NIHR Health Protection Research Unit in Emerging and Zoonotic Infections

Utilising social media as an adjunct to traditional zoonotic surveillance systems.

A case study: Lyme disease and dogs in the UK and Ireland

JSP Tulloch [1,2], AD Radford [1, 3], J Warner [1,4], RM Christley [1,3] , R Vivancos [1,2]

1 NIHR Health Protection Research Unit in Emerging and Zoonotic Infections, University of Liverpool, UK
2 Field Epidemiology Service, National Infection Service, Public Health England, UK
3 Institute of Infection and Global Health, University of Liverpool, Leahurst Campus, UK
4 Rare and Imported Pathogens Lab, Public Health England, PHE Porton, UK

jtulloch@liverpool.ac.uk
John.tulloch@phe.gov.uk
@JT_EpiVet

Introduction

Background

- Social media (e.g. twitter) has revolutionised communication, but it's potential for surveillance of veterinary diseases remains under-explored.
- Lyme disease is a zoonotic tick-borne disease, and it's incidence in humans is rising across Europe.
- However, little is known about the incidence and public perception of canine Lyme disease.

The pathognomonic rash for human Lyme disease

Objective

- To compare human and canine twitter datasets to known epidemiological data. Identify themes raised about canine Lyme disease.

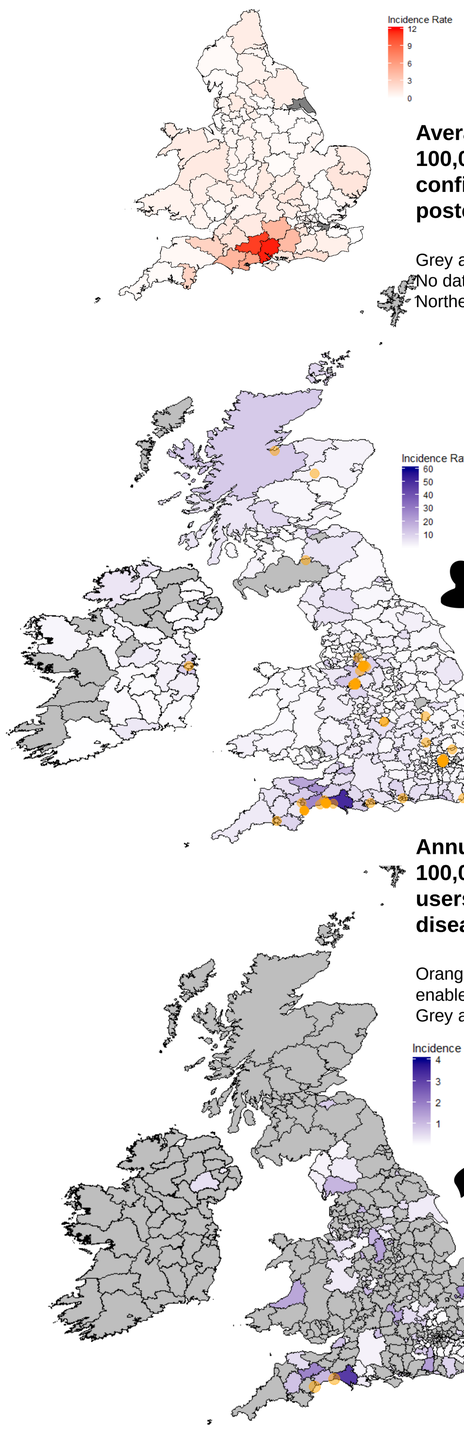
Methods

Canine Clinical Presentations - ACVIM Consensus Statement

- It is not proven that European Lyme disease causes clinical signs in dogs. (May be due to different causal genu-species)
- Many seropositive with no clinical signs
- May present with polyarthritis or nephritis

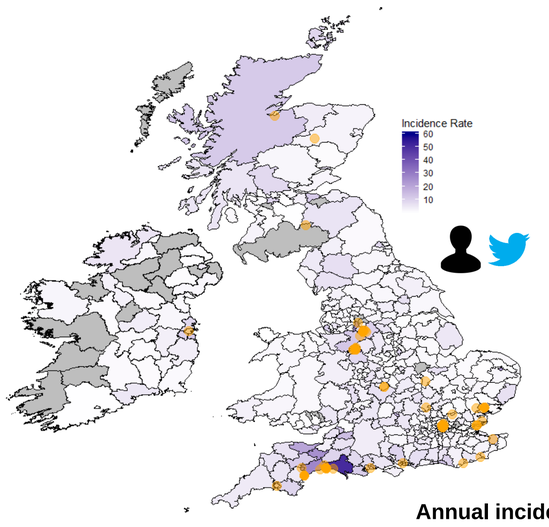
- Tweets from the UK and Ireland (July 2017 - June 2018) were searched for the word 'Lyme'. Dog and human subsets were generated.
- Trends in seasonality and geography were compared to published figures.
- Data was explored for word frequency, association, sentiment analysis, and impact.

Results



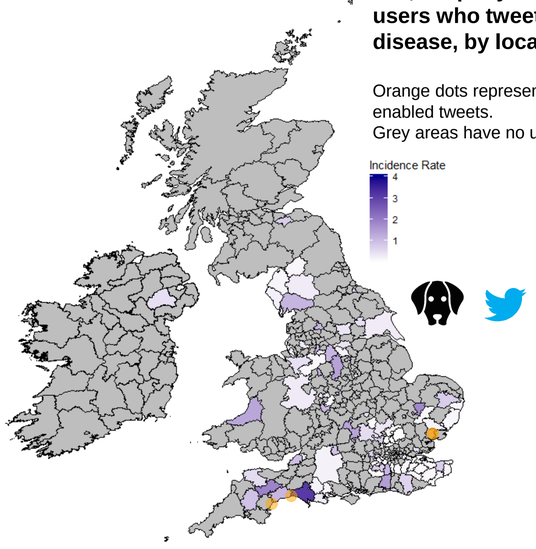
Average annual incidence (cases per 100,000 per year) of laboratory confirmed Lyme disease cases, by postcode area.

Grey areas have no cases.
No data is available for Ireland, Scotland, and Northern Ireland.

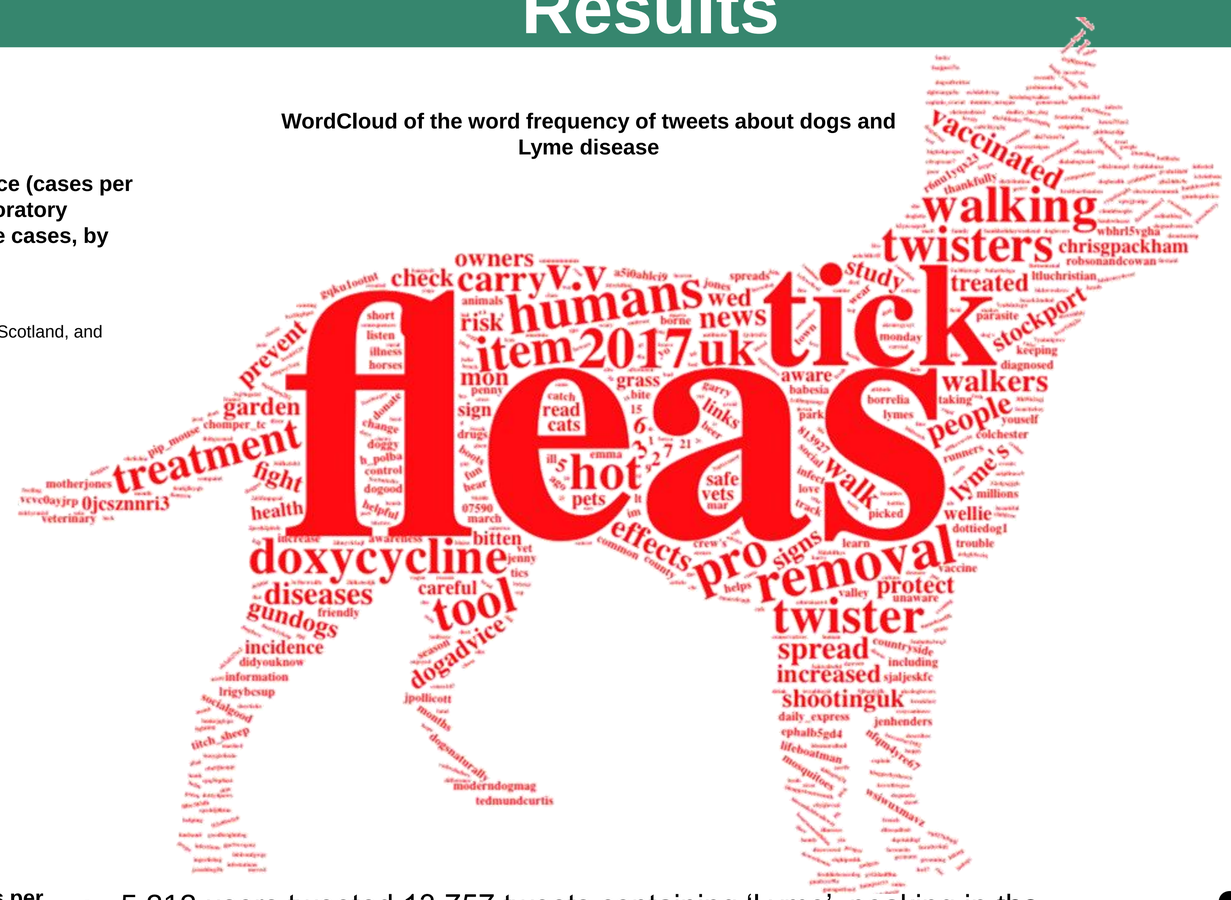


Annual incidence (users per 100,000 per year) of twitter users who tweeted about Lyme disease, by local authority.

Orange dots represent location of location enabled tweets.
Grey areas have no users



WordCloud of the word frequency of tweets about dogs and Lyme disease

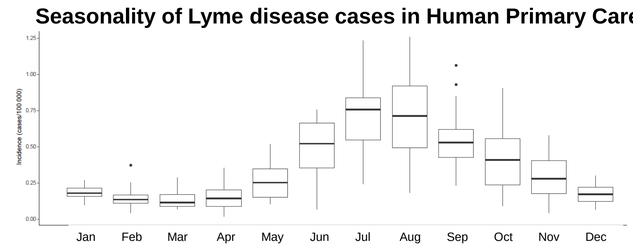


- 5,212 users tweeted 13,757 tweets containing 'Lyme', peaking in the summer.
- Clustering of users occurred in the South-West of England and Highlands of Scotland, reflecting the known areas of high incidence of Lyme disease in humans.
- 165 users tweeted 205 tweets containing 'Lyme' and 'dog'.
- The data suggested some seasonality, but data was skewed by one tweet. If this tweet is removed, seasonality appears in original tweets data.
- No geographical conclusions could be drawn.
- Sentiment analysis showed a mixed range of emotions, with neither positive or negative sentiments dominating. However, 'anger' was the most numerous single sentiment.

The most impactful tweet

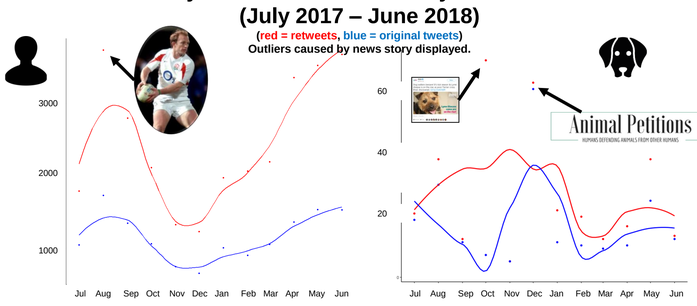
Impact = Total followers of original tweet author + Σ((Followers of a user who retweets) + (Followers of user who liked the tweet))

Seasonality of Lyme disease cases in Human Primary Care

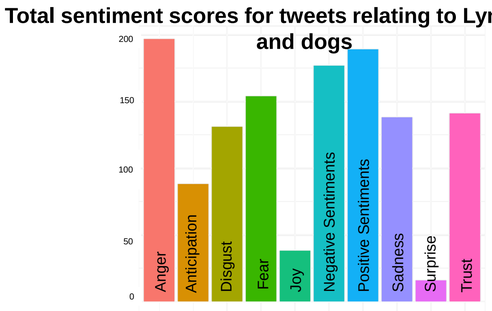


Seasonality of human and canine Lyme disease tweets (July 2017 – June 2018)

(red = retweets, blue = original tweets)
Outliers caused by news story displayed.



Total sentiment scores for tweets relating to Lyme disease and dogs



Discussion

Discussion and Conclusion

- Twitter may be useful as an epidemiological tool to assist in Lyme disease surveillance.
- It can be analysed in real-time and identify potential disease hotspots; however there is a substantial risk of false positives.
- The canine-specific dataset was too small to provide useful epidemiological data.

Perspectives

- Such data can guide veterinary public health practitioners in the education of the public about the relative risk that Lyme poses to pets and its mode of transmission.
- Social media can be utilised to understand the public's knowledge base and emotions about a disease; and therefore shape education and policy.

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