

# **The Veterinarian's Role and Attitude in the Disposal of Unwanted Medications**

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# Pharmaceutical Use in the U.S.

How much medication is being used?



**Unused Medicine by the Numbers:**  
4 billion prescriptions are filled in the U.S. every year. **1/3** of that medicine goes unused. That's 200 million pounds of unused medication.!

# Pharmaceuticals in the Environment

## What have researchers found?

- Hormones
- Antibiotics
- Blood lipid regulators
- Analgesics and anti-inflammatories
- Beta-blockers
- Antidepressants
- Chemotherapy drugs
- Tranquilizers
- Retinoids
- X-ray contrast media



Daughton and Ternes 1999

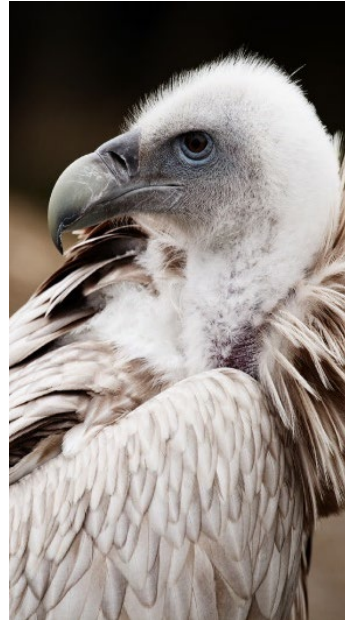
# What are the issues?

Improper use & disposal of PPCPs has unintended consequences



## **Aquatic Wildlife**

Reproductive and  
Developmental  
Impairments



## **Terrestrial Wildlife**

Fatalities in  
Non-Target Species



## **Agricultural Crops**

Uptake into Plants  
Consumed by People



## **Livestock**

Potential to Promote  
Antibiotic Resistance

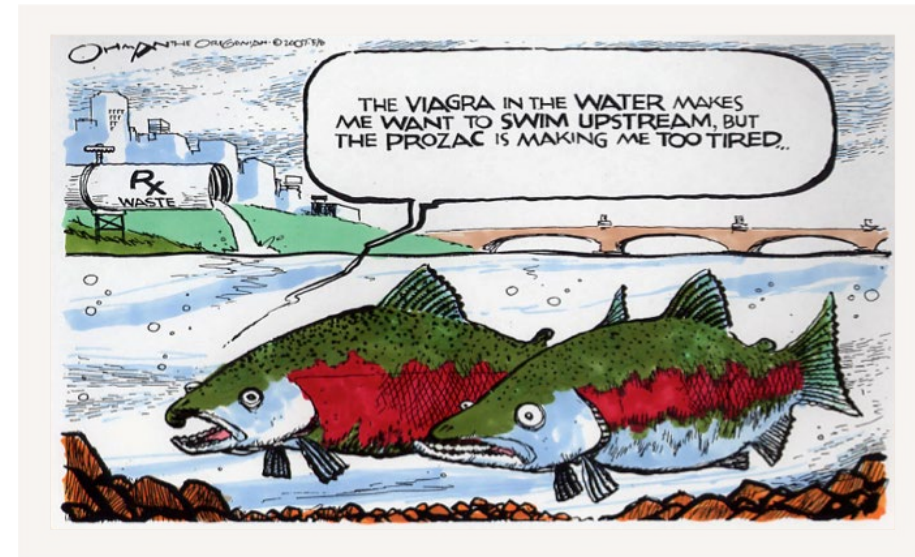
Conners et al. 2009, Oakes et al. 2004, Green et al. 2004, Dodgen et al. 2013, Pruden et al. 2006

# Pharmaceuticals in the Environment

## Organisms accumulate PPCP compounds

Juvenile chinook salmon in Puget Sound, WA:

- Estuary waters, local WWTP effluent, and fish tissues all tested for 150 compounds



Meador et al. 2016

# Examples of PPCPs with Environmental Impacts

## Antidepressants: SSRIs

African clawed frog (*Xenopus laevis*) tadpoles

- Clean water
- Water mixed with 38 ppb fluoxetine

At 57 Days



Control group



38 ppb FL

Conners et al. 2009

# Societal Reasons for Proper Use and Disposal

## What are the risks of improper disposal?



### Accidental Poisonings

Children do not always know the difference between medicine and candy.



### Drug Abuse

Many teenagers believe prescription medications are safer than “street drugs.”



### Drug Misuse

The elderly can become confused about proper use when they take multiple medications.



### Pet Poisonings

Pets sometimes cannot resist the temptation to eat what they find in the trash

# Pharmaceutical Disposal Challenges & Barriers

- Multiple agencies with oversight
- Privacy of medical information
- Knowledge and technology gaps
  - Misinformation!
- Feasibility, convenience & practicality
- Funding for staff, disposal, publicity
- Limited resources for public outreach
- Competition with other issues for target audiences' attention
- Confused, uninformed, or apathetic end users





# Why Veterinarians?

## Client Influence

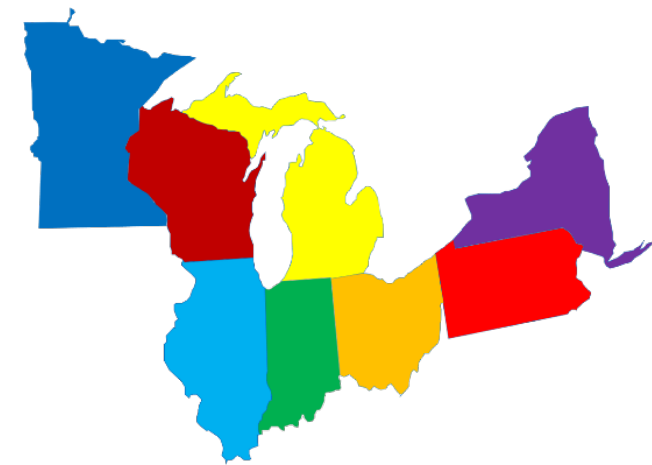
- Clinicians providing information?
  - Majority are not (53-78%)
- Knowledge about disposal programs
  - Physicians
    - 2/3 have no idea
    - 3/4 never received training

	Dogs	Cats	Birds	Horses
% Households with Pets	38.4%	25.4%	2.8%	0.7%
Households w/ pets (in millions)	48.3 M	31.9 M	3.5 M	0.9 M
Average # pets per home	1.6	1.8	2.1	2.1
Total Pets in U.S. (in millions)	76.8 M	58.4 M	7.5 M	1.9 M
Vet visits per household/ year	3.0	2.4	2.6	2.8

U.S. Pet  
Ownership and  
Demographics  
Sourcebook,  
AVMA, 2018

Vatovec et al. 2021; Wilson et al. 2011

# Great Lakes Veterinary Survey 2019



- Partnering with state VMAs or licensing boards
  - Reached 25k veterinarians (<5% response rate)
- 10-15 minute Qualtrics survey about behaviors, knowledge, attitudes
- Survey goals:
  - Learn about drug disposal practices of the veterinarian and their clients (from the vet perspective)
    - How important is this topic?
    - How often is it discussed?
  - Determine the outreach needs of veterinarians and how best to educate them about this issue

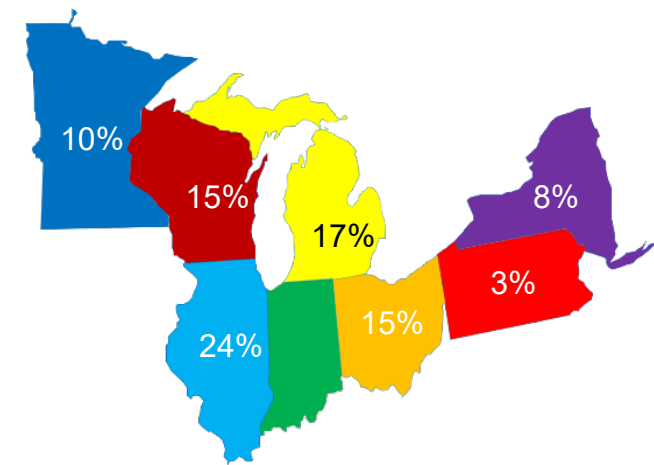
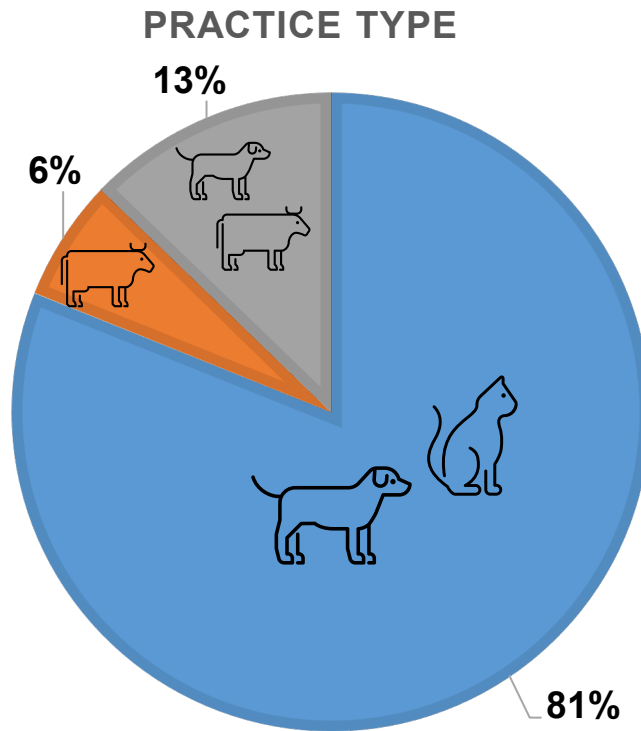
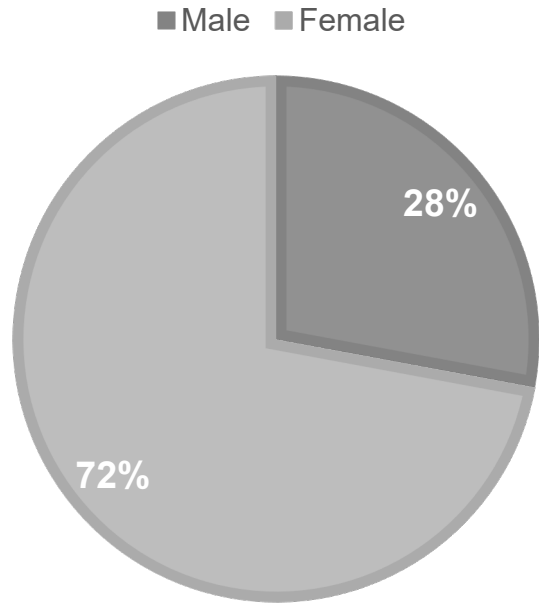
# Great Lakes Veterinary Survey 2019



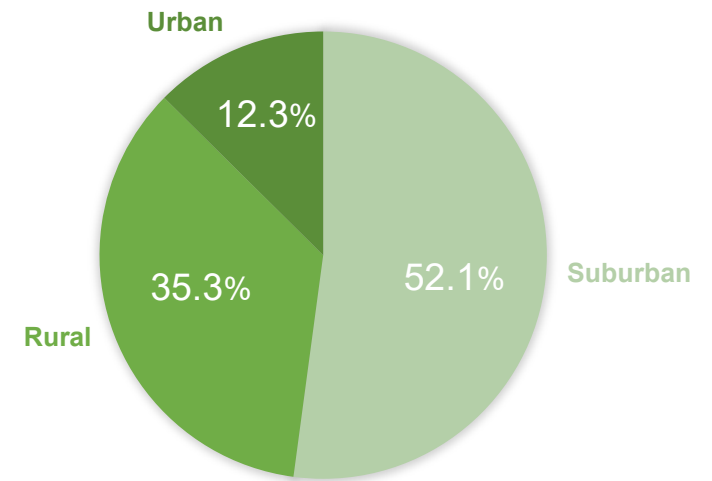
## Hypotheses:

1. Veterinarians do not prioritize discussing pharmaceutical disposal with their clients.
2. Veterinarians are not well informed on how best to dispose of pharmaceuticals.
3. Practicing proper human pharmaceutical disposal may be more frequent than proper veterinary pharmaceutical disposal.
4. Disposal of veterinary pharmaceuticals happens primarily in the garbage and secondarily through reverse distributors.
5. Drivers of pharmaceutical disposal in practice likely include what is financially feasible and legally required.

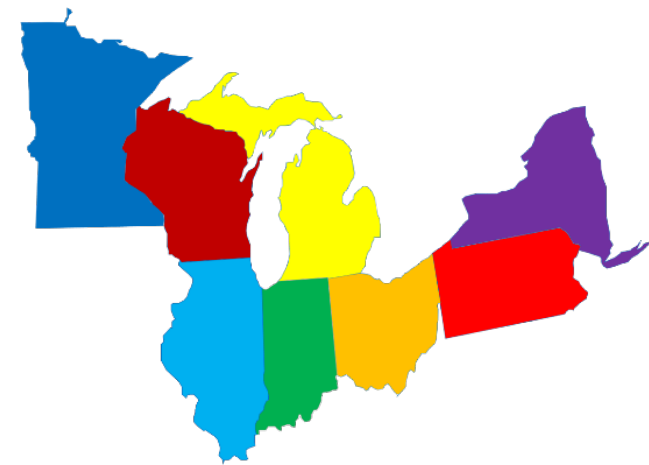
# Some Demographics



PRACTICE LOCATION

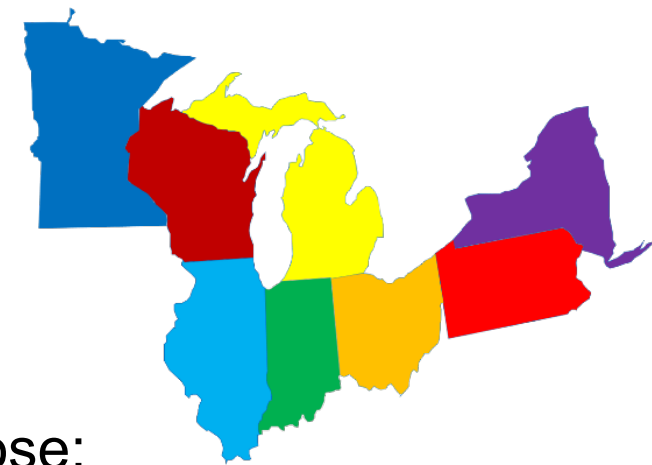


# Awareness



- Allow clients to return medications to practice: 55%
- Where They Get Information:
  1. Professional organizations
  2. Government
  3. Distributor/reverse distributor
- Pharmaceutical disposal attitudes:
  1. Human pharmaceutical improper disposal
  2. Animal pharmaceutical improper disposal
  3. Pharmaceuticals in environment threaten plants/animals
- How Informed about the Environment: Somewhat to Informed

# Actions

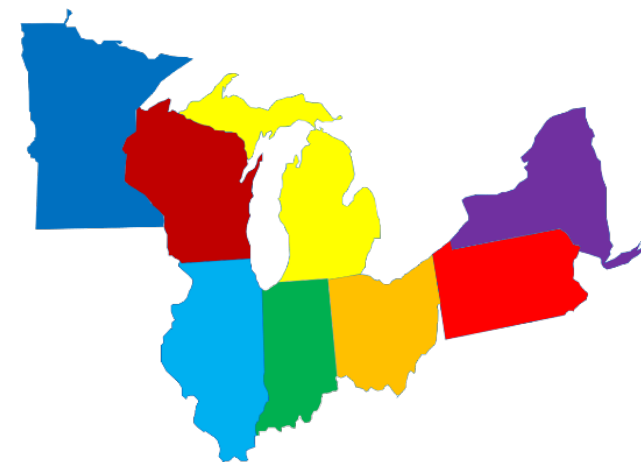


- Factors that Influence Disposal:
  1. Legally required
  2. Avoid misuse/abuse
  3. Avoid accidental poisoning
  4. Minimize pharmaceuticals in water
- Factors that Influence Actions to Protect Environment:
  1. Scientific studies
  2. Professional organization
  3. Financial penalty

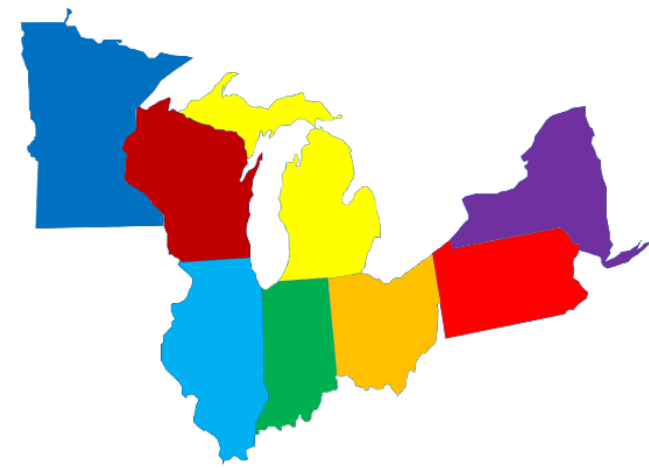
- How Do They Dispose:
  1. Garbage
  2. **Reverse distributor**
  3. Mix with litter and garbage
  4. Indefinitely hold on

# Actions

- Percentage of Appointments where Pharmaceutical Disposal Discussed: 11%
- Barriers to Discussing with Clients:
  1. Forget to mention
  2. Not enough time/information/priority



# Big Differences Among Demographics



- How to Dispose
  - Companion/Mixed: Follow the law
  - Food Animal: Avoid risk of misuse/abuse
- Appointments where Disposal Discussed
  - Companion/Mixed: 9-12%
  - Food Animal: 20%



# What Would Help



- Help to Address Clients
  1. Addition to discharge instructions
  2. Information card with prescription
  3. Brochures in lobby
- How to Reach Veterinarians
  1. Recommendation from professional organization
  2. Professional organization newsletter
  3. Product information
  4. Government
- How to Help Clinics
  1. Outreach and Education
  2. Regulations
  3. Retailer/Manufacturer collection

# Great Lakes Veterinary Survey



## Next Steps for Research Team:

1. Target preferred means of communication for veterinarians to convey the risk of pharmaceuticals
2. Partner with state and national veterinary associations to provide the necessary resources for veterinarians to discuss this topic with clients
3. Increase the level of attention received on this topic by those in the veterinary profession

# Thank you!

## Questions?

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