Horse power: establishing equine primary-care data surveillance in New Zealand

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Abstract

In New Zealand, population-level equine health data is sparse, despite extensive daily information collection by veterinary practitioners on animal health and welfare from their examination and treatment of animal patients. Such primary care data is held in isolation in practice management software systems and is not currently utilised to inform population health. Further, the type and depth of diagnostic data collected by different software systems varies, hindering the comparability of data between systems. However, a new approach to surveillance has recently been pioneered that utilises existing computerised veterinary practice management systems to capture primary-care data gathered by veterinarians. A prototype system was developed in New Zealand as an add-on to existing practice management software, which included standardised terms on presentation reason and diagnoses. In a four-week pilot study, clinical data from one equine veterinary practice was extracted into a dedicated database. The main objectives of this study were to gauge end-user support, prototype the approach in the New Zealand equine veterinary landscape, and create preliminary system outputs prior to seeking funding for a nationwide roll-out. A special focus of the project was to work closely with participating veterinarians to gain an understanding of how the system could best be embedded in their clinical workflow.

Keywords: *Surveillance, primary care, early warning, equine, interface design*

Introduction

Practice-based information networks are powerful tools for engaging veterinarians on the frontlines of patient care to identify important diagnostic questions, gather data, and translate the key findings into better clinical outcomes. Internationally, there has been a growing interest in capturing and collating veterinary data, such as diagnoses and presentation reasons, in a standardised electronic format for use in national surveillance systems. As such, electronic patient records are increasingly being used to support population health management. While already well-established in human medicine, a similar approach to animal health surveillance has been evolving that utilises existing computerised veterinary practice management systems to capture animal health data gathered by veterinarians.

An automated approach to collecting, sharing, and analysing veterinary primary care data to better understand disorders and improve the welfare of animals was initially pioneered for small companion animals by the Royal Veterinary College in the United Kingdom (1) and similar systems or adaptations are now emerging in different institutions and countries (2–5). However, no such system has yet been available to assess equine health using primary care data at a population level. The equine sector is particularly important to the New Zealand economy, contributing an estimated $6 billion (6) via both the racing and recreational sectors. Despite this, there is a paucity of health data on the New Zealand equine population. The integration of primary care data from multiple clinical practices into a common operating picture would minimise vulnerabilities to the industry and build key data needed to identify risk factors and to support the prevention and control of disease. Further, policymakers could ensure there is adequate capacity to manage exotic disease incursions and establish control programs. Early detection of disease enables response strategies, such as preventative vaccination and movement control, to be instituted early to decrease the duration of an outbreak. Additional benefits to an integrated population health surveillance system include:

- Quantifying baseline disease incidence in the New Zealand equine population
- Identifying any significant change in the level of disease or welfare issues
- Early detection and timely response to exotic disease incursions
- Understanding the pattern of expression of disease syndromes
- To support disease freedom statements
- To identify areas of concern that would benefit from investment and further research.

However, a successful system requires a balance to minimise the burden of adding extra steps in the existing veterinary workflow while simultaneously capturing accurate equine health data in real-time. The pilot project described here was conducted as an important step towards developing a national primary-care based surveillance system that extends beyond emerging infectious disease detection to provide important equine health information for use by a wide range of stakeholder groups, including participating veterinarians.

Figure 1. Logic of primary-care data surveillance in New Zealand equines. Veterinarians assess and if needed treat presented animals, standardised reasons for visit and diagnoses are recorded electronically, and the information is anonymised and sent to a central database for analysis.

Materials and methods

In collaboration with Provet Animal Health Practice Solutions (the vendor of Vision VPM), a software patch add-on was developed that enabled veterinarians to enter diagnoses and reasons for the visit directly into the practice management system. The software patch was populated with a pre-release draft version of equine VeNom codes, an internationally accepted standard of language and terms used in veterinary diagnosis and reports (7). The draft equine code list contained a total of 1,948 diagnostic and 203 reason for visit entries. Participating veterinarians were consulted regarding the positioning of the coding step in the normal system workflow (i.e. between the clinical record entry and billing fields) to minimise extra effort. Veterinarians in the participating clinic were briefed in VeNom codes prior to the trial and were asked to add at least one, but up to five, diagnosis and/or reason for visit codes for every patient consult. Due to the large number of possible codes, a key aspect was the development of an easy-to-use user interface to search and find relevant codes. A "Google-type" auto-suggest search allowed veterinarians to type keywords or word fragments that filtered the list to the relevant term. Other relevant data fields, such as species, breed, age or sex, were already captured by the standard functionality of the existing practice management system.

In addition to the VeNom term entry field, further functionality was added to the system to automate the data collection and extraction process. An IT server system hosted by Massey University was set up to collect and store daily data extracts from the veterinary practice. The system consisted of an FTP server to receive the XML files, an application server, and a shared database server. Data were anonymised by not extracting owner names and reducing the owner addresses to the post code only. The following fields were extracted:

- Date (of entry)
- Postal code (of owner)
- Practice ID
- Animal unique ID
- Species
- Breed
- Date of birth
- Sex
- Neuter status
- Body weight (kg)
- Body condition score (1–9)
- Messages and clinical notes added by the veterinarian in free text
- VeNom Diagnoses
- VeNom Presentation reason

Nightly data extracts over a four-week period were aggregated and imported into R statistical software for analysis (8). On completion of the first two weeks of the trial, preliminary results were presented to the veterinarians and their feedback was discussed. Upon completion of the pilot, detailed summaries were prepared and emailed to the practice and included descriptive statistics on the daily caseloads, patient demographics, reasons for visit, and diagnoses.

Results

From 18 September 2015 through 15 October 2015, participating veterinarians recorded 120 visits for 86 unique equine patients. The data migration worked seamlessly over the four-week window and there were no issues with transferring the nightly uploads to the server. The average VeNom coding rates (i.e. consults with at least one diagnosis or reason for visit coded) was 83%. The majority of entries were seen for wellness visits (17%), lameness (8%), or therapeutic interventions (3%). The practice summaries were enthusiastically received by the veterinarians. Care was taken to provide metrics not only of value to population health analyses but also to assist the veterinarians in improving their practice management. These included maps showing the distribution of clients by postal code, caseload statistics by weekday, and detailed analyses of common reasons for presentation and diagnoses. In fact, veterinarians continued to code at their own request beyond the pilot period even though the data collection process was not actively monitored during this time. Coding rates remained high and informal feedback to the practices continued.

Discussion

This pilot study provided proof-of-concept for the feasibility of establishing a VetCompass-like system for equines in New Zealand. New Zealand's strong international reputation for producing high-quality performance horses and breeding stock (9) created a well-suited environment to test such an approach. The observed high percentage of coded cases demonstrated that veterinarians were not just willing to code clinical cases according to a set of standardised terms, but if properly engaged they showed considerable enthusiasm to improve the quality and usability of the data collected. A sustainable information feedback loop provided veterinarians with easily accessible "practice health" information to potentially help them improve their clinical decision-making and business strategy.

The system described here was piloted in parallel in two New Zealand small companion animal veterinary clinics, with similar successes in terms of high coding rates and enthusiasm by participating veterinarians. Extension to livestock could also be possible with appropriately developed VeNom-like codes and a customised data entry

interface. This would expand early warning capacity and support biosecurity preparedness and government-industry collaboration in the livestock sector. It could also facilitate trade by providing assurance to trade partners, as baseline information on the number of animals seen by a veterinarian could demonstrate evidence for sufficient coverage of care by veterinary services.

Expansion to a national system would enable the New Zealand equine industry to measure key health indicators to enable proactive management of health as opposed to reactive management of disease. By sharing the information in real-time, stakeholders could also respond to emerging disease concerns in a timelier fashion. Ideally, any such surveillance system would also be supported by a multi-tiered user interface where veterinary clinics could access their individual practice information and benchmark their metrics to national/regional levels. Sophisticated web-based applications are increasingly being used for surveillance and complex epidemiological data analysis/visualisation (10,11). As such, a customised suite of data analysis and visualisation tools are currently being developed that allows users to easily explore animal health trends while maintaining the confidentiality of animal owners and their veterinarians. The aim is to provide the New Zealand equine community with a multi-purpose animal health information hub, with comprehensive, detailed, and timely information on the health of the New Zealand equine population. The early detection and a clearer picture of the spread and location of cases will enable veterinarians to target preventative animal health strategies, allow researchers t determine the scope and location of problems prior to their investigations. It will allow Government agencies and organisations such as the New Zealand Equine Health Association charged with responding to disease incursions to target movement control, quarantine or vaccination interventions early, thus minimising the cost and duration of any responses to epidemics they seek to control. This system provides a model that could be adopted by other animal sectors who would share the benefit from the software infrastructure development and migration system and web based interface.

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