

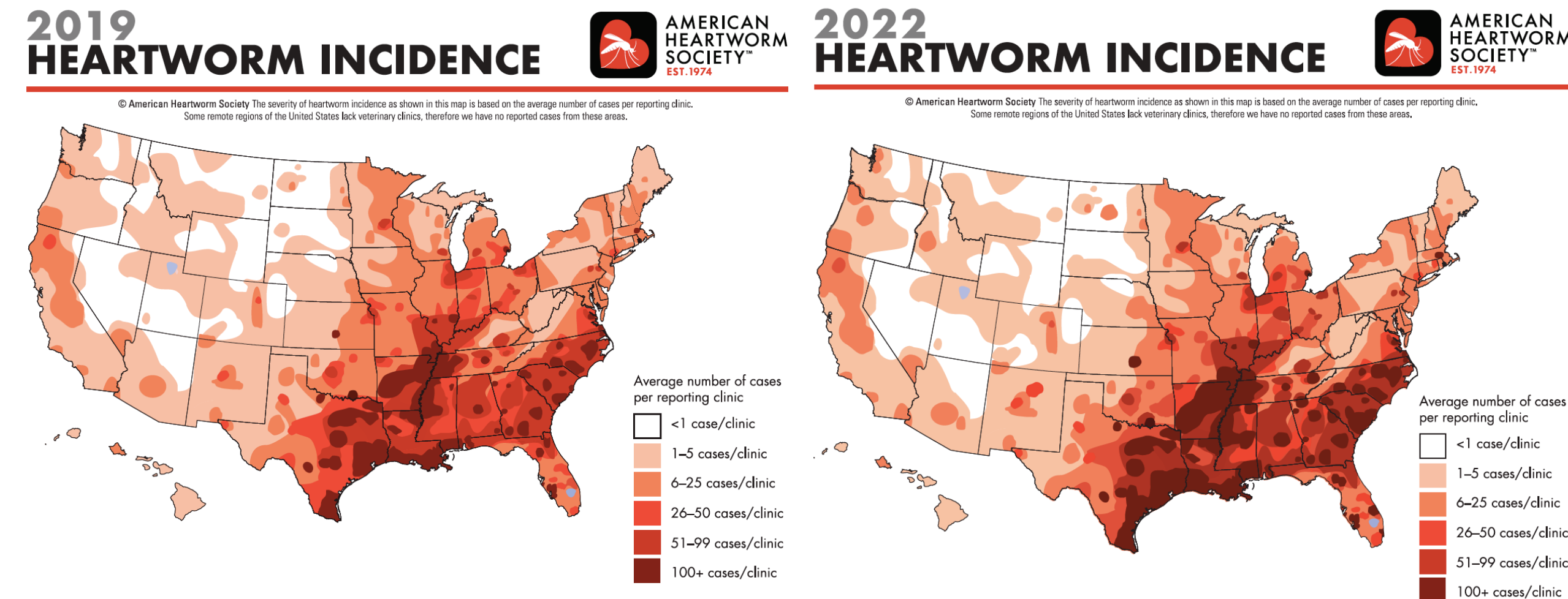
Heartworm Prevention Compliance of Canine & Feline Patients at a Veterinary Teaching Hospital

Retrospective review of medical records and drug dispensing records through the COVID-19 pandemic

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Background



Heartworm disease is preventable, yet fatal if left untreated. According to the 2022 Heartworm Incidence Survey from the American Heartworm Society (AHS), incidence rates increased in prevalent areas and in places where it was once rare. These increased rates were attributed to influxes of heartworm-positive pets and poor heartworm prevention compliance^{1,2,3}. Many studies have been performed to determine why heartworm disease is still prevalent when there are multiple heartworm preventives available in different formulations⁴⁻¹¹. Client compliance is one of the factors that could be targeted to ensure that the appropriate product is administered year-round^{12,13}. The high incidence, risk of infection, and burden from heartworm disease and treatment establishes the need for continuous heartworm prevention for both canine and feline patients¹⁴⁻¹⁷.

Due to the COVID-19 pandemic, there were many changes to the operations of veterinary practices including closures and rescheduling of non-emergent appointments causing pet owners difficulties in obtaining routine veterinary care. Throughout this time, changes in staff, costs, availability of heartworm preventives and of appointments may all have had an impact on heartworm prevention dispensing and caused interruptions in protection. The AHS provided COVID guidelines to address this concern^{18,19}. Currently, as normal operations have returned, prevention dispensing should ideally have returned to pre-COVID levels.

Objective: Explore the trends of heartworm prevention dispensing for both canine and feline patients at a veterinary teaching hospital through the pandemic to identify ways to improve year-round compliance.

Methods

IRB & IACUC Exempt

Dates	NC State Veterinary Hospital Modified Operations: <u>March 16, 2020</u> <ul style="list-style-type: none"> Pre-COVID: March 16, 2019 - March 15, 2020 COVID Restrictions: March 16, 2020 - July 31, 2021 Normal Operations: August 01, 2021 - September 30, 2022
Data Collection	Electronic Medical Record Systems <ul style="list-style-type: none"> UVIS: March 16, 2019 - March 30, 2021 <ul style="list-style-type: none"> Bill Item Search + Patient Drug Search ezyVet: March 01, 2021 - September 30, 2022 <ul style="list-style-type: none"> Invoice Report + Products/Related Records/Invoices
Outcomes	Primary: heartworm disease prevention compliance • Quantities of prevention dispensed in each time period Secondary: heartworm disease occurrence • Treatment with doxycycline, melarsomine, and/or surgical removal
Inclusion Criteria	• Domestic canine & feline patients • Primary: Dispensed a heartworm disease prevention product containing ivermectin, selamectin, moxidectin, or milbemycin • Secondary: <ul style="list-style-type: none"> Treated with concurrent doxycycline and prevention Treated with melarsomine or underwent surgical removal
Exclusion Criteria	Other species dispensed a heartworm prevention product (i.e. ferrets, rabbits, foxes, etc.)
Statistical Analyses	• Preliminary results conducted in Microsoft Excel: Descriptive statistics • All analyses to be conducted in R version 4.2.2 <ul style="list-style-type: none"> Courtesy of James Robertson, MS (Biostatistician) Complete analyses pending

Preliminary Results

Heartworm Prevention Products Included

- Canine unflavored ivermectin tablet 6-PK
 - Unavailable → Compounded ivermectin capsule (each)
- Canine ivermectin/pyrantel chew 6-PK
- Canine sarolaner/moxidectin/pyrantel chew 6-PK
- Canine & Feline milbemycin tablet 6-PK
- Canine topical selamectin 6-PK
- Feline topical selamectin 6-PK
- Puppy/Kitten topical selamectin 3-PK
- Feline topical selamectin/sarolaner 3-PK, 6-PK

Totals			
Patients	Prevention Dispenses	Prevention Doses	Heartworm Treatments
1,357	2,657	18,246	34

Prevention Product	Total Doses
Ivermectin/pyrantel	7,206
Sarolaner/moxidectin/pyrantel	3,786
Selamectin/sarolaner	3,556
Milbemycin	1,524
Unflavored ivermectin	906
Compounded ivermectin	667
Feline selamectin	534
Canine selamectin	42
Puppy/Kitten selamectin	25

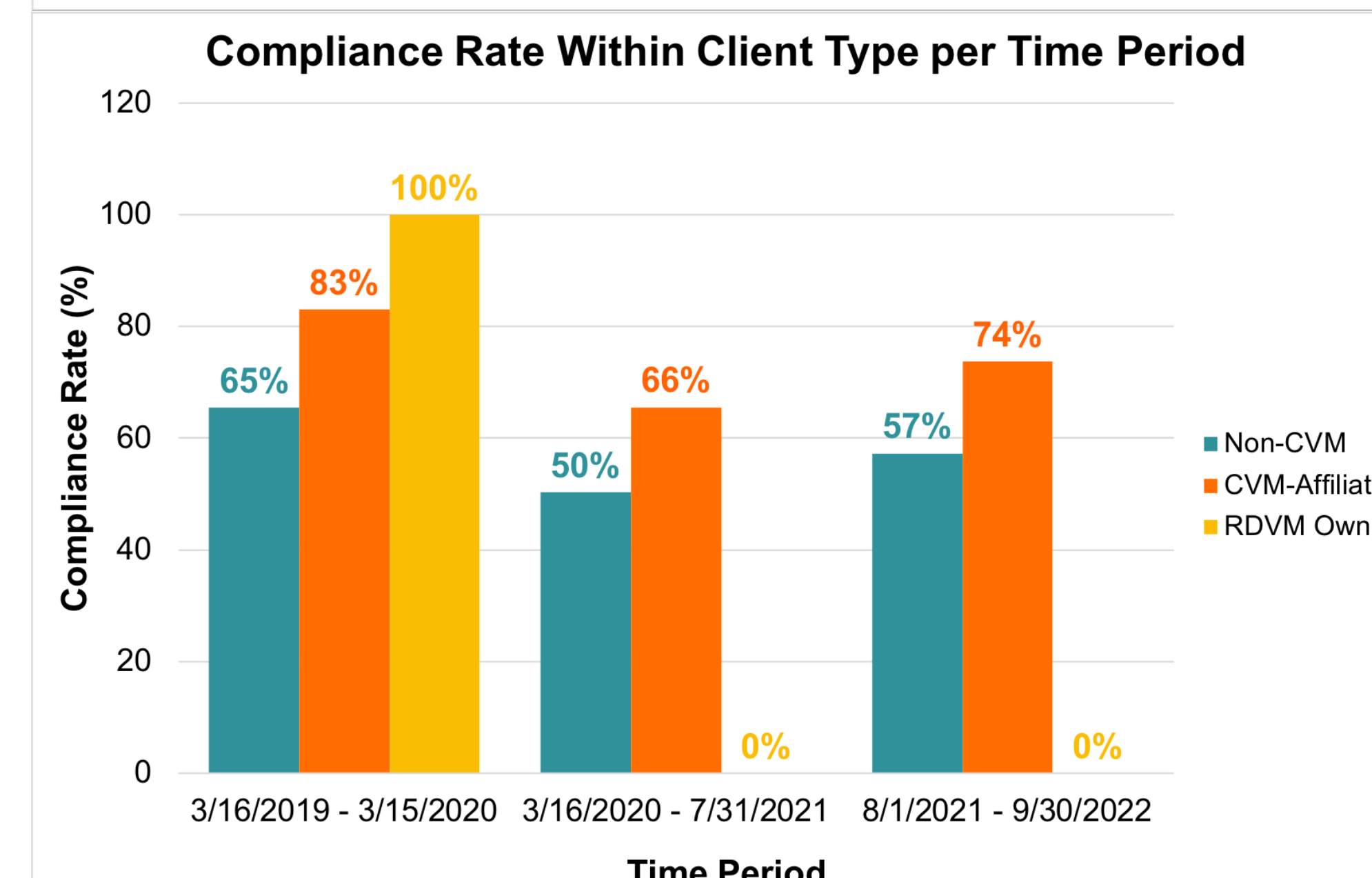
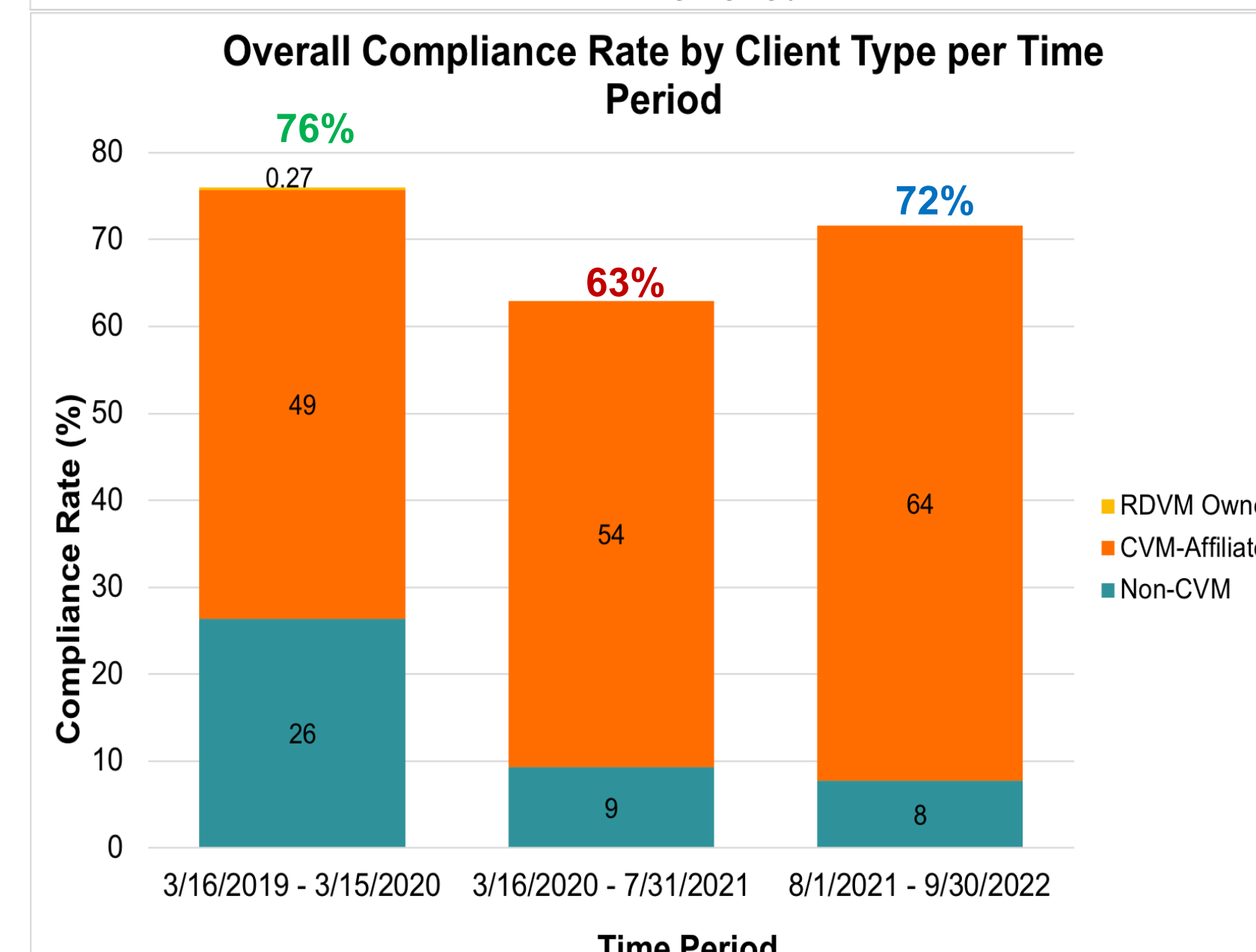
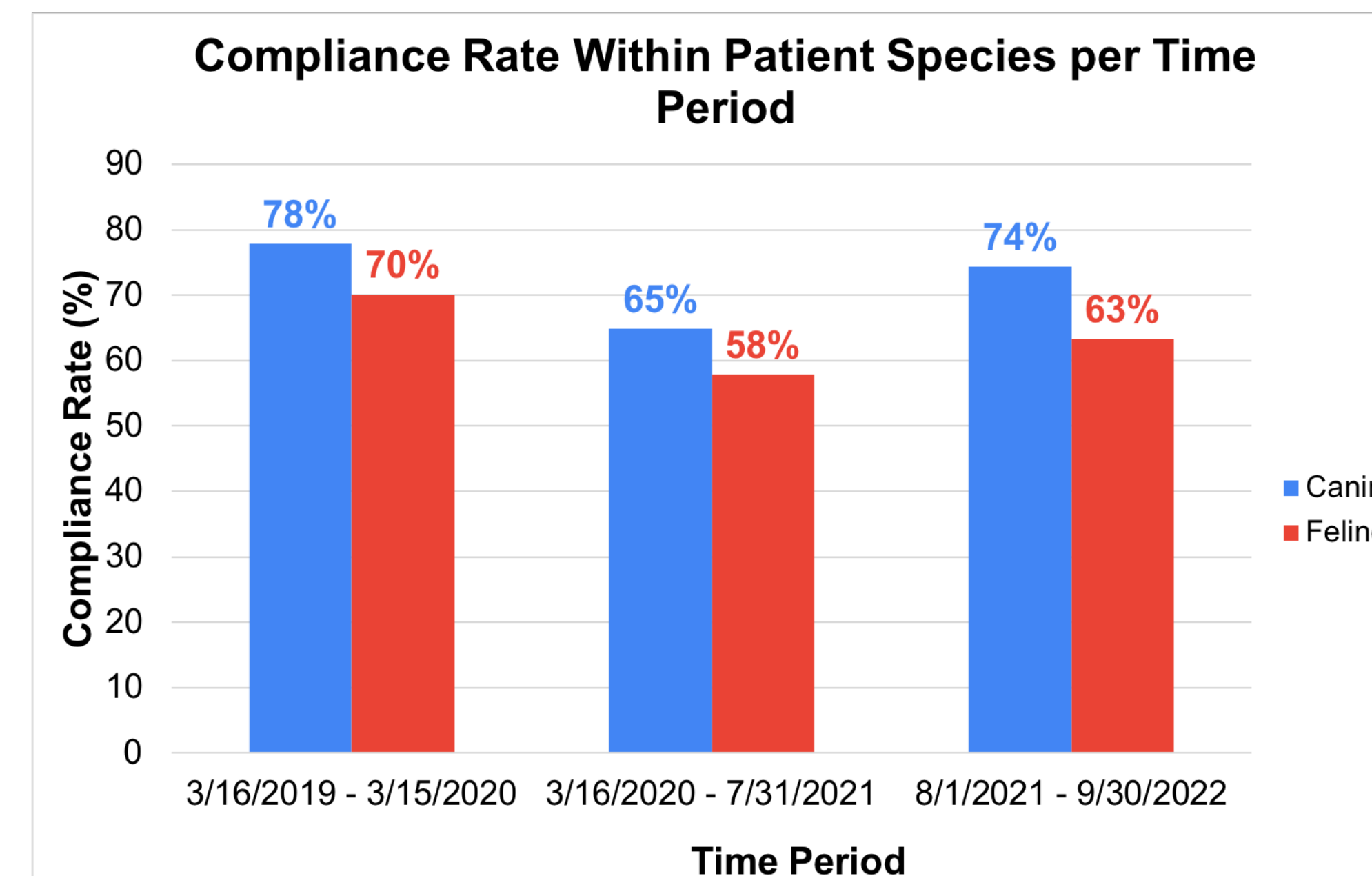
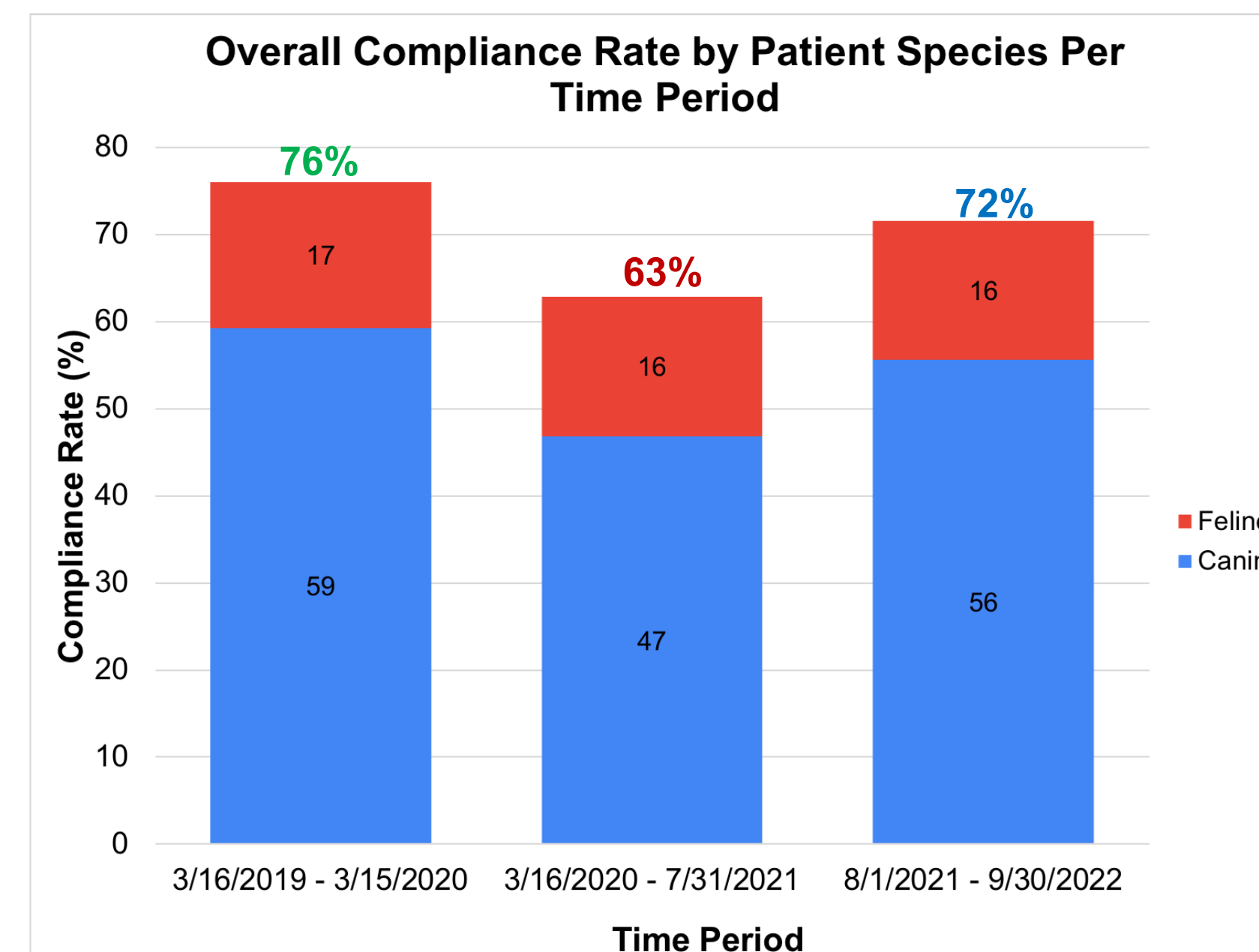
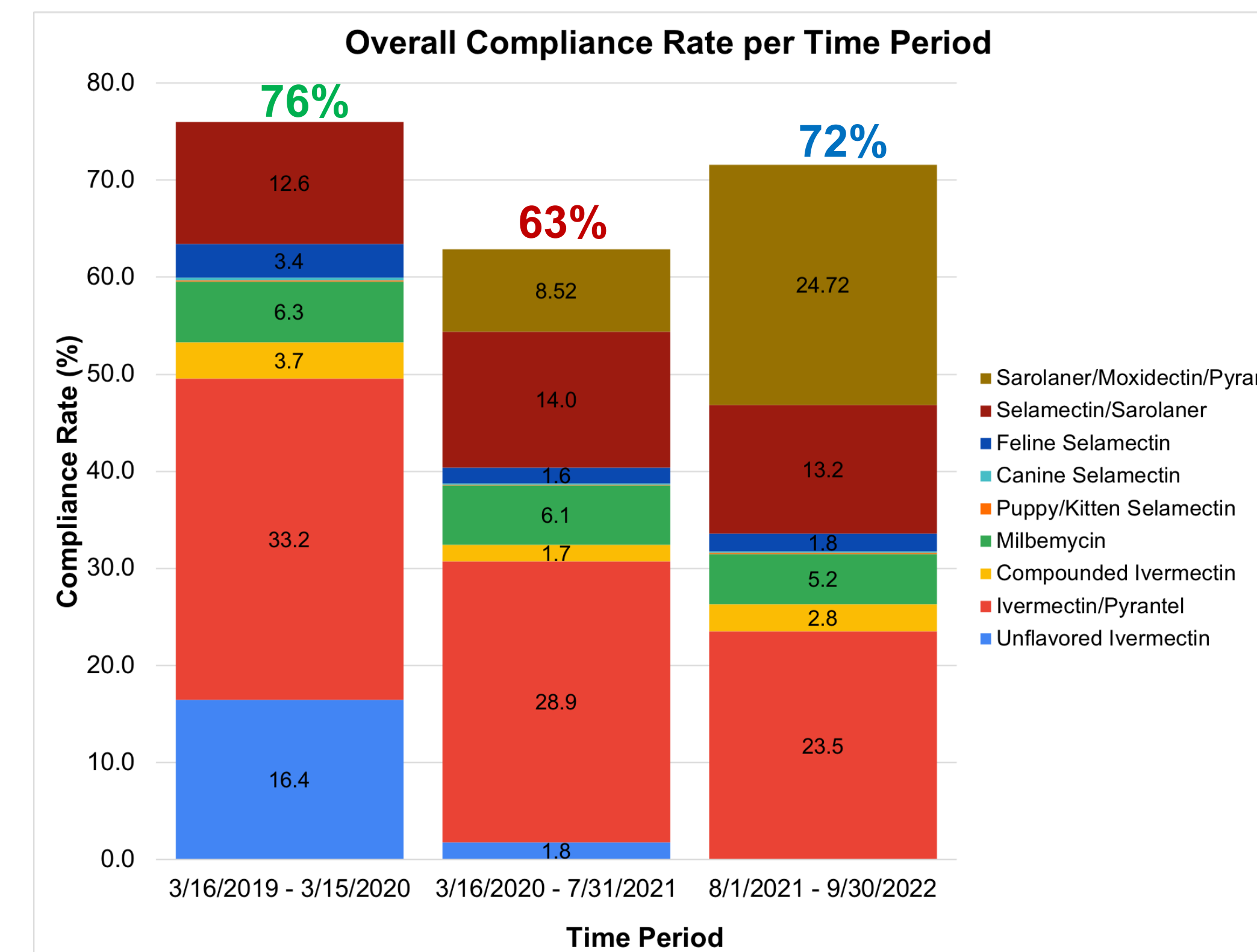
Heartworm Treatment	Total Cases
Doxycycline + Prevention	14
Melarsomine	6
Surgical Removal	14

2795 Records of heartworm prevention dispensed

12 Records of heartworm treatment:
Melarsomine
Surgical removal

138 Excluded
100 Other species:
Ferrets, hedgehogs, hamsters, rats, rabbits, guinea pigs, coatiundi, lynx, caracal
38 Returned products

2669 Records reviewed



Preliminary Results

Lapse	Total Number of Patients with Lapses in Coverage per Time Period		
	Pre-COVID	COVID Restrictions	Normal Operations
Lapse	30	149	210
No Lapse	65	137	236
One Dispense	270	361	393

Treatment	Heartworm Treatments per Time Period		
	Pre-COVID	COVID Restrictions	Normal Operations
Doxycycline + Prevention	5 Patients • 1 Cat • All Referrals	4 Patients • 1 Cat • 3 Referrals • 1 CVM: Surrender	5 Patients • 3 Referrals • 2 CVM: Non-compliance
Melarsomine	0 Patients	4 Patients • 1 Referral • 3 CVM: Adoptions	2 Patients • 2 CVM: Adoptions
Surgical Removal	6 Patients • All Referrals • 3 Survived • 3 Deceased	5 Patients • 1 Cat • All Referrals • 3 Survived • 2 Deceased	3 Patients • All Referrals • 1 Survived • 2 Deceased
Total	11 Patients	13 Patients	10 Patients

Discussion

Heartworm Prevention Compliance

- Decreased during COVID Restrictions period and increased during Normal Operations period (76% → 63% → 72%)
- Fewer feline patients than canine patients, but compliance rate was mostly similar between the two species (± 10%)
- Fewer non-CVM-affiliated clients than CVM-affiliated clients, and compliance rate for CVM-affiliated clients appeared greater than non-CVM-affiliated clients (>15%)

Heartworm Disease Occurrence

- 34 cases of heartworm disease receiving treatment: 26 were referrals
- 2 CVM-affiliated patients due to non-compliance (A-3 years, B-4 months)
- Documented disease in 3 cats

Limitations

- Underestimation: 2 EMR systems (1 archive), did not include patients with positive heartworm test results → Type II Error
- Unable to assess external prescriptions, switched veterinarian, deceased → Type I Error

Future Research

- Compliance: include external prescriptions, multicenter, additional preventative products
- Prospective pharmacist-led heartworm prevention compliance program

Conclusion

- Outcomes from treatment are not always guaranteed and are costly.
- Pharmacists who dispense prevention products are in the perfect position to monitor veterinary patients' dispensing records and help improve compliance to ensure year-round protection from heartworm disease.

References & Disclosure



Christina Chang, PharmD, FSVHP: Contact at cchang28@ncsu.edu
 I have no real or apparent conflicts of interest. I am referencing information on extra-label uses of medications.