



Nation-Wide Variation in Presence of Legislation or Protocols for EMS Care of Operational Canines

David W. Schoenfeld, MD, MPH;¹ Caroline E. Thomas;² Lee Palmer, DVM;³ William Justice, NRP, TEMS-I;⁴ Esther Hwang, DO, MPH;⁵  Kate D. Zimmerman, DO;⁶ Jeffrey M. Goodloe, MD;⁴ Jonathan D. Shecter, DO;¹  Stephen H. Thomas, MD, MPH^{1,7}

1. Department of Emergency Medicine, Beth Israel Deaconess Medical Center & Harvard Medical School, Boston, Massachusetts USA
2. BS Candidate, Department of Chemistry, Georgetown University, Washington, DC USA
3. Auburn University College of Veterinary Medicine, Auburn, Alabama USA
4. Department of Emergency Medicine, University of Oklahoma School of Community Medicine, Tulsa, Oklahoma USA
5. Department of Emergency Medicine, Emory University School of Medicine, Atlanta, Georgia USA
6. Department of Emergency Medicine, Maine Medical Center and Tufts University School of Medicine, Portland, Maine USA
7. Barts & The London School of Medicine, London, United Kingdom

Correspondence:

David W. Schoenfeld, MD, MPH
Department of Emergency Medicine
Beth Israel Deaconess Medical Center, 1
Deaconess Rd. Boston, Massachusetts
02215 USA
E-mail: dschoenf@bidmc.harvard.edu

Conflicts of interest: The authors declare no relevant financial or non-financial competing interests.

Keywords: canine; EMS protocols; operational K9; police canine EMS; veterinary EMS

Abbreviations:

DC: District of Columbia
EMS: Emergency Medical Services
LOD: line of duty
OpK9: operational canine/police working dog
VEMS: veterinary Emergency Medical Services

Received: October 7, 2023

Revised: December 12, 2023

Accepted: January 17, 2024

Abstract

Background & Aims: Deployment of law enforcement operational canines (OpK9s) risks injuries to the animals. This study's aim was to assess the current status of states' OpK9 (veterinary Emergency Medical Services [VEMS]) laws and care protocols within the United States.

Methods: Cross-sectional standardized review of state laws/regulations and OpK9 VEMS treatment protocols was undertaken. For each state and for the District of Columbia (DC), the presence of OpK9 legislation and/or care protocols was ascertained. Information was obtained through governmental records and from stakeholders (eg, state EMS medical directors and state veterinary boards).

The main endpoints were proportions of states with OpK9 laws and/or treatment protocols. Proportions are reported with 95% confidence intervals (CIs). Fisher's exact test ($P < .05$) assessed whether presence of an OpK9 law in a given jurisdiction was associated with presence of an OpK9 care protocol, and whether there was geographic variation (based on United States Census Bureau regions) in presence of OpK9 laws or protocols.

Results: Of 51 jurisdictions, 20 (39.2%) had OpK9 legislation and 23 (45.1%) had state-wide protocols for EMS treatment of OpK9s. There was no association ($P = .991$) between presence of legislation and presence of protocols. There was no association ($P = .144$) between presence of legislation and region: Northeast 66.7% (95% CI, 29.9–92.5%), Midwest 50.0% (95% CI, 21.1–78.9%), South 29.4% (95% CI, 10.3–56.0%), and West 23.1% (95% CI, 5.0–53.8%). There was significant ($P = .001$) regional variation in presence of state-wide OpK9 treatment protocols: Northeast 100.0% (95% CI, 66.4–100.0%), Midwest 16.7% (95% CI, 2.1–48.4%), South 47.1% (95% CI, 23.0–72.2%), and West 30.8% (95% CI, 9.1–61.4%).

Conclusion: There is substantial disparity with regard to presence of OpK9 legal and/or clinical guidance. National collaborative guidelines development is advisable to optimize and standardize care of OpK9s. Additional attention should be paid to educational and training programs to best utilize the limited available training budgets.

Schoenfeld DW, Thomas CE, Palmer L, Justice W, Hwang E, Zimmerman KD, Goodloe JM, Shecter JD, Thomas SH. Nation-wide variation in presence of legislation or protocols for EMS care of operational canines. *Prehosp Disaster Med.* 2024;39(1):59–64.

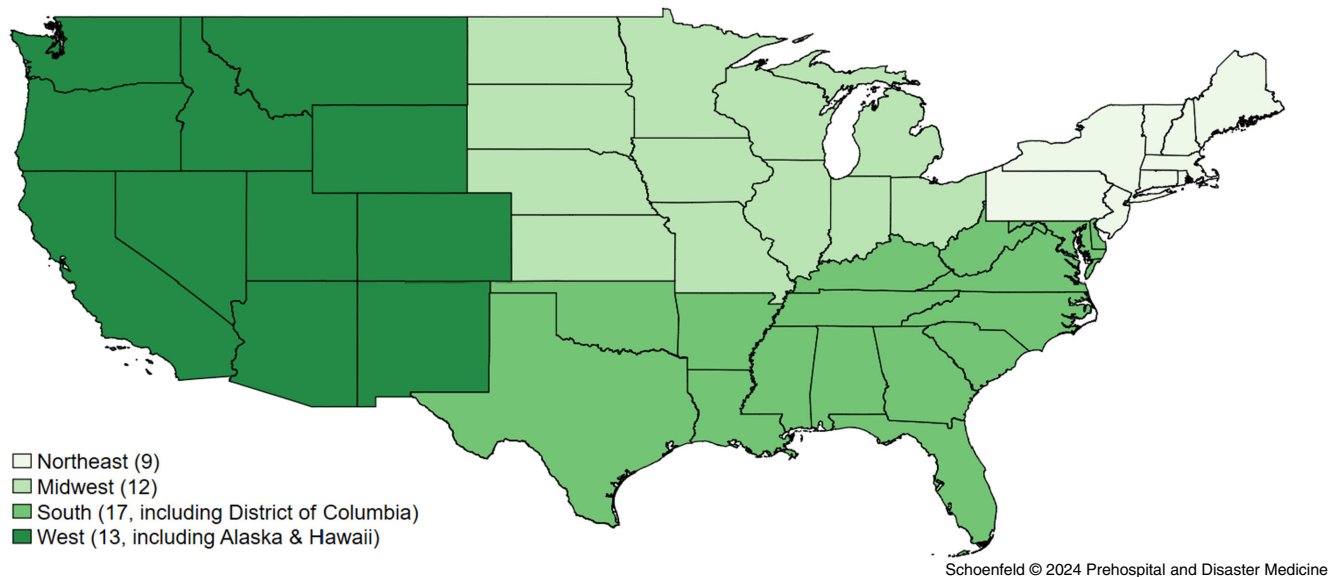
Introduction and Study Aims

In February 2022, significant publicity accompanied the signing of “Nero’s Law” in Massachusetts (USA). The legislation was drafted in response to a situation in which Yarmouth Police Sergeant Sean Gannon was killed in the line of duty (LOD) and his law enforcement operational canine (OpK9) Nero suffered near-fatal gunshot injuries. Although several ambulances were on scene, state regulations in place at the time prevented Emergency Medical Services (EMS) from rendering OpK9 aid or transport. As a result, Nero remained on-scene without any medical care until he was able to be transported by

doi:[10.1017/S1049023X24000074](https://doi.org/10.1017/S1049023X24000074)

© The Author(s), 2024. Published by Cambridge University Press on behalf of World Association for Disaster and Emergency Medicine.





Schoenfeld © 2024 Prehospital and Disaster Medicine

Figure 1. United States Census Bureau Geographic Regions.

Note: Adapted from https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

police vehicle. In light of this situation, Nero's Law was passed in order to enable EMS to provide basic OpK9 care and transport.

Massachusetts was not the first state within the United States to pass a law addressing the issue of EMS care for injured OpK9s. Colorado passed its Preveterinary Care Act in March 2014. Since that time, and prior to the 2022 passing of Nero's Law, veterinary EMS (VEMS) legislation had passed in a handful of other states (eg, Arkansas' 2021 enactment of Gabo's Law).

Deaths of OpK9s in the civilian law enforcement LOD have been long recognized as a clinical problem. One of the first reviews of OpK9 LOD deaths, covering the decade from 2002–2012, was published in 2014.¹ The next year, the OpK9 Tactical Emergency Casualty Care Initiative was described.² By 2017, best-practice recommendations were appearing in the literature.^{3–5} More recently, review articles and case series have continued to highlight the importance of considering OpK9 LOD injuries.^{6–11}

Heightened clinical awareness of OpK9 injuries has only partially translated to state-level EMS regulatory and legislative guidance. Variation in state jurisdictions' approach to OpK9 issues gave rise to the current project. Inconsistency in state-based approaches is suboptimal, given the complexity of OpK9 care (eg, training requirements, crew safety issues, and legal protection).

Thus, it could be useful to understand the national *status quo* with regard to presence (or absence) of guiding legislation and care protocols for prehospital providers who may be asked to stabilize and/or transport OpK9s with LOD injuries. The primary aim was ascertainment, in each of the 50 states and the District of Columbia (DC), of jurisdictional presence of enacted VEMS OpK9 legislation and/or state-wide care protocols (including guidelines). Secondary aims were to assess whether presence of legislation was associated with presence of clinical protocols for the care of OpK9s, and to determine whether presence of legislation or care protocols varied across the United States' four main geographic regions.

Methods

Design

The study was a cross-sectional assessment of publicly available information regarding existence of state-level EMS legislation and OpK9 care protocols. Institutional ethics review was not required.

Setting

The study covered the 51 state jurisdictions (including DC) within the United States. The United States Census Bureau (Washington, DC USA) definitions (Figure 1) were used to categorize states into four regions: Northeast, Midwest, South, and West.

Data and Analysis

Information on presence or absence of VEMS OpK9 legislation and care protocols was obtained via multiple pathways. Major data sources were publicly accessible national association websites. Four websites providing most of this study's data were those of the National Association of VEMS (NAVEMS,¹² Cumberland, Pennsylvania USA), the American Veterinary Medicine Association (AVMA,¹³ Schaumburg, Illinois USA), the National Association of State EMS Officials (NASEMSO,¹⁴ Falls Church, Virginia USA), and the web-based collection of EMS protocols.¹⁵

Data on bills in state legislative consideration were obtained through use of bill-tracking websites (eg, Iowa Legislature;¹⁶ Supplementary Material – available online only). Information on legislative status was updated at the end of June 2023.

Data on each state's legislation presence or absence, and (if no legislation enacted) whether a state was actively considering legislation, were entered into a spreadsheet (Excel, Office 365 v.16.0; Microsoft Corp.; Redmond, Washington USA). Similar dichotomous coding was entered to indicate whether the state had protocols in place (including either care protocols or clinical guidelines) for VEMS OpK9 care. After data were entered, the information was imported into statistical software (Stata version

18MP; Stata Corp.; College Station, Texas USA) which was used for all analysis and mapping.

Categorical assessments for association between legislation and OpK9 treatment protocol presence, and for regional associations with either legislation or protocol presence, were executed using Fisher's exact testing. Significance was defined at the $P < .05$ level. Precision of key proportions' calculations was indicated by calculation of binomial exact 95% confidence intervals (CIs). When a proportion's percentage was either 0% or 100%, Stata reports a one-sided 97.5% CI.

Results

The study obtained information on all 51 jurisdictions. Results are summarized in Table 1.

Twenty states had VEMS OpK9 laws in place (39.2% of 51). Of the jurisdictions without enacted laws, two (6.5% of 31) had bills in active legislative consideration.

One state, Maine, constituted a special case. Maine enacted a VEMS law in 2018, but the state's OpK9 protocol was temporarily suspended (as of June 2023) pending amendment to optimize EMS protection. For purposes of this analysis (and mapping), Maine was counted as having a VEMS OpK9 law. Figure 2 shows the geographic distribution of states with enacted OpK9 legislation.

There was no association ($P = .144$) between geographic region and existence of enacted legislation. Regional summary of states' VEMS legislation is shown in Table 2.

Table 2 also shows regional presence of VEMS OpK9 care protocols. The geographic distribution of states with care protocols is shown in Figure 3. There was significant ($P = .001$) regional variation in presence of state-wide OpK9 care EMS protocols; assessment of the 95% CIs in Table 2 suggested that the only statistically significant regional difference was between Northeast (100.0% with protocols) and the West (30.8% with protocols). There was no association ($P = .991$) between the presence of VEMS legislation in a state and that state's having an OpK9 care protocol.

The final mapping (Figure 4) framed the four possible situations characterized by presence or absence of VEMS OpK9 law and presence or absence of VEMS OpK9 protocol. Of 51 jurisdictions, a total of nine (17.6% of 51) had both legislation and protocols, 11 (21.6% of 51) had legislation without protocols, 14 (27.5%) had protocols without legislation, and 17 (33.3%) had neither legislation nor protocols.

Discussion

For this study's primary endpoint, the presence of enacted state-level VEMS legislation, the main finding is that such legislation is in place in 20 states. These laws are relatively new, with the first such legislation passed (in Colorado) in 2014. The fact that numerous VEMS laws have been passed in such a relatively short time is illustrative of the national-level importance of the issue.

This analysis' mapping (of presence or absence of VEMS OpK9 legislation and clinical protocols) identified substantial disparity in approaches across the 51 state-level jurisdictions. Despite limitations of low precision (due to low state n in some regions), a statistically significant geographic variation in the geographic regions' promulgation of clinical protocols was found.

There was no statistically significant finding of geographic variation in VEMS OpK9 legislation. This non-significant statistical result was likely due to low precision (power). More important than the region-based analysis was the overall finding

Region	State	Law Enacted (year)	OpK9 VEMS Protocol
Northeast	Maine	Yes (2018)	Yes
Northeast	Massachusetts	Yes (2022)	Yes
Northeast	New York	Yes (2023)	Yes
Northeast	Pennsylvania	Yes (2022)	Yes
Northeast	Rhode Island	Yes (2022)	Yes
Northeast	Connecticut	No ^a	Yes
Northeast	New Jersey	No	Yes
Northeast	New Hampshire	Yes (2023)	Yes
Northeast	Vermont	No	Yes
Midwest	Illinois	Yes (2018)	No
Midwest	Indiana	Yes (2021)	No
Midwest	Michigan	Yes (2019)	Yes ^b
Midwest	Minnesota	Yes (2021)	No
Midwest	Ohio	Yes (2016)	No
Midwest	Wisconsin	Yes (2018)	No
Midwest	Iowa	No ^a	Yes ^b
Midwest	Kansas	No	No
Midwest	North Dakota	No	No
Midwest	Missouri	No	No
Midwest	Nebraska	No	No
Midwest	South Dakota	No	No
South	Arkansas	Yes (2021)	No
South	Florida	Yes (2021)	No
South	Maryland	Yes (2017)	Yes
South	Mississippi	Yes (2018)	No
South	North Carolina	Yes (2021)	Yes ^b
South	Delaware	No	Yes
South	Oklahoma	No	No
South	South Carolina	No	Yes ^b
South	Tennessee	No	Yes ^b
South	Texas	No	No
South	Virginia	No	No
South	Alabama	No	Yes
South	District of Columbia	No	No
South	Georgia	No	No
South	Kentucky	No	Yes ^b
South	Louisiana	No	No
South	West Virginia	No	Yes
West	California	Yes (2018)	No
West	Colorado	Yes (2014)	No
West	Oregon	Yes (2021)	No
West	Alaska	No	No
West	Arizona	No	Yes ^b
West	Idaho	No	No
West	Nevada	No	No
West	Utah	No	Yes ^b

Schoenfeld © 2024 Prehospital and Disaster Medicine

Table 1. Presence or Absence of Veterinary EMS (VEMS) Legislation or State-Wide Operational K9 (OpK9) Care Protocols (*continued*)

Region	State	Law Enacted (year)	OpK9 VEMS Protocol
West	Wyoming	No	No
West	Hawaii	No	No
West	Montana	No	Yes
West	New Mexico	No	Yes ^b
West	Washington	No	No

Schoenfeld © 2024 Prehospital and Disaster Medicine

Table 1. (continued). Presence or Absence of Veterinary EMS (VEMS) Legislation or State-Wide Operational K9 (OpK9) Care Protocols

^a Bills under active (committee-level) consideration as of June 2023.

^b State guideline (treated in this analysis as equal to a protocol).

that one-third of jurisdictions had neither VEMS OpK9 legislation nor related clinical guidelines.

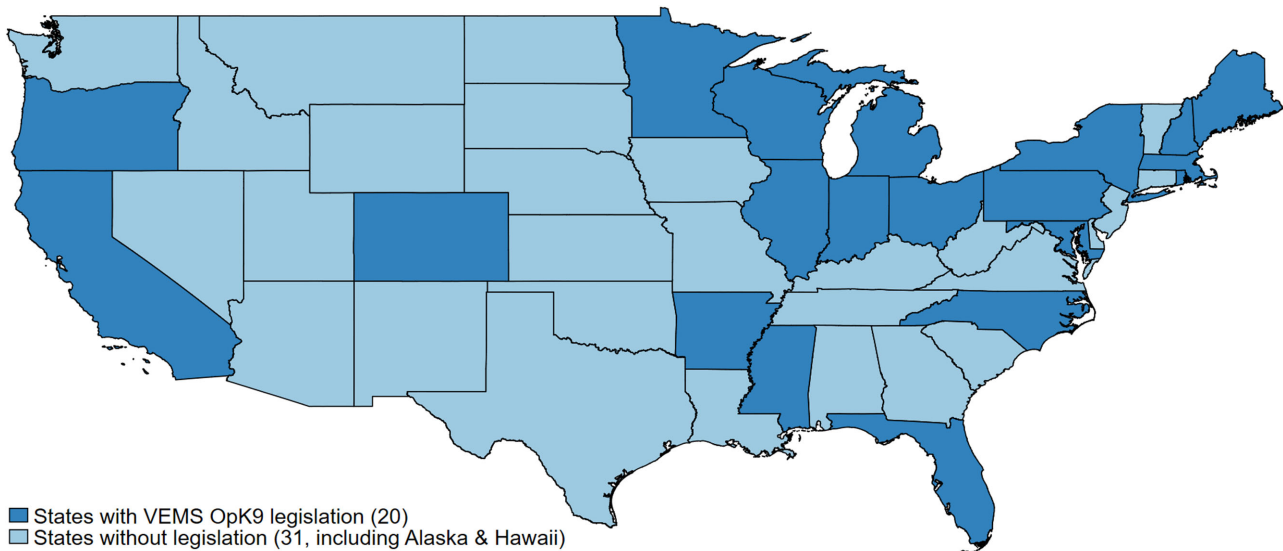
The third important finding in this analysis was that presence or absence of VEMS OpK9 legislation was not associated with presence or absence of related clinical care protocols. Given VEMS OpK9's myriad facets (eg, training, EMS safety, and legal protection), it is highly likely that this finding represents an important highlight for prehospital regulators and providers.

In framing the results of the current analysis in context of the current evidence, a previously published map of approaches of all 51 jurisdictions with regard to VEMS OpK9 legislation and protocols was unable to be found. There is, however, a growing evidence base defining OpK9,^{2,10} describing deployment and injuries,^{1,6,9,11} and outlining best-practices protocols.^{3,4,7,8} While a number of OpK9 animals is not known with precision, it is estimated that there are approximately 50,000 deployed in various law enforcement and

Region	N, States in Region	States (%; 95% CI) with Enacted Laws	States (%; 95% CI) with State-Wide Care Protocols
Northeast	9	6; 66.7% (29.9-92.5%)	9; 100.0% (66.4-100.0%)
Midwest	12	6; 50.0% (21.1-78.9%)	2; 33.3% (4.3-77.8%)
South	17	5; 29.4% (10.3-56.0%)	8; 47.1% (23.0-72.2%)
West	13	3; 11.7% (5.0-53.8%)	4; 30.8% (9.1-61.4%)
Total	51	20 (39.2% of 51)	23 (45.1% of 51)

Schoenfeld © 2024 Prehospital and Disaster Medicine

Table 2. Veterinary EMS (VEMS) Operational K9 (OpK9) Legislation and Care Protocols by Region



Schoenfeld © 2024 Prehospital and Disaster Medicine

Figure 2. Veterinary EMS (VEMS) Operational K9 (OpK9) Care Legislation in Each State within the United States (n = 20). Abbreviations: VEMS, veterinary Emergency Medical Services; OpK9, operational canine.

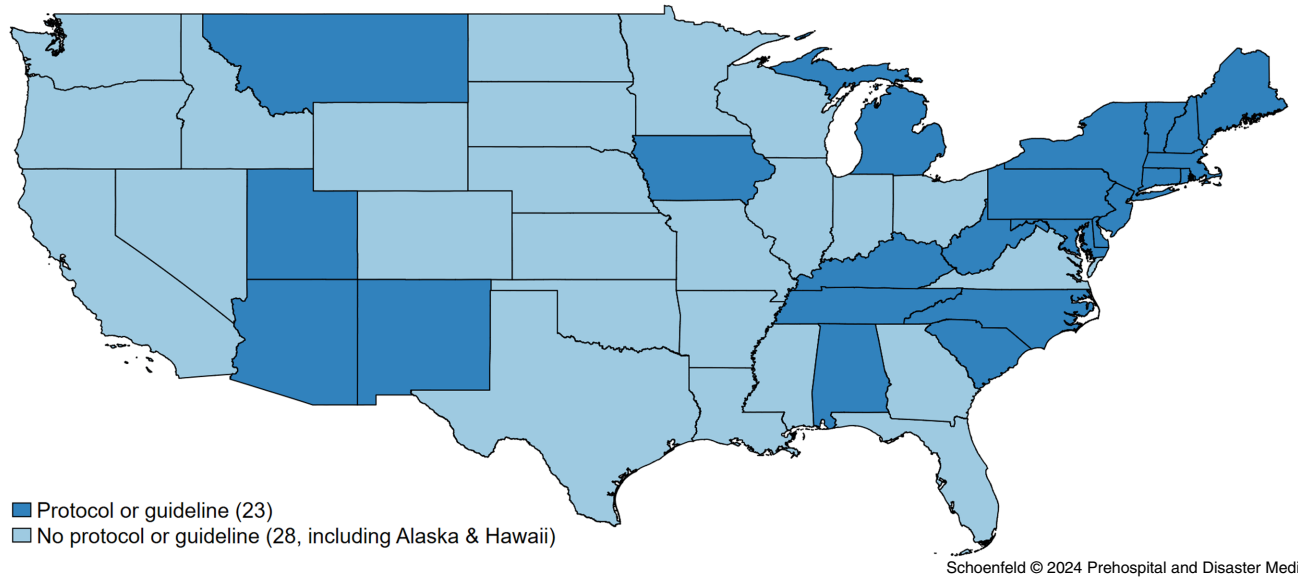


Figure 3. States ($n = 23$) with Veterinary EMS (VEMS) Operational K9 (OpK9) Care Protocols or Guidelines.

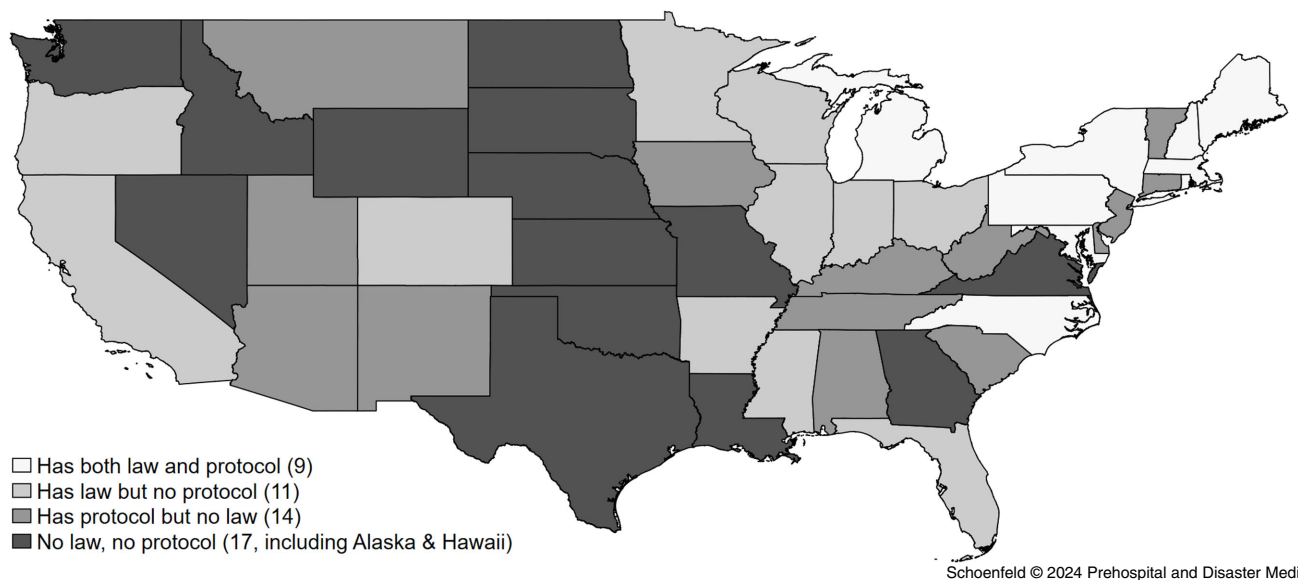


Figure 4. States with Combinations of Veterinary EMS (VEMS) Operational K9 (OpK9) Laws and Care Protocols.

related activities. Regardless of the exact number of OpK9s, they are present in sufficient numbers (and there are sufficient recommendations on clinical care) to warrant efforts at national-level collaboration on OpK9 clinical matters.

The results of this study indicate a need for collaborative discussion and detailed expert assessment by all stakeholders (eg, EMS providers, OpK9 law enforcement officers, veterinarians, prehospital training experts, and regulatory authorities). The authors are aware (and some are participants in) on-going efforts to move towards consistent guidance on VEMS care, including generation of guidelines supported by veterinary medicine experts. The results of this study provide evidence that there is regulatory heterogeneity that may benefit from nation-wide discussion on this important subject. National discussions can include (but should not

necessarily be limited to) conversation regarding practice scope, best-practice guidelines generation, and EMS clinician-centric OpK9 training courses with mutual veterinarian and physician buy-in for VEMS training.

Limitations

The current analysis has a number of methodological limitations that restrict definitive conclusions. One such limitation, low analytical power due to some regions' having low n of states, has been mentioned. The result of this shortcoming is that it is not easy to conclude whether or not there is a "statistically significant" difference between regions' findings.

While statistical significance for some region-based calculations was lacking, practical significance is also important. Maps can tell

an important story even in the absence of $P < .05$. Nearly two-thirds of states lack legislative guidance for VEMS care or transport in the United States. The occasional logistics of interstate law enforcement operations, or the more common occurrences of operations in states' border regions, can easily translate into situations in which the closest emergency veterinary care center is across state lines. The finding of differing regulatory situations in bordering states poses potential for confusion as well as unappreciated (or under-appreciated) liabilities for EMS professionals involved in acute, unscheduled OpK9 care.

Another limitation of this study is the accuracy of the information. It is possible that, despite using publicly available and presumably updated state-governmental information sources, misclassification errors were made. Some states categorized as lacking legislation (or protocols) may in fact have had such guidance. Even in the case where laws were noted to be present, complications can arise. The situation with Maine is illustrative.

Maine's VEMS OpK9 law provides civil protection, but the protocol was suspended pending consideration of an amendment to the state veterinary practice act to bolster criminal immunity. The Maine situation serves to illustrate the complexities of VEMS immunity: there are both civil and criminal considerations. The larger picture, and greater challenge for this study, is that 51 jurisdictions represent 51 different and potentially evolving arenas for VEMS OpK9 care and transport. The results from this cross-sectional analysis should be taken with a *caveat* that situations are changing on an annual, if not monthly, basis.

A final limitation of this analysis was its restricted focus on presence (or absence) of VEMS OpK9 legislation or protocols. For the laws that were identified, and the protocols that were found to be in place, this study did not attempt to provide detailed information. These details can be important and are worth discussion.

Perhaps the most important detail left for later studies is that the term "VEMS legislation" can have disparate meanings in different jurisdictions. Laws may cover care and transport, or they may cover just one phase of the VEMS interaction. Transport, which may even occur by helicopter,⁶ is an integral part of OpK9 trauma care.⁸ Other potentially important areas of difference (eg, training and tort protection) emphasize the limitation that not all VEMS laws are equal. Some states with enacted legislation have a curriculum, whereas other states' curricula are either in development or absent. In at least one jurisdiction, there

appears to be a state law with regional (but not state-wide) protocols for both care and transport.^{7,8} Details of legislation, training, and protocols are important, but they lie outside this study's scope. The results presented here should be considered coarse measures of presence or absence of *some* VEMS legislation and protocol guidance.

An additional facet of VEMS OpK9 care not covered here is the practice atmosphere for those jurisdictions that lack VEMS OpK9 legislation. While not always spelled out in the details of publicly available information, there were indications of important differences in various states' OpK9 care environments. The fact that a state does not have VEMS legislation simply reflects that the state has not enacted a law. It is quite possible that states that lack formal laws are just as supportive of EMS providers (and OpK9 units) as are those states with laws. Informal agreements may exist (and not be easily identified or referenced) in many jurisdictions that provide some "coverage" or a mutual care agreement so that EMS can care and/or transport injured OpK9s.

While some on-going efforts toward improving a given state's VEMS care were identified as part of this review, it is assumed that other states' efforts may have been unidentified. Specifically, some jurisdictions' characteristics suggested that well-intentioned (and non-billed) VEMS care would incur low risk of administrative penalty. Examples of favorable characteristics are found in states in which there were high-profile media reports lauding VEMS care incidents, and states with organized VEMS education programs or active work on protocol development. For some states, there remains potential risk that veterinary boards could investigate any VEMS care as unauthorized practice of veterinary medicine.

Conclusion

In this cross-sectional standardized review of state laws and OpK9 treatment protocols for all 50 states and DC, a substantial disparity was found with regard to presence of OpK9 legal and/or treatment protocols. Additionally, there was no association between presence of legislation mandating or allowing EMS treatment of OpK9s and presence of state-wide treatment protocols to guide providers.

Supplementary Materials

To view supplementary material for this article, please visit <https://doi.org/10.1017/S1049023X24000074>

References

1. Stojish SE, Baker JL, Les CM, Bir CA. Review of canine deaths while in service in US civilian law enforcement (2002-2012). *J Spec Oper Med*. 2014;14(4):86-91.
2. Palmer LE, Maricle R, Brenner JA. The operational canine and K9 tactical emergency casualty care initiative. *J Spec Oper Med*. 2015;15(3):32-38.
3. Hanel RM, Palmer L, Baker J, et al. Best practice recommendations for prehospital veterinary care of dogs and cats. *J Vet Emerg Crit Care (San Antonio)*. 2016;26(2):166-233.
4. Corse T, Firth C, Burke J, et al. Operation canine lifeline: recommendations for enhancing prehospital care for government working dogs. *Disaster Med Public Health Prep*. 2017;11(1):15-20.
5. Palmer LE, Yee A. TacMed updates: K9 tactical emergency casualty care direct threat care guidelines. *J Spec Oper Med*. 2017;17(2):174-187.
6. Hogan CS, Nesbit CE. Air medical transportation of injured operational canines. *Air Med J*. 2019;38(1):36-38.
7. Mitek AE, McMichael MA, Weir WB, Smith MJ, Schneider DC. The Carle-Illinois (Urbana, Illinois USA) treatment protocol for law enforcement K9s: guidelines for Emergency Medical Services. *Prehosp Disaster Med*. 2019;34(4):428-437.
8. Weir WB, Mitek AE, Smith M, Schneider D, McMichael MA. The Carle-Illinois (Urbana, Illinois USA) transport protocol for LEK9s: guidelines for Emergency Medical Service providers. *Prehosp Disaster Med*. 2019;34(4):422-427.
9. Edwards TH, Scott LLF, Gonyeau KE, Howard EH, Parker JS, Hall K. Comparison of trauma sustained by civilian dogs and deployed military working dogs. *J Vet Emerg Crit Care (San Antonio)*. 2021;31(4):498-507.
10. Palmer LE. Operational Canine. *Vet Clin North Am Small Anim Pract*. 2021;51(4):945-960.
11. Vegas Comitre MD, Palmer L, Bacek LM, Kuo KW, Keys D. Assessment of prehospital care in canine trauma patients presented to veterinary trauma centers: a VetCOT registry study. *J Vet Emerg Crit Care (San Antonio)*. 2021;31(6):788-794.
12. National Association of Veterinary Emergency Medical Services (NAVEMS). navems.org. Accessed June 20, 2023.
13. American Veterinary Medicine Association (AVMA). avma.org. Accessed June 20, 2023.
14. National Association of State Emergency Medical Services Officials (NASEMSO). nasemso.org. Accessed June 20, 2023.
15. EMS Protocols. emsprotocols.org. Accessed June 20, 2023.
16. Iowa Legislature. Senate File 539 By Committee On Judiciary. <https://www.legis.iowa.gov/legislation/BillBook?ga=90&cha=SF539>. Accessed June 20, 2023.