

Introduction

- Medical decision making is often influenced by media coverage, but reports often contain a lack of complete information. [3]
- Highly publicized medical cases have been shown to have a direct effect on the public, such as the death of Katie Couric's husband as a result of colon cancer leading to a rise in colonoscopies in the months following. [2]
- Researchers in pharmacovigilance have previously used social media to detect adverse drug reactions (ADRs). [1]
- However, little has been done to connect recorded data on consumer behavior to news and social media influences. In this project, we ask:

- 1) How do clinical and non-clinical reports in the media influence prescription drug behavior?
- 2) Does media coverage explain historical trends in prescribing volumes in the US?

Data Sources

- Centers for Medicare & Medicaid Services (CMS) Medicaid State Drug Utilization Datasets for 1992-2017 (74M records, temporal)
- National Library of Medicine RxNorm Dictionary, OMOP v5 Vocabulary (37.8k event tables)
- FDA Adverse Event Reporting System Dataset (2.7M unique events, temporal)
- Custom query using The New York Times Article Search API and The Guardian Open Platform API (28.4k articles, temporal)
- Twitter REST API (229k tweets, temporal)

Methods

- Scrape The New York Times, The Guardian, and Twitter using their APIs to gather relevant content from the last 25 years
- Recreate Bidirectional Long Short-Term Memory (BLSTM) Recurrent Neural Network (RNN) to detect ADRs on Twitter and expand coverage to include new drugs to create a community driven dictionary of reactions
- Perform longitudinal prescription data exploration linking social and news media
- Utilize ReactJS and D3 to create interactive application mapping historical trends of pharmaceutical use across US and information from news and social media on user-specified drugs
- Conduct survey to gauge impact of presented information on consumer opinion and decision making

Results

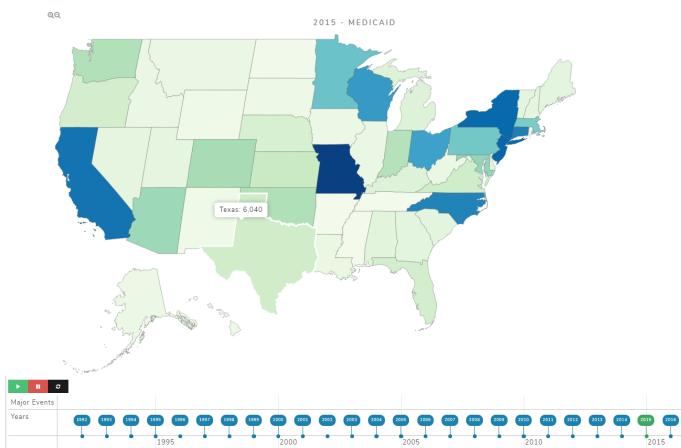


Figure 1: Oxycontin prescription volume for 2015 by state



Figure 3: Mapping of reactions to Oxycontin from Twitter

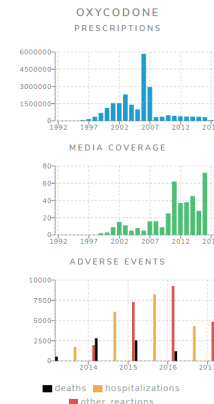
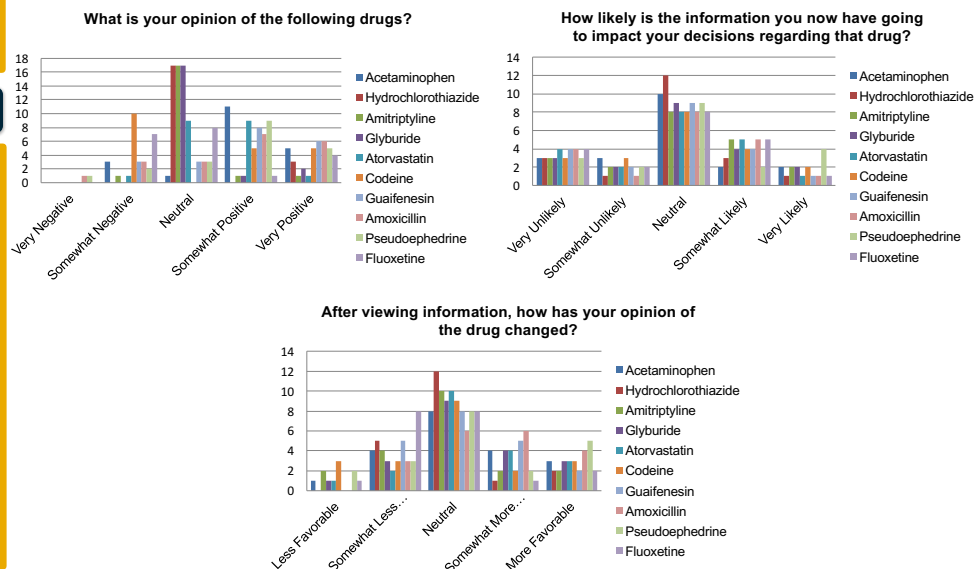


Figure 2: Total prescription volume, number of media articles and confirmed adverse events



Figure 4: Evaluation survey QR code

Evaluation of Results



Conclusion

Patients have access to more information than ever when making decisions regarding their health. Our findings show that there is a correlation between prescribing trends and media coverage as well as a negative correlation with confirmed adverse events. The results from our evaluation indicate that while 16% of participant responses were negative, 25% stated their opinion decreased after viewing the presented information. The results further show that publicly accessible information can have an effect on their opinion of a prescription drug, as 54% of participants indicated a change in opinion.

- References**
- [1] A Cocos, AG Fiks, and AJ Masino. "Deep learning for pharmacovigilance: recurrent neural network architectures for labeling adverse drug reactions in Twitter posts". In: Journal of the American Medical Informatics Association 24.4 (2017), pp. 813-821. doi:10.1093/jamia/ocw180. [2] P Cram et al. "The impact of a celebrity promotional campaign on the use of colon cancer screening: The Katie Couric effect". In: Archives of Internal Medicine 163.13 (2003), pp. 1601-1605. doi:10.1001/archinte.163.13.1601. [3] A Larsson et al. "Medical messages in the media - barriers and solutions to improving medical journalism". In: Health Expectations 6.4 (2003), pp. 323-331. doi:10.1046/j.1369-7625.2003.00228.x.

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