Assessment of Biosecurity for Equine Infectious Diseases in Veterinary Practice

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In a survey, American Association of Equine Practitioners (AAEP) members felt their clients have average to poor knowledge of biosecurity (81%) and are not well-prepared to deal with an infectious disease in their facility. In total, 70% reported that lack of owner compliance affected their ability to implement biosecurity plans. The most needed resources during an outbreak are affordable point-of-care tests and biosecurity handouts. Authors' addresses: Equine Disease Communication Center, 4033 Iron Works Pkwy, Lexington, KY 40511 (White); United States Equestrian Federation, 4001 Wing Commander Way, Lexington, KY 40511 (Flynn); United States Department of Agriculture Animal, Plant Health Inspection Service, Veterinary Services, Fort Collins, CO 80526 (Pelzel-McCluskey); e-mail: nawhite2@vt.edu. *Corresponding and presenting author.

1. Introduction

Biosecurity, defined as "all hygienic practices designed to prevent occurrences of infectious diseases,"[1] is one of the chief ways to prevent and respond to infectious diseases. Although veterinarians have knowledge of infectious diseases, it is not known how equine practitioners identify and manage disease outbreaks. Other than anecdotal information, there are few references about what equine practitioners need to better prevent disease spread.

Horses are transported more than any other livestock, and horse movement varies with numerous types of events or facilities where horses commingle. This frequent movement makes tracing the potential disease spread challenging. Although many of the risks for infection are known, there is limited information about the effectiveness of biosecurity methods, which are frequently garnered from production animal medicine.[2,3] A review of biosecurity on equestrian premises addressed topics including protocol for newly arriving horses, quarantine, visiting persons or professionals, direct and indirect contact between horses, isolation facilities, hand hygiene, owner compliance, barriers to implementing equine biosecurity, perception of risk, communications, and involvement of veterinarians.[4]

Previous outbreaks of equine herpesvirus myeloencephalopathy (EHM) in the United States[5,6] and Europe,[7] which lead to severe impacts on horse health and shutdown of the surrounding horse industry, underscores the need for development and implementation of biosecurity plans at a majority of equine events. Similarly, the spread of Equine Herpesvirus-1 (EHV-1) from a large horse show in California to multiple equine facilities during the spring of 2022 highlighted the need for enhanced biosecurity plans for disease outbreaks.

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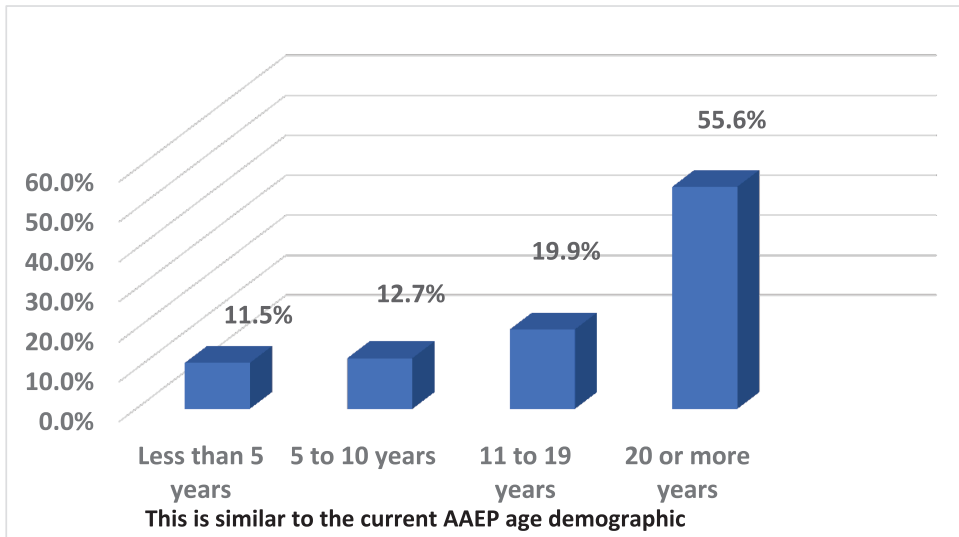

Fig. 1. How many years have you been a veterinarian?

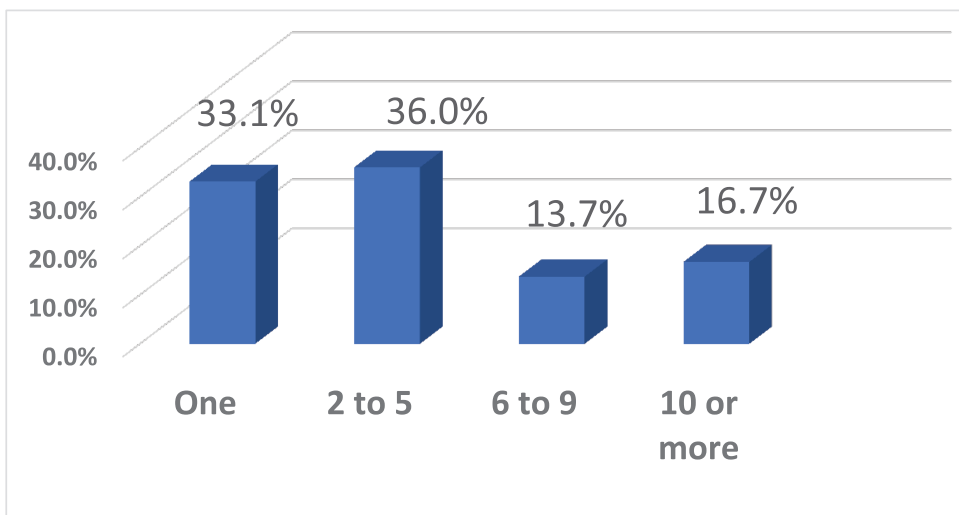

Fig. 2. How many veterinarians are in your practice? (10 or more veterinarians in the practice was significantly higher for racing).

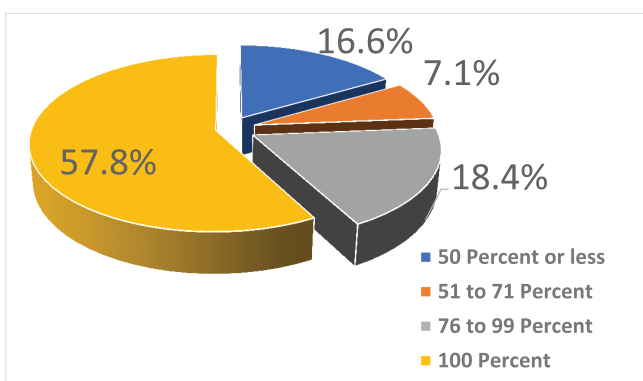

Fig. 3. What percentage of your practice is dedicated to horses? (Farm or ranch use or retired % was significantly higher for practices dedicated to less than 50% horses).

These large disease incidents highlight the detrimental effect of disease introduction and spread experienced at any equine commingling facility, including but not limited to horse shows, racetracks, veterinary hospitals, sales, studs, stables, and farms. Increased mortality and morbidity and curtailed equine activity can occur at any equine premises, regardless of size or number of horses.[6] The overall economic impact extends beyond horse loss to curtailment of an event and subsequent canceling of multiple events and interruption of expenditures in all parts of the equine industry economy.

Previous horse owner surveys have been completed in the United Kingdom and the United States.[8,9] These include a survey to determine the risk of infectious disease dissemination based on horse location and movement.[8] Assessment of equine disease risks and biosecurity on U.S. equine operations has been previously completed during the 2015 National Animal Health Monitoring System (NAHMS) study.[a] All report deficiencies in use of biosecurity practices to prevent disease spread. A recent horse owner survey found significant differences in biosecurity practices

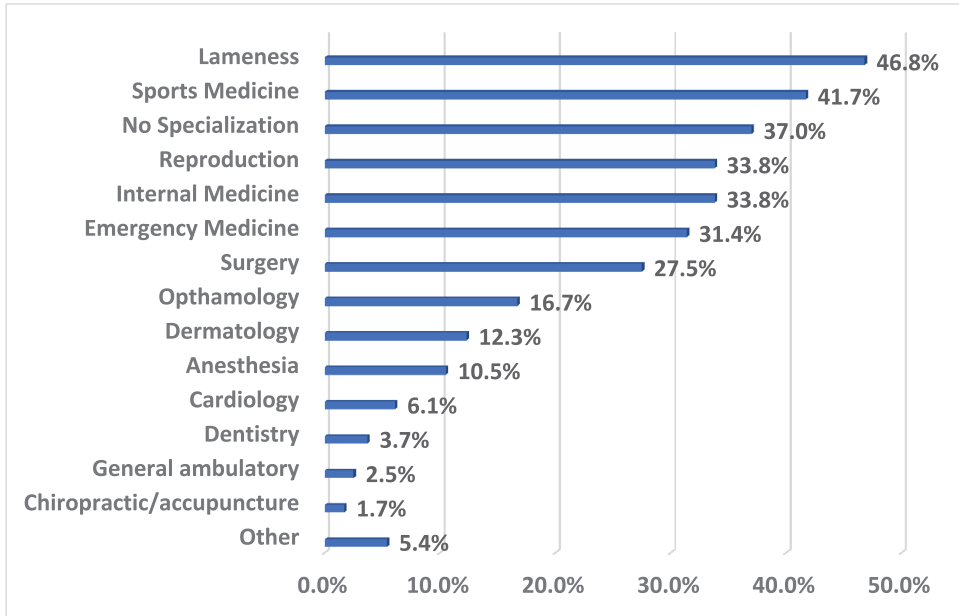

Fig. 4. Indicate any of the following areas that your practice specializes in. (Select all that apply).

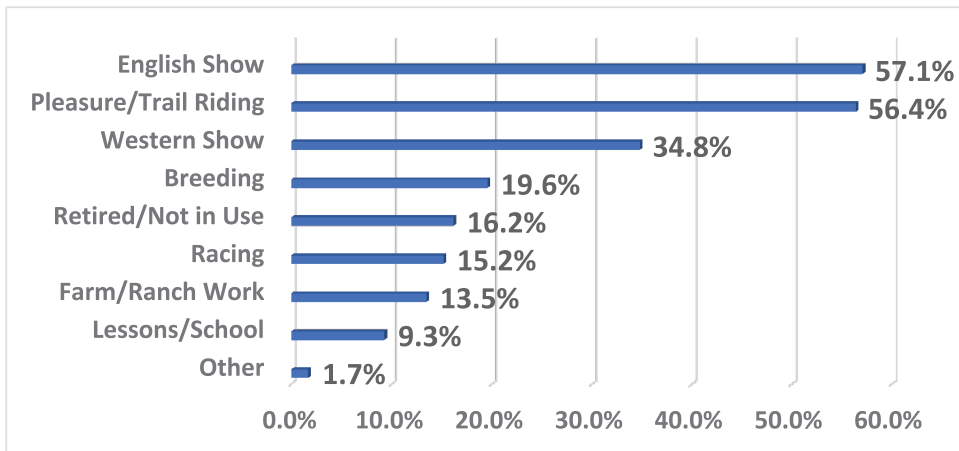

Fig. 5. Of the following disciplines, which make up the primary horse discipline(s) you service in your practice? (Select up to 2).

based on horse use and that owners are not overly concerned about disease risk.[9]

The objective of the study was to use a survey to determine veterinarians' knowledge and use of biosecurity for preventing equine infectious diseases. Once identified, the information can be used to create information and tools that horse owners and veterinarians can use to implement appropriate biosecurity protocols for different types of horse premises and events.

2. Materials and Methods

Survey questions were developed by members of the AAEP infectious disease committee.[b] The number of questions was based on what was considered the most likely to have optimal participation while still having sufficient information to fulfill the survey objective. The survey was pretested by practicing veterinarians to ensure clarity of the questions and to determine estimated time required to complete the survey.

The first five questions were developed to determine veterinarians' years in practice, the number of veterinarians in their practice, the percentage of their practice dedicated to horses, areas of specialization, and the predominate horse discipline in their practice. The remaining questions (questions 6–22) were used to determine veterinarian perception of horse owner knowledge of disease risk, biosecurity compliance and practice, use of the biosecurity techniques, and preferences for receiving information. In questions that directed survey takers to "select all that apply," respondents were able to include all the possible choices for their answer. Horse use was divided into 10 categories as follows.

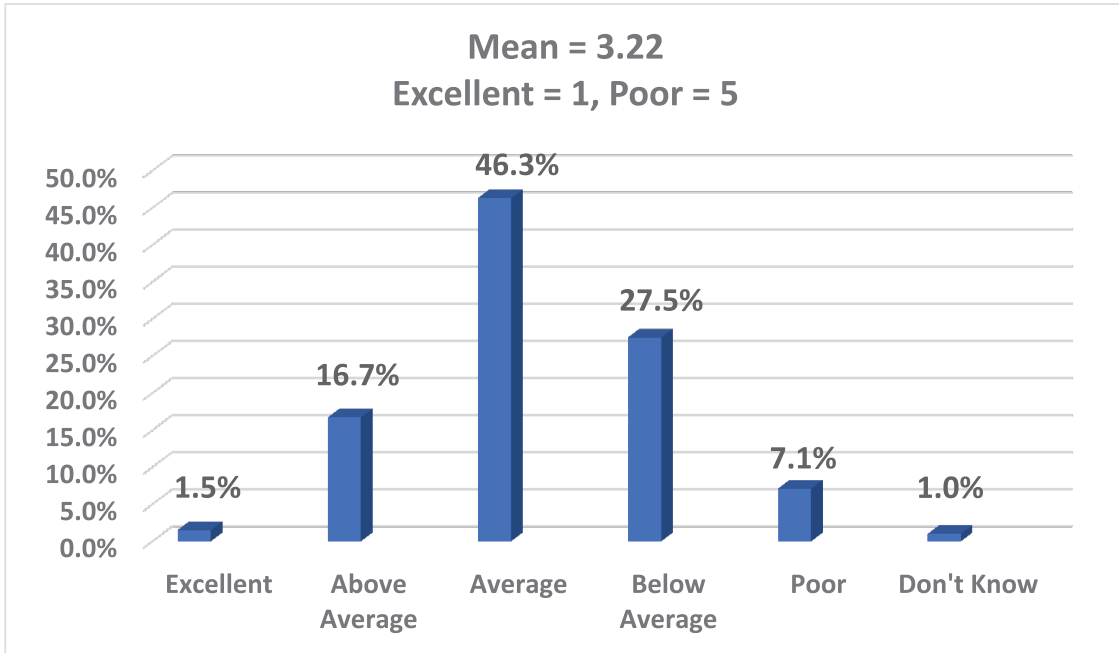

Fig. 6. What do you feel is the level of knowledge of your average client regarding biosecurity? (Significantly above average % for practices primarily working on racehorses and below average for practices primarily working on horses with farm/ranch use).

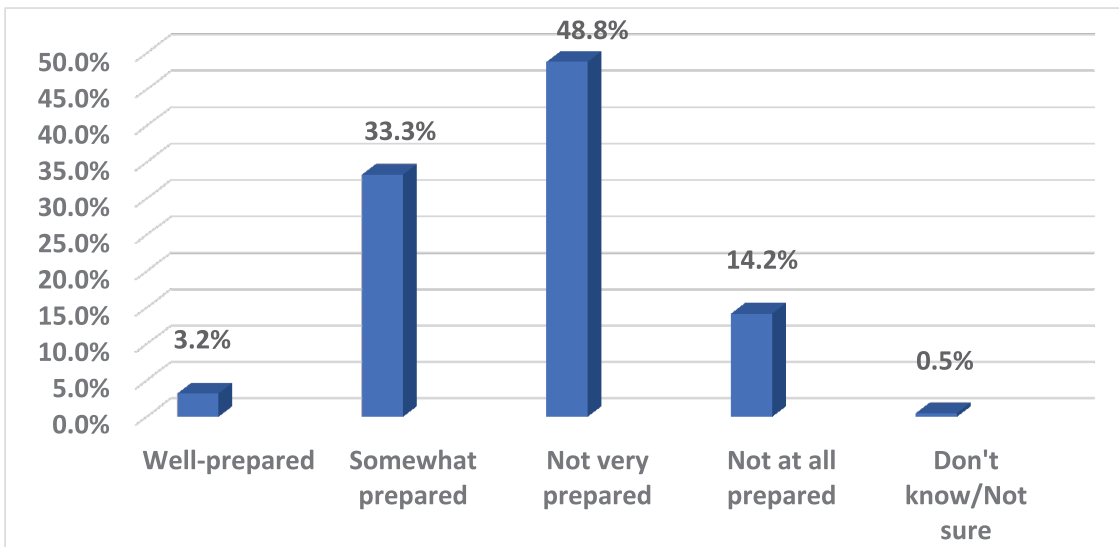

Fig. 7. How prepared do you feel most of the clients are within your practice to deal with an infectious disease situation in their stable, farm, or facility? (Significantly higher % for practices primarily working on retired horses).

- Pleasure/trail riding;
- Lessons/school;
- Western show;
- English show;
- Breeding;
- Farm/ranch;
- Retired;
- Racing;
- Driving; and
- Other (defined as any other use).

The Matrix group[c] finalized the survey, created the participant website, and performed the analysis on the collected data. The email announcement with survey link was distributed to the approximately 6,500 American Association of Equine Practitioner members actively practicing. A WinCross analysis[d] was completed to identify significant differences between the percentages in 10 horse use categories for each response within each question. A comparison of the

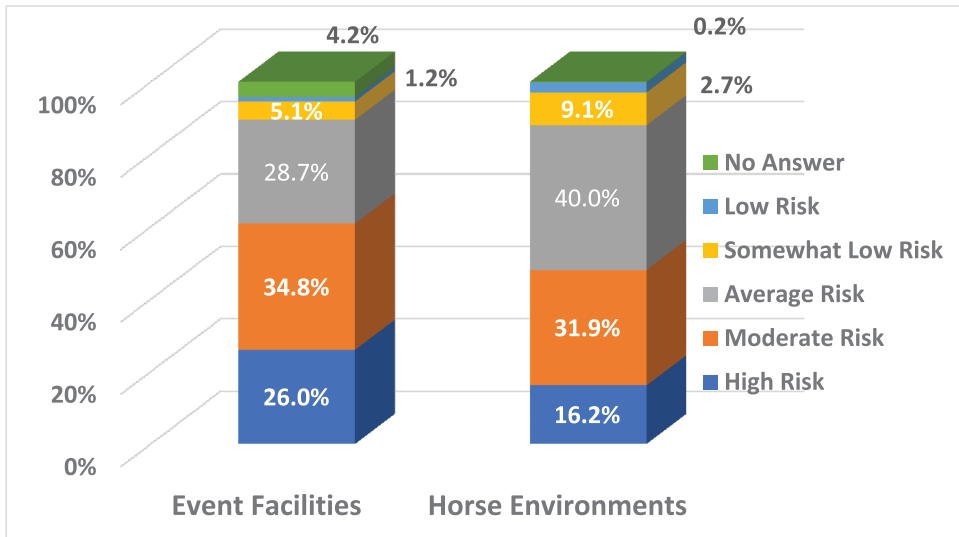

Fig. 8. On a scale of 5 to 1, with 5 being high risk and 1 being low risk, indicate your opinion of the level of risk you observe for susceptibility in the following: Horse environments (stables: farms, etc.) and event facilities (racetracks, show facilities, public and private, etc.) in your practice for susceptibility to an outbreak of infectious disease (EHM, influenza, strangles).

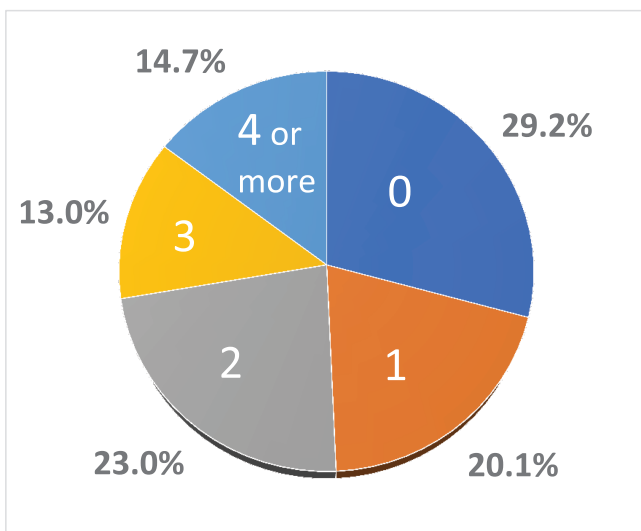

Fig. 9. How many infectious contagious disease outbreaks have you managed in the last year? (Significantly higher % for none in practices primarily serving racehorses and those working primarily on retired horses).

percentage of responses for each horse used for each part of each question was evaluated for significant differences using a Z-statistic. A value greater than 95% was considered a significant difference. Only horse use(s) considered significantly different from all the other uses in each response are reported.

3. Results

A total of 408 responses to the survey were received from AAEP member veterinarians. The questions and responses to questions are presented in Figs. 1–22. Responses to questions that were significantly different from all the other horse uses are presented in each figure legend.

The participant demographics for years in practice, the number of veterinarians in the practice, and the predominate areas of practice specialty (lameness and sports medicine) mirrored the AAEP membership (Figs. 1–5).[e] Survey results indicate veterinarians felt their clients had average (46.3%), below average (27.5%), or poor (7.1%) knowledge of biosecurity, and only 3.2% were well-prepared to deal with an infectious disease in their facility (Figs. 6 and 7). When respondents assessed disease risk, event facilities had high or moderate risk (60%) compared to 47% in resident environments (stables, farms, etc.) (Fig. 8). Responding veterinarians (75%) managed two or fewer outbreaks during the previous year (Fig. 9), and 70% answered that lack of owner compliance affected their ability to implement biosecurity plans (Fig. 10).

Without indicating the timeframe, 56% responded that they created or reviewed at total of one to five biosecurity plans with 28% answering none (Fig. 11). When asked the primary reason for not offering the service, 57% said clients do not want to pay for the service, while 30% answered the practice does not offer the service (Fig. 12). Additionally, 60% do not charge for creating a specific or detailed biosecurity plan for their clients (Fig. 13).

The most common risk factors for infectious disease encountered at facilities were the lack of isolating new horse arrivals, followed by a lack of horse owner knowledge of appropriate biosecurity practices and facility design (Fig. 14). When asked what was most needed in the field during an outbreak at facilities, affordable point of care tests and biosecurity handouts were identified at 60.8% and 50.5%, respectively (Fig. 15). A large majority of equine practitioners indicated they use hand and equipment sanitation when entering and leaving an equine facility (Fig. 16).

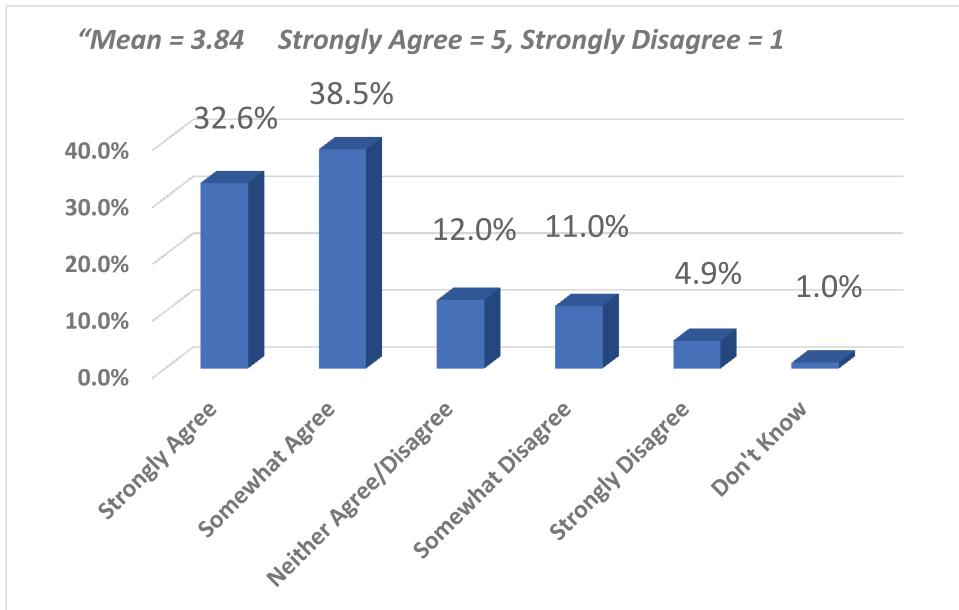

Fig. 10. Your level of agreement with the following statement: A lack of client compliance affects my ability to implement biosecurity plans for facilities.

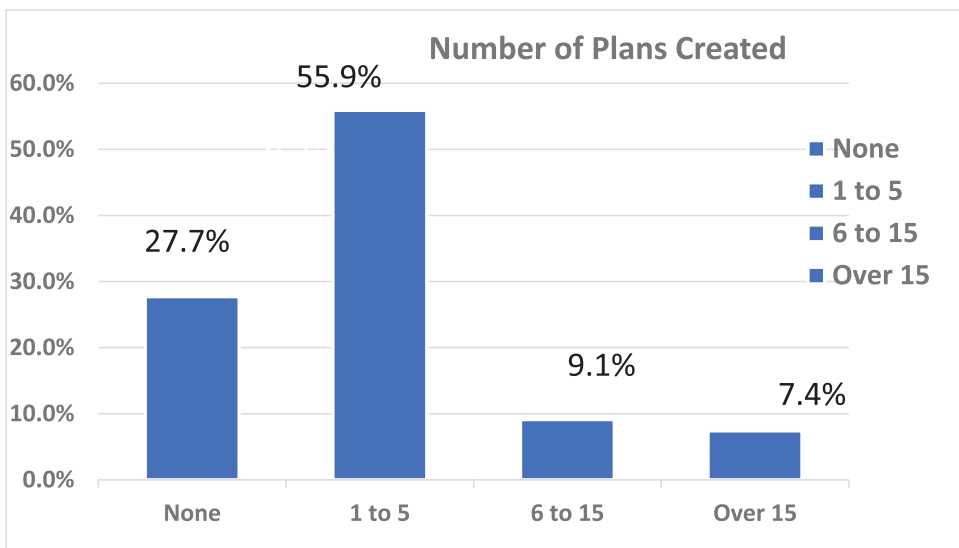

Fig. 11. How many event or equine farm biosecurity plans have you created or reviewed for your clients? (Significantly higher % for practices primarily working on racehorses and those working on horses with other uses).

The most frequent advice offered for biosecurity practices for equine facilities was to have a site for isolation (68.6%) with a plan for managing disease risk for horses coming and going to the facility (61.0%) (Fig. 17). The top three recommended biosecurity practices were isolating sick horses (77.7%), establishing an area to isolate new horses (73.0%), and monitoring temperature (41.9%) (Fig. 18).

Wearing examination gloves (83.6%) and washing hands and using hand sanitizer (79.7%) were the most common biosecurity practice used when collecting nasal swabs from a horse suspected of having a respiratory disease. Similarly, when discovering a horse with a fever, initiating diagnostic tests (69.1%) and maintaining separate equipment and feeding separately (65.7%) were considered the most important recommendations (Fig. 19). Protocols to manage horses and personnel when a horse with a fever are presented in Fig. 20. The most frequent reason for contacting State Animal Health Officials in the past 12 months was to report a reportable disease (32%), while 40% had no contact (Fig. 21). To learn current biosecurity recommendations, virtual on demand, current written, and a hybrid of in-person and virtual were the top three formats preferred by equine practitioners (Fig. 22).

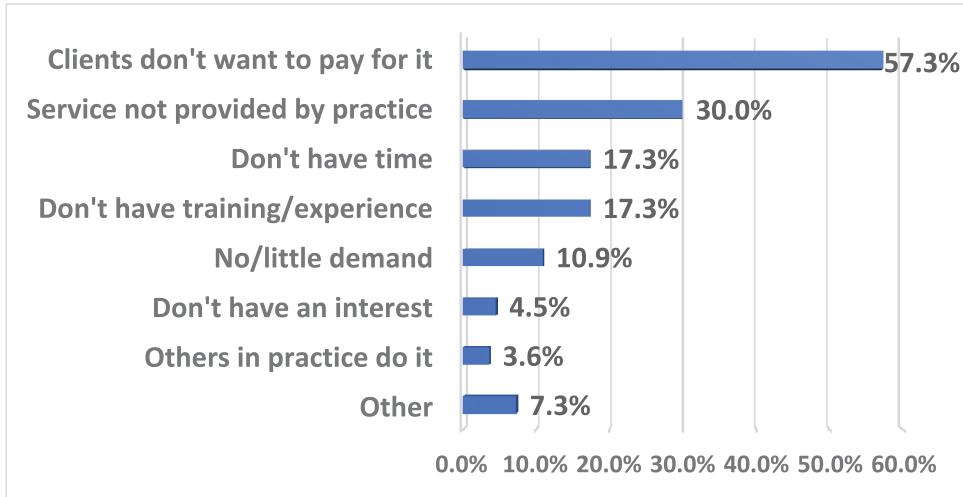

Fig. 12. What is your primary reason for not offering the service of writing or reviewing biosecurity plans for your clients? (Select all that apply) ("Other" responses were similar to the offered categories).

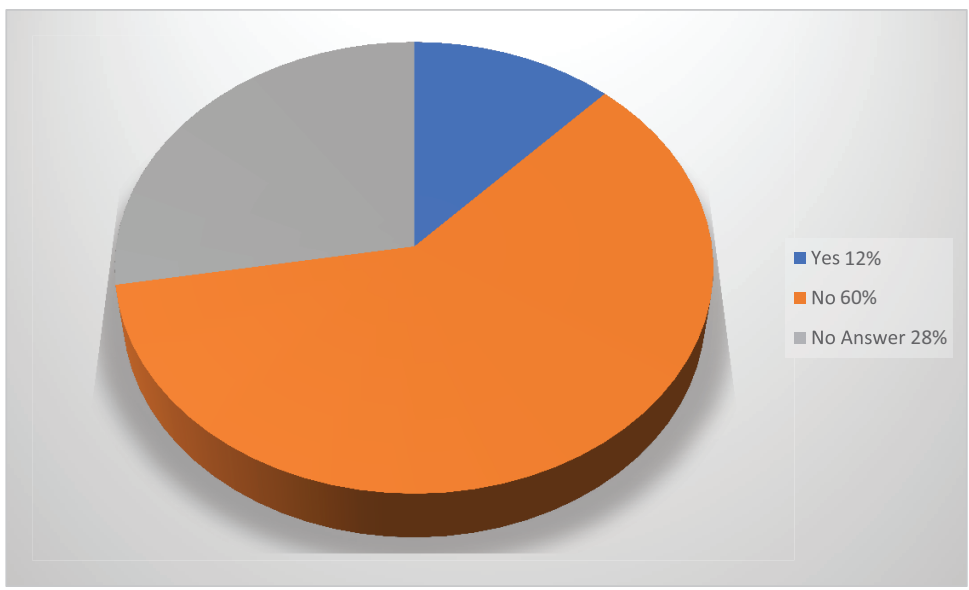

Fig. 13. Do you charge clients if you create a specific and detailed biosecurity plan for their horses?

4. Discussion

Equine veterinarians frequently apply or recommend biosecurity practices when treating infectious diseases. The initial response is to prevent the spread of the disease from affected animals, either in resident horses kept at a facility or where nonresident horses comingle at events such as horse shows. The practitioner is challenged to teach biosecurity to the horse owner or trainer that is not aware of the risks for contagious diseases that require owner compliance.[4,9]

Much of the recommended biosecurity measures come from those used in human and production animal medicine.[1–3,10,11] This information may be learned from veterinary college curriculums, but is rarely a topic in equine veterinary continuing education programs. Information on biosecurity practices for equine infectious disease management is available in reports from individual outbreaks but is rarely studied except in the face of outbreaks in veterinary hospitals, farms, stables, and events such as horse shows.[1,5,7,12–16]

Although applying biosecurity appears to be significantly increased for some horse uses, it is not clear from our survey if application of specific biosecurity measures is different based on horse use. The relative percentage of disciplines is similar to that identified in the 2015 NAHMS survey[f] and a horse owner survey[9] suggesting there is a good representation of the horse population in the demographics of the respondents. The difference in biosecurity knowledge of the practitioner's client may be related to horse use (Figs. 5 and 6). Although the principles are the same, implementation of biosecurity measures in a public

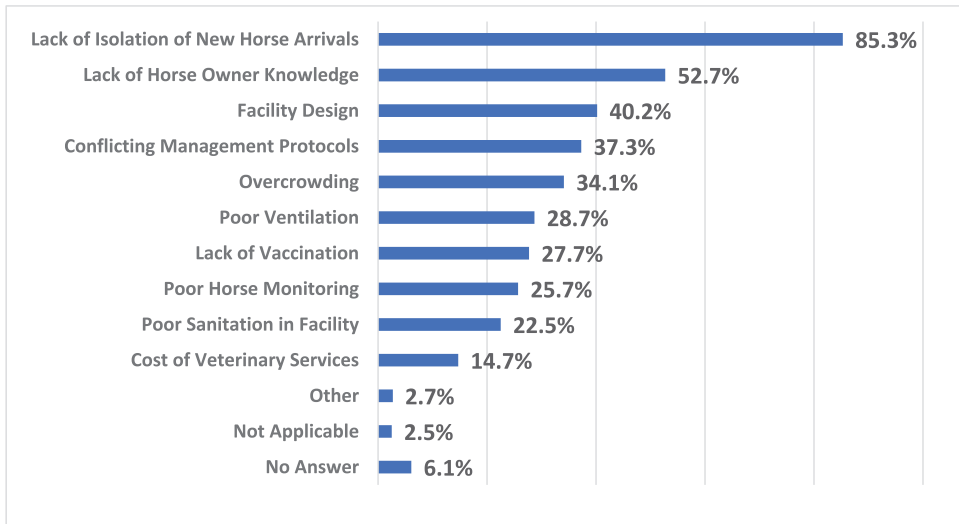

Fig. 14. What are the most frequent risk factors for infectious diseases you encounter at boarding, training, or event facilities in your practice? (Select all that apply).

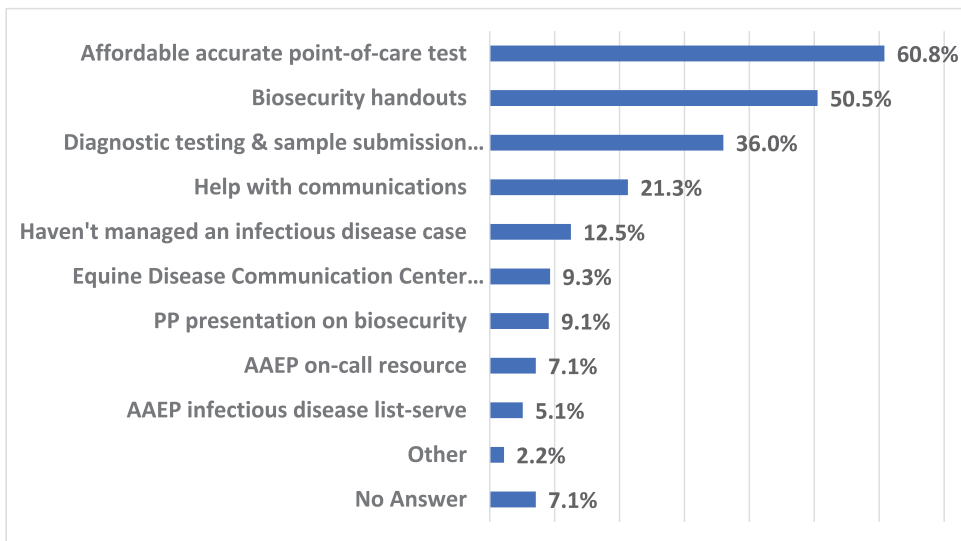

Fig. 15. What do you wish you had on hand or had known during a recent infectious disease case or outbreak at a barn/stable, training facility, racetrack, or show grounds? (Select all that apply) (Significantly higher % wish for biosecurity handouts at operations with horses for lessons/school use).

space such as a racetrack or horse show includes different management of personnel and horse movement compared to that in an owner's stable.

The survey supported findings in a horse owner survey in which there was an average or below average level of biosecurity preparedness and a perceived low risk for infectious disease when horses comingle at events.[4,9] Respondents also indicated that the majority of their clients were not very or not at all prepared to deal with an infectious disease. This likely explains the veterinarian's experience with a lack of compliance by their clients with recommended biosecurity protocols (Fig. 10). The lack of compliance was also rated the greatest challenge for managing a disease outbreak in a state animal health official survey.[17]

There is no information about the number of infectious disease outbreaks veterinarians in this survey managed during a specific period of time. In total, 50% reported one or no outbreaks. The way the term outbreak was defined and presented in the question may have influenced how the question was answered in Fig. 9. A more specific question may alter these results.

Demographics details were not collected from the respondents except time in practice and type of practice; both were similar to the overall membership. Because the demographics were similar to AAEP membership, the authors concluded the survey responses represented the opinion of most equine practitioners in the United States. This is useful for developing continuing education on biosecurity.

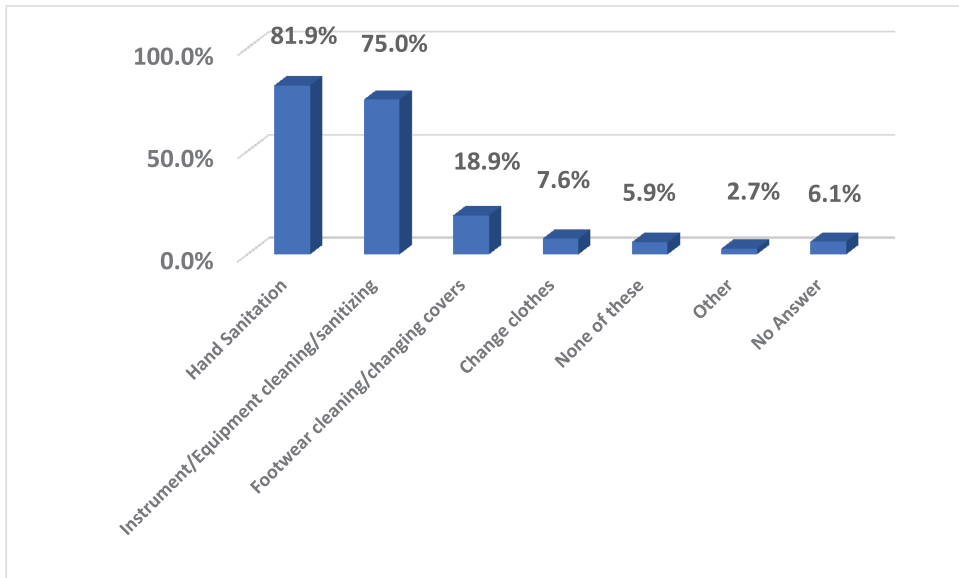

Fig. 16. When entering and leaving an equine facility on routine visits (not for an infectious disease case), do you take any of the following biosecurity measures? (Select all that apply) (Significantly lower % for English showing/competition use).

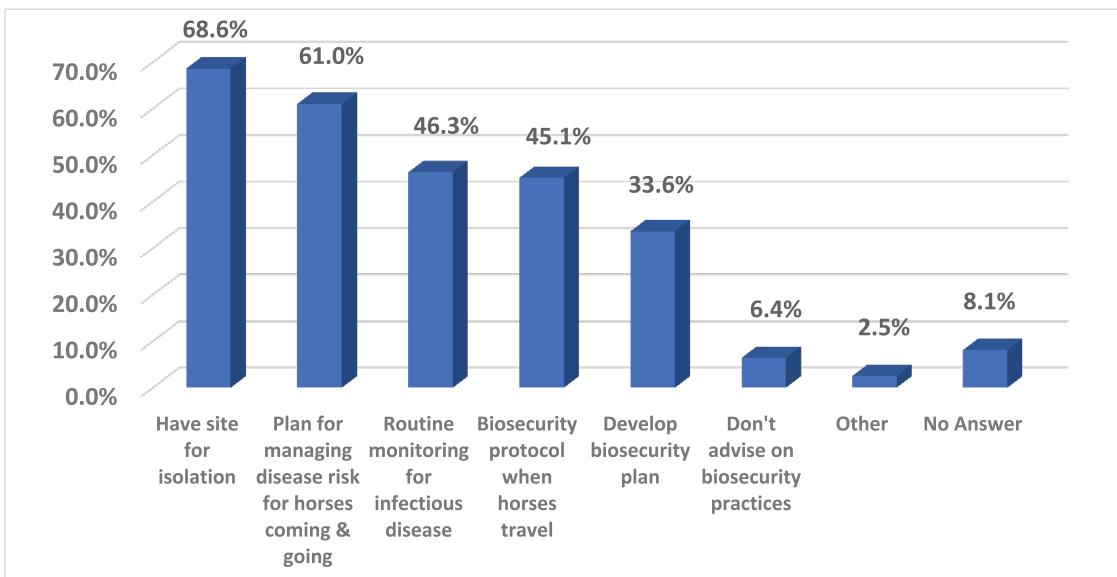

Fig. 17. On which of the following biosecurity practices do you advise your clients? (Select all that apply).

Information and recommendations for biosecurity measures are available either as those reported to have been implemented during outbreaks or from internet-published guidelines. These include communications, protocols for isolation and disinfection, facility and personnel management and needed resources for both veterinarians and horse owners.[g-i] Providing virtual presentations and continuing education courses is the best way to deliver biosecurity information to AAEP members. Based on this survey, providing brochures or other written material should also be considered.

Few members offer creating comprehensive biosecurity plans predominately because clients will not pay for it, the service is not offered by the practice or they do not have time or interest in providing this service. Practitioners and owners agreed that isolation of new horses was one of the most important biosecurity practices (Fig. 18).[9] Although practitioners are aware of the need for hygiene practices (wearing gloves and using hand sanitizer), the use of other forms of personal protection equipment beyond examination gloves is not often part of their routine when dealing with potential infectious disease cases.

The survey also suggested that equine practitioners manage few disease outbreaks and thus have limited personal experience. Respondents did

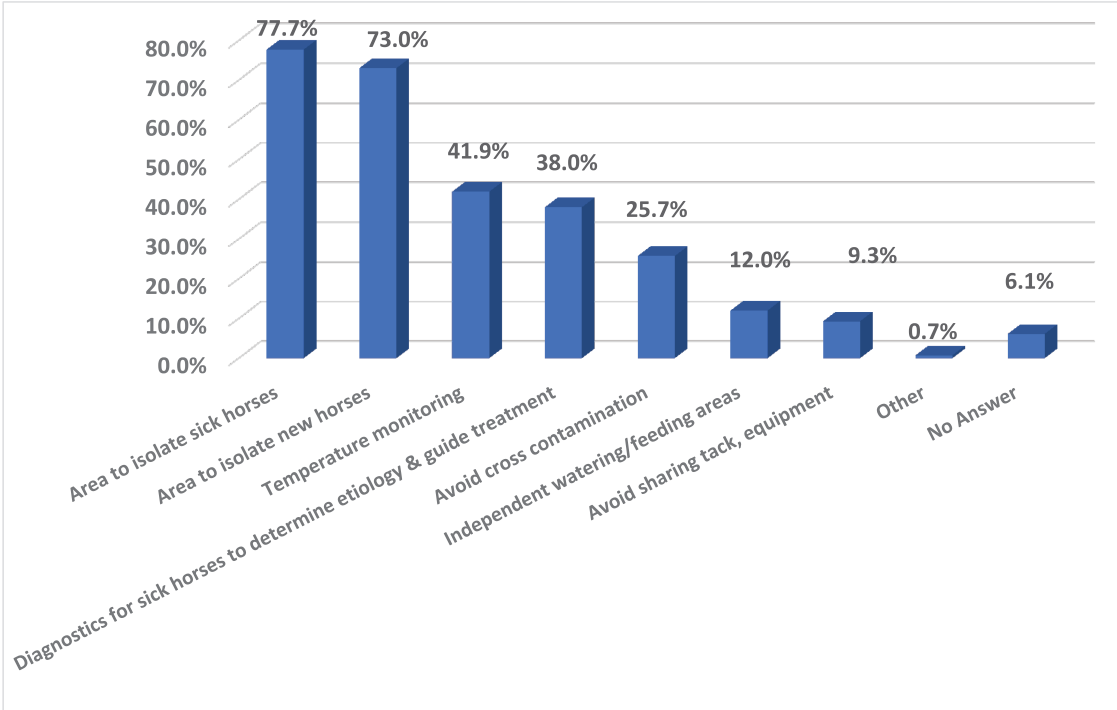

Fig. 18. Of the following biosecurity practices, which three do you feel are most important? (Select up to 3).

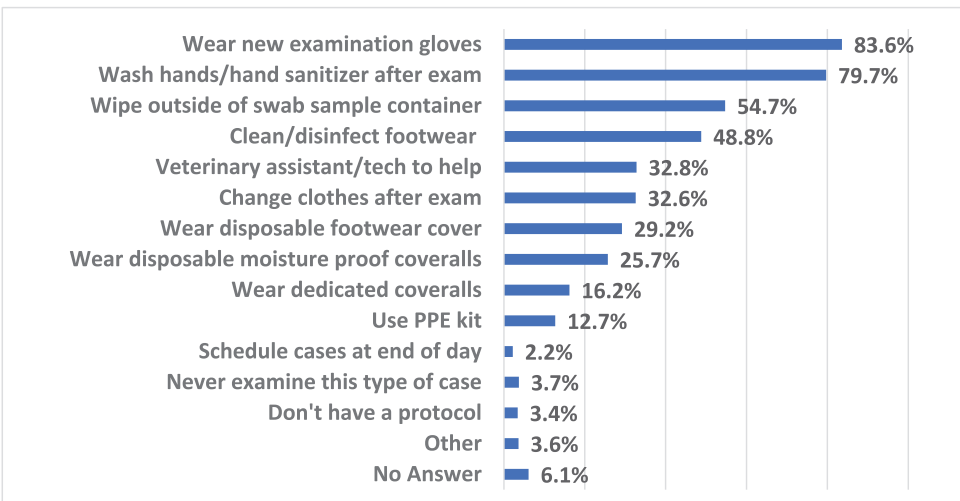

Fig. 19. When collecting nasal swabs from a horse suspected of having an infectious respiratory disease, which of the following are in your protocol? (Select all that apply) (Significantly higher % for wear new examination gloves when servicing horses with other uses).

indicate that they ask for advice from State Animal Health Officials related to specific disease cases. However, communications may be limited, as 50% of state animal health officials surveyed have less than needed resources for managing equine outbreaks.[17]

The response rate to the survey was low (~6.3%), which could affect the validity of the results. Emailing of the survey link was used because it expedited distribution of the survey and was felt to be more effective than distribution of hard copies through the U.S. postal service, as overall quality has not been shown to be different.[18] The use of the email for this survey could have created bias as communication by email potentially selecting members with different opinions compared to the entire AAEP membership. The survey was not standardized or validated and therefore susceptible to self-selection and sampling bias.[19]

The following conclusions based on the survey: 1) AAEP members do not think that their clients are prepared to deal with an infectious disease outbreak;

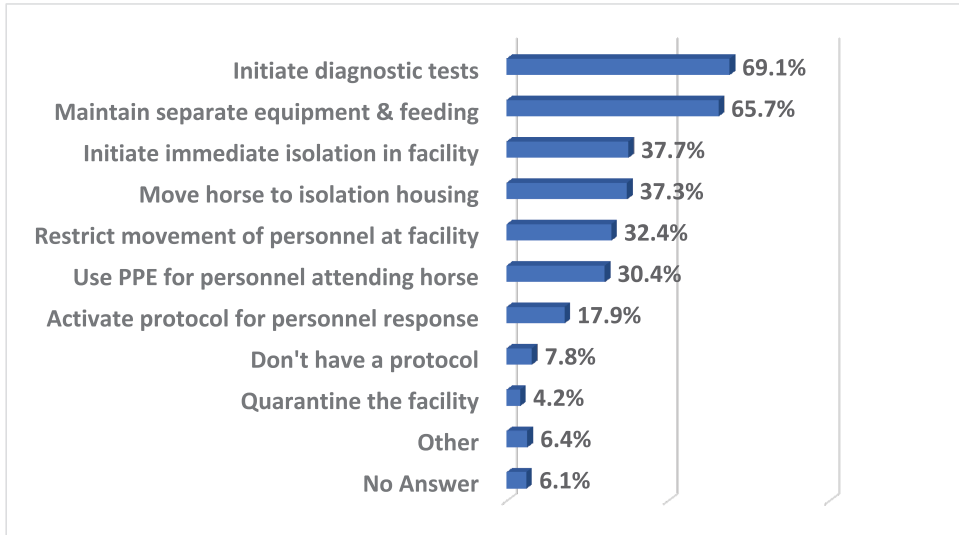

Fig. 20. What is the protocol you initiate for horse and personnel management after discovering a horse with a fever? (Select all that apply) (Significantly higher % for initiate immediate isolation in the stable or facility with farm or ranch use).

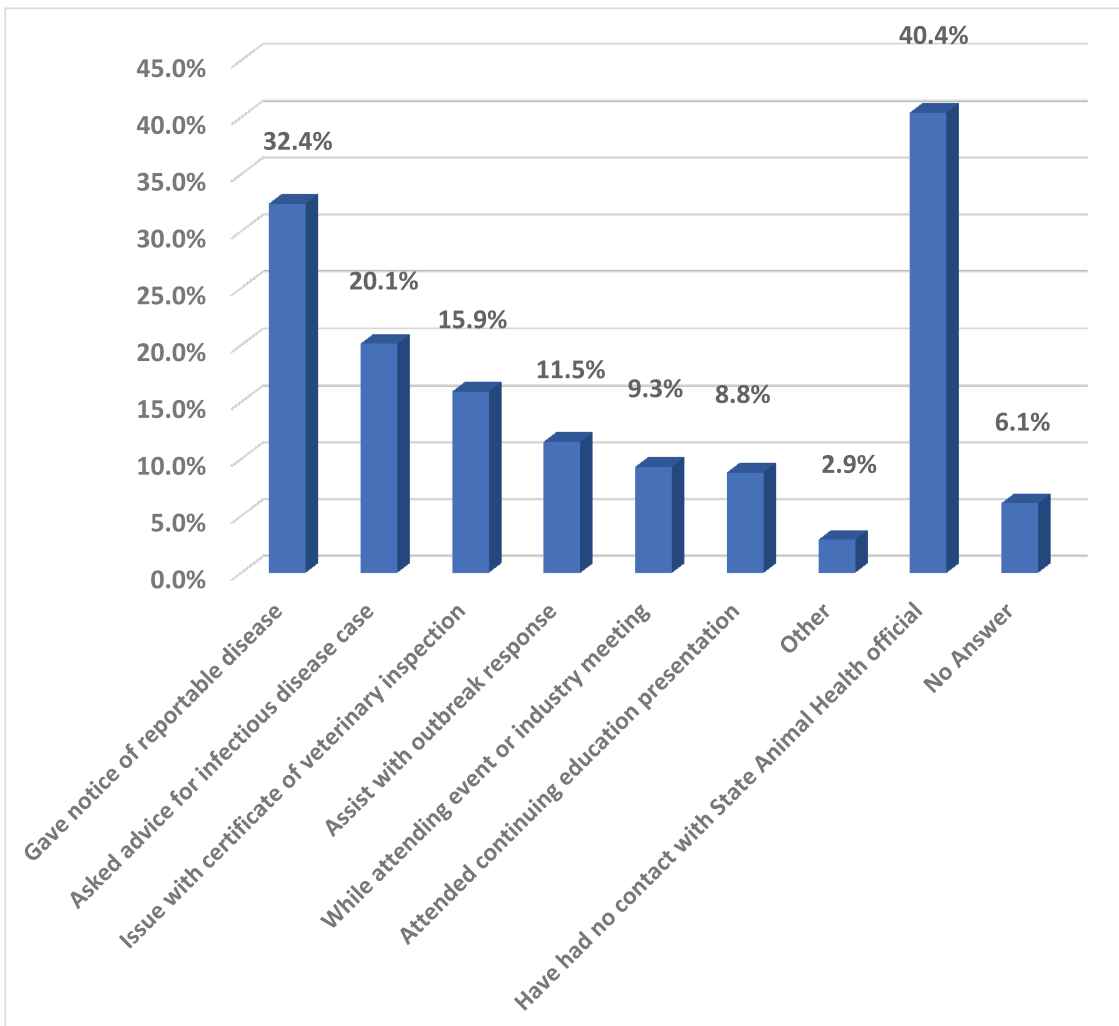

Fig. 21. Have you had contact with a State Animal Health Official in the past 12 months for any of the following reason (s)? (Select all that apply) (Significantly higher % of assisting with outbreak response that primarily services horses with lesson/school use and give notice of a reportable disease for practices that primarily services horses with other uses).

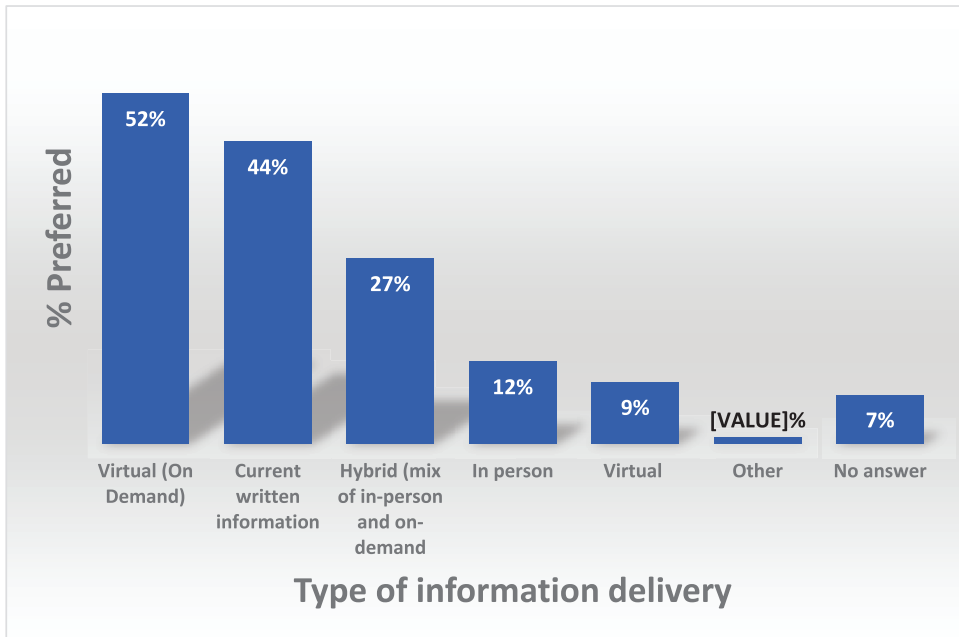

Fig. 22. If you want or need to learn about current biosecurity recommendations, what format do you prefer? (Significantly higher % for virtual [on demand] with lessons/school use).

2) lack of client compliance restricts the ability to implement biosecurity recommendations; 3) home environments have less risk for infectious diseases compared to event facilities; 4) horse use was infrequently a significant factor when considering the responses to the survey; 5) overall biosecurity practice is relatively uniform within the profession and can be improved; and 6) AAEP members prefer virtual presentation to learn about biosecurity. The results of the survey suggest the risk of infectious diseases could be decreased by increasing owner knowledge of and compliance with biosecurity recommendations from veterinarians.

The next step is to develop a curriculum that includes best practices and how to develop and apply biosecurity plans. In addition, equine practitioners could benefit from instruction on how to create and market a comprehensive biosecurity plan to their clients, since based on the survey, many equine practitioners do not charge for the service if they provide it. Creating a biosecurity plan should be considered as part of a preventive health program.

Acknowledgments

Declaration of Ethics

The authors have adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest

Dr. Pelzel-McCluskey is employed by the United States Department of Agriculture Animal, Plant Health Inspection Service, Veterinary Services, 2150 Centre Ave., Bldg B, Fort Collins, CO 80526. Drs. White and Flynn have no conflict of interest.

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[a]https://www.aphis.usda.gov/animal_health/nahms/equine/downloads/equine15/Eq2015_Rept4.pdf

[b]https://aaep.org/about-aaep/committees-and-councils/infectious-disease-committee

[c]The Matrix Group, Lexington, KY, www.tmgresearch.com

[d]The Analytical Group, Inc., 15300 N. 90th Street, Scottsdale, AZ 85260, USA, www.analyticalgroup.com

[e]N.A. White, AAEP office, personal communication, 2024.

[f]https://www.aphis.usda.gov/animal_health/nahms/equine/downloads/equine15/Eq2015_Rept4.pdf

[g]https://aaep.org/document/general-biosecurity-guidelines

[h]https://equinediseasecc.org/biosecurity

[i]https://www.cdfa.ca.gov/ahfss/Animal_Health/pdfs/Biosecurity_Toolkit_Full_Version.pdf