



Washington State HIV Vulnerability Assessment

Background

Opioid use and injection drug use are increasing in the United States and in Washington State.^{1,2} Due to increases in injection drug use, there is concern for HIV outbreaks among people who inject drugs (PWID). In 2015, there was an HIV outbreak among PWID in Scott County, Indiana.³ In 2018, there was also an outbreak among PWID in Seattle, Washington.⁴ Following the Indiana outbreak, the US Centers for Disease Control and Prevention (CDC) conducted a study to identify indicator variables associated with injection drug use, in order to determine which US counties may be vulnerable to new or increasing rates of HIV or HCV among PWID.⁵ In 2019, Washington State performed three similar analyses to identify counties that may be at risk of new or increasing 1) HCV or 2) HIV infections or 3) opioid overdose among PWID. This summary reports findings of the Washington State HIV vulnerability assessment.

Methods

We collected county-level data for 59 indicators from 2015 and 2016 that were identified in the CDC analysis,⁵ in a subsequent vulnerability assessment Tennessee conducted,⁶ or because of the Washington context. Asotin, Columbia, and Garfield were combined due to small numbers and data availability. We used 2015 data to fit and 2016 data to test our model. We summed virally unsuppressed prevalent HIV cases and created a binary variable of cases that were lower than the median (≤ 16 cases) or higher (> 16 cases). We used lasso regression to identify predictors of the outcome. Any predictor that was in $\geq 98\%$ of the 100 lasso regression runs and fit well in the logistic regression model was included. We performed logistic regression with the identified predictors for the 2015 data. We used the resulting coefficients to predict 2016 outcomes, compare them to actual counts, and rank counties.

References

1. Zibbell JE AA, Patel RC, Kupronis B, Iqbal K, Ward JW, Holtzman D. Increases in Acute Hepatitis C Virus Infection Related to a Growing Opioid Epidemic and Associated Injection Drug Use, United States, 2004 to 2014. *American journal of public health*. 108 (2):175-181.
2. Alcohol and Drug Abuse Institute University of Washington. Opioid trends across Washington state. https://ada.uw.edu/WAdata/opiate_home.htm.
3. Peters PJ, Pontones P, Hoover KW, et al. HIV Infection Linked to Injection Use of Oxymorphone in Indiana, 2014-2015. *The New England journal of medicine*. 2016;375(3):229-239.
4. Golden MR, Lechtenberg R, Glick SN, et al. Outbreak of Human Immunodeficiency Virus Infection Among Heterosexual Persons Who Are Living Homeless and Inject Drugs - Seattle, Washington, 2018. *MMWR Morbidity and mortality weekly report*. 2019;68(15):344-349.
5. Van Handel MM, Rose CE, Halisey EJ, et al. County-Level Vulnerability Assessment for Rapid Dissemination of HIV or HCV Infections Among Persons Who Inject Drugs, United States. *J Acquir Immune Defic Syndr*. 2016;73 (3):323-331.
6. Rickles M, Rebeiro PF, Sizemore L, et al. Tennessee's In-state Vulnerability Assessment for a "Rapid Dissemination of Human Immunodeficiency Virus or Hepatitis C Virus Infection" Event Utilizing Data About the Opioid Epidemic. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America*. 018;66(11):1722-1732.

Results

There were three variables that were included in the logistic regression models: log of population per square mile; rate of specialists in infectious disease, gastroenterology, hepatology, and addiction medicine; and the rate of patients with 5+ prescribers and 5+ opioid dispensers. The model predicted counties that were above or below the median count of unsuppressed HIV cases 95% accurately for 2015 and 95% accurately for 2016. County-level predictions are shown below.

2015 Results



2016 Results



-  unsuppressed HIV cases \leq median
-  unsuppressed HIV cases $>$ median

The model made 2 inaccurate predictions in 2016: Chelan and Lewis counties. Both were predicted to have above average counts of unsuppressed HIV cases, but had below average counts.

Next Steps

We identified predictors of having higher than average unsuppressed HIV cases in Washington State counties. These indicators can be tracked on the county level to inform HIV prevention efforts. Strategic interventions should be identified for counties with predicted higher HIV counts. Our models have limitations, including limited years of data. Future work will assess performance on 2017 and 2018 data.

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