Securing Lethal Means for Suicide: A Focus Group Study Exploring Perceptions and Barriers Among Practicing Veterinarians

By

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Abstract

Veterinarians are at higher risk for suicide than the general population, and it has been hypothesized that this may be attributable to veterinarians' access to and knowledge of lethal drugs, specifically pentobarbital. One possible method for reducing suicide risk is means safety, which involves creating barriers between suicidal individuals and lethal means. To date, no research has examined acceptability and feasibility of various means safety in the veterinary workplace. In our mixed methods study of 43 veterinarians, we administered surveys before and after their participation in focus groups. The pre-test survey revealed that 30% reported storing their pentobarbital unlocked at least part of the time. Thematic analysis of focus group discussions evaluated veterinarians' perceptions of risk factors for suicide in their profession, as well as means safety protocols for pentobarbital. Participants identified work/life balance or being overwhelmed as the most common suicide risk factor in veterinarians, with normalizing mental health emerging as a primary way to improve mental health in veterinarians. Participants also identified the difficulty of changing veterinary culture as a barrier to improving mental health in veterinarians. Additionally, adding an extra lockbox for euthanasia drugs emerged as the most acceptable and feasible means safety method, with the possibility of increasing animal suffering or lack of space emerging as barriers to implementing this protocol. Finally, after participating in the focus groups, veterinarians increased in willingness to implement storage protocol changes ($p = .02$) and were more likely to endorse concern about a coworker's suicide ($p < .01$) as a reason to change pentobarbital storage methods. Results from this study will inform policy changes for pentobarbital storage and suicide prevention efforts in the veterinary workplace.

Introduction

Veterinarians have an elevated suicide risk in comparison to the general population (Platt et al., 2010; Tomasi et al., 2019; Witte et al., 2019). One potential explanation for this elevated suicide risk among veterinarians is their access to and extensive knowledge of lethal drugs, and in particular, the drug that is most commonly used for humane euthanasia (i.e. pentobarbital). As reviewed by Bartram and Baldwin (2010), veterinarians are less supervised in their use of medications than physicians, allowing for easier access to pentobarbital (Fishbain, 1986). Unlike virtually any other profession, they also have substantial knowledge and experience with pentobarbital and using it for humane and relatively painless euthanasia, which may make this method particularly appealing for suicide (Tomasi et al., 2019; Witte et al., 2013). Consistent with this idea, Witte et al. (2019) analyzed suicides among veterinarians from 2003 through 2014 utilizing records from the National Violent Death Reporting System (NVDRS). The results showed that poisoning was the most common suicide method for used by veterinarians, and pentobarbital was the most common drug used, accounting for 25% of the suicides in the sample. Moreover, although the standardized mortality ratio (SMR) was elevated above the general population for male and female veterinarians, this was no longer the case after the individuals who had used pentobarbital were removed from the equation. This suggests that access to and knowledge about pentobarbital may account for the elevated suicide rate seen in veterinarians, and accordingly, interventions targeting safe storage of pentobarbital may be a promising avenue for preventing suicide. Compared with the general population (Nett et al., 2015) and compared with other veterinary professionals (Witte et al., 2019), veterinarians are less likely to have a history of non-fatal suicide attempts. This suggests veterinarians may be more likely to die on their first suicide attempt, thereby eliminating the opportunity for intervention after an attempt.

Accordingly, veterinarians would likely benefit from a universal intervention geared towards improved administrative controls for pentobarbital storage, which does not require identifying at-risk individuals prior to implementation (Nett et al., 2020). However, there has not yet been any research examining what secure storage measures would be acceptable to veterinarians and feasible to implement in veterinary practices. The goal of the proposed study is to gather information from veterinarians regarding what additional storage methods they would be willing and able to implement in the workplace.

Means Safety

Changing the methods by which pentobarbital is stored in the veterinary workplace for the purpose of reducing suicide risk would be categorized as a means safety intervention. Means safety is a method of creating barriers between individuals who are suicidal and lethal means in order to reduce the likelihood of suicide using that method (Leenaars et al., 2000; Mann et al., 2005; Hawton, 2007). Because acute suicidality is most often temporary, there is evidence that reducing access to lethal means during a temporary crisis can prevent suicide attempts (Hawton, 2007). One common critique of means safety interventions is that means substitution will occur; that is, that individuals will still attempt suicide utilizing an alternate method if they cannot easily access a particular lethal means (Daigle, 2005). However, research suggests that this is unlikely due to the short time span of acute suicidality and the fact that many individuals have a preference for a specific means (Daigle, 2005; Hawton, 2007; Nett et al., 2020). Additionally, even if means substitution does occur, any substituted means are less likely to be less lethal when means safety interventions are put into place for the most lethal and/or common methods of suicide (Pirkis et al., 2015; Jin et al., 2016).

There have been multiple studies in recent years illustrating the effectiveness of means safety for suicide prevention. As described by Witte et al. (2019), one relevant quasi-experimental study was conducted by Yip et al. (2010) examining the impact of controlling charcoal purchases on suicide in Hong Kong, where suicide via charcoal burning and carbon monoxide poisoning is common. In this study, two districts were designated to either the control or intervention condition. Individuals in the control district were able to purchase charcoal from open shelves in retail stores, while individuals in the intervention district were required to request charcoal for purchase from store clerks. This intervention resulted in a reduced rate of suicide by charcoal in the intervention district, compared with the control district. Importantly, this study found that overall suicide rates in the intervention district went down after the intervention was implemented, illustrating that means substitution did not overtake any benefits conferred by reduced access to charcoal. This shows that means safety concerning the most lethal and common means can reduce the overall suicide rate. Additionally, this study is especially relevant when discussing pentobarbital storage in that it did not ban charcoal completely, but rather, created a minor administrative barrier to easily accessing charcoal. This type of intervention could also be effective for pentobarbital storage in veterinary settings by preventing access for suicidal individuals while also allowing veterinarians to access it when necessary.

One primary suicide method that has been highlighted in means safety research is firearms. This is because firearms are extremely lethal and result in the most suicide deaths in the United States (Butterworth et al., 2017; Houtsma et al., 2018). Evidence has shown that laws reducing access to firearms result in reduced overall suicide rates and reduced firearm suicide rates (Leenaars et al., 2000; Anestis & Anestis, 2015). However, there is also evidence that

storing firearms securely, such as in a gun safe or using a gun lock, can prevent suicide because of the time required to access the firearm in this situation (McClurg, 2000; Houtsma et al., 2018). This again emphasizes the point that an outright ban is not necessary to reduce the likelihood of suicide; rather, improving the storage security of pentobarbital could reduce suicide rates among veterinarians while still allowing access for critical clinical responsibilities.

Research has also examined the efficacy of means safety for drugs. Nordentoft (2007) performed a literary review examining the efficacy of means safety strategies for drug access and found support for means safety interventions for drugs with high case fatality. She found that as specific medications became more commonly used for suicide (e.g. barbiturates, dextropropoxyphene, and tricyclic antidepressants), it seemed that doctors would prescribe those medications less, which would in turn result in less suicide using those medications. Although legal restrictions were not put into place, the reduction of prescriptions reduced access to lethal medications. Additionally, Nordentoft (2007) found additional evidence that means substitution was not common, and that reducing access to specific lethal means resulted in reductions in overall suicide rates across studies.

For veterinarians, it is important to gather information from those currently in the workforce regarding current storage methods for pentobarbital and what changes they would be willing to and able to make with regards to means safety. The *Practitioner's Manual: An Informal Outline of the Controlled Substances Act*, which describes guidelines for controlled substances in all medical professions, notes that federal law specifies that controlled substances need to be stored in a "substantially constructed" and securely locked cabinet. However, the manual notes that the law is not clear regarding what constitutes a "substantially constructed" cabinet (Drug Enforcement Administration, 2006, p.14). Additionally, the law does not specify

when or how the cabinet needs to be locked, and so this results in some leeway for veterinarians. Witte et al. (2019) found that 89% of veterinarians who died by suicide using pentobarbital did not die in their workplace. This suggests they either removed it from their workplace or had it sent directly to their homes. An unpublished online survey of over 8,000 individuals found that 92% of veterinarians and 71% of all veterinary staff reported they could access controlled drugs in their clinic without anyone else present (Roark, 2019). Additionally, another study currently under review found that the majority of veterinary practices have lethal medications unlocked during the entirety of business hours (Houtsma et al., under review). So, although there are currently guidelines for pentobarbital storage, they are not clearly defined and are apparently not sufficient to prevent veterinarians from accessing pentobarbital for the purpose of suicide.

Firearms

In addition to improving the safe storage of pentobarbital, we also need to keep in mind the necessity of addressing firearm safety among veterinarians. As noted above, means substitution does not often occur, and in the event it does occur, it would normally result in the use of a less lethal means if interventions target the most common and lethal means in a population. However, in the veterinarian population, means substitution for pentobarbital could result in the use of an equally lethal method of suicide (i.e. firearms). Although pentobarbital is believed to be the primary method which results in higher suicide rates in veterinarians than the general population, firearms are also a common suicide method among veterinarians (Tomasi et al., 2019; Witte et al., 2019). It is possible that this is due to personal firearm ownership in this population, as well as firearm ownership for euthanizing large animals who are unable to be transported to a clinical environment (Bartram & Baldwin, 2010; Shearer et al., 2018). We therefore need to consider both these avenues of firearm access when planning intervention

strategies. Personal firearm ownership has not been directly examined in veterinarians; however, in an online study examining the role of firearm ownership for individuals in a variety of high suicide risk groups, researchers did note a high rate of firearm ownership in veterinarians compared to other groups at risk for suicide (e.g., Veterans, firefighters; Anestis & Houtsma, 2019). Out of all other primary groups in the study with more than five members, veterinarians (31.8%) had the largest percentage of firearm owners besides military service members (active duty, special forces, and veterans; 40.5%) and law enforcement (53.1%). This is especially significant in that veterinarians had a larger percentage of firearm owners than other individuals in clinical professions, such as psychologists (20.8%) and nurses (21.1%).

Additionally, means safety solutions for both pentobarbital and firearm access for veterinary purposes may need to be different for veterinarians with different specialties. One solution proposed by Dr. Andy Roark in response to his online survey was for pentobarbital access to only be possible with at least two people present (Roark, 2019). However, as noted in the Occupational Outlook Handbook for Veterinarians from the U.S. Department of Labor (2018), veterinarians who treat horses, farm animals, and food animals often travel from their offices to farms and ranches for veterinary services. Due to this travel on the part of large animal veterinarians, which comprise approximately 16% of veterinarians, there may not be an office manager, veterinary technician, or other assistant to be a second person present for access to euthanasia means (American Veterinary Medical Association, 2018). Thus, a different solution would be necessary for these veterinarians who work alone at least some of the time.

Focus Groups

Given the lack of published research investigating solutions for addressing the role that pentobarbital plays in suicide among veterinarians, it would be beneficial to assess what means

safety protocols would be acceptable to veterinarians and feasible for implementation in the workplace. It would also be beneficial to obtain more in-depth information regarding current practices related to pentobarbital storage. This could be accomplished through the use of focus groups, which allow for a wide range and depth of content due to the input from many different participants (Bogart & Ehrhardt, 1998). Although in-person focus groups allow for tonal and body language interactions between participants to be analyzed, online focus groups can be especially useful when discussing sensitive topics because there is heightened confidentiality in comparison to in-person focus groups (Belzile & Oberg, 2012; Moore et al., 2015; Woodyatt et al., 2016). Additionally, it is more practical to conduct focus groups virtually with veterinarians so practitioners in more rural areas or who have busier schedules can participate and so that it is possible to obtain the perspectives of individuals from various geographic reasons. Finally, because this study took place during COVID-19 pandemic, it was essential to design the research protocol in a way that allowed for appropriate social distancing during the data collection process.

Study Aims

Due to the lack of prior research in this area, Aim 1 of this study was to gather in-depth information regarding current practices related to pentobarbital storage, Aim 2 was to utilize focus groups to examine what methods of means safety for pentobarbital and firearms would be feasible and acceptable for veterinarians as well as possible ways to improve mental health for veterinarians, Aim 3 was to identify any perceived barriers for means safety implementation and improving mental health for veterinarians, and Aim 4 was to examine whether focus group participation influenced veterinarians' willingness to add additional storage protocols for workplace euthanasia methods. We also added an exploratory Aim 5 of examining whether the

reasons veterinarians are willing to add additional storage protocols changes from pre- to post-focus group participation. We conducted multiple focus groups that were broken up into two phases of research. The first phase consisted of focus groups separated by veterinary specialty (e.g., small animal, large animal/equine), in order to learn which solutions would be most feasible in the unique workplaces for different areas of veterinary medicine. The second phase consisted of focus groups integrating individuals from each veterinarian population to investigate whether these solutions can be combined for one acceptable and feasible solution or if different solutions are necessary for different veterinarian populations. This study involved both qualitative and quantitative analysis. The qualitative analysis examined the content of the focus group interviews as well as one open-ended question from the post-test survey and consisted of a) determining what means safety method(s) is/are the most acceptable and feasible to implement across specializations and b) characterizing the barriers to means safety methods faced by individual specializations or across specializations. The quantitative analysis examined data collected via online questionnaires. For our quantitative analyses, we hypothesized that the majority of veterinarians would report leaving their pentobarbital or firearm storage unlocked during business hours. Additionally, we hypothesized that veterinarians would be more willing to change storage practices for pentobarbital and firearms after focus group participation.

Method

Participants

We recruited 43 participants for our study. Demographics can be found in Table 1. The sample was 90.7% female (n= 39) and ranged in age from 27 to 51, with a mean age of 34.56 (SD = 6.65). Participants were 93.0% White (n = 40), 4.7% Asian (n = 2), and 2.3% Hispanic/Latino with no race identified (n = 1). Participants lived in 21 different states, with

44.2% (*n* = 19) identifying their location as rural, 39.5% (*n* = 17) suburban, and 11.6% (*n* = 5) urban. Our participants were from multiple specialties, with 27.9% (*n* = 12) identifying as small animal practitioners, 7.0% (*n* = 3) as large animal, 16.3% (*n* = 7) as equine, 27.9% (*n* = 12) as mixed animal, and 20.9% (*n* = 9) as other specialties (e.g., academia, laboratory animal, regulatory, government, other). Only a minority of our participants (11.6%, *n* = 5) were solo practitioners (See Table 2).

Measures and Procedures

Participants were recruited via social media and veterinary listservs. Specifically, colleagues sent out advertisements to their veterinarian contacts, and they were also posted on Dr. Andy Roark's Facebook, Instagram, and Instagram story. Advertisements outlined demographic inclusion criteria (i.e. veterinarians currently practicing in the United States, aged 18-65) and described the study as "a focus group discussing clinical protocols and possible ways to prevent suicide in veterinarians." Advertisements also contained a link to the screener questionnaire to determine eligibility. Study flow can be found in Figure 1. After participants were screened for the study, eligible participants were sent a Qualtrics link to the consent form, which they signed electronically. The consent form outlined study procedures and also noted that a certificate of confidentiality was acquired for the study to provide additional protection for participants, given that they would be discussing compliance with federal regulations for pentobarbital storage. Participants were consented in the order they completed the screening survey, and as we reached our expected number of participants in each specialty (i.e. small animal, mixed animal, equine/large animal, other), applicants were put on a waitlist in case participants withdrew from the study. As noted in Figure 1, 140 participants were placed on this

waitlist throughout the study. After the consent form was completed, participants were then emailed a link to the pre-test survey.

The pre-test survey assessed demographics, firearm ownership status, veterinary practice (specialization, location, number of employees, etc.), methods of euthanasia primarily used in their practice (pentobarbital, firearm), and current pentobarbital and/or firearm storage methods. These data can be found in Tables 1-4. They also answered a question on a 100-point sliding scale regarding their willingness to change pentobarbital storage practices in their workplace (i.e. *How willing would you be to use additional locking mechanisms [e.g., combination lock] for pentobarbital in your workplace?*). If participants reported that they use firearms as a method of euthanasia in their workplace, they answered similar questions for firearm storage in the workplace (i.e. *How willing would you be to use additional locking mechanisms [e.g., combination lock] for firearms in your workplace?)* Additionally, if participants reported owning personal firearms, they answered these questions for firearm storage in the home (i.e. *How willing would you be to store your personal firearms more securely in the future?*).

For reported euthanasia means and firearm ownership, participants were also asked why they would be willing to store pentobarbital or firearms differently (i.e. *For what reason(s) would you potentially be more willing to use additional locking mechanisms (e.g.) combination lock) for pentobarbital/firearms in your workplace? / For what reason(s) would you be willing to store your personal firearms more securely in the future?*). Participants were able to select multiple answers. For workplace pentobarbital/firearms, participants had the following options: concern about my own suicide risk, concern about a coworker's suicide risk, concern about theft, concern about following DEA regulations, and other. For personal firearms, they had the

following options: concern about my own suicide risk, concern about a family member's suicide risk, concern about someone else's suicide risk (please specify the person), concern about theft, concern about accidental injury, and other. We also assessed previous depression diagnoses (*Have you ever had a significant problem with clinical depression?*), mental health treatment status (i.e. *Are you now taking medicine or receiving treatment from a doctor or other health professional for any type of mental health condition or emotional problem?*), and suicide attempt history (*Have you ever attempted suicide?*), using identical items to those used by Nett et al. (2015). Lastly, we asked participants to rate on a 5-point scale to what extent they agree with the statement *If someone wants to die by suicide and you prevent them from using a specific method, they will simply find another way to die*.

After pre-test completion, participants were scheduled for a focus group run by the principal investigator of the study. Focus groups lasted 60-90 minutes and were hosted on secure Zoom software. For this study, we conducted 10 focus groups that involved a total of 43 participants, which provided adequate data to reach saturation for our qualitative analyses (Hennick & Kaiser, 2022). The first set of focus groups was recruited from the most populous veterinary specializations. These included three small animal focus groups, one large animal / equine focus group, and two large/equine/mixed animal focus groups. Next, we conducted four focus groups that combined veterinarians from various specialties, which included individuals from all three previously mentioned specializations as well as lab animal, food animal, and federal/government. Focus groups ranged in size from two to seven participants, which allowed the groups to remain concentrated on the topic at hand and allowed everyone to speak (Moore et al., 2015). To protect confidentiality, participants' names were changed to participant numbers prior to entering the Zoom meeting. Within the focus group meeting, the facilitator asked

questions and prompted responses to direct the conversation and gain information from participants. Each focus group was recorded on Zoom software for transcription purposes.

The facilitator asked participants open-ended questions in order to prompt discussion and always began focus groups by asking what factors participants think contribute to the elevated suicide rate for veterinarians. Subsequent questions depended largely on different topics brought up by participants; however, a sample of the questions that were used can be found below:

What are your current storage practices for medications (and firearms if applicable) in the workplace?

Would you be willing to change these storage practices if necessary? Why or why not?

From past research, we know that individuals are less likely to attempt suicide if it takes longer for them to prepare to do so. Based on this information, why might it be important to implement additional storage protocols for pentobarbital?

What are some barriers to implementing different storage practices in the workplace, and how can those be overcome?

What additional storage practices would be able to be implemented in your workplace?

Aside from changing how euthanasia drugs are stored, are there any other ways you think that veterinarians could be prevented from using pentobarbital for the purpose of suicide?

Aside from preventing suicide, what else can be done to improve mental health in the veterinarian community?

These questions were used to gain information from participants regarding additional safeguards that would be feasible and acceptable in their practice settings, as well as what they think could be done to improve mental health in the greater veterinarian community. After each focus group concluded, undergraduate research assistants manually transcribed them, using a

multi-step process. First, a research assistant used the focus group audio file to conduct the preliminary transcription. Then, a second research assistant reviewed the video recording to attribute specific text to individual participants, as well as review the transcription for accuracy. Once all transcriptions were complete, the videos were deleted to protect participant confidentiality.

After participating in the focus groups, participants responded to an additional Qualtrics survey within 48 hours of their focus group. This post-test survey assessed willingness to change euthanasia storage practices in their workplace to protect themselves or their employees from suicide, as well as the same questions from the pre-test regarding their reasons why they would be willing to change their storage practices and to what extent they believe that if someone is prevented from using a specific means for suicide, they will choose another means. This allowed us to determine if focus group participation impacted veterinarians' willingness to change their storage practices or how much they agree that individuals will substitute another means if a specific means is inaccessible. They were also asked the following open-ended questions:

Is there anything you did not feel comfortable sharing in the focus group?

Are there any additional topics you wanted to discuss in the focus group?

After attending the focus group, what additional storage procedures do you think would be reasonable to implement in your practice?

If participants noted anything in these responses that they wanted to discuss with study staff, they were offered an individual interview with the facilitator. The responses to the first two open-ended questions on the post-test survey were only used for the purpose of arranging additional interviews and were not coded. Four additional interviews were conducted. These interviews were recorded, transcribed, and coded in the same way as the focus groups. The third

open-ended question was coded using a subset of codes from the focus group codebook. The analytic strategy for coding this question can be found below.

All participants were compensated with a $10 Amazon gift card after post-test completion. As can be seen in Figure 1, 100% of focus group participants completed both the pre- and post-test.

Data Analytic Strategy

To address Aim 1, we computed descriptive statistics to report the frequencies of key study variables. For Aims 2 and 3, we used thematic analysis to identify and analyze themes that arose throughout focus group discussion and the open-ended question in the post-test survey regarding pentobarbital and firearm storage in the workplace (*After attending the focus group, what additional storage procedures do you think would be reasonable to implement in your practice?)*. Thematic analysis is a foundational qualitative method for identifying and assessing themes in a dataset (Braun & Clarke, 2006). Two graduate students in clinical psychology independently reviewed the focus group transcriptions and generated initial codes for the data. These codes denote patterns in the transcription regarding means safety interventions for pentobarbital and firearms, barriers to implementation for additional protocols, and current problems and possible solutions for mental health concerns in the veterinarian community. The codes are theory-driven, meaning that they focus on comments that relate to these three study topics (Braun & Clarke, 2006). The data codes were allocated by the graduate students individually into themes, and then the students collaborated to generate a final list of themes to be used in data analysis. These themes were revised and consolidated so that they encompassed topics that reached thematic significance across focus groups, such as which means safety interventions are most preferred, what barriers exist in different specializations or across

specializations for implementation, and which mental health issues are most concerning and salient for veterinarians.

Although we used the same procedure to code the open-ended responses to the post-test questionnaire, these codes are reported separately from the codes derived from the focus group. Of note, there were some responses to the open-ended question in the post-test that did not fall under existing codes (None, Other, Increase compliance of existing security protocols, Unsure but willing to make changes). For these additional codes, a similar process was conducted to create the codebook, wherein two graduate students discussed the codebook and resolved any discrepancies through discussion or consulting with the faculty mentor.

The two graduate students met regularly to discuss coding for each focus group and resolve disagreements in coding. After the two graduate students completed coding, the first author consulted with the faculty mentor in order to refine codes. Through this process, codes that arose fewer than three times were either removed due to a lack of thematic significance in the overall study or were merged with a different code. When codes were merged, the title and description of the code was expanded to encompass both previous codes. We used Dedoose™ for coding the data, an online software application used for qualitative data analysis.

For Aim 4, we conducted a paired samples t-test to compare the pre- and post-test survey item regarding participants' willingness to implement additional storage methods to prevent suicide changed after participating in the focus group. For exploratory Aim 5, we conducted McNemar's Test for nominal data to measure whether veterinarians' reasons for being willing to change their storage methods changed from pre- to post-test. We conducted a power analysis in G*Power to determine the necessary sample size to have 80% power to identify a medium effect ($d = 0.50$) for a paired samples t-test with an alpha level of .05. This analysis indicated that we

would need at least 34 participants, meaning that we have sufficient power with 43 participants. For our exploratory aim, we conducted a post-hoc power analysis for the McNemar Test for 43 participants, assuming an odds ratio of 1.50. Of note, this test only had 5.9% power and was therefore severely underpowered.

Results

Study flow can be found in Figure 1. Descriptive statistics for key study variables can be found in Table 1, and information regarding participants' veterinary practices can be found in Table 2.

Aim 1

Aim 1 of our study was to gather quantitative information regarding practices related to pentobarbital storage. We asked veterinarians to report all storage methods for pentobarbital in their workplace, as sometimes pentobarbital may be stored in multiple ways (e.g., some stored in a lockbox at the veterinary practice, some stored in vehicles for ambulatory practice calls). Contrary to our hypothesis, as can be seen in Table 3, the majority of our participants reported that all of their pentobarbital is stored locked at all times except when in use (n = 28, 65.1%). However, for a sizeable minority (30.3%; n=13) of participants, some pentobarbital is stored unlocked at least part of the time. Additionally, as can be seen in Table 3, only three of the six participants who reported utilizing workplace firearms for euthanasia reported storing them locked at all times.

Personal firearms are also important to consider for suicide prevention in veterinarians. As can be seen in Table 4, 19 of our participants (44.2%) endorsed owning a personal firearm. Out of our 43 participants, 18.6% (n=8) reported storing their personal firearms unlocked and unloaded, and 9.3% (n=4) reported storing their personal firearms unlocked and loaded.

Aims 2 and 3

Aims 2 and 3 of our study were to examine what methods of means safety are feasible and acceptable for veterinarians and what perceived barriers exist for means safety protocol implementation. Related to these aims, we also gleaned information regarding current mental health concerns in the veterinarian community, possible solutions to these concerns, and barriers to improving mental health among veterinarians.

Five major themes emerged under these aims: perceptions of contributing factors for suicide among veterinarians, possible solutions and barriers to improving veterinarians' mental health, current clinic protocols for pentobarbital storage, additional implementable pentobarbital storage protocols and relevant barriers, and general barriers to changing pentobarbital storage protocols. Below, we expound on each of these themes and relevant subthemes.

Perceptions of Contributing Factors for Suicide Among Veterinarians

With regards to factors that are perceived as contributing to suicide in the veterinary profession, many different subthemes arose. Information regarding these subthemes can be found in Table 5. Work/life balance or feeling overwhelmed was the subtheme that arose the most, with participants noting that they feel overworked and as though they are unable to have a good work/life balance because of the demands of their work. The next most common subtheme was ease of access to pentobarbital, with participants noting that having access to pentobarbital allows them to have access to a lethal means for suicide. Participants discussed that ease of access to pentobarbital may also be due to veterinary offices having excess pentobarbital on hand, or veterinarians being alone at least some of the time around pentobarbital, such that they could access it without anyone else knowing. This subtheme relates heavily to the subtheme of euthanasia experience – participants noted that because they perform euthanasia procedures

regularly, they are extremely knowledgeable about how to utilize pentobarbital for suicide, and they have ample knowledge about how humane pentobarbital is, mentioning that they often describe being euthanized with pentobarbital as peaceful or painless. Because of this experience, pentobarbital may be an appealing, lethal means if a veterinarian is suicidal. The next most frequent subtheme that emerged in this area is lack of appreciation. Veterinarians reported feeling underappreciated by society as essential workers during the COVID-19 pandemic, feeling underappreciated by their employers, and most significantly feeling underappreciated by clients. Participants mentioned that not only are clients sometimes unappreciative, but they sometimes engage in posting negative reviews on social media such that it is detrimental to veterinarians' reputations. The final subtheme that was discussed as a perceived contributor to suicide is that veterinarians are hard on themselves. Participants reported that, in their experience, veterinarians are often "type A" or are perfectionists, and so they put additional pressure on themselves to perform well in their profession above and beyond what is required of them.

Other subthemes that arose less often as perceived contributors to veterinarian suicide were financial debt and feeling stuck within their profession. With regards to financial debt, participants reported that the cost of veterinary school is such that they oftentimes do not pay off their student loans in their lifetimes. This can cause additional stress on veterinarians as it is constantly a factor in their lives and their profession. Regarding feeling stuck within their profession, some participants noted that they feel unable to change specializations or professions because of the way it would be negatively perceived by others. Relatedly, they reported experiencing or witnessing shame or fear associated with leaving veterinary medicine or their chosen specialty in order to pursue something different. Participants also reported that they feel

as though it is difficult to leave veterinary medicine since they have spent so much time and money in veterinary school and working in the profession.

Possible Solutions and Barriers for Improving Veterinarians' Mental Health

Information regarding this theme and its subthemes can be found in Table 6. Notably, this theme often arose in response to discussing pentobarbital storage. Participants noted that changing storage protocols may not be sufficient to prevent suicide, and other possible suicide prevention strategies were discussed in this context. With regards to possible ways to improve veterinarians' mental health, the most significant subthemes were normalizing mental health and increasing organizational support for mental health. Specifically, veterinarians reported that it may be helpful for their profession to normalize discussing mental health concerns. Additionally, they discussed the need for practice owners, veterinary schools, veterinary employers, etc. to be more supportive of veterinary mental health. This could include supporting veterinarians in disputes with clients, organizing and providing additional trainings on how to cope with mental health and suicide, and/or trainings focused on how to discuss mental health and suicide with their peers and coworkers. Notably, additional trainings emerged as a significant topic under the subtheme of increasing organizational support for mental health. Participants reported that, although mental health trainings do exist for veterinarians, it would be helpful to have more trainings integrated into veterinary school or required as continuing education credit during their years in the workforce. They reported perceiving that most veterinarians would not necessarily choose mental health training if they have other trainings available that are required for their continuing education as veterinarians.

Other possible ways to improve mental health that met thematic significance were posting mental health signage within practice settings, improving and increasing the number of

available support systems, and increasing mental healthcare access. Mental health signage was mentioned by participants in that they either had seen mental health-related signage posted around their veterinary schools and practices, which they found helpful to support their mental health, or they thought signage of this nature would be helpful. This signage ranged from a sticker denoting the suicide hotline on pentobarbital storage containers to signs on doors reminding them to think of multiple good things that happened throughout the day. For improving available support systems, veterinarians reported that they think it would be helpful for there to be more facilitated opportunities for veterinarians to support each other, especially for veterinary interns and solo practitioners. Participants also noted that personal support systems have been helpful for those who have them. With regard to increasing mental healthcare access, participants specifically noted that it is difficult to find a mental health provider who understands the unique struggles and stressors of veterinary medicine. Thus, it would be helpful to have more treatment providers who have knowledge about the veterinary field or who would be open to learning so that they can best serve veterinarians.

Participants also discussed barriers to improving mental health in veterinarians. This subtheme included these topics: changing veterinarian culture surrounding mental health is difficult, and that some veterinarians do not find it necessary to improve mental health or do not discuss mental health. With regards to changing culture, veterinarians noted that changing the culture of their profession will take time. Participants reported that they perceived mental health issues to be pervasive within the profession, and due to stigma surrounding discussion of these struggles, change cannot be immediate. They reported that mental health is not something that is discussed often enough within their profession, and moreover that some veterinarians ignore the topic as unimportant.

Current Clinic Protocols for Pentobarbital Storage

Information regarding the theme and subthemes relevant to current clinic protocols for pentobarbital storage (i.e. those that are currently being used by a respondent's practice) can be found in Table 7. It is important to note that although these protocols were all being used by at least one respondent's practice, they were not universally being used. The first current protocol discussed is a CUBEX, which is an automated machine for dispensing controlled substances[1]. Participants who are already using CUBEX in their practice reported that CUBEX may make it more difficult to access pentobarbital for the purpose of a suicide attempt because of the steps necessary to retrieve controlled substances from the machine (i.e. a veterinarian needs to log how much of any controlled substance is being taken and for which patient before being able to remove the substance from the machine). However, they also noted that CUBEX machines are imperfect, and it would still be possible to access pentobarbital for the purpose of suicide, despite extra steps required (e.g., a veterinarian can still access pentobarbital with no other staff present by withdrawing extra pentobarbital while logging a pentobarbital withdrawal for a patient, etc.). Additionally, CUBEX systems cannot be used for firearm storage.

The second protocol discussed was drug logging. Participants with drug logging already in place reported that regularly checking drug logs may be helpful for preventing suicide because it would allow veterinarians and practice managers to note when pentobarbital is missing and was not logged. However, participants commonly noted that drug logs are not always checked, and even if veterinarians are logging all dispensed substances and the drug logs are being checked, drug logs could be falsified, in which case they would not be effective in preventing suicide.

[1] For a description of CUBEX products, see cubex.com/products/

Some participants said that they already have multiple locks on their euthanasia drug storage, meaning that they have to unlock multiple mechanisms in order to access pentobarbital. Of note, participants did not identify any faults in this protocol as a current method of storage.

Additional Implementable Euthanasia Means Storage Protocols and Relevant Barriers

This broader theme represents discussion of protocols that were not currently in place in the respondent's practice and can be found in Table 8. Overall, two additional protocols emerged as widely accepted and feasible among those who did not have them in place already. The specific protocol that emerged as most acceptable and feasible was adding an extra lockbox or lock to euthanasia means storage (i.e. pentobarbital and workplace firearms would be in a lockbox separate from other controlled substances, or in a lockbox within the lockbox being used for other substances). This protocol would be helpful for suicide prevention in that it would provide an additional barrier between veterinarians and pentobarbital or firearms if they are experiencing a suicidal crisis. Although increased time for access similarly received support, this was a more general statement with no specific protocol mentioned (i.e. one of the proposed options which would increase the time necessary to access pentobarbital would be acceptable, such as a time lapse lock which does not open for a set time period after a code is entered, or an additional lock or lockbox). Importantly, adding an extra lockbox or lock to euthanasia storage is an example of a specific protocol that would increase time to access euthanasia means.

The two perceived barriers to implementing these protocols were 1) that additional physical space would be required to accommodate an additional lockbox, and 2) increasing time for access may result in animal suffering. Importantly, these barriers emerged very sparsely during focus groups in comparison to participants noting that this protocol would be implementable. For the first barrier, there are multiple possible solutions. First, it may be

possible to place a smaller lockbox within the current storage container for controlled substances, specifically for pentobarbital or, if necessary, workplace firearms. Second, it may be possible to place pentobarbital solution and workplace firearms in a separate lockbox within the workplace. Within this second solution, this second lockbox would remain locked unless a veterinarian was actively performing a euthanasia. Additionally, an option for workplace firearms would be adding a cable lock or other locking device to the firearm, which would not take up significantly more space. When considering the idea that increasing time for access may result in animal suffering, this is an important consideration when implementing this protocol. However, this barrier was primarily noted in extenuating circumstances (e.g., when many animals need to be euthanized at once) and did not emerge as one of the most concerning barriers for veterinarians. An important note for adding an extra lockbox or lock to euthanasia storage is that this emerged as an implementable protocol for small animal, mixed animal, large animal, and other veterinarian specialties. Similarly, the noted barriers did not emerge for one specialty in particular.

Another protocol that emerged often as an implementable protocol was requiring two people to access pentobarbital. This was not discussed specifically for firearms but would be similarly implementable if the firearms are locked in the same container as other controlled substances or pentobarbital. For this protocol, two people would need to be present to access pentobarbital. Although this protocol was discussed positively as often as the protocols mentioned above, barriers to implementing this protocol were almost always identified as part of the discussion. Specifically, participants noted that two people are not always available when euthanasia means need to be accessed, and so it would not always be feasible to implement this requirement.

Other protocols that were mentioned in this discussion were calling a phone number to access pentobarbital, CUBEX machines, and using intrathecal lidocaine as an alternative to pentobarbital. First, with regards to calling a phone number to access pentobarbital, the system described for this additional protocol was hypothetical, in that a lock would need to be created that can be unlocked only when a number is called and a veterinarian answers questions regarding the reason for access. This option was not mentioned nearly as often as other additional protocols and would require a currently nonexistent system to be created. Second, CUBEX machines were not commonly discussed as an additional implementable protocol. Although a small number of participants noted that they could feasibly acquire a CUBEX, a greater number of participants noted that CUBEX systems are too expensive or take up too much space to be feasible in their workplace. Financial cost and space as barriers were mentioned across specialties, but physical space may be a more significant barrier for large animal veterinarians, due to the fact that they oftentimes work out of a vehicle with relatively little space. Lastly, for intrathecal lidocaine, this may be a potential solution for large animal veterinarians. This is a method of euthanasia that involves injecting a lidocaine solution into the spinal cord of an animal (Leary et al., 2020). This method of euthanasia would be effective in preventing suicide in that it would not be possible for a veterinarian to administer on themselves; however, it was brought up only rarely as an option and it is only feasible for large animals. So, intrathecal lidocaine is not an option with universal applicability.

In the post-test survey, participants were asked *after attending the focus group, what additional storage procedures do you think would be reasonable to implement in your practice?* Results from this survey question are in Table 9. Of note, participants were able to choose more than one storage procedure in this response. These responses will be discussed qualitatively and

quantitatively because, unlike focus group discussion, these responses are self-generated answers to a single question. Within focus group discussion, the number of participants who contributed to a theme would not necessarily encompass all participants who agreed with that statement; for these responses, we were able to acquire answers from all participants who wished to answer.

For these responses, there were additional codes generated beyond those present in the focus group coding scheme: *None, Other, Increase compliance with existing security protocols, Unsure but willing to make changes*. These codes were created to capture participants who said they would not be willing to make changes to their storage methods, participants who mentioned additional implementable storage methods that did not meet thematic significance in the focus groups, participants who noted they could increase compliance for protocols already in place in their practice, and participants who did not have a specific new protocol in mind.

Quantitatively, we can see that the answers to this question reflect focus group discussion in that adding an extra lockbox or lock to pentobarbital storage was the most commonly reported protocol participants would be willing and able to add in their practice. Importantly, this protocol was identified by veterinarians across multiple specialties, indicating that it may have broad applicability. It is also important to note that two large animal specialists were willing to implement a time lapse lock, which would result in more time to access pentobarbital, and one mixed animal participant was unsure what would work best for their practice due to the fact that they would need to completely reevaluate how the mobile units in their practice are organized.

Additionally, although calling a phone number to access pentobarbital and intrathecal lidocaine emerged as themes in the focus groups, no participants identified these methods as reasonable to implement in their practices on the post-test survey. Similarly, only a small number of participants noted that a CUBEX (or similar) system or needing two people to access

pentobarbital would be feasible and acceptable in the post-test survey. Thus, although these additional protocols did emerge as focus group themes, they ultimately were not widely acceptable and implementable for our participants.

Of note, the next most common answer to this question after *extra lockbox/lock* was that participants would not change anything about their storage methods, and this answer also emerged in all specialties. Qualitative analysis of these responses can further illuminate why so many participants answered that they would not change anything about their storage methods. While four participants only answered that they would not change anything, seven participants noted that the reason why they would not change anything is because they already had secure storage methods in line with the most secure methods discussed in the focus group. One participant noted that, while they liked the idea of making changes, they did not see how it could be feasible. Additionally, three participants fell under the *increase compliance with existing security protocols* category. These participants noted that they currently have more secure protocols than what they typically practice (e.g., they have a combination lock on their controlled substances but have two of three numbers pre-entered). These participants noted that they would enforce and implement protocols as they were originally intended (e.g., scramble all numbers on the combination lock).

There were some storage methods, denoted in the *other* category of this table, that did not meet thematic significance within focus group discussion about additional implementable protocols. These were additional security on keys and adding a video camera above pentobarbital storage. Additional security on keys was not discussed within a focus group, and no additional details were given for what this would entail. Adding a video camera above pentobarbital storage

was mentioned within a focus group one time as a current protocol, but was not discussed and did not arise again, and so was not retained as a focus group theme.

General Barriers to Changing Pentobarbital Storage Protocols

Focus group participants also noted general barriers to changing protocols that did not pertain to specific protocols. The subthemes relevant to this theme can be found in Table 10. The most common barrier was the belief that changing protocols will not stop suicide. Beneath this subtheme, a few participants noted that checking drug logs specifically will not prevent suicide. Some participants noted that means substitution may result in suicide risk remaining unchanged even if protocols are changed, some participants noted that it is too much effort to change storage methods for pentobarbital and/or firearms in the workplace, and a few participants noted that differences in state laws may result in some storage methods not being feasible for some veterinarians. These barriers will be important considerations when working towards implementing protocols.

Aim 4

Aim 4 of our study was to examine quantitatively whether focus group participation influenced veterinarians' opinions regarding means safety. These results are illustrated in Table 11.

Paired-sample t-test analyses (Table 11) showed that there was a statistically significant increase from pre-test to post-test in willingness to change storage methods for pentobarbital in the workplace with a small effect size. There was no change in willingness to change storage methods for firearms in the workplace or personal firearms. However, these results should be viewed with caution given the low number of participants owning firearms for workplace (n = 6) or personal use (n = 19), which reduced our statistical power to detect an effect.

Aim 5

Lastly, Aim 5 of our study was to conduct exploratory analyses examining whether reasons to change storage practices changed after participation in the focus groups (descriptive statistics can be found in Table 12). Results of McNemar Test analyses (Table 13) can be found in Table 13. Because this test may be unfamiliar to readers, we offer the following illustrative example, using *concern about coworker's suicide risk,* which exhibited a statistically significant change from pre- to -post-test for pentobarbital. Regarding this reason for being willing to change storage methods, the table shows that at pre-test, 21 participants said they would be willing to change pentobarbital storage methods for this reason, and at post-test 32 participants reported being willing to change pentobarbital storage methods for this reason, resulting in a net difference of 11. Of 22 participants who said *no* to being willing to change pentobarbital storage due to concern about a coworker's suicide risk at pre-test, 13 of these participants changed their answer to *yes* at post-test; however, two participants changed their answers in the other direction (i.e. they said *yes* at pre-test and *no* at post-test), resulting in the reported net difference of 11.

For personal firearms, there was a statistically significant increase in participants reporting they would be willing to modify storage methods out of concern about a family member's suicide from pre- to post-test. Of note, there was no significant change in willingness to modify storage methods for reasons besides those above, including veterinarians being willing to change storage methods to prevent their own suicide.

Discussion

The current study offered a mixed-methods analysis of data collected through surveys and focus groups with currently practicing veterinarians. We found that while the majority of veterinarians in our sample reported storing their pentobarbital locked except when in use, a

substantial minority do not. Additionally, the focus group discussions generated information regarding what storage methods for pentobarbital and workplace firearms would be most feasible and acceptable to veterinarians and identified barriers to implementing these storage methods. Finally, the focus group discussions highlighted the mental health issues that are most concerning to veterinarians with regards to suicide. Data from post-test survey illustrated that veterinarians were more willing to change their storage methods for pentobarbital after participating in the focus group. Additionally, after participating in the focus group, participants were more likely to endorse concern about a coworker's suicide risk as a reason to modify their pentobarbital storage and concern about a family member's suicide risk as a reason to modify their personal firearm storage. Understanding the information regarding means safety methods and willingness to change storage methods, generated from both focus groups and surveys, is vital when considering ways to prevent suicide in veterinarians. Evidence suggests both that means safety is an effective way to prevent suicide when used for an especially lethal and commonly used means for suicide (Hawton, 2007; Yip et al., 2010) and that veterinarians are likely to utilize pentobarbital solution and firearms for suicide (Witte et al., 2019). Thus, means safety protocols for pentobarbital solution and workplace firearms may be effective approaches for preventing suicide in veterinarians. However, our participants emphasized the importance of a broad focus on improving mental health, rather than exclusively focusing on pentobarbital storage in order to prevent suicide.

Data collected in this study regarding current storage protocols in veterinary practices illustrated that the majority of participants in our sample store their pentobarbital locked at all times except when in use. However, it is important to keep in mind that our goal was not to recruit a representative sample of veterinarians to establish base rates of pentobarbital storage,

but rather, ensure that we hear from a sufficient number of participants from varying specialties for the focus group discussion. As such, it is possible that our rates of secure pentobarbital storage are an overestimate, given that our participants responded to a study advertisement focused on clinical protocols and suicide prevention (i.e. they may be more likely than the average veterinarian to store pentobarbital securely). A worthwhile avenue for future research would be collecting information from a representative sample of veterinarians to more precisely estimate the degree to which pentobarbital is securely stored within veterinary practices. Limitations aside, our study demonstrates that some proportion of veterinarians store their pentobarbital unlocked at least part of the time when it is not in use. Of note, current guidelines from the Drug Enforcement Administration do not specify exactly when pentobarbital storage needs to be locked (Drug Enforcement Administration, 2006, p.14). As such, this is not indicative of a lack of compliance with existing DEA guidelines, but these guidelines may need to be re-evaluated for the purpose of limiting access to lethal means for suicide.

In focus group discussion, we were able to acquire more details regarding current pentobarbital storage protocols, namely usage of multiple locks on storage containers, CUBEX machines, and drug logging. Other topics discussed were additional implementable protocols, barriers to implementing protocols, and mental health in veterinarians. For additional implementable protocols, adding an additional lockbox or lock to current storage containers or generally increasing time to access euthanasia methods emerged as the most favorable additional protocols. As one participant noted:

> "It would be really easy to put in another box [for pentobarbital], in [the box used for all controlled substances]. I would definitely do it. It'd be pretty easy to do."

Many participants noted that they could foresee a way for an additional lockbox to be implemented in their practice, whether within the current lockbox or separate from that lockbox. Another participant noted:

> "Another box would be doable. […] It'd be like a fireproof, smaller one maybe in the truck, and it wouldn't kill anybody probably to do that. It wouldn't be overly daunting or something."

Importantly, for participants who already have multiple locks on storage containers, they did not report any difficulties or flaws in this type of protocol. Additionally, adding an additional lockbox/lock was noted as the most feasible and implementable across veterinary specialties (e.g., large animal, small animal, mixed animal). However, one barrier to adding an additional lockbox noted was the space required for an additional lockbox. Although this was noted across specialties, as well, and was not noted often, it is important to consider physical space required for this protocol. This is especially true for large animal veterinarians; participants who fell into this specialty noted that they work out of trucks that do not have much extra space. Although we hope that additional protocols will be implemented for all specialties, we also acknowledge that according to Nett et al. (2015), small animal veterinarians have higher rates of previous suicide ideation in comparison to large animal veterinarians. Because of this, although all veterinarian populations might benefit from means safety, there may be a more immediate need for protocols to be put into place for small animal veterinarians who appear to have elevated risk for suicidality. Thus, if it seems as though adding an additional lockbox or lock may not be

implementable for large animal veterinarians, this should not necessarily hinder efforts to improve means safety for small animal veterinarians and veterinarians who work out of brick-and-mortar offices, while continuing to discuss the best additional protocol for large animal veterinarians and the mobile units for mixed animal veterinarians.

Within the discussion of increasing time to access euthanasia means, both adding an additional lockbox/lock and implementing a time lapse lock were discussed. Notably, implementing a time lapse lock may be a reasonable option for practices lacking space to add an additional lockbox for pentobarbital. Research has shown that suicidal crises are time limited (Deisenhammer et al., 2009; Hawton, 2007), and therefore increasing time necessary to access lethal means is one way to prevent suicide, insofar as the crisis may subside and/or there is more opportunity for rescue. However, one particularly relevant barrier to increasing time to access pentobarbital is that it may result in animal suffering. Although this barrier was not often noted, this would need to be an ongoing discussion within the veterinary field regarding how to balance preventing suicide with preventing animal suffering. This barrier seems especially salient in emergency situations. For example, one participant noted a situation in which a truck full of cattle flipped, and as a result about 40 cattle needed to be euthanized immediately and were suffering. According to the AVMA guidelines for euthanasia, anesthetics can be used prior to euthanasia, but are not always required (Leary et al., 2020). For situations in which requiring extra time to access pentobarbital would cause animal suffering, anesthesia would be a way to reduce animal suffering while pentobarbital solution is prepared.

Other current protocols discussed were CUBEX machines and drug logging. CUBEX machines were also discussed as an additional implementable protocol; however, one barrier to implementing CUBEX machines in veterinary practices is the barrier of finances and space.

CUBEX systems are expensive and large, and thus smaller practices may not have the ability to afford a CUBEX and/or fit it in their practice space. Drug logging was not discussed as an additional implementable protocol, but for both CUBEX machines and drug logging as current protocols, participants noted that it would be possible to acquire pentobarbital through flaws in the CUBEX system or falsely logging pentobarbital withdrawal. Notably, however, although these mechanisms for tracking pentobarbital withdrawal do have flaws, they would still require extra steps for someone to access pentobarbital above simply taking it out of an unlocked cabinet, which would increase the time and effort necessary to access pentobarbital for suicide. As illustrated in the study by Yip et al. (2010), which targeted charcoal as a lethal means being used in Hong Kong, making lethal means less accessible to suicidal individuals resulted in fewer suicide deaths with the targeted means, as well as fewer suicide deaths overall. In this study, the researchers did not make charcoal completely inaccessible, but rather required individuals to ask for charcoal from cashiers when purchasing it from the pharmacy, rather than having it on the shelf. Although this means safety strategy did not completely ban the purchase of charcoal, the extra time and effort required resulted in lower suicide rates in the districts in which this policy was implemented. Analogously, although there may be ways to improve CUBEX systems, drug logging, or other similar storage methods, these protocols do still increase the time necessary to access pentobarbital beyond opening up an unlocked cabinet and removing pentobarbital with no other necessary steps. This would reduce access to pentobarbital similarly to what was demonstrated in the Yip et al. (2010) study, and so we would still expect lower suicide rates with pentobarbital when these protocols are in place.

Relatedly, research has found similar results of means safety protocols for firearms in the United States. Specifically, storing firearms securely, such as with a gun lock or in a safe, can

prevent suicide by increasing the time required to access the firearm in a suicide attempt (McClurg, 2000; Houtsma, Butterworth, & Anestis, 2018). These studies, along with the Yip et al. (2010) study, suggest that similar protocols could be effective suicide prevention strategies if implemented for pentobarbital storage. Additionally, although the current study was primarily concerned with pentobarbital, there is an additional concern for the veterinarians who utilize firearms for euthanasia and store their firearms unlocked at all times or in the home when not in use, and for veterinarians who own personal firearms and store their firearm unlocked. Because firearms are also commonly used by veterinarians who die by suicide (Tomasi, Fetcher-Leggett, Edwards, Reddish, Crosby, & Nett, 2019; Witte et al., 2019), they are also important to consider when developing means safety strategies for this population.

Our study also examined willingness to change pentobarbital storage methods. We found a statistically significant increase in willingness to change storage methods for pentobarbital after focus group participation, highlighting the importance of discussing pentobarbital storage with veterinarians. The focus group discussions were approached by the facilitator in a way that was similar to motivational interviewing (MI; Hettema et al., 2005), in that the discussion was open-ended, empathetic, and non-confrontational, while also asking questions to prompt discussion geared towards change. MI has been shown to be effective in promoting change for patients in a variety of healthcare settings (Rollnick et al., 2010; Welch, 2014), as well as for promoting change in lethal means storage practices for firearms (Anestis et al., 2021; Rozel et al., 2021). The findings in the present study support the idea that discussing pentobarbital storage utilizing a motivational interviewing approach may be effective in promoting changes in pentobarbital storage practices. Of note, this shift in willingness to change pentobarbital storage was evident during focus group discussion. Specifically, some participants who were unwilling to change

storage methods at the beginning of their focus group stated that they were more willing to change storage methods after learning about the research regarding means safety. This could be important when developing means safety interventions for this population, as it implies that veterinarians are more willing to implement changes when the proposed changes are supported by empirical evidence. Some participants reported during individual interviews that they were more willing to change storage methods upon contemplating focus group discussion after their focus group had ended. These findings suggest the need for further research on how MI-based intervention grounded in empirical data could be effective in veterinarian populations. Regarding willingness to change firearm storage both for workplace and personal firearms, additional research is needed, due to the fact that these analyses were underpowered in our study.

We also examined participants' reasons for which they would be willing to change pentobarbital, workplace firearm, and personal firearm storage methods. Although only two reasons had statistically significant changes (concern about coworker's suicide for pentobarbital and concern about a family member's suicide for personal firearms), an important aspect of these findings is that veterinarians reported being more willing to implement means safety protocols for others' safety, rather than their own. This could be a useful point of emphasis in any means safety interventions developed for veterinarians. It is also important to acknowledge that these analyses were underpowered. This suggests that additional research may be necessary to identify additional reasons why veterinarians would be willing to change their storage methods for euthanasia means and personal firearms.

The other themes thoroughly discussed during focus groups were perceived risk factors for suicide in veterinarians, possible ways to improve mental health in veterinarians, and barriers to improving mental health in veterinarians. Within focus group discussion of suicide risk

factors, participants expressed that they see these stressors as contributors to the suicide risk for veterinarians, both individually and compounded together. Some of the most common risk factors for suicide reported in focus group discussion (Table 5) were ease of access to pentobarbital and euthanasia experience, This is consistent with previous assertions that veterinarians have easy access to pentobarbital relative to other medical professionals (Bartram & Baldwin, 2010) and speculation that ease of access to and extensive knowledge of pentobarbital may result in pentobarbital being appealing as a means for suicide (Tomasi et al., 2019; Witte et al., 2013). Participants noted that they are more capable than any other profession to perform euthanasia with pentobarbital solution. Additionally, they spend much of their time speaking with clients about euthanasia as a "humane death" for patients, which makes pentobarbital more appealing for suicide. One participant noted:

> "We're taught to use [pentobarbital], we know how to dose it and we know it's euthanasia, it's a good death."

This sentiment was echoed by other participants, as well. Some participants even noted that, if they were going to die by suicide, pentobarbital would be the most appealing method, illustrating again how potentially dangerous it is for veterinarians to have easy access to this lethal means during a suicidal crisis.

Participants also described difficulties with work/life balance or feeling overwhelmed, lack of appreciation, and that veterinarians are hard on themselves as perceived risk factors for suicide, which is consistent with research showing that veterinarians commonly report workplace demands as a practice-related stressor (Nett et al., 2015). Participants noted that they work well

over 40 hours a week and are often overwhelmed, noting that "workload" is a primary problem. It also seemed that participants felt as though older, more established veterinarians would not work with them or respect them if they did not work long hours. As one participant noted:

> "If you're not willing to give up every single weekend and every single weeknight, then you have no business working with [established veterinarians]."

Focus group participants also reported that lacking work-life balance and feeling overwhelmed was related to financial debt experienced by veterinarians. One participant stated:

> "There's a lot of pressure to see those extra cases because maybe we need that extra production because one of the big disparities between the human medical field and the veterinary field, is the pay gap is so, so big between human medical doctors and veterinarians. So, you know, do I eat lunch or do I see this other patient that needs my help, but also is going to earn me more production, which is going to earn me more money, which is going to help pay off, you know, the hundreds of thousands of dollars of student loans we have?"

Overall, the experience of being overwhelmed or being unable to have a good work-life balance was prevalent throughout focus groups when discussing perceived suicide risk factors.

Also related to the discussion of perceived risk factors for suicide, participants noted that veterinary students and professionals are often "Type A" and tend to be perfectionists, which

results in higher distress when cases do not go perfectly. One specific example reported by a participant was:

> "I was just thinking, today I was in surgery, doing a surgery I have not done in a really long time, and I had one of the senior doctors in surgery with me, and I asked, 'Alright like what do you think about what I'm doing?' and he said, 'Oh yeah, that's good enough,' and my exact response was, 'I don't want good enough, I want perfect.'"

This kind of response and wanting to be perfect was commonly expressed by participants. This perspective may also relate to the concept of moral distress, or distress arising from knowing the right thing to do while being logistically unable to do it (Jameton, 2017; Kipperman et al., 2018; Moses et al., 2018). Research has shown that veterinarians often experience moral distress relating to clients disagreeing with veterinarians about how to treat their pet (Kipperman et al., 2018; Moses et al., 2018). Within focus group discussion, there was also discussion regarding the idea that sometimes a veterinarian is unable to treat a patient due to other factors besides clients' opinions. One participant noted:

> "I think that we have a lot of isolationism and then a lot of internalizing of everything that leads to that compassion fatigue. […] And then we also have to go through the sense of helplessness when we can't do something for those pets because we are - our hands are tied because of the budget constraints from the owners so we want to help but we just can't and so we are left with that weight, with that guilt on us that we could have done something, but we were unable to in that point in time."

Further, participants reported that they are often unappreciated by clients, as well as to an extent employees and the government (with regards to being essential workers during the COVID-19 pandemic). They reported that they often experience clients who become angry when veterinarians cannot help, or than the client is willing to pay. They also reported that they often feel dismissed or invalidated as medical professionals. Although it is unclear the extent to which these work-related stressors and personality variables are actually responsible for the elevated risk for suicide among veterinarians, what is clear is that they are perceived as such and are associated with substantial distress. Accordingly, any interventions aimed at reducing the likelihood of suicide among veterinarians should acknowledge and address these factors in order to enhance buy-in, as well as target general distress that could be distally associated with suicide, pending further research.

Participants also reported that they perceive a general stigma towards mental health difficulties and seeking help for mental health. This discussion related strongly to the reported barriers for improving mental health in veterinarians, that changing veterinarian culture surrounding mental health is difficult, and that some veterinarians do not find it necessary to improve mental health or do not discuss mental health. Participants reported that senior veterinary professionals were especially invalidating to difficulties with mental health in younger veterinarians, specifically during internship. For example, supervising veterinarians often note the stressors of internship as a "rite of passage," which results in the perpetuation of these stressors across generations. This may point to a necessity for education for supervising veterinarians at internship sites regarding mental health and the importance of support during internship. Additionally, with regards to organizational support for mental health, participants

discussed the importance of support from veterinary schools and offices for students and employees. This extended to education regarding workplace stressors, additional trainings regarding how to handle depression and anxiety or how to discuss mental health and struggles with coworkers, and additional support for veterinarians when clients are difficult or support staff require additional training.

Although this study had many strengths, it also had a few notable limitations outside of those discussed above. First, our sample was more than 90% female, which is not representative of the veterinary profession as a whole, of whom 40% are male (AVMA, 2018). Rather, our sample may be more reflective of the newer generation of veterinarians. As of 2020, the veterinary student population is over 80% female (AAVMC, 2020). Moreover, due to the fact that we made an effort to recruit veterinarians across specialties, our sample is not necessarily reflective of the general veterinarian population. For example, the overall population of U.S. veterinarians is 67% small animal specialists (AVMA, 2018), whereas our sample is only 28% small animal veterinarians. Additionally, as noted above, some of our analyses for workplace firearms and personal firearms were underpowered due to a low number of participants utilizing firearms in the workplace or owning personal firearms. Thus, it may also be beneficial to examine these topics, specifically willingness to change storage practices, in a sample with more veterinarians who utilize firearms in the workplace or own personal firearms.

It is also important to note that our primary goal in recruiting for this study was to have a diverse sample from a variety of specialties, and to have the three largest specialty groups (small animal, mixed animal, large animal/equine) evenly represented. Thus, this sample is not necessarily representative of the demographics for all veterinarians in the United States. Within qualitative research, it is more important to collect rich, rigorous data from a varied sample of

individuals who belong to the population being studied, rather than a sample that is necessarily representative of the general population (Tracy, 2010). Within thematic analysis, it is vital to utilize an inductive approach to modify and develop the overall codebook and to ensure that themes that emerge are explored to saturation (Ando et al., 2014). For example, although our sample has a smaller proportion of small animal veterinarians in comparison to the national population, the themes that emerged from small animal veterinarian focus groups were able to be saturated with the number of small animal veterinarians in our sample, without our overall codebook becoming oversaturated or biased by small animal veterinarians.

Overall, this study illustrates that current euthanasia means storage protocols are not as secure as they could be and that veterinarians report multiple different perceived suicide risk factors within their profession, including ease of access to pentobarbital. Additionally, participants across veterinary specialties indicated that adding an extra lockbox or lock for euthanasia means is a feasible and acceptable way to increase security surrounding both pentobarbital and workplace firearms. Lastly, our results show that veterinarians were more willing to change euthanasia means storage protocols after focus group participation, and that veterinarians were more willing to change their storage protocols due to concern for their coworkers' suicide risk, rather than their own. We believe this study is a significant step towards developing means safety interventions for veterinarians, as this is the first study investigating veterinarians' opinions with respect to means safety protocols within their workplace and what protocols would be feasible and acceptable to implement.

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Table 1

Sample Characteristics

Demographic	Mean (*SD*)
Age	34.56 (6.65)

Demographic	*n* (%)
Gender	
Female	39 (90.7)
Male	4 (9.3)
Race/Ethnicity	
White	40 (93.0)
Asian	2 (4.7)
Hispanic/Latino	2 (4.7)
None reported	1 (2.3)
Sexual Orientation	
Straight/Heterosexual	39 (90.7)
Lesbian/Gay	2 (4.7)
Bisexual	2 (4.7)
Marital Status	
Married	23 (53.5)
In a committed relationship	9 (20.9)
Never married	9 (20.9)
Separated	1 (2.3)
Divorced	1 (2.3)
History of Depression	
No	25 (58.1)
Yes	18 (41.9)
Mental Health Treatment Status	
No	29 (67.4)
Yes	14 (32.6)
Suicide Attempt History	
No attempts	39 (90.7)
One attempt	4 (9.3)

Table 2

Practice Information for Focus Group Participants

Demographic	Mean (SD)
Gross Revenue (*N*=19)[a]	$1,864,157.89 ($2,419,927.60)
Weekly Work Hours	48.77 (13.12)

Demographic	*n* (%)
Years Practicing	
1-4 years	16 (37.2)
5-9 years	11 (25.6)
10-19 years	13 (30.2)
20-29 years	3 (7.0)
Specialty	
Small animal	12 (27.9)
Large animal	3 (7.0)
Equine	7 (16.3)
Mixed animal	12 (27.9)
Academia	4 (9.3)
Laboratory animal	1 (2.3)
Regulatory	1 (2.3)
Government	1 (2.3)
Other	2 (4.7)
Practice Type	
Single doctor	1 (2.3)
Ambulatory	14 (32.6)
Multi-doctor	10 (23.3)
24-hour	8 (18.6)
Other	10 (23.3)
Solo veterinarian	
Yes	5 (11.6)
No	38 (88.4)
Geographic Location	
Urban	5 (11.6)
Suburban	17 (39.5)
Rural	19 (44.2)
Other	2 (4.7)

[a] *N* represents participants who knew their gross practice income.

Table 3

*Workplace Pentobarbital and Firearm Storage Methods from Qualtrics Survey (*N = *43)*

Storage Method [a]	Pentobarbital	Workplace Firearms
	n (%)	*n* (%)
Locked at all times, except when in use		
In a cabinet	29 (67.4)	2 (4.7)
In a vehicle	5 (11.6)	2 (4.7)
In a lockbox in a vehicle	8 (18.6)	0 (0.0)
Unlocked during business hours & locked when practice is closed		
In a cabinet	6 (14.0)	0 (0.0)
In a vehicle	1 (2.3)	0 (0.0)
In a lockbox	2 (4.7)	0 (0.0)
Unlocked		
In a cabinet	2 (4.7)	2 (4.7)
In a vehicle	2 (4.7)	0 (0.0)
In a lockbox in a vehicle	3 (7.0)	0 (0.0)
Other (cabinet in pharmacy, locked safe, Cubex, locked VetBox, gun safe, at home when not performing euthanasia)	5 (11.6)	1 (2.3)
Least secure storage method reported by each participant	Pentobarbital	Workplace Firearms
	n (%)	*n* (%)
Locked at all times except when in use	28 (65.1)	3 (7.0)
Unlocked during business hours, locked when practice is closed	7 (16.3)	0 (0.0)
Unlocked	6 (14.0)	2 (4.7)
Unknown	0 (0.0)	1 (2.3)
No pentobarbital/firearms in practice	2 (4.7)	37 (86.0)

[a] Participants could choose more than one storage method; numbers will not add up to 100%.

Table 4

*Personal Firearm Storage Methods (*N = *43).*

Storage Method [a]	Personal Firearms
	n (%)
No personal firearms	24 (55.8)
Locked in a location, unloaded	
In a safe or lockbox	3 (7.0)
With a combination lock	1 (2.3)
With a key lock	5 (11.6)
In a vehicle	1 (2.3)
Locked in a location, loaded	
In a safe or lockbox	0 (0.0)
With a combination lock	0 (0.0)
With a key lock	0 (0.0)
In a vehicle	2 (4.7)
Unlocked	
Unloaded	8 (18.6)
Loaded	4 (9.3)
Least secure storage method reported by each participant	
No personal firearms	24 (55.8)
Locked in a location, unloaded	7 (16.3)
Locked in a location, loaded	0 (0.0)
Unlocked and unloaded	8 (18.6)
Unlocked and loaded	4 (9.3)

[a] Participants could choose more than one storage method; numbers will not add up to 100%.

Table 5

Focus Group Participants' Perceptions of Factors that Contribute to Suicide Among Veterinarians

Subtheme	Child subtheme	Description
Work-life balance / overwhelmed		Veterinarian mental health is negatively impacted by a lack of work-life balance and feeling overwhelmed by work hours, feeling overwhelmed by the profession in general, compassion fatigue, etc.
Ease of access to pentobarbital		Current suicide risk is because of easy access to means for suicide. This can also include when pentobarbital is accessible because of euthanasia prep
	Excess pentobarbital results in easy access to pentobarbital	A current problem is that veterinarians often have a surplus of drugs in the workplace or can purchase extra pentobarbital with a DEA license
	Working alone results in easy access to pentobarbital	It is easy for veterinarians to access pentobarbital when they are alone at the practice or are solo vets
Euthanasia experience		Veterinarians are at high risk for suicide because they have experience with euthanasia. This could also be due to euthanasia seeming peaceful because of experience talking to clients about it
Lack of appreciation		Lack of appreciation from different individuals is detrimental to veterinarian mental health
	Lack of appreciation as doctors / essential workers	Veterinarians are not appreciated as equal to physicians and are not seen as "essential workers," and this is detrimental to mental health. This has occurred recently due to the COVID-19 pandemic, where hospitals utilized PPE from veterinarians, but veterinarians were not given priority for the COVID-19 vaccine
	Lack of appreciation from clients	Lack of appreciation from clients is detrimental to mental health. This can include resistance to paying, rudeness, and backlash on social media
	Lack of appreciation from employers	Lack of appreciation from employers is detrimental to mental health

(Cont.)

Subtheme	Child subtheme	Description
Veterinarians are hard on themselves		Current suicide risk comes from veterinarians being hard on themselves or being perfectionists, "type A"
Financial debt		Current mental health issues come from the burden of financial debt
Feeling stuck within profession		Participant discusses feeling distress because they feel unable to shift from whatever they started in (specialty or field), despite stressors. They feel they dedicated too much time, effort, and money to becoming a veterinarian, feel as though they would be looked down upon, etc.

Table 6

Possible Solutions and Barriers to Improving Veterinarians' Mental Health Identified by Focus Group Participants

Subtheme	Child subtheme	Grandchild subtheme	Description
Possible ways to improve veterinarian mental health			Statement discusses possible ways to improve mental health outcomes for veterinarians which do NOT concern euthanasia storage.
	Normalize mental health		Normalizing mental health and seeking mental health services would help improve veterinarian mental health.
	Increase organizational support for mental health		State, company, professional, or practice owner support is necessary and needs to be more prevalent. This could be helping veterinarians navigate disputes with clients, additional trainings in how to cope with mental health struggles, etc. This also includes organizations disseminating information educating clients about why veterinarians do what they do and why things cost what they do.
		Additional trainings in mental health and suicide	Additional training in coping with mental health and suicidality, suicide risk for veterinarians, communication with co-workers or clients about mental health, etc. has been or would be helpful in improving mental health for veterinarians.
	Mental health signage		Participant has put up a sticker or sign in their workplace, has seen a sign in their workplace, or would be willing to put up a sign in their workplace with positive messages or the suicide hotline to try to prevent suicide and other mental health issues.
	Support system		Having a support system can improve veterinarian mental health. This could include a personal support system (e.g. family), or a professional support system (e.g. other veterinarians).
	Increase mental healthcare access		Veterinary schools and/or practices should try to increase mental healthcare access from trained professionals, preferably who have experience working with veterinarians, in order to improve veterinarian mental health.

(Cont.)

Subtheme	Child subtheme	Grandchild subtheme	Description
Barriers to improving veterinarian mental health			Statement discusses barriers to improving mental health for veterinarians.
	Changing veterinarian culture surrounding mental health is difficult		Statement discusses the idea that improving mental health would be difficult in the veterinarian community because it would require the entire culture to change in order to move towards this goal.
	Veterinarians do not find improving mental health necessary or do not discuss mental health		A barrier to improving mental health in the veterinary community is that veterinarians don't think mental health is important, don't think working to improve mental health within the profession is necessary, or do not discuss mental health.

Table 7

Current Clinic Protocols for Pentobarbital Storage Identified by Focus Group Respondents

Subtheme	Child subtheme	Description
CUBEX as current protocol		Statement discusses CUBEX or similar storage system.
	CUBEX has effective security	Workplace has CUBEX and participant thinks it is effective because it increases steps and difficulty for accessing controlled substances.
	CUBEX is not perfect	Statement discusses that the CUBEX is flawed in some way for preventing easy access to suicide means.
Drug Logs as current protocol		Statement discusses drug logging.
	Checking drug logs is effective	Employees (e.g. owner, veterinarians) currently regularly check drug logs, participant thinks this is effective for making sure veterinarians do not take additional drugs to potentially use for themselves.
	Drug logs could be falsified	Current problem is that drug logs could be falsified (e.g. someone could take more pentobarbital than written down, veterinarians often take slightly more than necessary for a euthanasia, etc.) and so a veterinarian could take out a little extra pentobarbital each time they prep a euthanasia to prepare for suicide.
	Ineffective drug logging system	Current problem is that no one checks the drug logs or the drug logging system is otherwise ineffective.
Multiple locks as current protocol		Euthanasia storage already has multiple locks on it and is kept locked except when in use.

Table 8

Additional Implementable Pentobarbital Storage Protocols and Relevant Barriers

Subtheme	Child subtheme	Grandchild subtheme	Description
Extra lockbox / lock implementability / barriers			Statement discusses adding an extra lockbox or lock to pentobarbital storage as a protocol that could be implemented in their workplace.
	Extra lockbox / lock is an additional implementable protocol		Statement discusses that participant would be willing to add an additional lockbox for euthanasia means.
	Physical space as a barrier to acquiring an additional lockbox		Statement discusses that it would take too much effort to access a separate lockbox or second lock for pentobarbital or there is not enough room to store a second lockbox.
Increased time for access implementability / barriers			Statement discusses generally increasing time for access as a new protocol. This could be through a time lapse lock, needing to call a number to unlock the pentobarbital, etc.
	Increasing time for pentobarbital access is an additional implementable protocol		Participant would be willing to implement additional safeguards that would increase time necessary to access euthanasia means.
	Increased time for access may result in animal suffering		Statement discusses that increasing the time for someone to access euthanasia means could result in additional suffering for animals.

(Cont.)

Subtheme	Child subtheme	Grandchild subtheme	Description
Needing two people to access pentobarbital implement ability / barriers			Statement discusses feasibility and barriers to requiring two people to access pentobarbital.
	Needing two people to access pentobarbital is an additional implementable protocol		Needing two people to open lockbox would be feasible for the participant in their current workplace.
	Two people not always available		Statement discusses that an additional safeguard requiring multiple people to open storage would not work in their workplace because two people are not always available or at the practice. This may be because the person is a solo vet, because it is cost prohibitive, or because sometimes only one vet is at the practice after hours.
Calling a phone number to access pentobarbital is an additional implementable protocol			Participant would be willing to call a phone number or otherwise contact a second party in order to access euthanasia means.
CUBEX implementability / barriers			Statement discusses CUBEX or similar system as a protocol that could be implemented in their workplace.
	CUBEX is an additional implementable protocol		Participant would be willing to get a CUBEX in their workplace.
	Barriers to acquiring a CUBEX		Statement discusses barriers to adding a CUBEX to their workplace.
		Financial cost as a barrier to acquiring a CUBEX	Statement mentions that veterinarian's practice could not afford a CUBEX financially.
		Physical space as a barrier to acquiring a CUBEX	Statement mentions that veterinarian does not have physical space for a CUBEX.

(Cont.)

Subtheme	Child subtheme	Grandchild subtheme	Description
Intrathecal lidocaine is an additional implementable protocol			Statement discusses using intrathecal lidocaine for euthanasia as a new protocol because it would not be usable for suicide.

Table 9

Additional Implementable Protocols Reported in Response to "After attending the focus group, what additional storage procedures do you think would be reasonable to implement in your practice?"

Title	Description	*N* (%) [a]	Specialty types
Extra lockbox / lock	Statement discusses that participant would be willing to add an additional lockbox for euthanasia means.	21 (48.8)	Small, mixed, large animal, other
None	Participant noted that they would not change anything or did not answer this question	12 (27.9)	Small, mixed, large animal, other
Needing two people to access pentobarbital	Needing two people to open lockbox would be feasible for the participant in their current workplace.	4 (9.3)	Small
CUBEX	Participant would be willing to get a CUBEX to protect against suicide in their workplace.	3 (7.0)	Small animal, other
Increase compliance with existing security procedures	Participant would be willing to increase compliance with existing security protocols (e.g., increasing locked drawer compliance)	3 (7.0)	Mixed, large animal
Other	Participant notes another protocol they would be willing to implement, which was not discussed in the focus group or did not reach thematic significance. These included additional security on keys, adding a video camera above pentobarbital storage	2 (4.7)	Small animal, other
Increasing time for pentobarbital access	Participant would be willing to implement additional safeguards such as a time lapse lock that would increase time necessary to access euthanasia means.	2 (4.7)	Large animal
Unsure but willing to make changes	Participant noted that they would be willing to change their current storage practices but were unsure of what would work in their practice	1 (2.3)	Mixed animal
Mental health signage	Participant would be willing to put up a sign in their workplace with positive messages or the suicide hotline to try to prevent suicide and other mental health issues. Although this emerged within "Possible ways to improve veterinarian mental health" in the focus group discussion, it was noted in response to this open-ended question by one participant.	0 (0.0)	None

(Cont.)

Title	Description	*N* (%) [a]	Specialty types
Calling a phone number to access pentobarbital	Participant would be willing to call a phone number or otherwise contact a second party in order to access euthanasia means.	0 (0.0)	None
Intrathecal lidocaine	Statement discusses using Intrathecal Lidocaine for euthanasia as a new protocol because it would not be usable for suicide.	0 (0.0)	None

[a] Participants could choose more than one storage method; numbers will not add up to 100%.

Table 10

General Barriers to Changing Protocols

Subtheme	Child subtheme	Description
Changing protocols won't prevent suicide		Participant discusses that they don't think changing storage protocols will help.
	Checking drug logs won't stop suicide	Statement notes that checking drug logs may not stop suicide because if someone makes the decision to attempt suicide, checking the drug logs after the fact will not prevent the suicide attempt.
Means substitution		Statement discusses that it will not help to change protocols because veterinarians will just utilize a different means for suicide.
Too much effort		Additional storage methods result in an unnecessary amount of effort to implement and access such that they would not be willing to change storage methods.
Legal obstacles		Statement discusses that because state laws differ, some solutions would not be feasible in some states (e.g. some states require veterinarians to each have their own storage for controlled substances, so they cannot use a CUBEX as a communal storage method).

Table 11

Paired Sample T-Test for Willingness to Change Storage Method

Question	*N*	Mean(SD) pre	Mean(SD) post	*t*	df	*p*	*d*
How willing would you be to use additional locking mechanisms (e.g. combination lock) for pentobarbital in your workplace?	41[a]	64.51(24.98)	74.27(26.46)	2.36	40	.02	0.37
How willing would you be to use additional locking mechanisms (e.g. combination lock) for firearms in your workplace?	4[b]	76.00(18.18)	64.50(9.71)	-1.47	3	.23	-0.74
How willing would you be to store your personal firearms more securely in the future?)	17[c]	73.29(32.01)	74.65(24.54)	0.17	16	.86	0.04

Note. Participants were only administered these questions if they reported access to the method in question. (e.g., only personal firearm owners were asked about willingness to change for personal firearms). They additionally had the option not to answer.

[a] Out of 41 administered this question

[b] Out of 6 administered this question

[c] Out of 19 asked this question

Table 12

Frequencies of Reasons to Change Storage Methods

Reason to Change [a]	Pentobarb. Pre	Pentobarb. Post	Work Firearms Pre	Work Firearms Post	Pers. Firearms Pre	Pers. Firearms Post
	N (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)
Concern about my own suicide risk	11.6(5)	20.9(9)	0	2.3(1)	7.0(3)	9.3(4)
Concern about a coworker's suicide risk	48.8(21)	74.4(32)	2.3(1)	11.6(5)	N/A	N/A
Concern about theft	72.1(31)	69.8(30)	9.3(4)	9.3(4)	27.9(12)	37.2(16)
Concern about following DEA regulations	72.1(31)	60.5(26)	4.7(2)	2.3(1)	N/A	N/A
Other	9.3(4)	4.7(2)	2.3(1)	0	0	0
Concern about a family member's suicide risk	N/A	N/A	N/A	N/A	18.6(8)	32.6(14)
Concern about someone else's suicide risk (unspecified)	N/A	N/A	N/A	N/A	0	7.0(3)
Concern about accidental injury	N/A	N/A	N/A	N/A	39.5(17)	37.2(16)
None	0	0	0	0	2.3(1)	0

Note. Participants could choose more than one reason; numbers will not add up to 100%.

Table 13

McNemar Tests for Reasons to Change Storage Methods

Reason		McNemar Test			
		Post-test			
Pentobarbital	Pre-test	No	Yes	Total at pre-test	*p*
Concern about own suicide risk	No	32	6	38	.289
	Yes	2	3	5	
	Total at post-test	34	9	43	
Concern about coworker's suicide risk	No	9	13	22	.007
	Yes	2	19	21	
	Total at post-test	11	32	43	
Concern about theft	No	6	6	12	1.000
	Yes	7	24	31	
	Total at post-test	13	30	43	
Concern about following DEA regulations	No	8	4	12	.267
	Yes	9	22	31	
	Total at post-test	17	26	43	
Other	No	37	2	39	.687
	Yes	4	0	4	
	Total at post-test	41	2	43	
Workplace Firearms		No	Yes	Total at pre-test	*p*
Concern about own suicide risk	No	42	1	43	N/A[a]
	Yes	0	0	0	
	Total at post-test	42	1	43	
Concern about coworker's suicide risk	No	38	4	42	.125
	Yes	0	1	1	
	Total at post-test	38	5	43	
Concern about theft	No	39	0	39	1.000
	Yes	0	4	4	
	Total at post-test	39	4	43	
Concern about following DEA regulations	No	41	0	41	1.000
	Yes	1	1	2	
	Total at post-test	42	1	43	

(Cont.)

Workplace Firearms		No	Yes	Total at pre-test	*p*
Other	No	42	0	42	N/A[a]
	Yes	1	0	1	
	Total at post-test	43	0	43	
Personal Firearms		No	Yes	Total at pre-test	*p*
Concern about my own suicide risk	No	37	3	40	1.000
	Yes	2	1	3	
	Total at post-test	39	4	43	
Concern about a family member's suicide risk	No	28	8	36	.039
	Yes	1	6	7	
	Total at post-test	29	14	43	
Concern about someone else's suicide risk (unspecified)	No	40	3	43	N/A[a]
	Yes	0	0	0	
	Total at post-test	40	3	43	
Concern about theft	No	25	6	31	.289
	Yes	2	10	12	
	Total at post-test	27	16	43	
Concern about accidental injury	No	23	3	26	1.000
	Yes	4	13	17	
	Total at post-test	27	16	43	
None	No	42	0	42	N/A[a]
	Yes	1	0	1	
	Total at post-test	43	0	43	

[a] If the number of participants who selected "Yes" or "No" at one timepoint equals 0, *p* value cannot be calculated.

Figure 1

Study Flow