Data Modernization of Rhode Island Department of Health's Rabies Program: An Evaluation of Time Savings

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BACKGROUND

Rabies is a viral disease transmitted through contact with saliva or brain tissue of an infected animal typically via bite or scratch.[1] Rabies is nearly 100% fatal without vaccine intervention prior to the onset of symptoms.[1] Due to the high mortality rate of rabies, all animal bites and potential rabies exposures are required by state regulation to be reported to the Rhode Island Department of Health (RIDOH) immediately upon recognition by healthcare professionals. Once reported to RIDOH, a public health nurse evaluates each case to determine if a potential rabies exposure exists. If so, the nurse recommends rabies vaccine, otherwise known as post-exposure prophylaxis (PEP).

Reporting of animal exposures or rabies PEP releases is often required by health departments in the United States; however few health departments require reporting of both.[2] Rhode Island's rabies program is unique in that, in addition to requiring reporting of animal exposures, rabies PEP is administered only after assessment and recommendation by a RIDOH nurse. This process helps prevent unnecessary administration of PEP and provides RIDOH with a comprehensive dataset.

Between 2021 and 2025, there has been a steady increase of animal bite reports which corresponds with an increase in the number of rabies PEP releases [**Figure 1**]. In 2025, RIDOH received 3,571 animal exposure reports and released rabies PEP for 780 cases, both of which were record highs. Notably, the rate of rabies PEP recommendations has remained steady between 21% and 26%, supporting the effectiveness of RIDOH's rabies risk assessment process [**Figure 1**].

In 2023, RIDOH initiated the transition of the rabies program from paper-based reporting to an electronic reporting system. Between 2023 and 2024, animal bite reports, animal testing submission forms, and rabies PEP

Figure 1. Count of animal bite cases, rabies PEP recommendations, and rate of rabies PEP recommendations by year 2021–2025

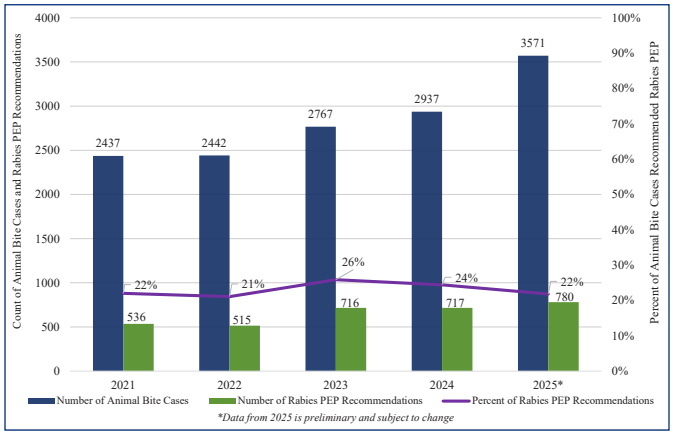
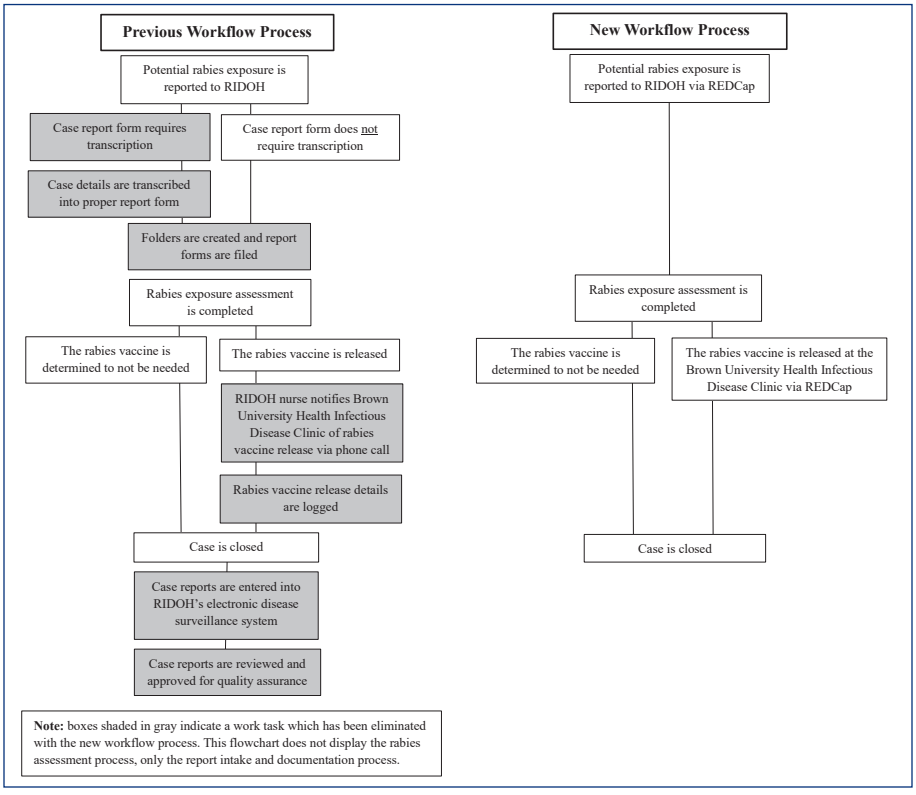


Figure 2. Comparison of case intake and documentation processes in discontinued Microsoft Teams versus new REDCap system.



release records were stored in Microsoft Teams, and PEP releases were communicated by phone to hospital pharmacies and emergency departments. While this represented an improvement, animal bite investigators continued to lose valuable time in certain areas. To further improve efficiency, the rabies program transitioned to REDCap on January 1, 2025. **Figure 2** displays the workflow processes in the Microsoft Teams system compared to REDCap and highlights work components that have been drastically reduced or eliminated. The goal of this evaluation is to measure the time saved by the animal bites team as a result of the modernization of the data system.

METHODS

To begin evaluating the time saved in the new system, a baseline was determined using 2024 animal bite reports, 2024 rabies testing reports, and 2025 rabies PEP releases at the Brown University Health Infectious Disease Clinic (BUH ID Clinic) [**Table 1**]. Only rabies PEP releases completed at the BUH ID Clinic were included in this analysis, as this is the only facility that has transitioned the PEP release process to REDCap. All case data were obtained from RIDOH's National Electronic Disease Surveillance System (RI-NEDSS), record filing system in Microsoft Teams, and REDCap.

Trials were conducted to measure the time previously required to transcribe and file case report forms (CRFs), log reports of animals submitted for rabies testing, and enter cases into RI-NEDSS. In each session, five-six participants completed a different type of data entry and timed each entry. Following completion of each timed trial, participants' times were combined, and an average was calculated. For each of the activities with timed trials, between 60 and 90 seconds was added to the average to account for the tasks which previously occurred but were not included in the timed trials (i.e., creating and naming folders). **Table 1** displays the number of timed trials completed for each discontinued work component and the average time spent on each task based on the timed trials.

Table 1. Description of time savings evaluation methods

Animal Bite Investigation Components	Evaluation Methods		
	Number of timed trials	Average time spent per task (Minutes)	Number of 2024/2025 animal bite cases
Transcribing and filing case report forms	100	8.25	2370
Filing duplicate case report forms	150	2	355
Logging reports of animals tested for rabies	120	4.5	731
Entering cases into RIDOH's electronic disease surveillance system	50	6	3385
Reviewing cases for quality assurance	Qualitative	4	3385
Recommending rabies PEP to the Brown University Health Infectious Disease Clinic	Qualitative	20	218*

*Reflects 2025 data. See methods for details.

Table 2. Animal bite investigation components evaluated for time saved in the new data system displayed by unit of time measured

Animal Bite Investigation Components	Unit of measurement (Time)			
	Minutes	Hours	Days (7 hours)	Weeks (5 days)
Transcribing and filing case report forms	19,553	326	47	9
Filing duplicate case report forms	710	12	2	0.3
Logging reports of animals tested for rabies	3,290	55	8	1.6
Entering cases into RIDOH's electronic disease surveillance system	20,310	339	48	10
Reviewing cases for quality assurance	10,155	169	24	5
Recommending rabies PEP to the Brown University Health Infectious Disease Clinic	4,360	73	10	2
Total time saved	**58,378 Minutes**	**974 Hours**	**139 Days**	**28 Weeks**

In the previous system, duplicate reports for the same case were common and required additional review and filing. To estimate the frequency of duplication, 150 case files were reviewed to identify cases with multiple initial reports and document the number of duplicates.

Finally, qualitative estimates of the time previously spent on conducting quality assurance reviews in RI-NEDSS and on rabies vaccine releases at the BUH ID Clinic were collected from members of the animal bites team [**Table 1**]. The animal bite nurses estimated that 85% of rabies PEP releases completed with the BUH ID Clinic did not require follow-up outside of REDCap. Based on this estimate, 15% of cases sent to the BUH ID Clinic were excluded from this analysis since there would have been no time saved when follow-up phone calls related to PEP were needed. These work components were measured with qualitative responses due to time constraints of the animal bites team and an inability to release rabies PEP at the BUH ID Clinic using the discontinued method.

Average times derived from each trial and from qualitative estimates were multiplied by the corresponding 2024 and 2025 case counts to calculate total time saved for each work component [**Table 1**]. Time savings were summarized

in minutes, hours, workdays, and workweeks [**Table 2**]. A workday was defined as seven hours, and a workweek as five workdays, consistent with RIDOH's work schedule.

RESULTS

In the year following the transition of RIDOH's rabies program from Microsoft Teams to REDCap, the animal bites team saved approximately 58,378 minutes of work time [**Table 2**]. On a larger scale, this equates to roughly 28 weeks or seven months of effort that is no longer required. Two work components eliminated under the REDCap system accounted for nearly 70% of total time savings: transcription and filing of case report forms (CRFs) and case entry into RI-NEDSS, which saved 19,553 minutes and 20,310 minutes, respectively [**Table 2**].

Previously, approximately 70% of animal bite cases (2,370 cases) were reported via fax, requiring animal bites team members to transcribe data into an internal case report form (CRF), a process that took an average of 8.25 minutes per report [**Table 1**]. Under the new system, providers and the public must report cases directly into REDCap, virtually eliminating the time previously required for transcription of case reports. Additionally, case entry into RI-NEDSS has been eliminated, as all required data are captured within REDCap. In addition, REDCap ensures higher data quality by reminding submitters of missing information prior to submission. With more complete data capture and the ability to export data from REDCap, which was not possible in Microsoft Teams, there is no longer a need to enter cases into a separate database.

Additional time savings resulted from discontinuing RI-NEDSS case quality assurance, logging reports of animals submitted for rabies testing, and filing duplicate CRFs which accounted for 10,155 minutes, 3,290 minutes, and 710 minutes saved, respectively [**Table 2**]. An additional 4,360 minutes were saved by recommending rabies PEP at the BUH ID Clinic through REDCap rather than by telephone [**Table 2**]. These time savings are notable, as they allow RIDOH nurses to devote more time to case assessment and also reduce administrative burden for BUH ID Clinic staff.

DISCUSSION

In cases where rabies PEP is recommended, timely initiation of the vaccine series is essential. To accommodate the steady increase of animal exposures requiring investigations and ensure that rabies assessments were not delayed, RIDOH spent three years streamlining the animal bites data system. Through the modernization of the rabies system, the animal bites team has been able to manage higher case counts while requiring fewer staff hours. During the summer, when reporting is highest, the animal bites team previously required the assistance of four to five full-time interns to assist with the transcription of CRFs and data entry into RI-NEDSS. With the cessation of these tasks, the animal bites team now requires only two full-time interns during the summer to cover phone intakes. This reduction in staffing has also improved the cost efficiency of the rabies program.

This evaluation did not capture all areas in which time savings have been realized under the REDCap system; therefore, the estimates presented here are likely underestimates of the total time saved. RIDOH intends to continue this evaluation by looking into time saved both internally and externally by partners such as the Rhode Island State Health Laboratories and medical professionals who have used the new system. RIDOH also plans to onboard additional healthcare facilities to REDCap to expand electronic rabies PEP releases and further reduce staff time previously spent on telephone-based processes.

The rabies vaccination process is time intensive, as a typical PEP regimen requires four medical visits for administration of human rabies immune globulin (HRIG) and four doses of rabies vaccine on days 0, 3, 7, and 14.[3] The rabies vaccine series is also costly. In 2023, patients seen at Brown University Health facilities incurred an average cost of $13,759 for the rabies vaccine series. In a manuscript forthcoming in the *Journal of Public Health Management and Practice*, RIDOH conducted an analysis to assess the healthcare cost saving resulting directly from our rabies assessment procedures. The analysis estimated that these procedures save the Rhode Island public approximately $6 to $13 million annually. Recognizing the significant time and financial burden placed on the public by rabies vaccination, Rhode Island has committed to ongoing modernization and improvement of the rabies program.

References

1. Centers for Disease Control and Prevention. About Rabies, 2025. [https://www.cdc.gov/rabies/about/index.html]
2. Whitehouse ER, Person MK, Brown CM, Slavinski S, Rao AK, Blanton JD. Evaluating Surveillance for and Estimating Administration of Rabies Postexposure Prophylaxis in the United States, 2012-2018. PLoS Negl Trop Dis. 2021 Oct 25;15(10):e0009878. doi: 10.1371/journal.pntd.0009878.
3. Centers for Disease Control and Prevention. Rabies Post-exposure Prophylaxis Guidance, 2025. [https://www.cdc.gov/rabies/hcp/clinical-care/post-exposure-prophylaxis.html]

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