



EVALUATING AND STRENGTHENING PUBLIC HEALTH COMMUNICATION RELATED TO RABIES IN VERMONT

Riyam Hasan

Master of Public Health

Infectious Disease and Zoonoses

About me

Experience:

Consumer Safety Inspector (USDA-FSIS)

Graduate Teaching Assistant – Environmental Health

Student Editor – One Health Newsletter

Veterinary Technician

Research Assistant – Veterinary Medicine

Doctor of Veterinary Medicine (DVM)

Educational Background:

Master of Public Health (MPH) – Infectious Diseases & Zoonosis (Spring 2026)

Associate of Applied Science – Veterinary Technology (2021)

Master of Animal Physiology – Veterinary Medicine (2016)

Doctor of Veterinary Medicine (DVM) (2013)



Food Safety and
Inspection Service



Applied Practice Experience site (APE)

- Vermont Department of Health
- Vision

“All people and communities in Vermont have equitable opportunities to achieve their highest level of health and well-being.”
- Location: Waterbury, VT
- Preceptor: Dr. Natalie Kwit
- Date: January-April 2026



Presentation Outline

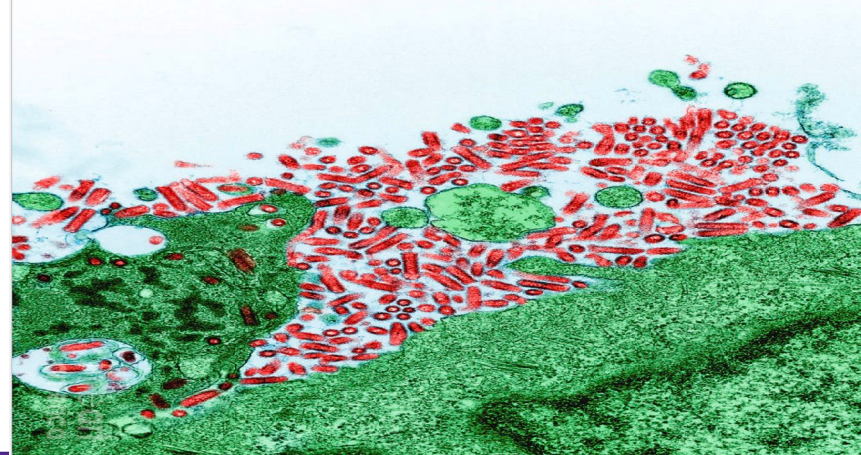
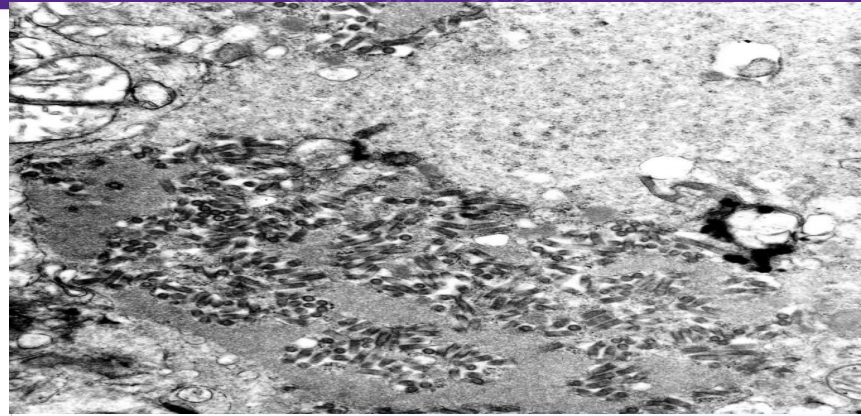
- Introduction
- Background and purpose
- Objectives and Approach
- Applied Practice Experience
- Products
- Limitations
- Recommendations
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Background: Rabies

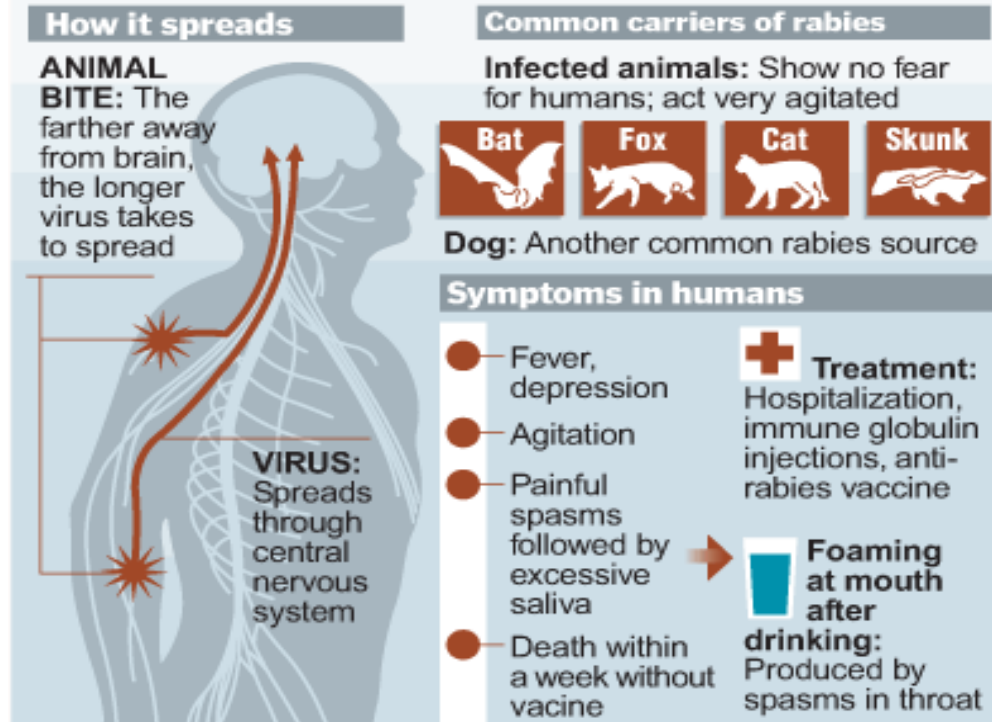
- Nearly 100% fatal once symptoms develop.
- Approximately 59,000 deaths annually worldwide
- Rare in U.S., but wildlife reservoirs persist
- Caused by the rabies virus (RABV), which belongs to the genus *Lyssavirus*



Background: Rabies in Humans

- **Incubation**
 - Usually 1–3 months
 - Variable based on exposure site
- **Early Symptoms**
 - Fever, headache, malaise
 - Tingling at bite site
- **Neurologic Disease**
 - Agitation, confusion
 - Hydrophobia
 - Progressive paralysis

Rabies



SOURCE: The World Book Medical Encyclopedia

KRT

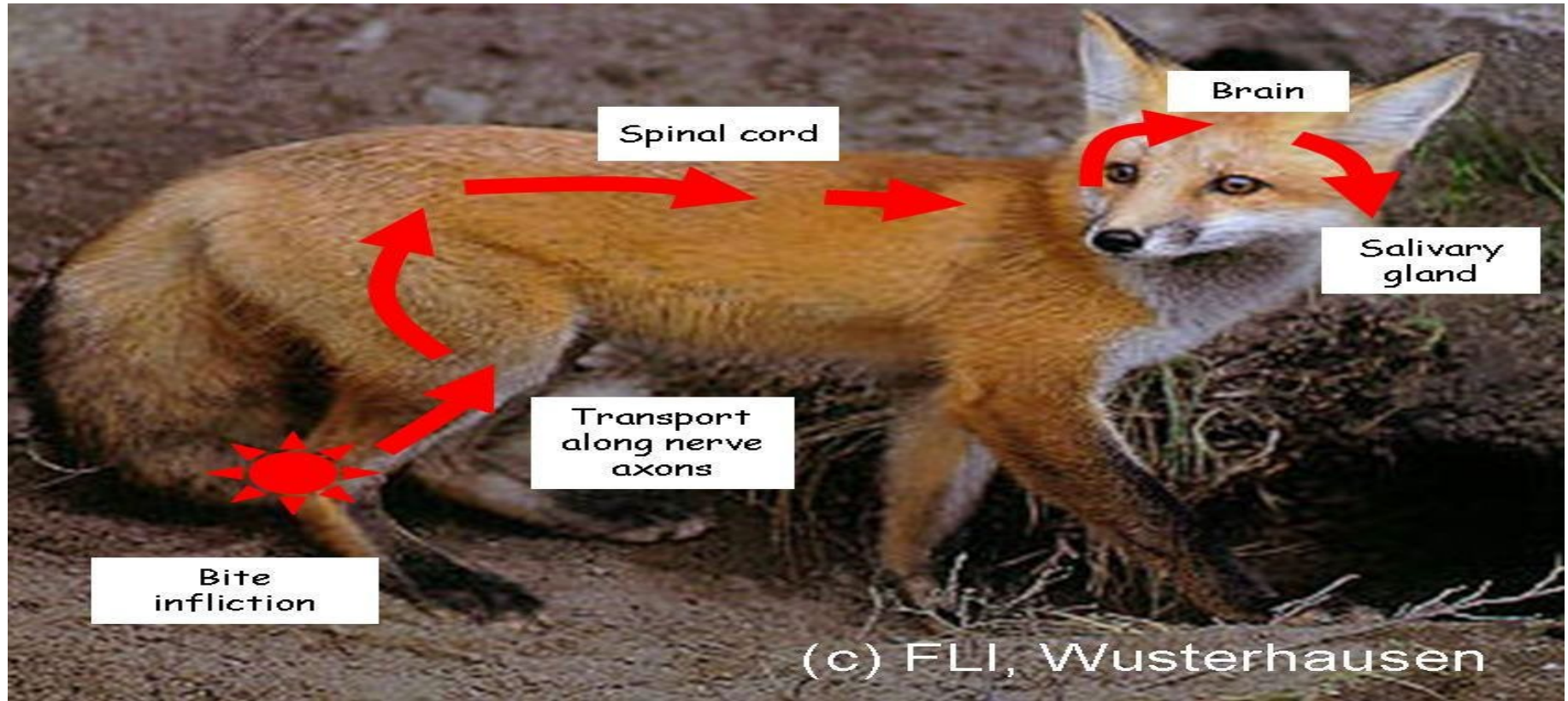
Background: Rabies in Animals



- Maintained in wildlife reservoirs (bats, raccoons, skunks, foxes)
- Transmitted through saliva via bites
- Spillover to domestic animals can occur
- Clinical signs: behavioral changes or paralysis
- Rapid progression to death after symptom onset



Background: Rabies Transmission Cycle



Background: Diagnosis



Humans

Ante-mortem Diagnosis

- Requires specialized testing of multiple specimens (saliva, CSF, serum, nuchal skin biopsy)
- Detection of rabies virus antibody in CSF confirms infection
- No reliable point-of-care test available

Post-mortem Diagnosis

Gold standard: Direct Fluorescent Antibody (DFA) test on brain tissue

Animals

- Gold standard: DFA test on fresh brain tissue
- Brain tissue required because virus is concentrated in nervous tissue.

Background: Treatment

- Rabies Post-Exposure Prophylaxis (PEP)
- Immediate wound cleansing
- Human rabies immune globulin (HIG) — Day 0
- Vaccine series — Days 0, 3, 7, 14
- Fifth dose (Day 28) for immunocompromised patients

Background: Prevention

TOP 5 RABIES PREVENTION TIPS



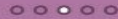
Clean bite
wound
immediately



Start treatment
within 24 hours



Complete full
vaccine course



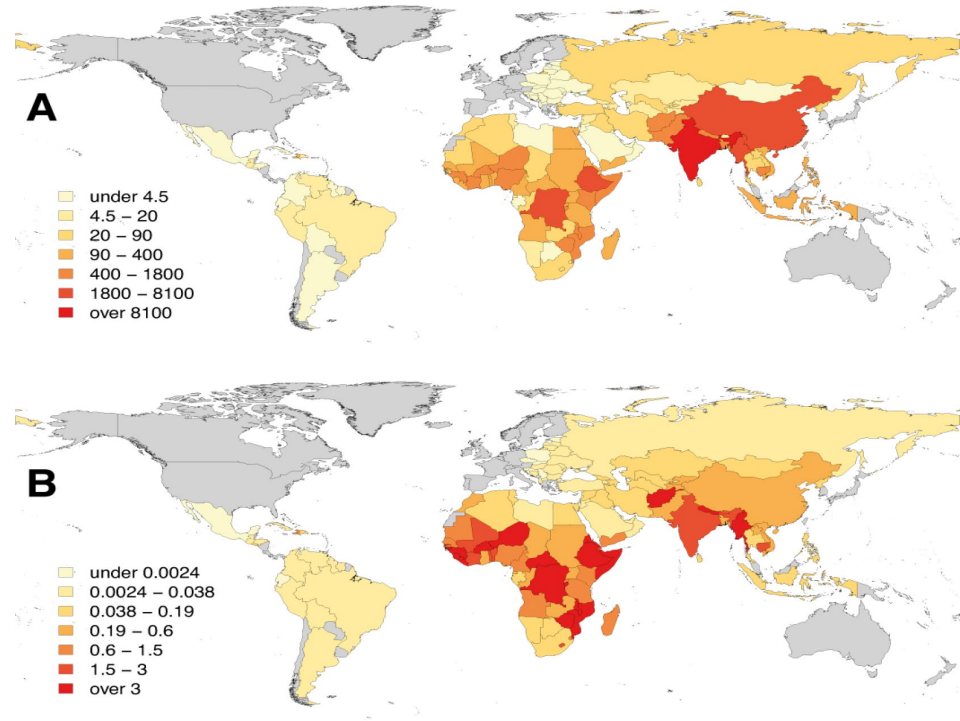
Vaccinate
dogs and cats



Avoid contact
with strays



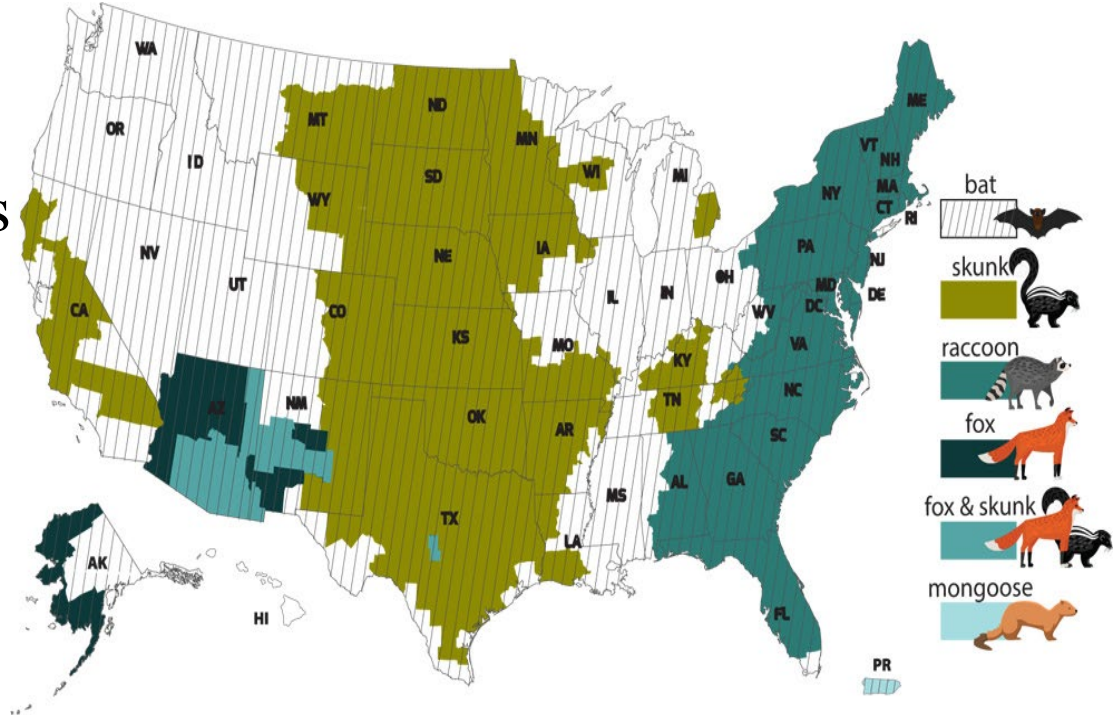
Background: Global Burden of Rabies



- India and several central African countries show the greatest mortality
- Many high-income countries (e.g., U.S., Western Europe, Australia) report minimal or no canine rabies deaths
- Geographic disparities reflect differences in dog vaccination coverage, access to PEP, and health infrastructure

Rabies in the United States

- Wildlife reservoirs: raccoons, skunks, foxes, bats
- 1–3 human cases annually
- Most recent human cases linked to bats



Bat-Associated Human Risk

- Majority of U.S. human rabies deaths are bat-associated
- Most cases involve unrecognized or minimal contact
- Approximately 70% of U.S. human rabies cases since 1960 have been linked to bats (CDC).



Background: Bat-Associated Human Risk

- Cryptic exposures are common (no clear bite history)
- Risk assessment required in ambiguous exposure scenarios
- Prompt PEP prevents disease when exposure is suspected



Background: Rabies in Vermont

- 66 confirmed rabid animals (2024 - 2025)
- Significant geographic clustering
- Endemic raccoon rabies zone
- Around 100,000 Americans are vaccinated against rabies following a potential rabies exposure each year.

Background: Rabies in Vermont



Confirmed Rabid Animals in Vermont (2023–2025)

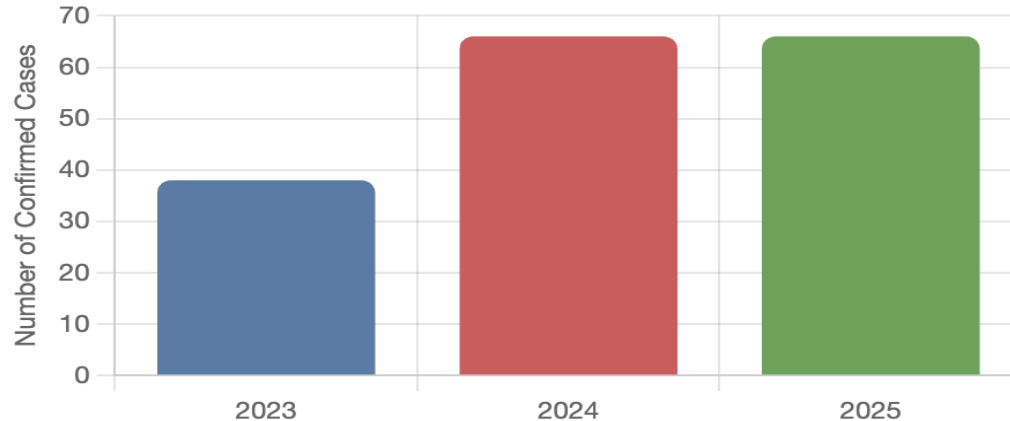
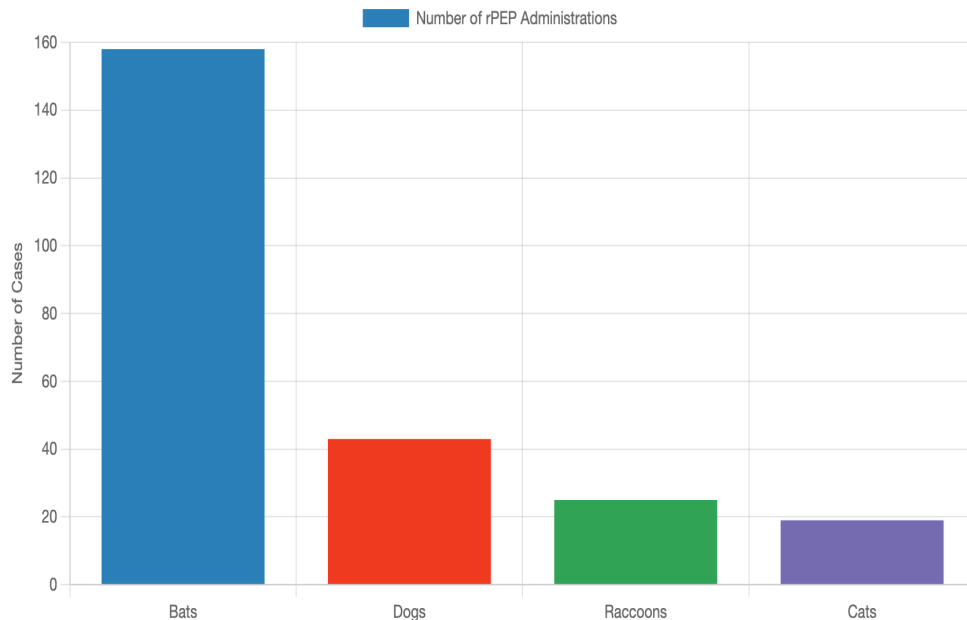


Figure 1. Confirmed rabid animals in Vermont, 2023–2025. 2025 data reflect provisional counts reported in the 2025 Rabies Surveillance Report. Source: Vermont Department of Health (2024, 2025, 2026).

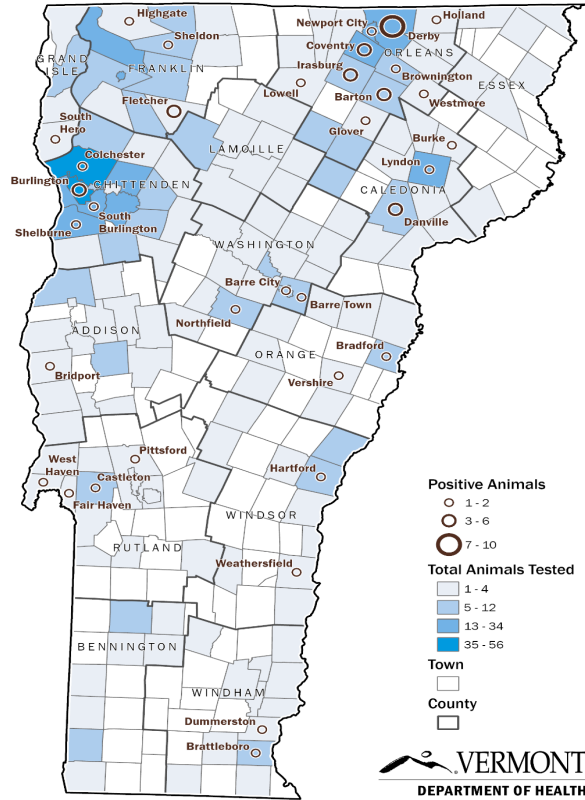
Background: 2025 Vermont Exposure Data (animal)

- **2025:** 260 rPEP administration
- 61% associated with bat exposures (158 cases)
- Dogs (17%), raccoons (10%), cats (7%)
- rPEP peaked in August
- Hotline utilization elevated during increased wildlife activity

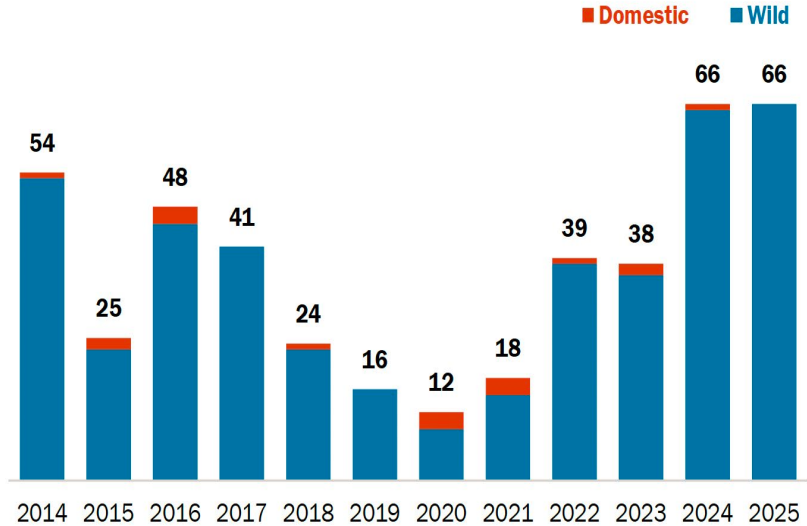
2025 Vermont rPEP by Exposure Type (n=260)



Background: 2025 Vermont Exposure Data (location, time)



Annual reported cases of rabies increased during 2024–2025. All 66 cases of rabies in 2025 were in **wild animals**.

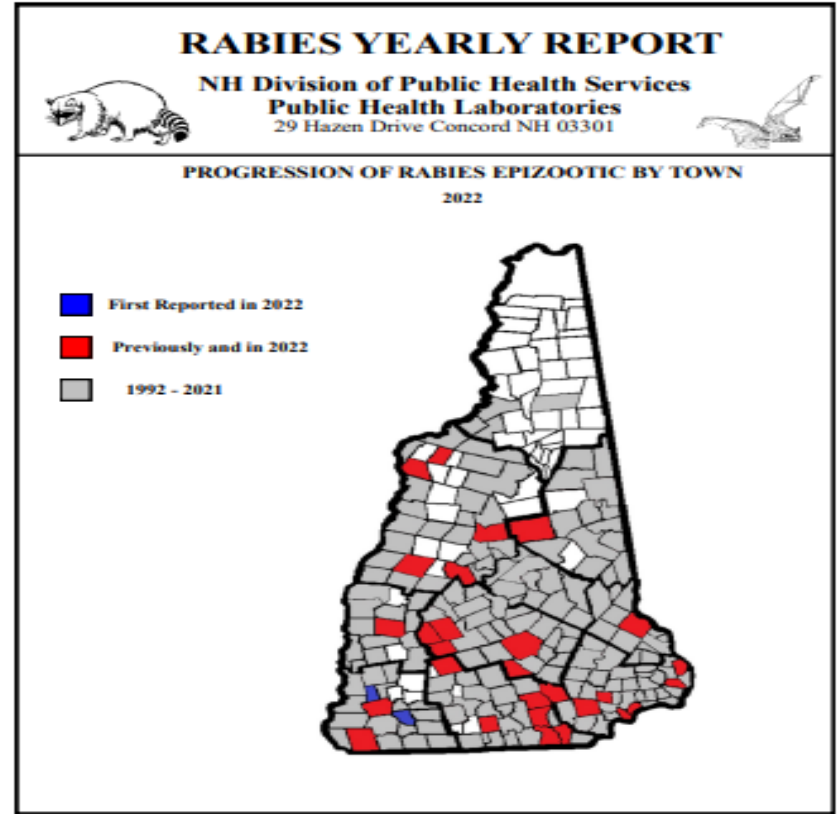
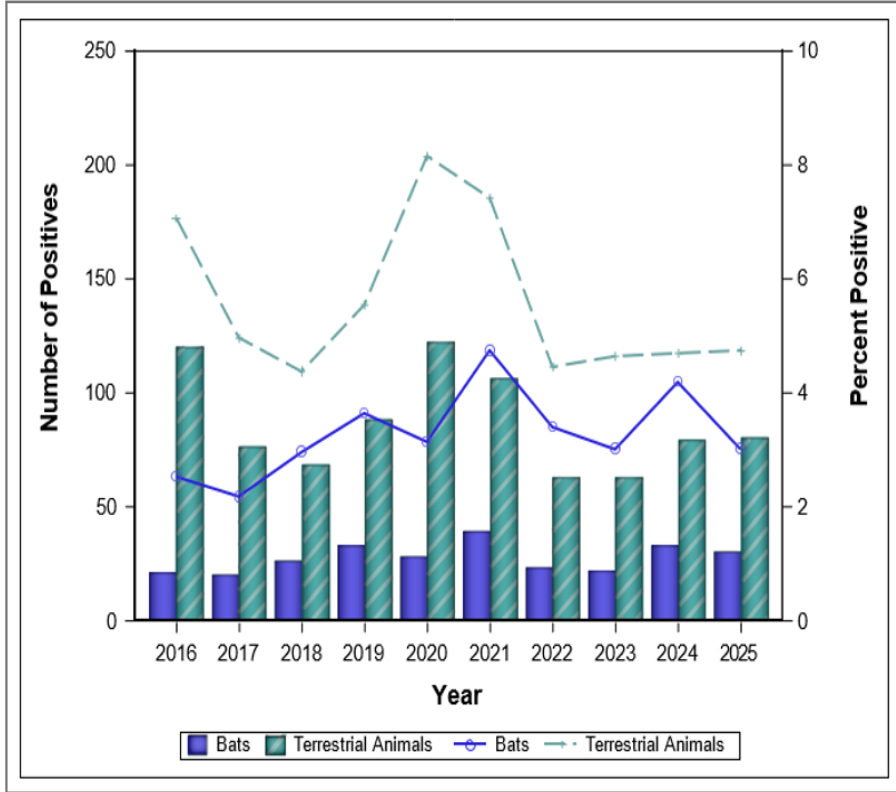


Background: Challenges in Reducing Rabies Cases in VT

- Wildlife reservoirs (raccoons, bats, skunks, foxes) sustain ongoing risk
- Most exposures involve bats (~61%), often without clear contact
- Unclear exposure history complicates decision-making
- Seasonal peaks and hotspots increase system strain
- High use of PEP is costly and resource-intensive
- **Messaging may be inconsistent across sources**
- **Complex guidance can delay timely decisions**

Regional Context from VT neighbors (NH, MA)

Figure 1. Number of Animals Positive for Rabies and Percent Positive by Year: Massachusetts, 2016-2025

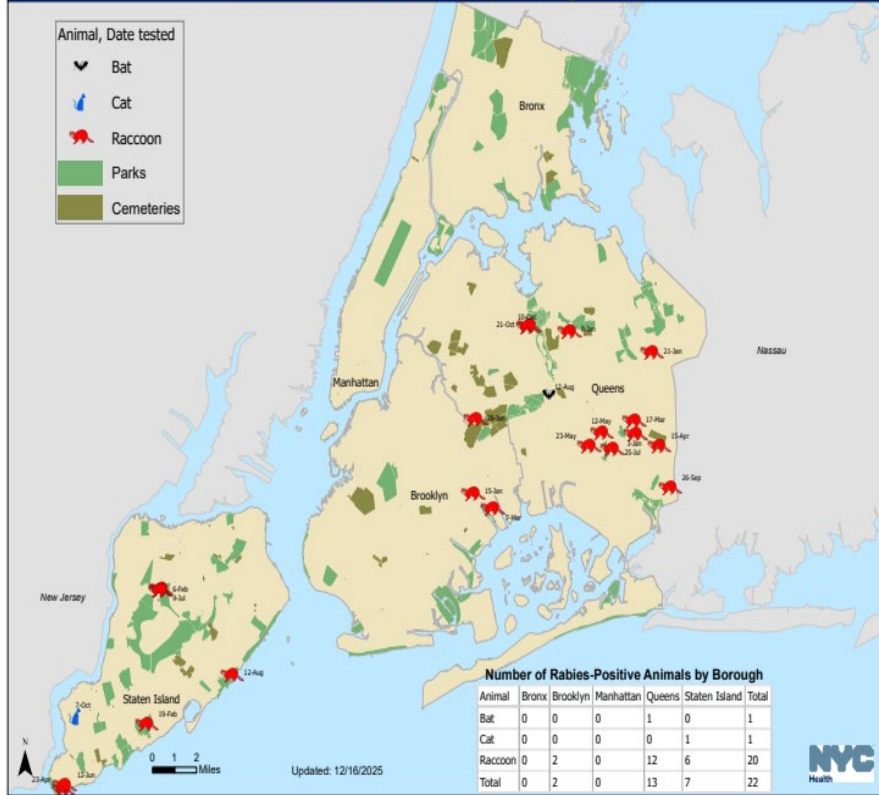


Sources:

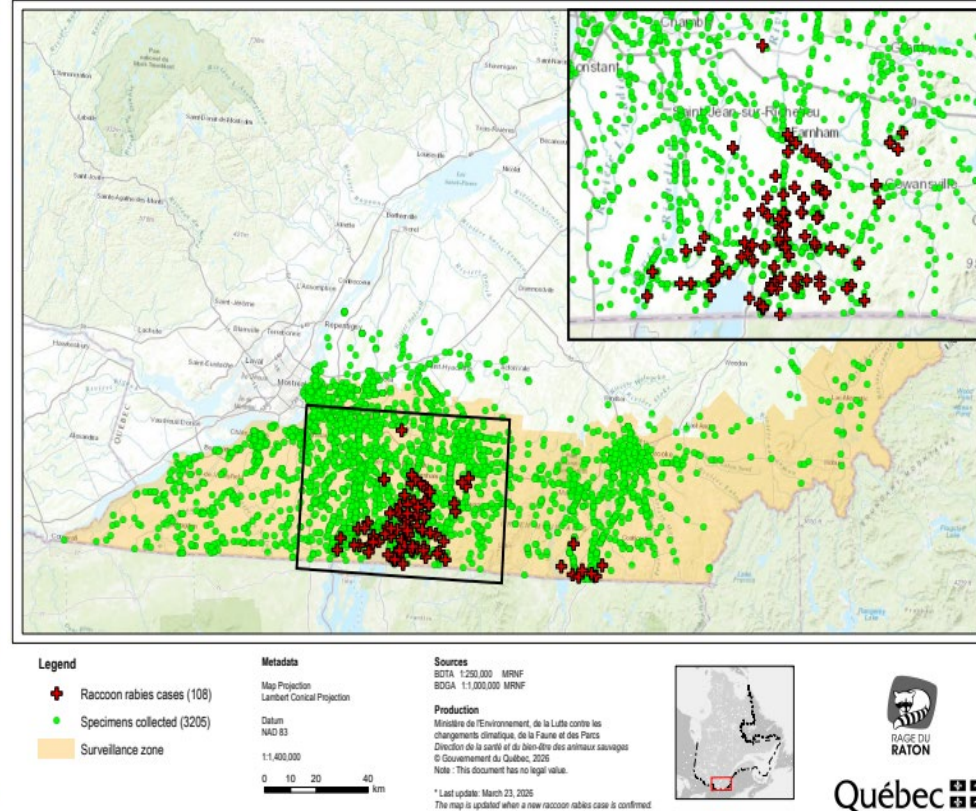
Massachusetts Department of Public Health, *Rabies Surveillance Data (2016–2025)*
New Hampshire Division of Public Health Services, *Rabies Yearly Report (2022)*.

Regional Context from VT neighbors (NY, Quebec Canada)

Animal Rabies in New York City, 2025



Distribution of specimens collected for raccoon rabies surveillance in Québec since January 1, 2024*, and confirmed raccoon rabies cases in wildlife



Sources:

New York City Department of Health and Mental Hygiene, *Animal Rabies in NYC (2025)*;
Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (Québec),
Raccoon Rabies Surveillance Map (2024–2025).

Purpose

To evaluate and improve rabies risk communication in Vermont to support clear, timely, and effective public health decision-making.

Presentation outline

- Introduction
- Background and purpose
- **Objectives and approach**
- Applied Practice Experience
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Objectives

- **Objective 1**

Inventory & organize publicly available VDH rabies communication materials

- **Objective 2**

Evaluate clarity, consistency, audience alignment, and risk communication strategies

- **Objective 3**

Identify strengths, gaps, and improvement opportunities to enhance clarity, coordination, and messaging effectiveness

Approach

- Identified and collected rabies-related materials (Jan–April 2026)
- Included both internal VT DOH documents and external public-facing materials
- Categorized materials by audience, format, and purpose
- Conducted structured document review using predefined evaluation criteria
- Performed cross-document analysis to assess clarity, consistency, and messaging gaps
- Developed prototype messaging product based on identified gaps

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Materials Reviewed



Category	Number of Documents	Purpose in Communication System
Surveillance Reports	2	Tracking disease trends
Public Education Materials	3	Raising awareness & prevention
Clinical Manuals	1	Guidance for health professionals
Reporting Forms	2	Data collection & case notification
Website Content	1	General information & resources

Source: Vermont Department of Health Rabies Communication Materials Review (January–April 2026).

Evaluation Criteria

- Intended audience
- Clarity
- Terminology consistency
- Risk tone
- Action steps
- Alignment

Evaluation Rubric



Structured Evaluation Rubric

Document Review Tool (0–2 Scale)

Criterion	Definition	Score (0–2)	Notes
Intended Audience	Target audience clearly identified and appropriate	0–2	
Clarity	Language understandable for intended audience	0–2	
Terminology Consistency	Consistent use of key rabies terms across materials	0–2	
Risk Tone	Appropriate balance of urgency and reassurance	0–2	
Action Steps	Clear, specific, actionable guidance provided	0–2	
Alignment	Consistent with CDC and VT DOH guidance	0–2	

Scoring Scale

- 0 = Not addressed
- 1 = Partially addressed
- 2 = Clearly addressed

Evaluation Questions



Do materials align with risk communication and health literacy principles?



How effectively is bat-associated exposure risk communicated?



Is human exposure risk proportionally emphasized relative to surveillance trends?



Where are gaps in clarity, consistency, and actionability?

Examples: Cross-document Variability



Town Health Officer Animal Bite Report Form

Reporting Information



Management of Potential Human Exposures* to Rabies



Was the patient bitten or had saliva directly
contact an open wound or mucous membrane?

YES

****** Reporting terminology is bite-specific “Animal Bite Report”, while clinical guidance uses broader “Potential Human Exposures” language inclusive of non-bite contact.

Examples: Cross-document Variability

Public-Facing Website (FAQ Page)

Frequently Asked Questions

✓ What should I do if I find a bat in my house?

Follow these steps if you find a bat in your room after waking up, or if you find a bat in a room with a person or animal who may not recognize the risk – like a child, a person with a cognitive disability, an intoxicated person or a pet.

1. **Do not release the bat if it might have come in physical contact with a person or an unvaccinated pet.**
2. Call **1-800-4-RABIES** for assistance.
3. **Try to safely capture the bat only if you can do so without getting bitten.** Game Wardens, animal control officers, nuisance wildlife trappers, and Town Health Officers may be able to help capture bats.

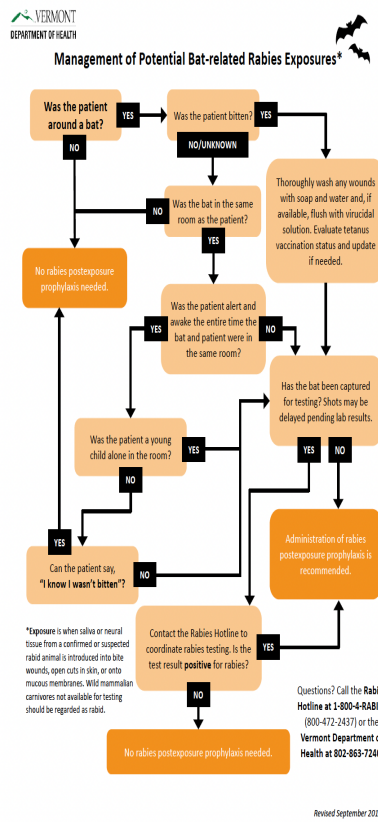
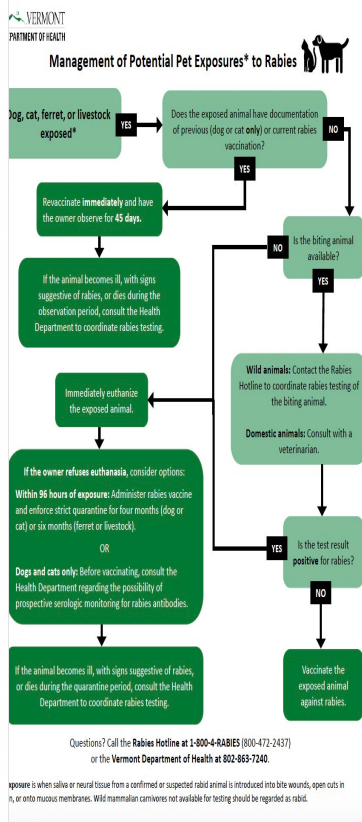
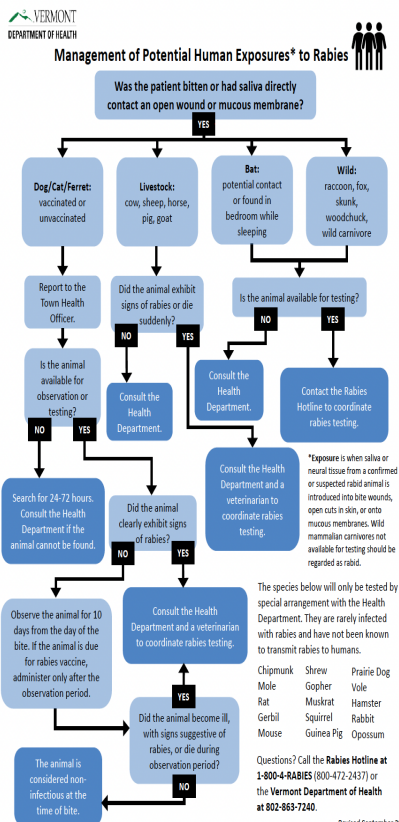
Clinical Manual – Exposure Guidance

Capture a bat if there has been a possible exposure.

Testing is recommended for any bat that has been in a room with an **unattended child, a sleeping, intoxicated, or mentally impaired individual, unvaccinated pet, or that has had physical contact with a person.** Game Wardens will assist in these situations by euthanizing the animal, packaging it, and sending or transporting it to the Vermont Department of Health Laboratory for testing, but will not be able to assist in the capture of a live bat. The Laboratory will not accept any live bats for testing.

****** The clinical manual outlines specific high-risk exposure scenarios (e.g., sleeping person, unattended child), whereas public-facing guidance emphasizes precautionary action and referral.

Examples: Cross-document Variability



**** Human, bat-related, and pet exposures are presented in separate algorithms, requiring cross-referencing during exposure assessment.**

Results: Weaknesses Identified Through Document Review

Internal Materials (Clinical / Reporting Documents)

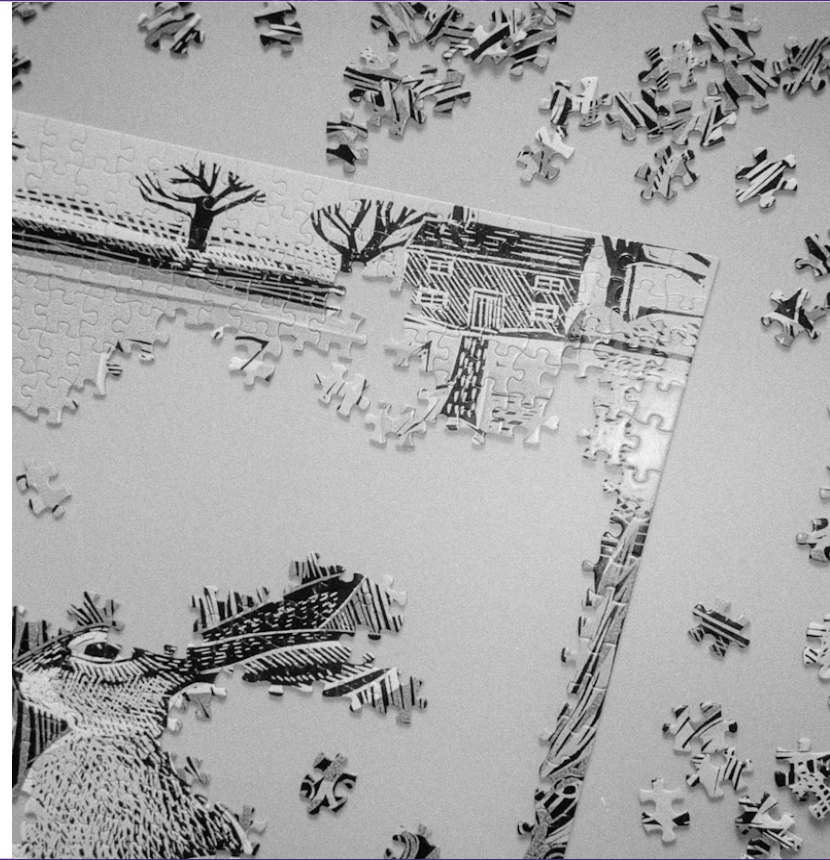
- Variability in exposure definitions across guidance documents
- Inconsistent terminology between manuals and reporting forms
- Flowcharts not directly integrated with reporting tools

External Materials (Public-Facing Content)

- Exposure scenarios described with less specificity
- Action steps dispersed across multiple webpages
- Messaging varied in level of detail compared to clinical guidance

Summary of Findings

- **Bat exposure risk** is acknowledged; however, proportional emphasis varies across materials.
- **No consolidated provider** quick-reference tool
- **Clinical guidance** is dispersed across multiple documents
- **Time-sensitive** exposure scenarios increase cognitive burden



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Purpose of Product Development



Purpose

- Guide exposure assessment and clinical decisions
- Standardize surveillance and reporting
- Educate the public on bat-related rabies risk
- Align with CDC and Vermont DOH guidance

Alignment Findings

- Internal materials supported technical workflows
- External materials provided clear public guidance
- Messaging largely consistent across audiences
- Minor variability in terminology and exposure specificity

Product no. 1:

Provider Quick-Reference Guide

Intended Users

- Emergency department clinicians
- Primary care and urgent care providers
- Public health nurses

VERMONT RABIES EXPOSURE & PEP PROVIDER QUICK-REFERENCE GUIDE



1) Exposure assessment

- Bite that breaks the skin
- Saliva contact with an open wound or mucous membranes
- Bat found in a room with a sleeping person, unattended child, or cognitively impaired individual



2) Delay PEP when animal is available

- Monitor cats, dogs, and ferrets for 10 days following bite
- Test all high-risk animals for rabies



3) High-risk animals in Vermont

- Bats • Raccoons • Woodchucks
- Foxes • Skunks • Wild terrestrial carnivores



4) Wound care

- Wash thoroughly with soap and water for 15 minutes
- Apply povidone-iodine solution or other virucidal agent if available



5) PEP administration guide

- Administer human rabies immune globulin (HRIG) on Day 0
- HRIG dosing: Infiltrate as much as possible into and around wound(s); give remainder intramuscularly
- Rabies vaccine on Days 0, 3, 7, and 14
- Immunocompromised patients: 5-dose series (Days 0, 3, 7, 14, 28)



6) Reporting requirements

- Complete Animal Bite Report Form
- Complete Rabies PEP Report Form



7) Contact health department

- 802-863-7240 (covered 24/7)
- Uncertain exposures • Administration questions
- Immunocompromised patients

Public Quick Reference Guide on Rabies and Bat Exposure

Intended Audience

- Vermont residents
- Individuals with potential bat exposures
- Parents and caregivers
- Community members seeking rabies information

BAT EXPOSURE: WHAT YOU NEED TO KNOW



WHAT IS A BAT EXPOSURE?

You may have been exposed to rabies if:

- A bat bites or scratches you
- A bat is found in a room with a sleeping person, unattended child, or someone who cannot report contact



Rabies is rare but almost always fatal once symptoms begin. Early treatment can prevent illness.



WHAT SHOULD I DO?

DO NOT release the bat and call the Rabies Hotline (1-800-4-RABIES) for assistance. If bitten, wash the area with soap and water and call your healthcare provider.



WHEN TO SEEK MEDICAL CARE

Seek medical care if:

- You were bitten or scratched by a bat and it is released or not available

Rabies treatment works best when started quickly.

CONTACT INFORMATION

Vermont USDA Rabies Hotline: 1-800-472-2437 or 800-640-4374

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Limitations of the project

- Evaluation limited to publicly accessible materials
- No stakeholder interviews conducted
- No formal usability testing of the provider guide
- No quantitative outcome evaluation (e.g., pre- and post-implementation PEP trends)

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Recommendations based on Project Outcomes

Individual Level

- Maintain clear, action-oriented bat exposure guidance
- Preserve visibility of rabies hotline and consultation pathways

Institutional Level

- Adopt and disseminate the Provider Quick-Reference Guide
- Standardize terminology across public, clinical, and reporting materials
- Implement routine cross-document communication reviews

Policy / Systems Level

- Integrate communication system audits into routine rabies program evaluation cycles

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Conclusion



- Vermont's rabies communication system is **comprehensive, structured, and operationally strong**
 - However, **inconsistencies in terminology and exposure definitions** create confusion across public and clinical messaging
- **Key guidance is fragmented across multiple documents**, increasing cognitive burden during time-sensitive decision-making

Conclusion (cont.)

- **Bat-associated exposure risk—while recognized—is not consistently or proportionally emphasized** despite being the primary driver of human risk
-
- Lack of **centralized, quick-reference tools** limits efficient decision support for both providers and the public
-
- Overall, **targeted improvements in integration, clarity, and alignment—**rather than expansion—could significantly enhance communication effectiveness and support timely PEP decisions

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MPH Competencies: Synthesis and Integration of Competencies

Competency	Description of Synthesis and Integration
MPH Foundational #1 – Apply epidemiological methods to settings and situations in public health practice	I analyzed rabies surveillance data, categorized exposure types, examined temporal and seasonal trends, and interpreted rPEP utilization patterns to evaluate zoonotic transmission risk within Vermont. I integrated descriptive epidemiology, infectious disease principles, and operational data to inform communication refinement and exposure classification.
MPH Foundational #11 – Select methods to evaluate public health programs	I designed and implemented a structured qualitative document review framework informed by the CDC Program Evaluation Framework. I evaluated terminology consistency, risk framing, action-step clarity, and cross-document alignment, and synthesized findings to identify system-level communication gaps.
IDZ Emphasis #1 – Pathogens/pathogenic mechanisms	I analyzed rabies virus transmission pathways, differentiated bite and non-bite exposures, and synthesized viral pathogenesis principles into risk-stratified exposure categories. I integrated pathogen biology with surveillance trends to construct evidence-based clinical exposure guidance.

MPH Competences: Practice-Based Products that Demonstrate Competency Attainment	
Specific Products	Competency
Provider Quick-Reference Guide	Foundational #1 – Apply epidemiological methods
Oral Presentation with PowerPoint Slides	Foundational #11 – Select methods to evaluate public health programs
Oral Presentation with PowerPoint Slides	Foundational #19 – Communicate audience-appropriate public health content
Provider Quick-Reference Guide	IDZ #1 – Pathogens/pathogenic mechanisms
Bat Exposure Reference Guide	IDZ #4 – Disease surveillance

Acknowledgements



Committee Members:

- Dr. Paige Adams, D.V.M, PhD
- Dr. Margaret Kincaid, PhD
- Dr. Jean Gonzalez, MD, PhD

MPH Team:

- Dr. Ellyn Mulcahy, PhD, MPH
- Dr. Justein Kastner, PhD
- Plern Kongsamut

VDH Team:

- Dr. Natalie Kwit
- VDH team

Family and Friends



Questions

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