Infection Control Strategies for Horses in the New Millennium

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This review is written to highlight concepts of control of infectious diseases in horses on farms and in hospitals or clinics. Although both vaccination and the use of antimicrobials have a place in the control of infectious diseases, they should only be relied upon as adjuncts to other infection control measures. Strategies of infection control in populations revolve around minimizing exposure and optimizing resistance of the animal to infectious agents and have been known for centuries. These strategies are as effective today as they were 100 years ago, though they may be more difficult to implement. Optimal hygiene strategies, along with segregation of animals based on their infection status, are methods that can help reduce outbreaks of infectious diseases among groups of horses. The overall health and immune status of the individual and herd can play a role in resistance to infection. Management practices such as assuring passive transfer in neonates, optimizing a healthy gastrointestinal flora, assuring adequate nutrition, and ventilation for housed animals all can play a role in minimizing new infections. Authors’ addresses: Department of Clinical Sciences College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523 (Traub-Dargatz, Morley, Landry); USDA-APHIS/VS Centers for Epidemiology and Animal Health (CEAH), 555 S. Howes Street Fort Collins, CO 80521 (Dargatz); and Gluck Equine Research Center, University of Kentucky Lexington, KY, Department of Veterinary Science, Lexington, KY 40546 (Dwyer). © 2001 AAEP.

Important components of an infectious disease control program include:

1. Determine which diseases are to be controlled and understand the ecology of the diseases.
   a. If fecal–oral spread is likely, then all means of oral spread must be taken into consideration, for example, rodent control, bird control, insect control, preventing contamination of feed and water sources, hand cleanliness of personnel, and cleanliness of the facility.

2. Group animals based on their infection status.
   a. Requires monitoring to know the status of the animal (at arrival physical examination, on arrival testing or testing prior to arrival.
such as a screening test for EIA or other diseases, or knowing the status based on history or lack of history of exposure).

b. Once animals are grouped together, it is important to maintain hygiene of the facility and personnel so that these animals and their bodily fluids and excrements stay separate from other groups.

c. Requires adequate facilities to allow for segregation of animals into groups based on their status.

3. Monitor for occurrence of infectious disease through observation of clinical signs and through testing, if appropriate, for infectious disease occurrence. Isolate and appropriately treat affected animals if disease occurs.

a. Requires performing regular examinations of the animals, including determination of rectal temperature daily during the monitoring period as a minimum.

b. Requires compilation of test results to look for trends.

c. Requires a willingness to admit when there is a problem.

d. Requires taking appropriate action if it appears infections are spreading within the group or among groups (e.g., isolation of infected animals to prevent further spread).

e. Should develop both written and verbal communication for personnel regarding control strategies and post information regarding status of animals and control methods. Postings should be made so that personnel involved with care of the animals can stay informed of the status of the animals in their care and of the current biosecurity protocols being implemented. For example, develop a communication board, color code animal identification and clothing used in animal care, and post signs to promote hand washing.

f. Determine methods to improve compliance with biosecurity methods such as an incentive program and predetermine the consequence if personnel do not comply with protocols.

4. Be certain if biosecurity protocols entail use of foot dips or frequent hand washing that the facility is equipped to allow for convenient use of such methods of infection control, for example, if a sink were not available in the animal housing area, a temporary hand washing station would need to be improvised.

5. Institute an immunization program if there is evidence that immunization in the face of an outbreak may be beneficial.

6. Optimize the overall health of the animals by minimizing stressors, optimizing nutritional status, optimizing specific immunity through vaccination and minimizing treatments that may make the animal more susceptible to disease.

The occurrence of infectious diseases among horses can be costly and result in suffering of affected animals. The impact of an infectious disease outbreak depends on: 1) number of animals affected, 2) morbidity and mortality, 3) the ability to prevent further spread or future outbreaks, 4) limits placed on movement of horses onto and off of the affected premises, and 5) loss of confidence and business of those who would bring their animal to the premises (farm, hospital, or clinic). Hospital-acquired or nosocomial infections are a concern for the medical professionals who care for human and animal patients and appear to be on the rise. Many of the nosocomial organisms involved are multi-drug resistant. Based on a recent survey of directors of North American veterinary teaching hospitals (18 respondents) there had been a total of 18 outbreaks of nosocomial infections from 1985 to 1996. Of these, 14 outbreaks were due to salmonellosis and led to closure of the hospital. The associated cost of the outbreaks ranged from $10,000 to $428,174. Equine nosocomial infections have been reported in the scientific literature including those due to infections with *Salmonella* sp. and *Staphylococcus aureus*. Programs in hospitalized horses have been implemented at several veterinary teaching hospitals aimed at infection control. These programs are tailored toward the individual facility but the infection control principles detailed in these programs have a common theme and could be applied to any veterinary clinic. After an outbreak of salmonellosis in 1996 there has been a major commitment to the prevention of nosocomial infections in patients at Colorado State University. The biosecurity program has specific personnel assigned to infection control and all personnel and students trained in infection control strategies. Detailed information on this program is available from Colorado State University College of Veterinary Medicine and Biomedical Sciences website. When developing an infection control scheme for hospitalized animals it is important to keep in mind that horses housed at a veterinary clinic are different than the general population. Many of the animals hospitalized may be more likely to acquire or shed an infectious agent than those in the general population due to transport stress, altered diet, administration of antimicrobials, and their underlying problem (these animals may be immunosuppressed and more susceptible to infection than animals in the general population). It is also important to keep in mind that each hospitalized equine patient represents a separate herd and admixing them from a hygiene standpoint would mean admixing different herds on a daily basis. Thus, efforts to prevent infection in this population may
need to be more stringent than in the general population.

Infections of horses with bacterial and viral pathogens are not limited to animals housed at veterinary hospitals. Outbreaks of salmonellosis and respiratory disease such as strangles and influenza occur on horse farms, racetracks, and other locations where horses congregate. These can have a major impact both financially and on the morale of those on the premises who have to deal with the ill animals and their owners. Financial impact would include expenses associated with resolution of an outbreak, cost of treating the affected animals, lost use of affected animals, cost of animals that die, and lost income for the operation if movement or value of horses is impacted.

Control of infectious diseases such as rotaviral diarrhea, salmonellosis, and strangles have been covered in recent publications oriented toward readers who are horses owners. Veterinarians are a critical link to convey information on infection control to clients and must be aware of this type of article themselves to best serve their clients by answering questions and tailoring recommendations to their clients’ specific situation.

It is also important for the veterinarian to work with a veterinary diagnostic laboratory that is in a position to optimize recovery of the agent of interest and is willing to determine if there is a trend in the type of organisms being recovered. This requires that the veterinarian and the laboratory personnel work as a team to optimize sample collection, shipping, testing, and reporting.

As many of the principles in place at the Colorado State University Veterinary Teaching Hospital would apply to infection control at other hospitals and even on farms, they are summarized here as an example of methods that could be used to control infections in horses.

At the CSU-VTH we believe that the colic patient and food animal patients are most likely to shed Salmonella sp. We have based our approach on the analysis of data from our Salmonella Infantis outbreak in 1996. We monitor for Salmonella sp. shedding in the large animal hospital by doing fecal cultures on all colic patients during their stay in our hospital. Owners sign a consent form when admitting their animal that indicates that a portion of the hospitalized animals are cultured and that infections can occur in the hospital and that the clients’ questions have been answered to their satisfaction.

At CSU-VTH we also monitor for the cleanliness of stalls (methods described in detail on website). We also do spot checks of the environment where the animals most likely to be positive have been housed such as the ceiling areas and drains in the colic housing area. The cleanliness and hygiene practices of hospital personnel are addressed through regular training on biosecurity, by having readily available hand washing stations and footbaths, and by having special clothing readily available to facilitate barrier precautions. We also minimize the use of shared equipment between equine patients.

Based on an average of three cultures per colic patient we have found that approximately 9% of these animals shed Salmonella sp. in their feces at CSU-VTH. The fecal shedding prevalence for the food animal patients overall is much higher even though only a single sample is collected per animal. Some of the dairies have as many as 45% of their animals shedding on arrival at the hospital. The monitoring methods have allowed for early detection and prompt intervention when a nosocomial spread of Salmonella sp. appears.

Several outbreaks of influenza in horses have occurred in our hospital since we have instituted our biosecurity program in 1997. The outbreaks have been controlled by prompt identification and isolation of positive animals along with vaccination of in contact animals and recommendations to clients that they have their animals vaccinated against influenza prior to hospitalization.

When there have been vesicular stomatitis outbreaks in the state we have instituted an oral examination policy for all new admissions to the hospital in an effort to prevent an infected animal from entering the main hospital as the consequences would be quarantine of the entire facility. This protocol was developed with guidance of the State Veterinarian of Colorado. Our hospital has not been quarantined due to vesicular stomatitis since instituting our biosecurity protocols despite ongoing cases in the surrounding states and Colorado. Based on our monitoring program we avoided having a positive animal admitted to the main hospital even though the most recent outbreak in 1998 involved horses in our immediate area.

Biosecurity principles have proven successful in control of disease outbreaks due to rotaviral diarrhea on equine farms. Recommendations regarding outbreak control on equine premises can follow those that have been successful in controlling disease outbreaks in veterinary hospitals.

Many of the principles of infection control used in our veterinary hospital could be used to control infections in horses in other types of veterinary hospitals and on equine farms. It is important to realize that an infection control program may not eliminate infectious diseases in horses but hopefully would limit the severity of the problem by minimizing the number of animals affected.

Based on the National Animal Health Monitoring System (NAHMS) Equine ‘98 study, overall during 1997, 22.0% of operations added new resident equids, while 11.2% of operations had non-resident equine visitors for less than 30 days. Larger operations were more likely to have had visiting equids and to have added new resident equids (Table 1). One method of managing disease risk posed by introducing equids to an operation is isolation or quarantine of new arrivals for a period of time that exceeds the incubation period for disease on-
set. Approximately one-third (34.0%) of operations that added new resident equids routinely quarantined these new arrivals from their resident equine population. As the size of operation increased, larger percentages of operations routinely quarantined new arrivals. For operations that routinely quarantined newly added equids, the average routine length of quarantine was 28.5 days. The percentage of equine operations with new additions that routinely quarantined new arrivals exceeded that reported for dairy operations in the NAHMS Dairy ’96 Study (13.6% quarantined at least 50% of new additions) and was similar to that for cow–calf operations according to the NAHMS Beef ’97 Study (38.9% quarantined all or some).25

Other methods of reducing the risk of disease spreading from animal to animal are those that help to assure optimal health status of new arrivals through veterinary examination, requiring vaccination and deworming of the newcomer prior to arrival, and requiring the newcomer to be tested for contagious diseases. Based on data from the NAHMS Equine ’98 study, over 50% of equine operations that added new resident equids required a test for equine infectious anemia (EIA). About 40% always or sometimes required an official health certificate and about the same percentage required an examination by a veterinarian other than for an official health certificate. Over 50% of operations that added new resident equids required vaccinations and deworming of new additions prior to arrival. Larger percentages of operations required an official health certificate, a veterinary examination other than for an official health certificate, and deworming for new residents as size of operation increased. Approximately one in four operations with new arrivals (24.2%) had no health requirements for new arrivals. Resident animals could be at risk for infectious disease if a quarantine or program for testing newcomers on arrival are not used.

Many equine owners and operators of equine facilities look to veterinarians to provide information they need to make decisions about health care. Based on the NAHMS Equine ’98 study veterinarians were rated very important as sources of information for equine health care decisions by 84.1% of operations and somewhat important on another 12.6% of operations.26 As an important source of equine health information and to serve as an example to our clients, veterinarians should strive toward optimal biosecurity principles in their clinic or hospital and personnel as well as serve as a source of such information for their clients.

References and Footnotes


Table 1. NAHMS Equine ’98 Study. For Operations that Added New Equids to the Resident Equine Population during 1997 (excluding births), Percent of Operations that Always or Sometimes Required the Following Tests

<table>
<thead>
<tr>
<th>Health Requirement</th>
<th>1–2</th>
<th>3–5</th>
<th>6–19</th>
<th>20 or More</th>
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<tbody>
<tr>
<td>Official health certificate</td>
<td>31.5</td>
<td>(10.3)</td>
<td>31.9</td>
<td>(5.1)</td>
</tr>
<tr>
<td>Veterinary examination other than for health certificate</td>
<td>36.4</td>
<td>(11.1)</td>
<td>36.5</td>
<td>(5.4)</td>
</tr>
<tr>
<td>EIA test, Coggins test</td>
<td>52.0</td>
<td>(11.3)</td>
<td>42.6</td>
<td>(5.8)</td>
</tr>
<tr>
<td>Swamp Fever test</td>
<td>44.7</td>
<td>(11.2)</td>
<td>51.9</td>
<td>(5.8)</td>
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<tr>
<td>Vaccination within past year</td>
<td>39.1</td>
<td>(10.9)</td>
<td>61.4</td>
<td>(5.6)</td>
</tr>
<tr>
<td>Deworming within past year</td>
<td>4.7</td>
<td>(4.6)</td>
<td>7.8</td>
<td>(4.4)</td>
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<tr>
<td>Anything else</td>
<td>56.0</td>
<td>(11.3)</td>
<td>76.0</td>
<td>(4.7)</td>
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</tbody>
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References and Footnotes