

Factors influencing diagnostic sample submission by food animal veterinarians in Mississippi

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Summary

A focus group was organised to gather information and opinions from food animal veterinarians in Mississippi regarding sample submission to diagnostic laboratories. The research found that a range of factors influence the veterinarian's decision regarding whether samples will be submitted to a diagnostic laboratory, with the cost of diagnostics as the key influence. The veterinarians believed that the relationship they had with diagnostic laboratories was important in the protection of public health, but they thought that their role in disease surveillance was under-utilised. More attention needs to be directed towards strengthening veterinary surveillance at ground level to ensure that emergent diseases are detected effectively by a partnership approach between veterinary practitioners in the field and diagnosticians in diagnostic laboratories. This partnership is a vital component of the 'One Health' concept for the protection of both animal and human health. This study demonstrates that qualitative social science methodologies, such as focus groups, can usefully be applied to topics of relevance to veterinary public health.

Keywords

Diagnosis, Emerging diseases, Focus group, Mississippi, One Health, Sample submission, Surveillance, Laboratory, United States, Veterinarian.

Fattori che influenzano il conferimento del campione diagnostico da parte dei veterinari che si occupano di animali da reddito in Mississippi

Riassunto

E' stato organizzato un gruppo di discussione per raccogliere informazioni ed opinioni da parte dei veterinari che si occupano di animali da reddito per quanto riguarda il conferimento di campioni ai laboratori diagnostici in Mississippi. La ricerca ha evidenziato che la decisione del veterinario per quanto riguarda i campioni e il loro relativo conferimento ad un laboratorio diagnostico è influenzata da una serie di fattori: il peso maggiore è dato dal costo dell'esame diagnostico. I veterinari ritengono che il rapporto avuto con i laboratori diagnostici è stato importante per la tutela della

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salute pubblica, mentre ritengono sottoutilizzato il loro ruolo in ambito di sorveglianza delle malattie. Bisogna porre maggiore attenzione nel rafforzare la sorveglianza veterinaria anche ad un livello di base al fine di avere la garanzia che le malattie emergenti siano sicuramente individuate attraverso un partenariato tra i veterinari pratici e i veterinari operanti nei laboratori diagnostici. Questo partenariato è una componente essenziale del concetto di "salute unica" degli animali e umana. Questo studio dimostra altresì che le metodologie qualitative delle scienze sociali, come i gruppi di discussione, possono essere utilmente applicate a temi di rilievo per la sanità pubblica veterinaria.

Parole chiave

Conferimento campioni, Diagnosi, Gruppo di discussione, Laboratorio, Malattie emergenti, Mississippi, Salute unica, Sorveglianza, Stati Uniti, Veterinario.

Introduction

Within North America, 34 states and 2 Canadian provinces have veterinary diagnostic laboratories accredited by the American Association of Veterinary Laboratory Diagnosticians. These diagnostic laboratories perform an essential role in disease diagnosis and have an important surveillance function in protecting both animal and human health (31, 32, 46).

Discoveries made in diagnostic laboratories have the potential to have an impact both nationally and internationally. West Nile virus is an example of an important emergent disease in both animals and humans since its appearance in the United States in 1999 and diagnosis early in the outbreak in a veterinary diagnostic laboratory (17). Bovine spongiform encephalopathy (BSE) was first described in the United Kingdom in 1986 by veterinary pathologists in a regional diagnostic laboratory (47). It is subsequently estimated to have cost the European livestock industry €2.75 billion (US\$3.8 billion) annually (8), with significant economic repercussions on North America (29). Within the past decade, diagnostic laboratories have been critical in disease confirmation for avian influenza (15),

bluetongue (7) and foot and mouth disease epidemics worldwide (1).

A diagnostic investigation generally begins with the livestock producer recognising an abnormality and seeking the opinion of a veterinarian who decides whether to use a diagnostic laboratory service and which samples need to be submitted. Often veterinarians will request the service of the most local laboratory. These laboratories are familiar with regional disease trends and are likely to recognise changes in patterns of disease, thus providing an early alert for newly emerging and foreign animal disease incursions (18, 33, 41). The diagnostic process can be regarded as a continuum, beginning with the producer and extending to the diagnostic laboratory, with the veterinary practitioner acting as gatekeeper (40). This relationship has been described as a 'pyramid of scrutiny', with the diagnostic laboratory at the pinnacle of the pyramid (30). Test results and diagnoses obtained in veterinary laboratories provide an evidence base upon which effective treatment options can be implemented at an animal or herd level, and also provide guidance in the establishment of federal and state disease control programmes and food safety regulatory regimes (2).

We used a focus group methodology to conduct a preliminary investigation on factors which influence farm animal veterinarians to submit samples to a diagnostic laboratory. Focus groups have been used widely in human medical research (20, 21, 25, 37, 39) and infrequently in veterinary research (12, 13, 19). They are a form of group interview, with participants meeting to discuss with the researcher and between themselves their thoughts and experiences on a specific topic of interest (14). The group interaction is a specific part of the method as people are encouraged to talk to one another and comment on each other's experiences and opinions provokes further discussion (27). Focus groups are a powerful tool in the investigation of human-based phenomena and have the potential to provide much more valuable information about beliefs and attitudes than can be

achieved through other qualitative research methods, such as surveys (24).

The overall aim of the research was to gather consensus on factors associated with diagnostic laboratory submissions which subsequently could guide future development of veterinary diagnostic services. We also used the opportunity to seek the opinion of veterinarians on the wider issue of veterinary surveillance and to learn how veterinarians viewed their role in the protection of human health in the context of the 'One Health' initiative (42, 49).

Materials and methods

A list of Mississippi licensed practitioners involved in large animal (food animal plus equine) practice was provided by the Mississippi Veterinary Medical Board. This list was examined by three co-operating practitioners to identify those veterinarians known to be engaged in predominately (>50% time) food animal service for more than 2 years. The list contained 22 practitioners known to or believed to meet these criteria. This list was randomised and practitioners were contacted sequentially until obtaining 12 affirmative responses to participate in the study. No attempt was made to balance gender or age, but all participants were from different private veterinary practices and from different locations in Mississippi. A one-hour face-to-face group meeting was planned in conjunction with the annual winter meeting of the Mississippi Veterinary Medical Association. Due to scheduling difficulties, three were unable to attend, leaving nine eligible participants. All had been in private practice for at least 14 years and were believed to be representative of farm animal veterinary practitioners in Mississippi. Participants received a complimentary meal, but no other compensation, for participation. The focus group discussion was facilitated by a faculty member from the Social Science Research Center of Mississippi State University who used a pre-prepared list of questions to lead

the group discussion. The questions had been prepared and categorised as follows:

- influences on sample submission to diagnostic laboratories
- veterinary surveillance
- role of veterinarians and diagnostic laboratories in public health.

Written notes of the discussion were taken by two social science researchers as it was felt that audio or visual recording of the discussion may inhibit the participants from expressing their opinions. The notes were compiled into a report of the findings and the content analysed qualitatively.

Results

Influences on sample submission

There was immediate consensus that the veterinarian initiated the diagnostic testing plan and that economics was a key determinate that influenced diagnostic laboratory sample submission. Although practitioners were generally very keen to submit samples, the financial costs, including collection, shipment and diagnostic lab fees, were considered to be limiting factors. Although veterinarians formulated the diagnostic testing plan, the final decision to execute the plan was strongly influenced by producers. Generally, veterinarians thought that producers were unwilling to pay for diagnostics, trusting their veterinarian's judgment on diagnosis without laboratory confirmation. Additionally, there was concern among veterinarians that submitting samples, with the resultant increase in fees charged to the producer, may encourage the client to use another veterinarian: 'It would be nice to confirm a diagnosis, but you need to save dollars in hard times'. Practitioners felt a greater likelihood to submit samples if they were uncertain of a diagnosis, if the disease problem had been ongoing, or was having a serious economic impact. Somewhat paradoxically, with increasing experience, at least some members of the group were more likely to wish to submit samples than they may have been as new practitioners, stating that 'they now know what they don't know'. One

practitioner suggested that a laboratory diagnosis provided legal back-up and another believed that the use of the laboratory helped to broaden their thinking.

All participants said that they used more than one laboratory (range 2-12), depending on the service required and the specialties of the laboratories. If they did not find the level of service they expected, they indicated that they were prepared to use another laboratory. Experiences of laboratory performance failures included lost samples, mixed-up samples and inaccuracy of reporting results. Veterinarians had also stopped using particular laboratories because they did not offer the breadth of diagnostic services required, or lacked appropriately specialised personnel. They preferred labs where they could get assistance and advice easily.

All agreed that they would submit more samples if the diagnostic service was free or more heavily subsidised, and they pointed out that at some time in the past, subsidies allowed some labs to offer diagnostic services at no charge to the veterinarian or producer. West Nile virus surveillance in 2001-2002 was raised as an example of how practitioners had sampled a high proportion of suspect equine cases as the laboratory fees were covered by the state public health department using funds from the Centers for Disease Control and Prevention (CDC) surveillance plan. This was used as an example of how easily and effectively the practitioner network could work in surveillance.

When asked what they expected from a diagnostic laboratory, they listed low cost, fast turnaround, easy shipping, accuracy, a wide portfolio of available tests and expertise, acceptance of samples on weekends and good verbal and electronic communication of results. 'Long' turnaround times, where an epizootic resolved by the time results were available, made producers and veterinarians less likely to agree to future diagnostic testing.

Surprisingly, given the level of group experience, all participants agreed that there was a need for more practitioner training in diagnostic sample taking, as they sometimes

lacked confidence in knowing what the optimal samples were. This uncertainty made it more unlikely that a diagnostic sample would be submitted. It was thought that test and sample requirements had changed over time, and that retraining was required on a regular basis.

In addition, somewhat unexpectedly, the majority of participants were keen for greater use of electronic media in laboratory communication and reporting. Practitioners believed that the use of diagnostic test results could be improved by the provision of greater detail on test limitations (sensitivity and specificity) and advice on how alternative testing strategies might be used. Overall, they thought it was important to have a good veterinary laboratory service available to maintain food safety and public health protection.

Veterinary surveillance

When asked what veterinary surveillance meant, suggestions included 'biosecurity on farms' and 'food security'. The group agreed that it was very important to have surveillance for endemic and foreign animal diseases, but there was very strong agreement that surveillance in the United States was inadequate. They felt that large animal practitioners should be placed at the forefront of surveillance, but were not. Specific directives were believed to be restricting the scope of veterinary disease surveillance to the point that practitioners considered themselves unengaged and that 'their hands were tied'. Practitioners believed that surveillance systems should reward participating veterinarians and producers, but especially and particularly be sensitive to the reality that producers and veterinarians balance individual economic well-being with public good.

There was frustration that information on enzootic disease incidence and spatial distribution was not available to practitioners and it was strongly believed that this hindered surveillance. There was also a strong desire for such information to be shared between labs and states to raise awareness of disease trends

and new diseases amongst practitioners to encourage reporting, and to highlight current disease problems. A suggested solution was to have a shared database of results which could be widely accessed by practitioners. Another idea was to have online discussion tools to share information.

It was suggested that surveillance engagement would be improved by allocating some limited resources, in the form of free or reduced testing fees, to practitioners for use as they desired. This would encourage the development and implementation of surveillance programmes tailored to meet the conditions on farms targeted, and promote disease control. Examples included surveillance for bovine viral diarrhoea virus, leptospirosis, trichomoniasis, Johne's disease, internal parasites and nutrition monitoring. One participant suggested that diagnostics should be used more frequently to improve production efficiency rather than responding to problems. The poultry and swine industries were quoted as examples of instances where health diagnostics were used to improve production efficiency. There was agreement that population medicine was more important than just a single animal focus and, when considering a disease problem on a farm, the entire herd was considered.

Public health protection

The participants agreed that veterinary practitioners and laboratories had an important synergistic role in the detection of zoonotic and newly emerging diseases and thereby were involved in protecting public health. Public health protection was very important to the practitioners and there was a strong belief that failing to diagnose a disease problem which had zoonotic implications would be very serious.

Discussion

Whilst there is widespread agreement that veterinary surveillance is essential and there are frequent calls for more surveillance and the strengthening of diagnostic networks (3, 4, 26, 36), it seems that attention needs to be given to how this might be achieved at ground level.

Determining the factors that influence sample submission is fundamental to understanding how to strengthen passive surveillance, with the overall aim of being to improve the communication with and use of laboratories by practitioners. Without a steady flow of information and biological samples, the vital role of laboratories in protecting both animal and human health will be undermined.

As expected, the results of this focus group revealed that the cost of diagnostic testing has a major influence on sample submission by large animal veterinarians. It became evident that 'cost' contained economic and non-economic elements. Economic cost was rapidly identified as an important factor that influenced submission and included expense associated with collection, processing, shipment and conducting diagnostic testing on samples. However, non-economic factors also emerged as potentially important. It was believed that failure to produce timely or significant diagnostic results would be construed by producers as a waste of money and, by extension, bad advice from the veterinarian. Through recommendation to seek diagnostic testing, practitioners perceive that they are at a potential risk for loss of goodwill and ultimate loss of clientele. While reputation risk was a factor for consideration raised by the focus group, it was not clear what the magnitude of this risk might be. It would seem that these non-economic risks could be contained through producer and veterinarian education, communication and follow-up at the diagnostic lab.

Despite the call for free diagnostic services by the practitioners, it is unlikely that laboratories will be able to return to offering their services free of charge. The challenge therefore remains on how to improve the value proposition of diagnostic submissions to encourage sample submission while acknowledging that markedly decreasing diagnostic fees is unlikely. Many veterinary diagnostic laboratories, particularly those associated with universities, are involved in research and teaching (45). Laboratories must think creatively in regard to how diagnostic service fits their mission and how they can improve

their pricing objectives and value of service (5, 28).

Accuracy, faster turnaround times and excellent two-way communication must be priorities. Accelerating diagnostic results would improve the attitude of producer towards diagnostic testing. Results available after the disease has been resolved were not seen as helpful to the producer and were damaging to the practitioner's reputation. Laboratories need to use innovative ways to communicate with clients and our survey suggests that there is a strong appetite for use of electronic communication and for increased veterinarian education. Since many diagnostic laboratories are associated with university educational resources, the formulation of educational programmes should be 'low hanging fruit'. Outreach work that improves practitioner knowledge and awareness of testing will improve confidence in the laboratory and support veterinary sample submission. There is scope for adding information to diagnostic reports, making them more useful to practitioners, with a systematic value-added focus on problem-solving rather than reporting individual results. Laboratories may need to find collaborative partners, or create in-house specialities and focus effort on what they do best rather than trying to offer across-the-board diagnostic services.

The focus group has highlighted that as intermediaries, veterinarians must act in the interests of the client and simultaneously as an agent of the state for the greater public good. Failure to report disease has been recognised in the literature. Substantial under-reporting of BSE suspects occurred in Europe when disease detection was based on passive surveillance, probably because of disincentives for the farmer, such as compulsory herd slaughter or trading restrictions when BSE was confirmed (34). This problem was only resolved when compulsory active surveillance of fallen stock was implemented using rapid diagnostic tests on brain samples and apparent incidence rates appeared to increase dramatically (10, 44). Similarly, a questionnaire survey of British sheep farmers revealed that only 13% of those

who suspected scrapie in their flocks reported the suspicion to the authorities, despite a statutory requirement to do so (22). An effective surveillance system would minimise reluctance to report disease suspects, and would produce a very significant number of 'false-positive' disease investigations.

The veterinarians believed that their contribution to the overall national surveillance effort was not being recognised or maximised. It was evident that their view of 'surveillance' started with monitoring enzootic disease on client farms, engaging producers and providing a tangible benefit. This approach could provide immediate results and a foundation for surveillance of other conditions and deserves careful consideration. With a declining presence of food animal practitioners in the United States (38), and to preserve a strong 'pyramid of scrutiny', it is critical to engage veterinary practitioners and producers in surveillance efforts. Large livestock enterprises are using laypersons to conduct a greater proportion of animal health work (16), which could reduce the influence of the practitioner and result in lesser sample submissions and, consequently, increased economic pressure on laboratories. Diagnostic laboratories have a pivotal role to play in disease detection and must be at the centre of surveillance strategy, but the role that practitioners play in effective surveillance must not be underestimated.

Extensive research has been conducted to investigate factors that influence physicians to submit samples to diagnostic laboratories (43), but we believe this to be the first research on this topic with veterinarians. The focus group methodology was very successful in eliciting the views of the veterinarians and demonstrates the usefulness of qualitative social science techniques in veterinary research (11). We believe that the issues raised by the focus group may have general applicability to diagnostic systems in the United States and to agencies involved in animal and human infectious disease surveillance. Further investigation in other parts of the United States is needed, as this study was limited to one focus group in one state. The study has since

been repeated with veterinary practitioners in Northern Ireland to ascertain if there are similarities in factors affecting sample submission with large animal veterinarians in different parts of the world.

Conclusions

While the limitations of passive surveillance are recognised (6, 23, 48), there is good reason to continue to strongly encourage 'routine' submissions from veterinarians. This is particularly important if veterinary diagnostic laboratories are to continue to be at the forefront of recognising emergent diseases (9, 33). Given that many emerging diseases also affect humans, early detection is a vital part of the 'One Health' approach (35), and every effort must be made to strengthen the partnership between veterinarians in the field and diagnostic laboratories.

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