Toxin Ingestion Events in Companion Dogs

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Literature review

Dogs are one of the species for which owners most frequently seek assistance with potential poisonings, with dogs and cats accounting for 95–98% of all reported animal cases[1]. The majority (>90%) of pet poisonings are accidental and occur near or at their owner's home[1]. Toxin ingestion episodes represent a significant financial cost to owners; the average cost of treatment approached US$400.00 with the upper range of cost extending beyond US$2,000[2], according to a 2004 study.

Early identification of intoxication is crucial when seeking veterinary care as the efficiency and risk:benefit ratio of upper gastrointestinal decontamination following poisoning declines rapidly as the Exposure-to-Treatment Interval increases [3,2]. The urgent timeline highlights the importance of owner knowledge in recognizing potential toxins for their dogs to promptly seek the appropriate veterinary care, potentially improving prognosis following toxin ingestions.

The use of social media in public health education has been increasing due to its ability to remove physical barriers that traditionally impede access to healthcare support and resources[4]. Social media brings a new dimension to health care as it offers a medium to be used by the public, patients, and health professionals to communicate about health issues with the possibility of improving health outcomes[5]. However, there remains inconsistent empirical evidence on the effectiveness of social media to improve public health outcomes and trends[6,7]. While the utilization of social media as a tool in veterinary medicine is not unprecedented, its effectiveness in framing informative messages to potentially prevent the need for veterinary care or enhance prognosis has received limited research attention.

Objectives & Purpose
1. To identify and categorize the most reported toxin ingestion/overdose events and the frequency that veterinary intervention was pursued following these events in the Dog Aging Project (DAP) participant population (DAP Pack); to analyze the frequency of veterinary intervention for each toxin category; to describe demographics of dogs whose owners reported toxin/overdose events.

2. To evaluate follower engagement statistics of toxin-education graphics tailored to owners on DAP's social media platforms; to compare these metrics to the average engagement of all other posts over a four-week period.

Methods

DOG TOXIN INFORMATION
- ANIMALS: Dogs (n=4,700) for whom owners reported ingestion of toxic or controlled substances at least once in their lifetime (n=5,117 reported events).
- Data source: 2022 DAP Curated Data Release.
- Data collected:
  1. Toxin/controlled substance: Antifreeze, chocolate, grapes or raisins, human medication, overdose on medication prescribed to the dog (shown here as "veterinary medication"), rat bait, recreational drugs, or free-text entry.
  2. Veterinary Intervention: Surgery, hospitalization, surgery, and hospitalization did not require either.
  3. Demographics: Age at time of ingestion, sex, breed.
- Analysis

Free-text responses were reviewed. Those free-text entries that could be accurately assigned to one of the standardized categories were regrouped. Two free-text responses were provided so frequently new categories were added, plants & xylitol, were added to the list of individual toxins. Free-text responses reporting ingestion of non-toxic material, foreign bodies or allergic reactions were excluded from analysis. All other free-text responses were assigned into subcategories under "Other toxin."
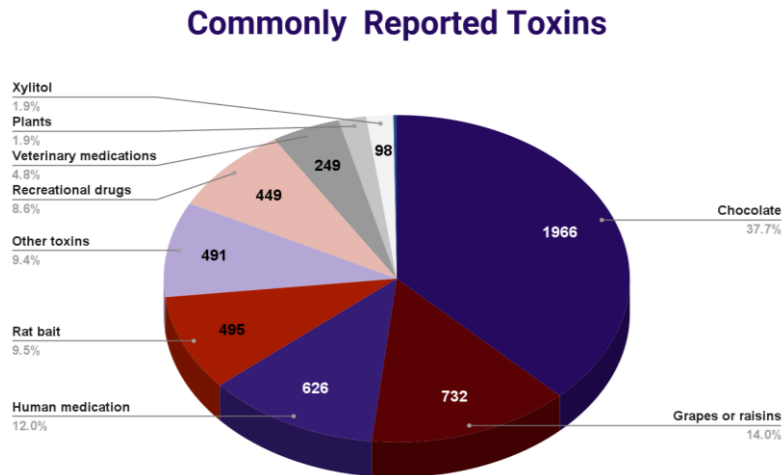
SOCIAL MEDIA CONTENT
- POSTS: Three toxin education social media posts designed for the project (focus: human food, plants, and household items)
- Data collected: DAP's Instagram and Facebook number of likes/reactions, shares, reach, impressions, engagement for all posts in July at the 2-week mark after being posted. Posts outside toxin education were categorized as "non-informative" and encompassed regular DAP social media content, including pack & staff spotlights, event presentations, cute dog pictures, and pet holidays.
- Analysis:
  1. Descriptive statistics of social media analytics.
  2. Compare the average likes/reactions, shares, impressions (the number of times a post was seen on screen) and reach (the number of unique

accounts that viewed a post at least once) between informative and non-informative posts.
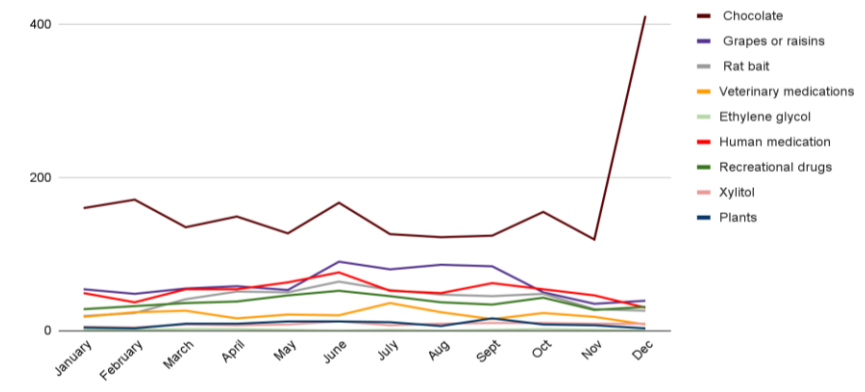
Results

Among participants in the DAP Pack (n=43,517) during the time of the study, owners of 4,700 individual dogs (10.8%) reported 5,117 single-event toxin ingestions and a total of 5,218 ingestion events.

Among the individual response choices offered, chocolate was the most ingested toxin (37.7%, n=1966), while ethylene glycol was the least frequently reported (0.23%, n=12).

Commonly Reported Toxins

Xylitol
1.9%
Plants
1.9%
Veterinary medications
4.8%
Recreational drugs
8.6%
Other toxins
9.4%
Rat bait
9.5%
Human medication
12.0%

98

249

449

491

495

626

732

1966

Chocolate
37.7%

Grapes or raisins
14.0%

Toxin ingestions were most reported during the summer months (June-September). Chocolate ingestion spiked in the month of December.

Legend:
- Chocolate
- Grapes or raisins
- Rat bait
- Veterinary medications
- Ethylene glycol
- Human medication
- Recreational drugs
- Xylitol
- Plants

X-axis: January, February, March, April, May, June, July, Aug, Sept, Oct, Nov, Dec
Y-axis: 0, 200, 400

Of 5,117 toxicity events, owners reported veterinary intervention for only 1,189 (23.2%) of all cases. Chocolate had the lowest frequency of veterinary intervention with only 12.9% of cases (n=255 out of 1,966) reporting intervention. On the other hand, ethylene glycol had the highest frequency of veterinary intervention with 58.3%of cases (n=7 out of 12) reporting veterinary intervention.
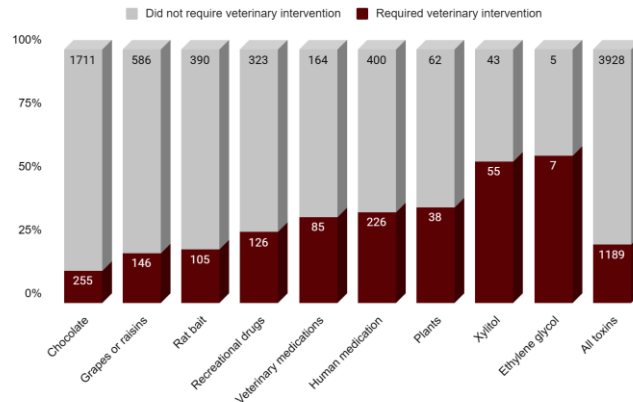
Toxicity events were reported in dogs between 0-18.2 years of age with a mean age of 4.2 years old (n=5,033) at time of ingestion.
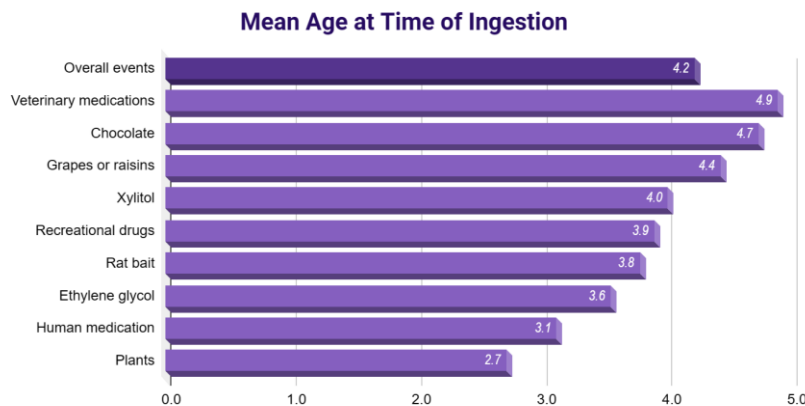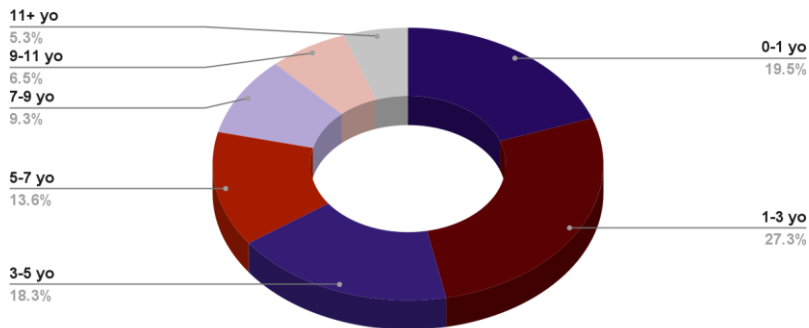

Veterinary medications had the highest mean age (4.9 yrs. old at time of ingestion), while plants had the lowest mean age (2.7 yrs. old at time of ingestion). The age group with the highest frequency of toxin events were dogs between the ages of 1-3 years, accounting for 27.3% (n=1,376) of all cases, while dogs over the age of 11 account for only 5.3% (n=269) of cases.

No significant difference in the frequency of reporting of toxin ingestion was noted between male (n=2569, 50.2%) and female (n=2548, 49.8%) dogs .
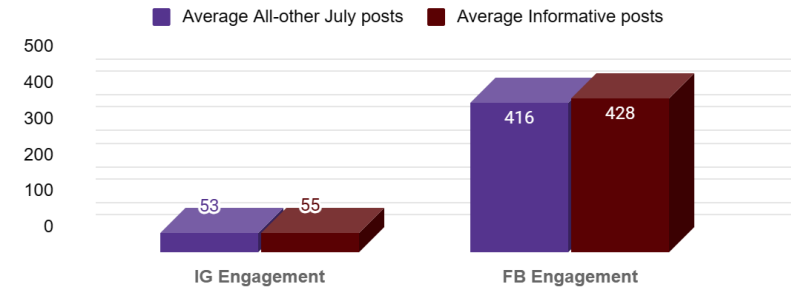
No significant difference in the frequency of reporting toxin ingestion was noted between mixed breeds (n=2,766, 54.1%) and purebred dogs (n=2,351, 45.9%). This finding was consistent throughout all toxin categories. Among purebred dogs (n=2,351), the breeds with the most frequent ingestion events were Labrador Retrievers (n=339, 14.4%), Golden Retrievers (n=203, 8.6%),Poodles (n=93, 4.0%), and Australian Shepherds (n=93, 4.0%).

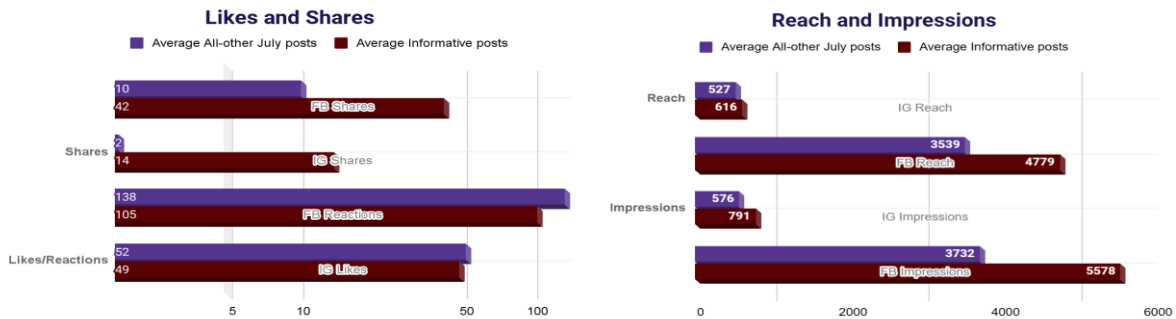**All Toxicity Events Reported by Age Group**

Age Group	Percentage
11+ yo	5.3%
9-11 yo	6.5%
7-9 yo	9.3%
5-7 yo	13.6%
3-5 yo	18.3%
0-1 yo	19.5%
1-3 yo	27.3%

Social Media Response

Overall Engagement

- Average All-other July posts
- Average Informative posts

Platform	Average All-other July posts	Average Informative posts
IG Engagement	53	55
FB Engagement	416	428

No significant difference in engagement average was noted between informative and non-informative posts across Facebook and Instagram. Most DAP followers are avid FB users, which accounts for the engagement difference between platforms.

Likes and Shares
- Average All-other July posts
- Average Informative posts

Shares:
- FB Shares: 10 / 42
- IG Shares: 2 / 14

Likes/Reactions:
- FB Reactions: 138 / 105
- IG Likes: 52 / 49

Reach and Impressions
- Average All-other July posts
- Average Informative posts

Reach:
- IG Reach: 527 / 616
- FB Reach: 3539 / 4779

Impressions:
- IG Impressions: 576 / 791
- FB Impressions: 3732 / 5578

While the average number of likes/reactions was greater for non-informative posts, the average number of times informative posts were shared was significantly higher across Facebook and Instagram. The average number of accounts reached, and impressions were greater for informative posts across Facebook and Instagram.

Conclusions

Dog toxin ingestion
- Toxin ingestion is a significant factor in dog health with ~10% of the DAP Pack population having reported events. Toxin ingestion events spike during summer and December through January, which may be related to owner vacation or holiday activities.
- Despite chocolate being the most reported toxin, this toxin had the lowest frequency of veterinary intervention (only 12.9% of cases), potentially indicating that owners feel this toxin is not very harmful, or that owners recognize exposure and intervene before harm can occur. On the other hand, ethylene glycol, while infrequently reported, had the highest frequency of intervention (58.3% of cases). A close second for frequency of veterinary intervention was xylitol (56.12% of cases).
- Younger dogs were more frequently reported to consume toxins, with dogs under the age of 3 accounting for close to 50% of all cases.
- Among the response choices offered, dogs reported to have consumed/overdosed on veterinary medications had a higher mean age than dogs in other response categories. The higher mean age for this type of toxin could be because more veterinary medications are used for older dogs, putting this group at a higher risk for veterinary medication overdose.
- Future research focused on these data could help us identify the factors that put dogs at risk for toxin ingestion and potentially mitigate this risk.

Social media content

- Though engagement statistics were similar between informative and non-informative posts, when looking at shares, reach, and impressions, informative posts had a higher average for all these parameters.
- On average, informative posts were shared 4x more times than all other posts on Facebook and 7x more times on Instagram. The high number of shares led to more exposure which could explain the higher reach.
- Followers engage in a comparable manner with informative content, but on average are more likely to share posts designed to be educational.

References

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