Identify a standard list of categories for each of the TMA fields.
2. Enter the data in these fields retrospectively for all the historical cases where this is absent.
3. Analyse the historical syndrome and diagnostic data as demonstrated in this study.
4. In the future, analyse the case data at the end of each year and identify geographic areas or syndromes with a foci of submissions that need further investigation. Also identify gaps, particularly geographic areas from where cases are lacking.
5. Report the results of the analyses to submitting laboratories and the wildlife health network to keep them informed and motivated to send further cases for investigation.

In the future we hope that if funding becomes available, data from this database can be integrated with data from other sources such as investigation of unusual events by Ministry of Agriculture and Forestry's Investigation and Diagnostic Centre, surveys, and research projects to provide a more comprehensive picture of wildlife disease in New Zealand.