

Wyoming Rabies Control:
Using 2016 Animal Bite Data to prevent rabies transmission in Wyoming
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Abstract:

Rabies is a viral disease affecting more than 60,000 people in the United States of America (USA) annually. If a victim does not receive post-exposure prophylaxis (PEP) before the onset of rabies symptoms, it is nearly universally fatal in humans (WHO, 2018). This viral disease is commonly spread through the saliva of infected animals during a bite to another organism (Signs, 2011). Statewide surveillance of animal bites, both domestic and wild, is necessary to reduce rabies transmission. This study was conducted to assist the Wyoming Health Department (WHD) with rabies intervention efforts by entering animal bite data from January through June of 2016 and analyzing trends. A descriptive analysis of the data shows that the majority of reported bite cases are from vaccinated domestic animals; and roughly 60% of all reported cases result in an adult victim. Although, some civilians reported animal bites, the majority of the origin of animal-to-human bite incident reports are received from animal control or healthcare providers. This could account for the bias in the severity of the bites that are reported. Of all the cases the WHD received roughly 70% are not receiving PEP due to the low risk factors. Animal bites are a reportable condition in Wyoming, but only some entities and counties are submitting reports to the WHD. A consistent reporting system is needed to better protect the state and education programs need to be increased to better enable the public to be prepared for animal bites and animal interactions.

Background Information:

Rabies virus

In the United States of America (USA) there is a dog bite rate of 103-118 per 100,000 people (Ellis & Ellis, 2014). In the USA dog bites alone account for roughly 1% of all injury related emergency room visits. There are between 10 and 20 deaths annually related to animal bites in the USA, many of the deaths being from infection. When it comes to animal bites infection is the common worry and one of the main infections that is brought up with animal bites is Rabies. There have been 6,000 to 7,000 documented cases per year of rabies in animals in the United States and Puerto Rico over the past 10 years.

The pre-mosaic Eshmun Code of Babylon was the first documentation of rabies (Singh et al., 2017). It wasn't until 1880 that the cause of the disease was discovered. Pasteur found that the disease was caused by a negative sense, single-stranded RNA virus in the family *Rhabdoviridae*, genus *Lyssavirus*, and the order *Mononegavirales*. The rabies virus is able to infect all warm-blooded animals (Wilson & Rohde, n.d.). This virus has multiple genomes, all progressing differently, but all are able to infect humans and cause disease (Singh et al., 2017). In humans, there is an almost 100% fatality rate if the clinical symptoms start to develop (Digafe, Kifelew, & Mechesso, 2015).

Saliva, brain tissue, and nervous system tissue are considered infective while blood, while urine, and feces are not infective and therefore cannot pass on Rabies to other organisms (Ellis & Ellis, 2014). Rabies infection is spread between organisms when infective material from an infected animal comes into contact with broken skin or mucosal membranes of a susceptible host (Digafe, Kifelew, & Mechesso, 2015). At the initial bite/entry site for the virus, it will multiply and can be stopped at this point with the use of wound care and rabies prophylaxis (Wilson & Rohde, n.d.). From the initial contamination the virus moves rapidly into the peripheral nervous

system (Manning et al., 2008). The virus uses the nervous system as a highway to move through the body to the brain and cause an encephalomyelitis in the victim. From the brain the virus can spread into the salivary glands making it so that the organism can pass the virus on to a different organism (Wilson & Rohde, n.d.). In humans, the process of progression from initial bite to death can take anywhere from days to years depending on the placement and severity of the bite. The virus cannot penetrate through intact skin and the rabies virus is inactivated rapidly by ultraviolet light, dehydration, and does not persist in the environment for long; therefore, contact with the environment around a rabid animal such as with any bedding or water bowls does not present a risk to humans (Minnesota Department of Health, 2019.). Due to the low levels of the virus available to be sampled in the saliva and cerebrospinal fluid the diagnosis of rabies directly after a bite is very difficult (Singh et al., 2017).

Rabies Prophylaxis

According to studies there needs to be 70% coverage of animal vaccines in order to properly protect the human population from rabies (Zinsstag et al., 2009). This coverage rate helps to interrupt the transmission between animals and humans for at least 6 years. This rate of coverage of domestic animals would interrupt the transmission and keep the rabies primarily in the wild animals rather than coming into the domestic animal population.

In Wyoming, pet owners are encouraged to vaccinate all domestic animals. The problem is the requirements of vaccination differ for each city with the rules being made by the municipalities and the county governments rather than by the state government (Animal damage management board (ADMB), n.d.).

There is a post-exposure prophylaxis (PEP) that can be administered to humans who have been bit by a suspected rabid animal. It is very effective in preventing the disease if it is administered before the virus makes it into the nervous system (Wilson & Rohde, n.d.). PEP is a

series of 4 1.0 mL rabies vaccines given on days 0 (first day of treatment), 3, 7, and 14 of treatment (Minnesota Department of Health, n.d.). If the victim of the bite is immunocompromised, they will receive a fifth shot on day 28 to combat the virus. Along with receiving PEP victims will receive a 20 IU/kg body weight dose of Human rabies immune globulin (HRIG) on day 0 to help the immune system. These vaccination requirements change for people who have received PEP previously, have been vaccinated for rabies with the pre-exposure prophylaxis, or are immunocompromised in anyway. When someone is recommended to receive PEP by the state health department and the physician the dosage volume, frequency, and amounts are looked at on an individual basis.

These PEP and HRIG recommendations are effective in increasing the survival rate precipitously. The treatment has been found to be biologically safe to people and rarely has side effects when used properly (Wilson & Rohde, n.d.). The cost is the main limiting factor for many people to get the treatment needed. In 2004 USD the costs were monumental, a dose of HRIG costing between \$326 and \$1,434 depending on the dosage amount that the person needs. A single dose of PEP costing between \$113 and \$624 depending on the type and availability of the vaccine (Manning et al., 2008). These costs do not include any hospital or doctor costs that might also go along with the bite injury. This means that for a single treatment of PEP can cost between \$778 and \$3,930 depending on the factors spoke about above.

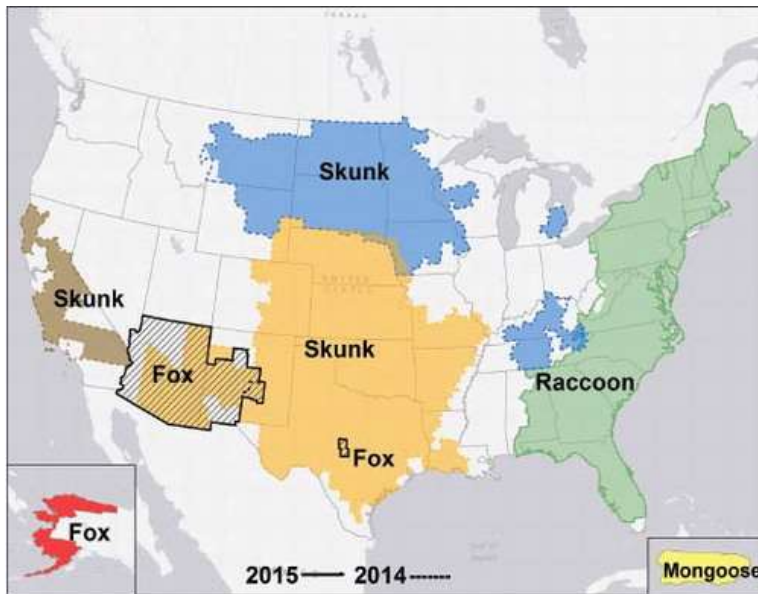
Worldwide rabies management

In many parts of the world canines are the primary source of rabies transmission (WHO, 2018). Globally, rabies is the tenth leading cause of death due to infection in humans (Weltgesundheitsorganisation, 2007) but only about 1% of deaths occur in the developed world (WHO, 2018). One of the reasons the developed world has such low death rates compared to the rest of the world is the availability of healthcare infrastructure (CDC - Centers for Disease Control

and Prevention, n.d.). This means the people who are infected with rabies may not have the ability to get to a health professional to receive the necessary treatment (Digafe, Kifelew, & Mechesso, 2015). Another common issue when it comes to global trends is that there is an underreporting of rabid animals and people are unaware that they are at risk of rabies in the first place (Zinsstag et al., 2009). If they are unaware of the problems that can occur, they will be less likely to go to a health professional to get the recommended treatments. With the unknown risks of rabies, the domestic animal vaccination campaigns are not utilized due to a thought that the risk is lower. This can enable people to come into contact with the disease because there is a general lack of knowledge. A final issue for much of the world is the costs of treatment (Manning et al., 2008). In many parts of the world people cannot afford these costs and therefore will die of a preventable disease.

US rabies management

In the USA there has been mass vaccination efforts for all domestic animals helping to eliminate domestic animal strains of rabies from being the predominant form of rabies circulating throughout the country. The wild animal strains are the common rabies strains in North America (Birhane et al., 2017). These strains are commonly found in certain areas as represented in the map below but can be spread easily around the country.



Map 1: A map showing the different animal strains of rabies that are common in different areas of the USA.

Domestic animals commonly cause bite wounds to humans though these wounds are generally minor lesions that people do not seek medical attention for (Philipsen, Molderez, & Gys, 2006). In the USA, cats are the most common infected domestic animal with rabies, but the majority of rabid animals are wild animals such as skunks, raccoons, and bats. When an animal is infected with rabies, they will show signs of abnormal behavior, ataxia, paralysis, seizures, and/or altered vocalizations (Ellis & Ellis, 2014).

In 2008, 16,000-39,000 American's had potential to come into contact with rabid animals (Manning et al., 2008). The risk of contracting rabies in the USA can be avoided with the use PEP or vaccination of animals and proper management protocols from the bite victim (Digafe, Kifelew, & Mechesso, 2015). In the USA when an animal bites a human the animal is taken into a quarantine in order to establish if the animal has rabies (WHO, 2018). The quarantine is necessary because

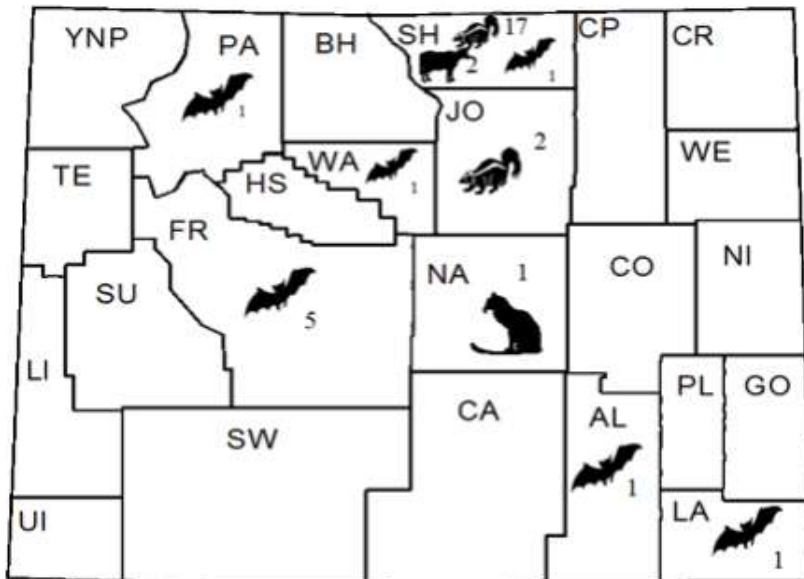
the animal can only transmit the rabies via a bite if the virus has made it to the salivary glands. Once the virus is in the salivary glands obvious clinical symptoms will develop within 4 or 5 days (Minnesota Department of Health, n.d.). If the animal develops rabies during the 10-day quarantine period, it will most likely perish on its own and the person treated for rabies with PEP. If the animal does not develop any signs or symptoms of rabies during the 10 days the animal is free to go, and the person is not at risk of developing rabies at that time. If the animal cannot be observed or tested for rabies it is assumed that animal has rabies and the preventative measures should be taken (Mayo Clinic, 2019).

Wyoming Rabies

Wyoming has recently been in the headlines for rabies. In 2015 a woman found a bat in her hair when she awoke but did not find any evidence that she was bit by the bat and therefore did not go to get PEP (Birhane et al., 2017). During late September the woman went into the doctor for increasing muscle weakness and her condition deteriorated quickly from there. In early October the woman passed away and it was found that she had a rabies virus that is associated with silver-haired bats. This woman was unaware of the risks that bat encounters had. This is a common issue throughout the state (Cote et al., 2018). In 2017 there was a mass bat exposure in Yellowstone National park, during this exposure there were 20 people who were sleeping in a research facility and encountered bats. Luckily none of these individuals developed rabies but not all of them got the PEP due to different reasoning's.

In Wyoming, the rabies virus has been found in bats, cats, cows, dogs, foxes, horses, squirrels, and skunks since 2000 (Miller, 2017). These animals are spread throughout the state as can be seen in the map below. This map shows the positive rabies cases in Wyoming for the year 2016 (Wyoming Animal Management Board, 2018). In 2016 there were 32 cases of rabies that were reported to the state ("Year End Table Final", 2017). Most of the cases are of wild animals

and therefore have little contact with humans. Although there is little contact to humans these animals will act differently and may come into contact with other animals and potentially those animals in close proximity to humans. Throughout the state, animal bites and rabies are both reportable conditions meaning that healthcare professionals and laboratories must report these conditions to the state Health Department (Wyoming Department of Health, 2019).



Map 2: This map shows the distribution of animals tested positive for the rabies virus in 2016 by the State Vet lab of Wyoming. The animals are split by county and species.
(Miller, 2017)

Importance

Rabies in both humans and animals has been a notifiable condition in all of the USA since 1944 and this is the best way to know the movement of the virus throughout the country (Birhane

et al., 2017). Since this time the wildlife services department (WSD) have been working to control rabies. One of the best ways to control for rabies is to monitor bite or other human contact with animals to understand the rabies risks in areas. Once the risks are found the WSD will vaccinate the animals that there are vaccines for or decrease the population of those animals. Surveillance is not only for the WSD to assess risks that are associated with rabies but also for point of care treatment for animal bites. This study was conducted to assist the Wyoming Health Department (WHD) with rabies intervention efforts by entering animal bite report data from 2016 and analyzing trends.

Methods

For this paper I used bite report data collected by the Wyoming Department of Health – Public Health (WHD) from 2016. This data was collected by the reports made to the WHD from across the state. As shown in the diagram below, animal bite reports are sent in from the victim, from animal control officers, or from health professionals. These reports are taken in by the WHD, read through and the data is extracted to be put into EpiInfo. After the data has been put into EpiInfo the data can be analyzed and trends can be found.



Diagram 1: Process to get the data. The bite victim can go to a health professional or animal control officer. These two entities must report animal bites to the Wyoming Health Department (WHD) (Wyoming Department of Health, 2019). The victim can submit a report directly to the WHD if they would like as well.

Descriptive Analysis of Animal to Human Bites

There were a total of 285 reports entered for the time period of January through June of 2016 that made up the data set. Most of the reports were complete although some characteristics and data sets have a lower total report number due to missing data.

Origin of animal-to-human bite data by county and source

It was found that 78.29% (220 of 281) of reports came from 5 counties (Natrona, 32.74%; Campbell, 21.71%; Laramie, 11.03%; Albany 7.83%; and Sheridan, 4.98%) and these 5 counties account for 50.48% of the population of the state (Natrona, 13.83%; Campbell, 7.95%; Laramie 16.94%; Albany, 6.57%; and Sheridan, 5.19%) as seen in Figure 1. The remaining 18 counties

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make up the other 21.71% (n=62) of the reports that come into the Wyoming Health Department with some counties not submitting any reports for this time period.

When looking at the initial source of the report as shown in figure 2, 187 of the 284 reports (65.85%) are from animal control officers, 70 (24.65%) are from healthcare providers, 22 (7.75%) are from a combination of healthcare providers and animal control officers, while only 5 (1.76%) are from bite victims.

Offending Animal Characteristics

Domestic animals constituted 93.68% (267 of 285) of the reports that were submitted for 2016. Dogs account for most of the animal bite reports, 75.79% (n=216), with cats accounting for 17.89% (n=51) as shown in table 11. Wild animals make up 2.10% (n=6) of the reports that come in with bats, raccoons, and other animals each accounting for 0.70% (n=2) of the total reports. 4.21% (n=12) of the reports are from unknown animals.

Of the dog bites 72.69% (157 of 216) have data on the breed of the dog as shown in table 12. Pit bulls were reported the most with 21.02% (33 of 157) with lab mixes accounting for 6.37% (n=10) and labs, German shepherds, and terriers each accounting for 5.73% (n=9) of the reports with dog breed data. There were 36 other breed types that were reported but all accounted for less than 5% of the dog bites that were reported.

Bite Location Characteristics

Most of the bites happened when the victim was on the owner's property (114 of 294; 38.78%) with the next amount being unknown (61 reports; 20.75%) as shown in table 3. The least amount of bites happened when the victim is at an animal shelter accounting for only 3.74% of bites (n=11). Table 4 shows that most of the bites happen when the victim is touching the animal (70 of 237; 29.5%) with approaching the animal being the next leading specific of the victim (n=51; 21.5%) while the least is when the victim is hurting the animal (n=2; 0.84%). When looking

at table 5 it can be seen that most of the bites occur when the animal is running at large (84 of 140; 60%) while there was only 1 report that had the animal being tied to something (0.71%). Less than 50% (140 of 285) of the reports had this data in the first place with there being some unknowns in the dataset as well. When looking at the owner of the dog 45.11% (106 of 235) of the time the owner is present during the bite incident as shown in table 6. The victim was bit by their own pet 22.13% of the time (54 of 244) as can be seen in table 7.

Rabies Prophylaxis

The incident reports indicated that 149 of the 285 (52.28%) reports bites were from vaccinated animals as shown in table 1. 17 (5.96%) of the reported bites were from unvaccinated animals, 100 (35.09%) were from animals with unknown vaccination status, and 19 (6.67%) were from previously vaccinated animals. When looking at table 2, the vaccination rates of just domestic animals showed that 149 of the 267 (55.81%) reported bites were from vaccinated animals, 84 (31.46%) were from unknown vaccinated animals, 19 (7.12%) were from previously vaccinated animals, and 15 (5.62%) were from unvaccinated animals.

Very few people in Wyoming are known to receive PEP according to the reports given to the Health Department and shown in table 13. Only 2.11% (6 of 285) of the victims received PEP according to the reports. There is a large amount, 22.46% (n=64) that are unknown and may receive PEP at a later time but the majority, 75.44% (n=215) of the victims do not receive PEP after the animal bite.

Human Descriptive Characteristics

The gender of the victims was split relatively evenly with 44.37% (126 of 284) reported bites among male victims and 45.78% (n=130) of reported bites being from female victims as shown in figure 4. The other 9.86% (n=28) of the reports had unknown genders for the victim. The maturity of the victims was not evenly distributed with 61.89% (164 of 265) reports being adults

(ages 19-64) as shown in table 8. Children (age 1-11) accounted for 22.64% (n=60) and elderly adults (age 65+) accounted for 7.92% (n=21) reports. When looking at the age breakdown in figure 5, rather than the maturity breakdown 30.18% (n=80) of the reports that came in were for victims under the age of 21.

The circumstances around the reason for the bite were looked in figure 3 and show that 108 (37.7%) of the 268 bite reports for all animal species were due to Provoked bites. 97 (33.92%) of the bites were due to an unprovoked bite, 48 (16.78%) of the 286 reports were due to a bite but provocation is unknown, while 31 (10.84%) reports had completely unknown bite instances. 2 (00.70%) of the victims had contact with animals but not bites.

When it comes to the location of the victim's bite injury, 48.29% (141 of 292) reports indicated that the injury was to the victims upper extremity, and lower extremities made up 22.26% (n=65) of the reports as shown in table 9. Injuries to the upper body were the least numerous accounting for only 2.4% (n=7). Low severity, bites that only leave bruising and scratches, were the least reported accounting for 7.53% (21 of 279) of the reports as shown in table 10. High severity, bites that had multiple puncture wounds and usually require sutures, accounted for 41.58% (n=116) and medium severity, bites that had at least one puncture wound or bite mark but do not commonly need suturing, accounted for 37.28% (n=104) of the bites. The remaining 13.62% (n=38) of the reports had unknown severity of the bites.

Discussion

Incident reports provide one of the several ways to acquire information on rabies risks and transmission in Wyoming. The risk of rabies transmission to humans in 2016 was low in Wyoming according to the bite report data that the Wyoming Department of Health was receiving. 93.68% of the bites are due to domestic animals. In the United States of America, the risk due to domestic

animals is low, but the vaccination rate of animals in Wyoming is not up to the threshold needed to properly protect humans from rabies. This means that the unvaccinated animals might be carrying the virus without people knowing. As Karl Musgrave, the state vet, said in an interview "After an animal bite or other form of potential exposure happens to a person, there is sometimes uncertainty about whether the involved animal was infected with rabies, especially if the animal isn't available for quarantine or testing," (RABIES PREVENTION REMAINS IMPORTANT IN WYOMING. 2015). If the animal were vaccinated, there would be no uncertainty in the risks associated with it. Wyoming is one of the states that has a lot of opportunity for domestic animals to come into contact with wild animals which would potentially put these animals at more risk of contracting rabies. Without having the domestic animals in the state up to the threshold level of vaccinations this is potentially putting the people who come into contact with domestic animals at risk for contracting rabies where they normally would be safe.

On top of the issue of under vaccination of animals there is also the issue of underreporting. This became apparent when the data was looked at and has been known in the Wyoming Health Department. The counties that are primarily reporting animal bites make up just over half the population. These counties are the ones with many of the large cities in the state making it so that these people could be encountering domestic animals more often but there is also the issue that other counties could be under reporting their incidents. Citizens are also under reporting the incidents. All animal bites are to be reported to the WHD but, as seen in the descriptive analysis, there is a disparity in the severity of bites. This is thought to be because there is a lack of citizen reports for incidents where the victim did not need medical attention. When looking at the data it suggests that almost all bite wounds are such that an individual would need to receive medical care although less severe bites, ones that would not require medical attention, are just as common if not

more common than severe bite (Morgan & Palmer 2007). There is also the idea that the person does not want the animal to be “in trouble” for causing the bite. This will encourage people to avoid reporting incidents that are not as severe.

Incomplete incident reports have led to potentially inaccurate assumptions about animal-to-human bite incident trends. Some of the data that was needed to know the risks that others could have in the area was missing in some of the reports. This makes it so that the trends could be inaccurate and lead those using the data to make incorrect new recommendations for the state. This lack of consistent data is due in part to the differences in the reports that are given. The animal control officers (ACO) send in a report in a different manner than healthcare providers which is still different from citizen reports. The differences in reports and the disparity in the data that is within the report happen throughout source types throughout the state. A healthcare provider from Park County might have a different report than a healthcare provider from Albany County. These different entities all report differently although there is a common report form that can be found on the WHD website.

As seen with the inconsistency of data there is a lack of knowledge about what the main risks are with rabies. Domestic animals are reported the most while encounters with wild animals are almost nonexistent. These encounters are where people are more likely to come into contact with rabies and are not often reported. Reports are primarily coming in from entities that must report the incident meaning that there are most likely more encounters with animals that are never reported. The lack of reports makes it so that there is a disparity in the ideas of those using the data and therefore in the preventative measures that must be taken in Wyoming.

Conclusions

Education of the general public on the risks associated with animal contact including the risks of rabies should be a priority for Wyoming when it comes to rabies management. In order to be a well-educated population that can properly protect themselves against rabies they need to know the basics of the disease. These basics include things like the symptoms to ensure that they can tell if an animal has rabies or not, the way that the disease is spread to enable them to know how to treat potential contacts with wild animals, and different prevention methods in order to protect the state as a whole. In increasing education for the state, the importance of domestic animal vaccinations needs to be emphasized. Pet vaccinations are the first line of defense for humans against the virus. If people are not getting their animal vaccinated due to an unknown need then this is creating an ability for people to be exposed to rabies.

In order to monitor rabies risks in the State of Wyoming and enable the health professionals to make educated decisions on the need for PEP a consistence reporting system is necessary. All animal incidents, not just bites, with domestic and wild animals need to be reported throughout the state. Although this will cause more work for the health department this will enable the state to see where people are encountering animals and the types of animals that people are coming into contact with. This can help to reduce the risks by enabling the state to target those animals with possible vaccinations as well as help to keep the health professionals up to date about rabies risks in the state. Although all counties should be reporting consistently this is not the case, not all counties are reporting consistently, 5 counties reported almost 80% of the incidents. There is currently nothing that can be done to make counties follow the reportable designation for the condition. This needs to be alleviated with the designation of a penalty for not following reporting designations in order to keep the data collected accurate. Not only do all encounters need to be reported but a common reporting system is needed. With multiple different entities filing reports

the data in each is different. With common information it is much easier to track and analyze data to be able to have a cohesive plan to keep the citizens of Wyoming safe.

The submission of animal-to-human bite incident reports are needed throughout Wyoming in order to better protect the general public of the state. Incident reports are one of the ways to monitor the risks that residents are being presented with and without consistent reports there could be inaccuracies in the management plans that are being made. Not only does submission matter for the reduction of animal-to-human rabies transmission risks, education also plays a role in this. To further reduce the risks to human's education on bite prevention and proper bite management is necessary to ensure that victims of animal bites are properly taking care of themselves. With consistent monitoring and education, the risks of rabies transmission can be further reduced for Wyoming residents.

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Figures

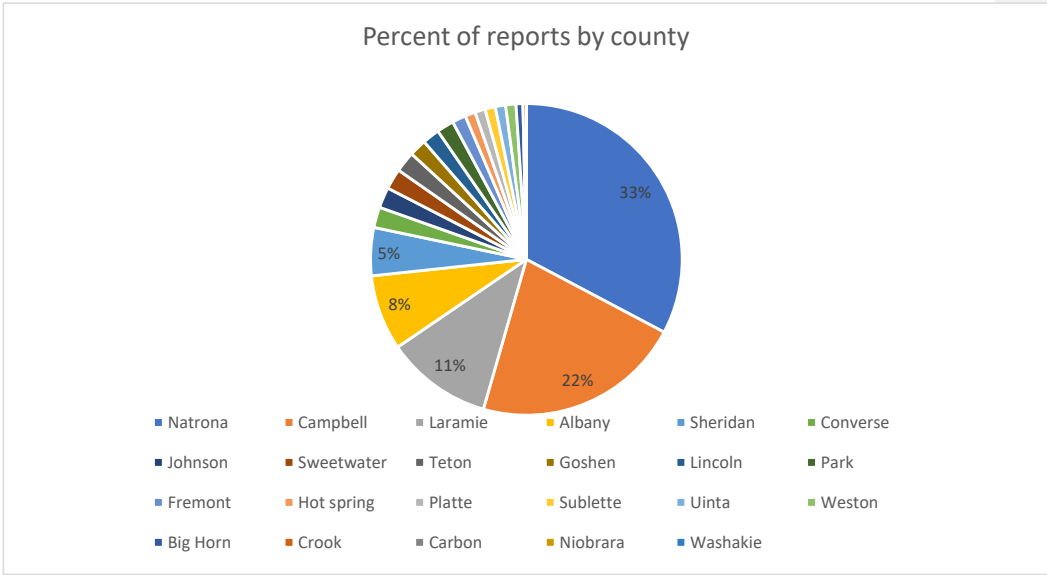


Figure 1: Percentages of reports by county. The top 5 counties account for roughly 80% of reports but only 50.5% of the population of Wyoming.

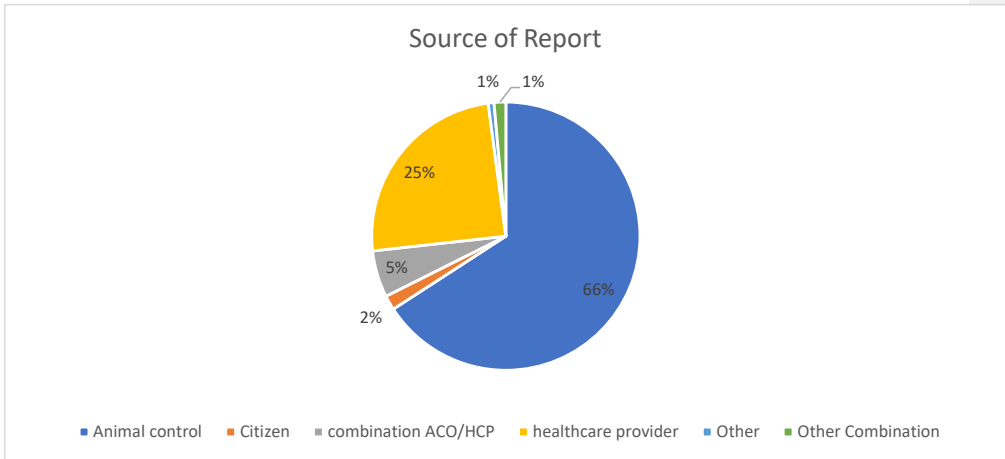


Figure 2: Percent of reports based on the source. Only 2% of reports are coming in from citizens, the victim commonly, whereas the rest are coming in from Animal Control Officers, Healthcare providers, or a combination of the two.

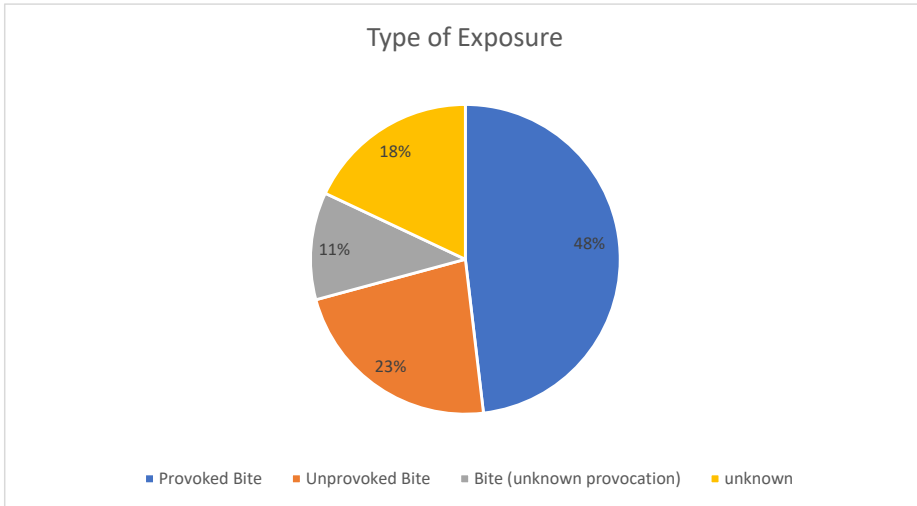


Figure 3: Percentages of reports by the type of exposure. A provoked bite is when the victim did something to cause the bite such as teasing the animal or hitting the animal. An unprovoked bite is when the victim did nothing to cause the bite from the animal. Unknown means that there was no data on the injury or how it happened whereas Bite (unknown provocation) means that the individual was bit, but the report did not disclose how the bite happened.

Table 1: The vaccination status of all animals that had reports is shown. Vaccinated means that the animal is current on the rabies vaccine, unvaccinated means they have not been vaccinated in the first place, previously vaccinated means that recently they have been vaccinated but they are not current. Unknown means the reporter of the incident did not know the vaccination status of the animal.

Vaccination status of all animals	number of reports	percentage
Vaccinated	149	52.28%
Unvaccinated	17	5.96%
previously Vaccinated	19	6.67%
Unknown	100	35.09%
	285	100%

Table 2: The vaccination status of only the domestic animals that were reported is shown. Vaccinated means that the animal is current on the rabies vaccine, unvaccinated means they have not been vaccinated in the first place, previously vaccinated means that recently they have been vaccinated but they are not current. Unknown means the reporter of the incident did not know the vaccination status of the animal.

Vaccination status of Domestic animals	number of reports	percentage
Vaccinated	149	55.81%
Unvaccinated	15	5.62%
previously Vaccinated	19	7.12%
Unknown	84	31.46%
	267	100%

Table 3: The characteristics of the place of the bite is shown. All these are on or around the property that is shown in the table.

Place	Number of reports	Percent of reports
Owners property	114	38.78%
Shelter	11	3.74%
unknown	61	20.75%
Victim's property	29	9.86%
vet clinic	7	2.38%
victim/owner same property	28	9.52%
public property	27	9.18%
other location	17	5.78%
Total	294	100.00%

Table 4: The characteristics of the victim of the bite is shown. These are the specifics that were given in the report that the victim was doing when bit by the animal.

Victim specifics	Number of Reports	Percent of Reports
Approaching property	25	10.55%
Retreating from animal	11	4.64%
Breaking up a fight	24	10.13%
Touching Animal	70	29.54%
Hurting Animal	2	0.84%
Approaching animal	51	21.52%
Employment related	11	4.64%
Playing with animal	22	9.28%
Child left unattended with animal	19	8.02%
teasing animal	2	0.84%
Total	237	100.00%

Table 5: The characteristics of the animal that bit the person is shown. These are the characteristics of what they were doing or how the animal was at the time of the bite.

Animal Specifics	Number of reports	percent
Animal was tied	1	0.71%
animal was on a leash	16	11.43%
running at large	84	60.00%
confined	29	20.71%
animal was eating	5	3.57%
sick or injured	5	3.57%
total	140	100.00%

Table 6: The characteristics of the owner of the animal is shown. Present means that the owner was there at the time of the incident, not present means that the owner was not there when the incident occurred. Unknown means that the report did not specify if the owner was there or not.

Owner specifics	number of reports	percent
present	106	45.11%
not present	31	13.19%
not applicable (stray or wild)	25	10.64%
Victim is owner	23	9.79%
unknown	50	21.28%
Total	235	100.00%

Table 7: The ownership in relation to the victim is shown. All relationships are in relation to the victim of the bite.

Ownership of Animal	Number of reports	percent
acquaintance's pet	25	10.25%
family members pet (in home)	17	6.97%
family member's pet (out of home)	7	2.87%
Friend's pet	21	8.61%
Roommate's pet	2	0.82%
Stranger's pet	46	18.85%
Stray	22	9.02%
Unknown	44	18.03%
victim's pet	54	22.13%
wild	6	2.46%
total	244	100.00%

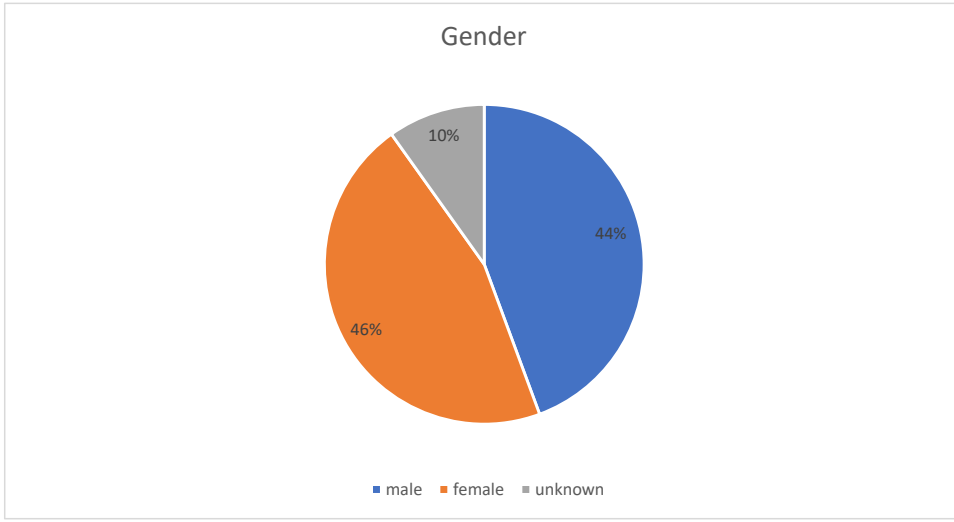


Figure 4: The gender breakdown of the victims of the reports. Unknown means that the gender was not specified in the report.

Table 8: The breakdown of victims of the bites by maturity. Adult encompasses ages 19-64. Child encompasses ages 1-12. Elderly adult is ages 65 and over. Infant means the victim is under the age of 1. Juvenile means that the victim is between the ages of 13 and 18. Unknown means that the maturity of the victim was not specified in the original report.

Maturity	Number of reports	Percent
Adult	164	61.89%
Child	60	22.64%
Elderly Adult	21	7.92%
Infant	2	0.75%
Juvenile	17	6.42%
Unknown	1	0.38%

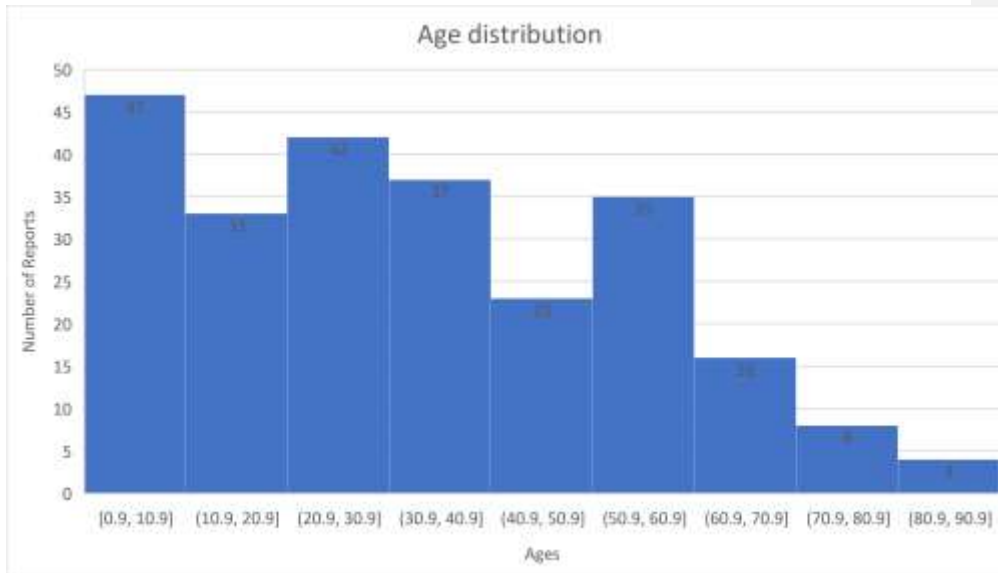


Figure 5: A histogram of the age distribution of the reports starting at 0.9 years of age and going through 91 with groups being 10-year intervals.

Table 9: The placement of the injury of the victim as based on what the report said. Some individuals had multiple injuries on multiple places on their body.

Placement of bite	number of reports	percentage of reports
Face Head Neck	46	15.75%
Upper Body	7	2.40%
Lower Body	12	4.11%
Unknown	21	7.19%
Upper Extremities	141	48.29%
Lower Extremities	65	22.26%
Total	292	

Table 10: The severity of the injuries to the victims. Low severity bites are those that only leave scratches or bruising but no puncture wounds. High severity bites are those that have multiple puncture wounds and often at least one needs suturing. Medium severity bites are those that have a puncture but do not need suturing. Unknown means that the severity of the bite was not specified in the original report

severity	number of reports	percentage
Low severity	21	7.53%
High Severity	116	41.58%
Medium severity	104	37.28%
Unknown	38	13.62%

Table 11: A breakdown of the species that caused the bite. Other is any animal that is not specified in Espino database such as mice. Unknown means that the species of the animal was not specified in the original report.

Species	Number of reports	Percent of reports
dog	216	75.79%
Cat	51	17.89%
Unknown	12	4.21%
Bat	2	0.70%
other	2	0.70%
raccoon	2	0.70%
Total	285	

Table 12: A breakdown of the different breeds of the dogs that were reported. Only 72.7% of dog bites had this data.

Breeds	Number of Accounts	Percentages
pit bull	33	21.019%
lab mix	10	6.369%
Lab	9	5.732%
German Shepard	9	5.732%
Terrier	9	5.732%
Collie	7	4.459%
Mastiff	7	4.459%
Mix	7	4.459%
Retriever	6	3.822%
Boxer	4	2.548%
Chihuahua	4	2.548%
Corgi	4	2.548%
Husky	4	2.548%
poodle	4	2.548%
Akita	3	1.911%
beagle	3	1.911%
Great Dane	3	1.911%
Rottweiler	3	1.911%
heeler	3	1.911%
bull dog	2	1.274%
Shepard's	2	1.274%
Schnauzer	2	1.274%
Shih Tzu	2	1.274%
Greyhound	1	0.637%
Chocolate Dutch	1	0.637%
Dioxin	1	0.637%
DSH	1	0.637%
German shorthair	1	0.637%
German Wirehair	1	0.637%
Hound Dog	1	0.637%
Keeshond	1	0.637%
mini Aussie	1	0.637%
min-pin	1	0.637%
Pin Doxy	1	0.637%
Dachshund	1	0.637%
Scottish Terriers	1	0.637%
Springer Spaniel	1	0.637%
Tamarkin	1	0.637%
Wirehaired pointer	1	0.637%
Yorkie	1	0.637%

Table 13: The breakdown of Post-exposure prophylaxis (PEP) administration to victims of animal bites. Administered means that PEP was given to the individual, unknown means that the report did not specify administration or not, no means that PEP was not given to the individual during treatment.

Human PEP	amount	Percent
Administered	6	2.11%
unknown	64	22.46%
no	215	75.44%
	285	