There are multiple underlying factors when determining the disposition of an unvaccinated animal that has been exposed to a rabid animal.\textsuperscript{1,2} This dilemma creates concerns for the attending veterinarian, the animal’s owner, animal control officials, and public health authorities. Although public health is of paramount importance, the emotional and monetary value of an animal cannot be discounted. The disposition recommendations of the National Association of State Public Health Veterinarians (NASPHV) are in the Compendium of Animal Rabies Prevention and Control.\textsuperscript{3} The suggested NASPHV protocol for currently vaccinated dogs, cats, ferrets, and livestock that have been exposed to rabies is to revaccinate the animal and have the animal be under the owner’s control and observed for 45 days. The same recommendation applies for exposed dogs and cats that have been previously vaccinated against rabies but are overdue for a booster vaccination; ferrets and livestock in this category are evaluated on a case-by-case basis to determine need for euthanasia or immediate booster vaccination followed by observation or strict quarantine. A case-by-case basis includes consideration of factors such as the severity of the exposure, length of delay in a booster vaccination, current health status, and local rabies epidemiology.

In the past, the NASPHV had recommended that unvaccinated (ie, no history of previous vaccination) dogs, cats, and ferrets exposed to a rabid animal be euthanatized or kept in strict isolation for 6 months and vaccinated against rabies 1 month prior to release.\textsuperscript{4} Those recommendations were modified in 2005 to suggest that unvaccinated exposed dogs, cats, and ferrets be euthanatized or kept in strict isolation for 6 months and vaccinated at entry into isolation or 1 month prior to release.
Current NASPHV recommendations are that the animal be euthanatized or vaccinated against rabies (preferably within 96 hours after exposure) and placed in strict quarantine for 4 months (dogs and cats) or 6 months (ferrets). If vaccination is delayed, public health officials may extend the quarantine period for dogs and cats to 6 months. Strict quarantine in this situation means confinement in an enclosure that prevents direct contact with people and other animals. Immediate slaughter or a 6-month period of observation on a case-by-case basis with no vaccination during or after the observation period has been and continues to be recommended by the NASPHV for exposed unvaccinated livestock.

Texas law provides a similar protocol to that of the NASPHV as an option for a currently vaccinated, rabies-exposed animal that includes an immediate booster vaccination and 45-day confinement; confinement means restricting the animal to an area in isolation from other animals and people except for contact necessary for the animal’s care. Alternatively, the animal may be euthanatized.

However, the Texas Department of State Health Services (DSHS, formerly the Texas Department of Health) has developed additional options for rabies postexposure prophylaxis (PEP) pertaining to unvaccinated animals exposed to a rabid animal; this PEP protocol has also applied to animals that were not currently vaccinated against rabies. Current Texas PEP requirements for these animals include immediately vaccinating the animal against rabies, confining the animal for 90 days, and administering booster vaccines during the third and eighth weeks of the confinement period. Alternatively, the animal may be euthanatized. These vaccination provisions apply to domestic animals for which a USDA-licensed rabies vaccine is available. The administration of a rabies vaccine in a species for which no licensed vaccine is available is at the discretion of the veterinarian; however, an animal receiving a rabies vaccine under these conditions will not be considered to be vaccinated against rabies virus in potential rabies exposure situations. For situations in which none of the requirements are applicable, the recommendations in the latest edition of the Compendium of Animal Rabies Prevention and Control should be followed.

Presently, there are no USDA-licensed rabies vaccines specifically for use in PEP for domestic animals. However, PEP is commonly utilized in humans. The PEP for previously vaccinated humans includes immediate administration of two doses of rabies vaccine (one each on days 0 and 3); rabies immune globulin (RIG) should not be given in these cases. The PEP for not previously vaccinated humans includes immediate administration of RIG and a series of 4 doses of rabies vaccine (one each on days 0, 3, 7, and 14). Additional doses of vaccine may be necessary with either protocol depending on the immunocompetence or other special circumstances of the exposed person.

The need for PEP options for exposed unvaccinated animals has been recognized in Texas. South Texas experienced a rabies epizootic in canines that began in 1988. Rabies involving the domestic dog–coyote variant of rabies virus is readily transmitted from coyotes to domestic dogs and between domestic dogs. According to reports from the DSHS, for all animals tested for rabies that have nonnegative results, more people were exposed to rabies via domestic animals than via wild animals. In a published report, approximately 86% of people presenting to emergency departments who received PEP did so because of exposure to rabid or potentially rabid dogs and cats; this high percentage is reflective of the close relationship between humans and dogs and cats and reinforces the importance of providing PEP options for unvaccinated animals.

The Rabies Control Act of the Texas Health and Safety Code was enacted in 1979. The Texas Administrative Code (TAC, also referred to as a rule) created under this statute, Rabies Control and Eradication, included the aforementioned PEP for animals that were current regarding rabies vaccination and were exposed to a rabid animal. The PEP protocol for exposed animals that were not current with regard to vaccination against rabies or were unvaccinated has undergone some variation.

The TAC requirements from 1979 through 1987 were to euthanize the animal exposed to rabies or immediately vaccinate the animal against rabies, keep it in strict isolation for 6 months, and administer an additional dose of vaccine to the animal 1 month prior to its release from isolation. For animals < 3 months of age, an additional vaccine would be administered when the animal reached 3 months of age. Immediate vaccination was mandated on the basis of field experiences in Texas involving rabies epizootics in canines in the 1970s, in which something similar to the early death phenomenon associated with vaccinations in relation to incubation periods was observed. During these rabies epizootics, it was indicated that vaccination may hasten the onset of clinical signs of rabies in dogs that are in the incubation stages of the disease.

Historical literature had indicated that although the incubation period for naturally exposed dogs typically ranged from 21 to 60 days, an animal exposed to rabies prior to vaccination would develop rabies within 1 month after vaccination. Immediate vaccination should stimulate antibody production for preventing rabies without lengthening the incubation period in instances where rabies develops despite the administration of PEP. A dose of RIG was not included in these recommendations because of limited availability for animals, high costs, and the concern about possible adverse reactions. In a retrospective study, 99.7% (711/713) of unvaccinated animals that received Texas’ original PEP protocol did not develop rabies; 2 dogs developed rabies.

In 1988, the TAC regarding PEP was amended, and rabies-exposed unvaccinated domestic animals were euthanatized or received a vaccination against rabies immediately and were kept in strict isolation for 90 days with booster vaccines administered during the third and eighth weeks of the isolation period. In December 2007, the TAC was reworded to 90 days of confinement, but the intent was that the confinement should remain in the form of strict isolation.) The modification to include a booster vaccination at the third week of isolation was based on
the possibility of a poor titer response after the first vaccination as detected in specimens voluntarily submitted by veterinarians and evaluated by use of a rapid fluorescent focus inhibition test\textsuperscript{15} for the detection of antibodies against rabies. The vaccination booster at the eighth week of isolation was included as a safety measure. The reduction to 90 days’ isolation was based on field observations after the original protocol had been in place. For animals < 3 months of age, additional vaccinations may be needed to ensure that the animal received at least 2 vaccinations at or after the minimum age designated by the USDA for the vaccine administered. Cumulative results from 3 study periods using this protocol\textsuperscript{12–14} were that 99.7% (2,469/2,476) unvaccinated animals that received this PEP did not develop rabies; 7 dogs developed rabies. However, 2 of the 7 dogs that developed rabies would not be classified as true PEP failures because there were delays in initial vaccine administration of 8 and 9 days.\textsuperscript{5} Prompt administration of the first rabies vaccine has been an important component for successful PEP. There was a notable number of rabies cases and animal exposures to these rabid animals. During the 10-year period covered in this paper, there were 8,185 confirmed cases of rabies in animals.\textsuperscript{15–24} Therefore, the objectives of the study reported here were to determine whether Texas’ PEP protocol is a viable option for unvaccinated animals and to examine any PEP and preexposure vaccination failures during this period.

**Methods**

The DSHS Zoonosis Control’s zoonotic incident reports (ZIRs) filed from 2010 through 2019 were reviewed. There were 8,185 reports associated with a laboratory-confirmed case of rabies in an animal. Reports of unvaccinated (no history of vaccination against rabies) animals that received PEP in accordance with the TAC\textsuperscript{9} after exposure to a rabid animal were included in the collected data. A separate data collection included unvaccinated exposed animals that were euthanatized instead of receiving PEP. Animals that had preexposure rabbit vaccinations and developed rabies were also included.

Testing of submitted specimens to detect rabies was performed by the DSHS Public Health Laboratory in Austin, City of El Paso Department of Public Health Laboratory, Houston Department of Health and Human Services, San Antonio Metropolitan Health District, or Department of Defense Veterinary Food Analysis and Diagnostic Laboratory at Fort Sam Houston, plus an out-of-state laboratory on rare occasions. Submitted specimens were tested for rabies virus antigen by means of direct immunofluorescence microscopic examination of brain tissue impressions. Antigenic analysis of specimens with positive results for rabies virus was performed with monoclonal antibodies (MABs) against the viral nucleoprotein to identify rabbits virus variants.\textsuperscript{25,26} To verify certain variants (eg, domestic dog–coyote vs Texas fox) or resolve atypical or unexpected results, a genetic analysis of the nucleoprotein sequence (amplification with a reverse transcription–PCR assay followed by sequence analysis)\textsuperscript{27} was conducted. In addition, the direct rapid immunohistochemical test\textsuperscript{27} was occasionally used to accomplish field testing, with positive results verified in the DSHS laboratory via direct immunofluorescence examination.

Every laboratory-confirmed case of rabies was verified by the DSHS as being investigated by personnel from the DSHS Regional Zoonosis Control, local health departments, local rabies control authorities, or animal control officers, and the standardized ZIR was then completed. The report included the date, location, and description of the incident that caused rabies to be suspected; the rabid animal’s medical history (if known), vaccination status, and vaccine information (if applicable); any animal(s) potentially exposed to the rabid animal along with the vaccination status and disposition (PEP or euthanasia) of the exposed animal(s); and the attending veterinarian’s contact information. Although not the focus of this study, the report also included information on any person(s) potentially exposed to the rabid animal.

Data from the ZIRs were reviewed by additional Zoonosis Control staff to differentiate the level of exposure animals with no known rabies vaccination had to rabid animals. Three categories of exposure were classified as follows: direct exposure, probable exposure, or low-probability exposure (Supplementary Material S1). Because the study involved field observations and the fact that the focus was on animals naturally exposed to rabies that received PEP, control animals were not available for comparison.

The PEP vaccine administrations involved a vaccine licensed by the USDA as required by Texas law.\textsuperscript{5} Rabies vaccines used for the PEP protocol were administered via the route prescribed by the USDA. The vaccines were administered by or under the direct supervision of a licensed veterinarian in accordance with state law, except that an individual with an established veterinarian-client-patient relationship may have obtained the rabies vaccine from a veterinarian to administer to that individual’s livestock.\textsuperscript{9} In some instances, rabies vaccines approved for use in animals 12 weeks of age or older were administered to animals < 12 weeks of age, as allowed for in the Texas PEP protocol. For any animal that received PEP, the attending veterinarian and owner were instructed to report to the DSHS if the animal developed rabies or clinical signs indicative of rabies.

According to the TAC,\textsuperscript{5} a currently vaccinated animal is defined as satisfying the following criteria: the animal must have been vaccinated against rabies with a vaccine licensed by the USDA for that species at or after the minimum age requirement and using the recommended route of administration for the vaccine, at least 30 days have elapsed since the initial vaccination, and the time elapsed since the most recent vaccination has not exceeded the recommended interval for booster vaccination as established by the manufacturer. During the time frame of this study, manufacturers of rabies vaccines recommended a booster vaccine be administered 1 year.
after the initial vaccination, regardless of the duration of immunity for the vaccine. To assess the interval between administration of preexposure rabies vaccination and the development of rabies, the period that included the day the vaccine was administered through the day prior to the rabies incident date was measured. The rabies incident date refers to the day the animal died or was euthanatized. To be recorded as a preexposure vaccination failure, the disease had to have developed in an animal with a vaccination meeting the above criteria. However, while reviewing reports, animals that received a rabies vaccine that did not meet all these criteria were also noted.

Results

From 2010 through 2019, the PEP protocol being implemented consisted of rabies vaccine administered immediately after exposure, confinement for 90 days, and booster vaccines administered during the third and eighth weeks of the confinement period. During this 10-year period, the following animals with no known rabies vaccination received PEP: 570 domestic dogs, 138 domestic cats, 347 bovine (including 1 buffalo), 93 equine (including 9 donkeys and 3 mules), 44 ovine, 24 caprine, 1 deer, and 1 wolf-dog hybrid; USDA-licensed rabies vaccines are not available for animals in boldface. Of 1,218 animals that received PEP, 268 (22%) had direct exposures, 368 (30%) had probable exposures, and 582 (48%) had low-probability exposures (Table 1). Of the animals with low-probability exposures, 285 (49%) were bovine, as whole herds received PEP in some case scenarios. Additionally, the following animals with no known rabies vaccination were euthanatized after being exposed to a rabid animal instead of receiving PEP: 473 domestic dogs, 438 domestic cats, 10 caprine, and 1 each of bovine, ferret, ovine, and rabbit. Of these 925 animals, 307 (33%) had direct exposures, 265 (29%) had probable exposures, and 353 (38%) had low-probability exposures (Table 2). Of the euthanatized dogs and cats, 410 (45%) were described respectively as puppies and kittens in more detailed reports; there were multiple case scenarios in which the rabid animal, usually a skunk or an occasional fox, was found attacking a litter. There were also case scenarios in which cats that could not be readily vaccinated or confined were depopulated because they were found on the premises where a rabid animal had been located.

During the 10-year period of 2010 through 2019, 1 cat and 2 dogs that received PEP developed rabies; 1,215 (99.8%) animals did not develop rabies (Table 1). The animals that developed rabies ranged in age from 10 to 12 weeks on their rabies incident date. A 12-week-old cat received an initial vaccination (at 10.5 weeks of age) on the day of an exposure involving being attacked and bitten by a skunk and a booster vaccination 10 days later; the cat died the day after the booster was administered, which was 11 days after the exposure, and was confirmed to have the south-central skunk rabies virus variant.28,29 A 10-week-old dog received an initial rabies vaccination (at 6.5 weeks of age) 5 days after the litter was attacked by a laboratory-confirmed rabid skunk; the dog did not receive the 3-week booster, died 31 days after the exposure, and was confirmed to have the south-central skunk rabies virus variant. A 12-week-old dog was exposed to rabies either by contact with a littermate that died with laboratory-confirmed rabies (south-central skunk rabies virus variant) or to the suspected skunk that exposed the littermate, so an exact exposure date was not available. The exposed dog received an initial rabies vaccination (at 10 weeks of age) 2 days after the littermate’s rabies incident date (which was 7 days after clinical signs of rabies were first noted in the littermate), died 11 days after the vaccination, and was confirmed to have the south-central skunk rabies virus variant (Table 3).

Table 1—Data on unvaccinated animals that received rabies postexposure prophylaxis (PEP) after possible exposure to rabies.

<table>
<thead>
<tr>
<th>Animal</th>
<th>No. that received PEP</th>
<th>No. per exposure category (direct/probable/low probability; Supplementary Material S1)</th>
<th>No. that developed rabies</th>
<th>PEP failure rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic dogs</td>
<td>570</td>
<td>237/216/117</td>
<td>2</td>
<td>0.4%</td>
</tr>
<tr>
<td>Domestic cats</td>
<td>138</td>
<td>23/54/61</td>
<td>1</td>
<td>0.7%</td>
</tr>
<tr>
<td>Bovine</td>
<td>347</td>
<td>5/57/285</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Equine</td>
<td>93</td>
<td>2/36/55</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Ovine</td>
<td>44</td>
<td>0/3/41</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>26</td>
<td>1/2/23</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td>1,218</td>
<td>268/368/582</td>
<td>3</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Table 2—Data on unvaccinated animals that were euthanatized after possible exposure to rabies.

<table>
<thead>
<tr>
<th>Animal</th>
<th>No. that were euthanatized</th>
<th>No. per exposure category (direct/probable/low probability; Supplementary Material S1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic dogs</td>
<td>473</td>
<td>213/153/107</td>
</tr>
<tr>
<td>Domestic cats</td>
<td>438</td>
<td>93/110/235</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>14</td>
<td>1/2/11</td>
</tr>
<tr>
<td>Total</td>
<td>925</td>
<td>307/265/353</td>
</tr>
</tbody>
</table>
One preexposure rabies vaccination failure was recorded from 2010 through 2019. It involved a currently vaccinated dog that was 3 years, 8 months of age on the rabies incident date. The dog received an initial rabies vaccination 3 years, 4 months prior to the incident date and received a subsequent booster rabies vaccination 1 year, 3.5 months after the initial vaccination. Both vaccines administered had a 3-year duration of immunity. The dog exhibited vomiting and diarrhea on day 1 of being ill; dehydration, ataxia, and pain in a forelimb on day 2; and biting at inanimate objects on day 3; it was then tested for rabies. The dog was confirmed to have the south-central skunk rabies virus variant.

An additional 2 dogs that had been previously vaccinated developed rabies; however, they were not currently vaccinated. A dog that was 7 years of age on the rabies incident date had received a vaccine with a 3-year duration of immunity 5 years prior to the rabies incident date and had not received any boosters. A dog that was 2 years of age on the date of the rabies incident was administered an initial rabies vaccine 1.5 years prior to the incident date; the vaccine had a 3-year duration of immunity, but the dog did not receive the recommended booster 1 year after the initial vaccination. Thus, these 2 cases were not considered true rabies vaccination failures. Both dogs were confirmed to have the south-central skunk rabies virus variant.

### Discussion

Not every animal exposed to rabies virus will develop rabies. Various factors can affect whether an exposed animal will develop rabies, such as the animal’s health and immunocompetence status, dose of virus the animal receives, location of the exposure, severity of the exposure, and variant of rabies virus involved.1,30 To address concerns that some of the animals that received PEP were not truly exposed and, therefore, would not have developed rabies even if they had not received PEP, animals were assigned to categories on the basis of the probability of exposure (Supplementary Material S1). In this study, 636 of 1,218 (52%) animals that received PEP had a direct or probable exposure to a rabid animal. This study did not include numerous animals that received PEP after exposure to a potentially rabid animal (eg, animals at a high risk for having rabies and animals with clinical signs of rabies) that could not be confirmed because the specimen was destroyed or decomposed, the specimen did not have the appropriate tissue so it could not be adequately tested, or the animal escaped so a specimen could not be submitted. Even though these animals were not included in this study, investigation of rabies cases did not reveal that they developed rabies.

In this study, the interval between the first rabies vaccination after exposure and the rabies incident date ranged from 11 to 26 days (mean, 18.5 days) and the incubation period for rabies ranged from 11 to 31 days (mean, 21 days); these data do not include the dog in which the exposure could have been to the suspected rabid skunk or the rabid littermate. This is consistent with the aforementioned early death phenomenon associated with vaccination during the incubation period of rabies; however, various factors mentioned at the beginning of this Discussion section could also have played a role.

Texas law allows for PEP in animals < 3 months old. In this study, all 3 animals with PEP failures were < 12 weeks of age when the rabies vaccine was initially administered. The lack of age-appropriate vaccines, plus immature immune systems and maternal antibody interference, may contribute to PEP failure in young animals.31 Again, other aforementioned factors could also have played a role.

The Oklahoma Administrative Code32 matches the Texas PEP 3-vaccination schedule for dogs, cats, and ferrets that have never been vaccinated against rabies. A 4-month quarantine is required for dogs and cats and a 6-month quarantine for ferrets. Animals < 16 weeks old at the time of entry into quarantine may be required to receive a booster vaccination in addition to those in the abovementioned protocol. The option to euthanize the animal is also available in Oklahoma. For exposed livestock that are not current on their rabies vaccinations, Oklahoma adheres to applicable NASPHV and State Department of Agriculture guidelines.

The Recommendations of the Canadian Council of Chief Veterinary Officers (CCVO) Subcommittee for the Management of Potential Domestic Animal Exposures to Rabies33 includes contemplations of Texas’ published data and recommends that unvaccinated dogs, cats, and ferrets that are exposed to a rabid animal be vaccinated immediately and quarantined for 3 months for dogs and cats and 6 months for ferrets. Consideration should be given for administering a booster rabies vaccine during the third

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### Table 3—Data on unvaccinated animals that developed rabies even though rabies PEP was initiated.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Age on rabies incident date</th>
<th>No. of PEP vaccinations</th>
<th>Date of exposure</th>
<th>PEP</th>
<th>First clinical sign(s) noticed</th>
<th>Rabies incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>12 wk</td>
<td>2</td>
<td>04-05-19</td>
<td></td>
<td>04-16-19 (lame hind limb)</td>
<td>04-16-19</td>
</tr>
<tr>
<td>Dog</td>
<td>10 wk</td>
<td>1</td>
<td>03-24-19</td>
<td></td>
<td>04-23-19 (altered phonation, lame hind limb, ataxia)</td>
<td>04-24-19</td>
</tr>
<tr>
<td>Dog</td>
<td>12 wk</td>
<td>1</td>
<td>Unknown whether exposed by rabid littermate (littermate’s clinical signs first noted on 07-26-17, rabies incident date 07-51-17) or suspected skunk that exposed the littermate (unknown date)</td>
<td>08-02-17</td>
<td>08-12-17 (neurologic)</td>
<td>08-13-17</td>
</tr>
</tbody>
</table>
week after exposure. If a dog or cat was not initially vaccinated within 7 days of the exposure, a 6-month quarantine is recommended. For livestock, regardless of rabies vaccination status, quarantine for 60 days from the time of exposure or 40 days from the time of first diagnosis if the index case is within the herd/group is recommended with consideration that postexposure vaccination may reduce the risk of these animals developing rabies.

The British Columbia Centre of Disease Control reflects the CCVO’s initial vaccination and isolation time-period recommendations for an exposed unvaccinated domestic animal, including the case-by-case consideration if a booster is warranted. In cases in which the exposed animal was younger than the manufacturer’s recommended age for the vaccination, an additional booster should be given when the animal has reached the minimum age for the administered rabies vaccine. Euthanasia may also be suggested if the suspect animal tests positive or is unavailable to test and isolation/observation period of the exposed animal cannot be properly conducted (E. Fraser, DVM, MSc, Public Health Response Service, BC Centre for Disease Control, email, January 20, 2023).

The Ontario Ministry of Agriculture, Food, and Rural Affairs has similar recommendations to those of British Columbia. Along with the first dose of rabies vaccine being given as soon as possible but no longer than 7 days after exposure, a booster vaccination during the third week after the exposure would be recommended on a case-by-case basis and typically would be recommended for animals that were naïve at the time of exposure. If the animal was < 12 weeks old when it received the immediate PEP vaccination, it would receive another after reaching 12 weeks of age (but not closer than 2 weeks between administration of vaccine doses). In the prescribed precautionary confinement period during which the owner would be responsible for confining the animal according to guidelines provided, the animal may be in contact with other pets in the household that are currently vaccinated (M. E. C. Anderson, DVM, DVMsc, PhD, DACVIM, Veterinary Science Unit, Animal Health and Welfare Branch, Ontario Ministry of Agriculture, Food, and Rural Affairs, email, January 27, 2023).

During 2016 to 2022, Ontario had the following unvaccinated animals receive PEP consisting of a rabies vaccine administered within 7 days after the exposure to a confirmed rabid animal: 5 cats, 3 dogs, and 1 goat with direct exposure (again, there are no licensed rabies vaccines for goats) and 1 cat, 78 cattle, and 2 goats with probable exposure. None of these animals developed rabies. Additionally, 2 cats and 4 dogs that were unvaccinated received the immediate PEP rabies vaccination after a direct exposure followed by a booster in week 3 (all of these animals were 6 months of age or younger except 1 geriatric cat in which the owner requested the booster). None of these animals developed rabies (M. E. C. Anderson, DVM, DVMsc, PhD, DACVIM, Veterinary Science Unit, Animal Health and Welfare Branch, Ontario Ministry of Agriculture, Food, and Rural Affairs, unpublished data, 2023).

For Alberta, the first vaccination is to be given as soon as possible after exposure and within 96 hours. A booster is then recommended, but not required, for previously unvaccinated animals between 14 and 21 days after the primary dose. If the exposed animal is < 12 weeks old, an additional vaccination would be required after 12 weeks of age. Quarantine durations are consistent with the CCVO’s recommendations, with an additional requirement for the animal to have either a permanent identifier, such as a microchip or tattoo, or to wear visible identification, such as a collar tag. For puppies without canine housemates, “play dates” with a limited number of fully vaccinated dogs from other households may be permitted to ensure continued socialization, provided the owners are informed of the circumstances and associated risks (H. Keshwani, DVM, MPH, DACVPM, Alberta Agriculture and Irrigation and Alberta Health, Government of Alberta, email, January 30, 2023).

The potential use of MAbs in PEP for animals was researched in a study in which investigators evaluated PEP in dogs experimentally infected with rabies: 0 of 5 dogs that received 2 murine anti-rabies glycoprotein MAbs and rabies vaccine developed rabies and 1 of 5 that received the murine anti-rabies glycoprotein MAbs alone developed rabies. In another study, Syrian hamsters and Beagles were inoculated with Chinese street rabies virus. In the Syrian hamsters, results were compared between groups that received various PEP protocols; general results were that the administration of MAbs was more effective in preventing rabies than the saline-control or vaccine-only protocols and higher doses of the MAbs were as effective as the standard dose of human RIG. In the Beagles, general results when comparing various PEP protocols were that the administration of MAbs was more effective in preventing rabies than the saline-control or human RIG protocols.

In a study on rabies in bats in Texas, data were collected indicating that, of domestic animals exposed to rabid bats, only 1% of those that were current on vaccination were euthanized, compared with 27% of those considered to be not current on vaccination or never vaccinated, which reinforces the importance of keeping domestic animals current on vaccination against rabies.

Results derived from Texas in the present study support a conclusion that a viable option for a suitable PEP protocol for unvaccinated animals exposed to a rabid animal includes immediate rabies vaccination, a confinement period of 90 days, and booster vaccinations during the third and eighth weeks of the confinement period. Other protocols warrant additional consideration. For instance, just as the CCVO reviewed Texas’ PEP protocol when developing their modified recommendations, Texas can consider the CCVO’s modifications when reviewing updates to the TAC. Researchers may be inspired to pursue additional studies on the effectiveness and feasibility of the use of MAbs in PEP.

Even so, the importance of preexposure rabies vaccination in animals must be emphasized. The availability of an option of PEP for unvaccinated animals should not supplant the need for preexposure
vaccination against rabies. Preexposure rabies vaccination helps protect animals from unknown or undetected rabies exposures; therefore, it is strongly advocated from public health, One Health, and safety perspectives as well as from a legal standpoint.

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References

5. Title 25, health services. Chapter 169, zoonosis control.