

U.S. Counties' Vulnerability to Rapid Dissemination of HIV/HCV Infections Among People Who Inject Drugs

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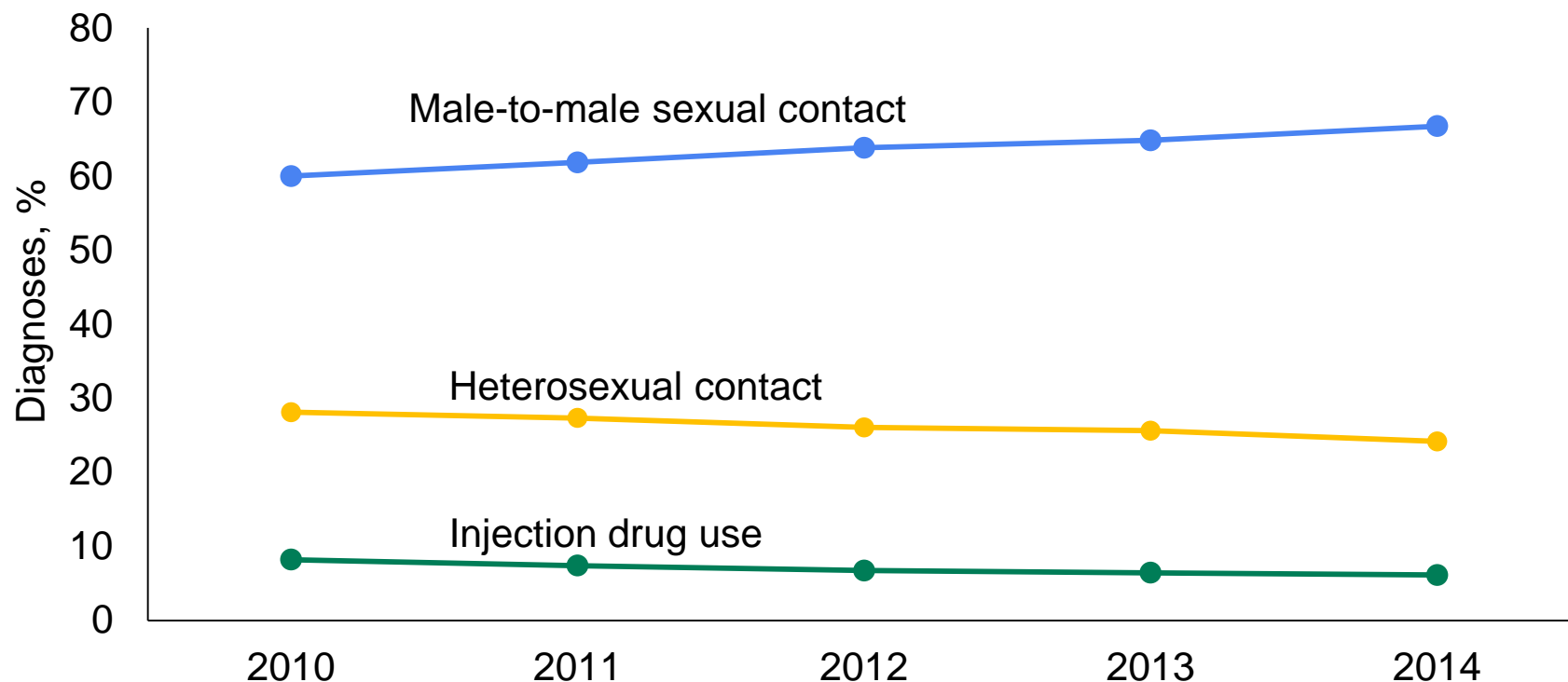
Learning Objectives

- Describe the factors associated with acute hepatitis C infection rates during 2012-2013 in the United States.
- Increase provider awareness of the geographic areas identified as vulnerable to rapid spread of HIV, if introduced, and new or continuing high rates of HCV infections among persons who inject drugs and the HIV infection proximity in these areas.
- Describe three actions that state and local health departments can do to better understand their local vulnerability to rapid spread of HIV or HCV infections among persons who inject drugs.

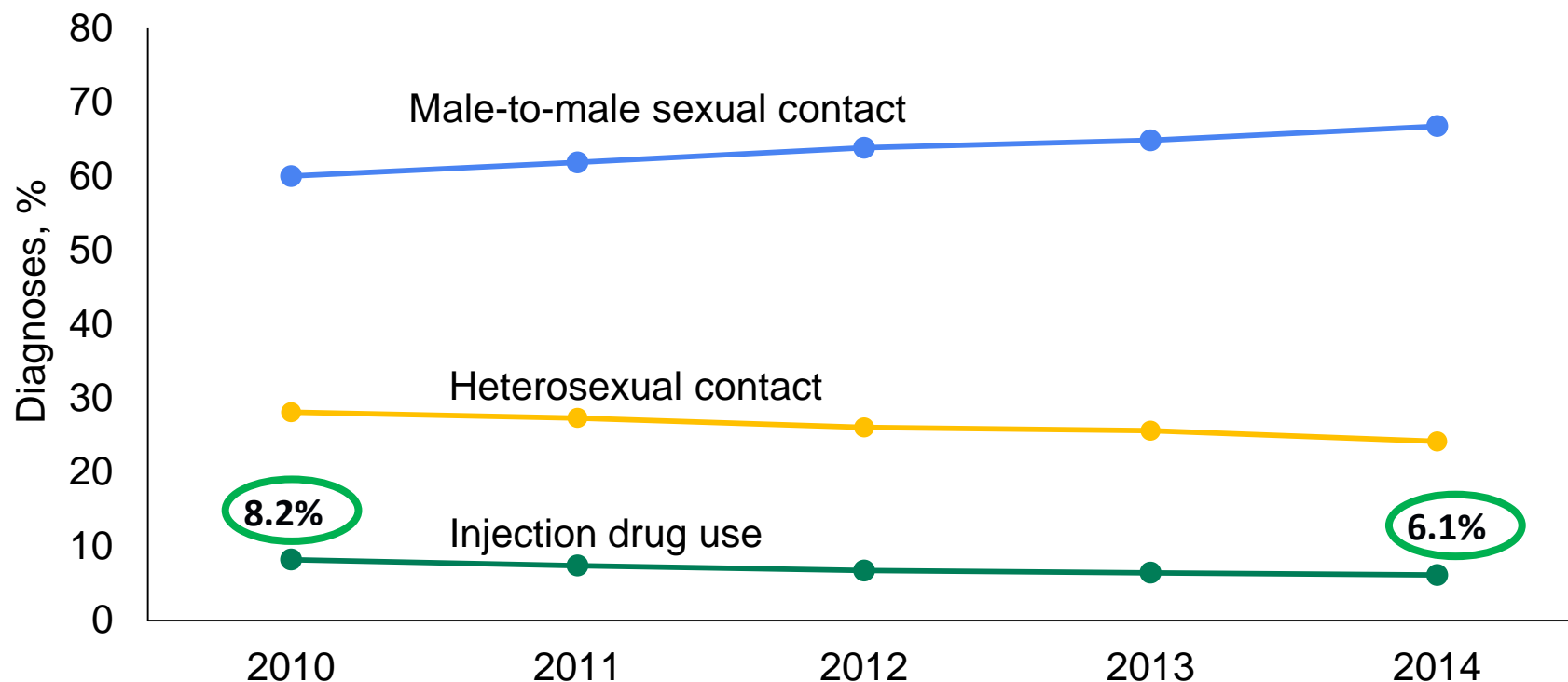
Outline

- Review HIV infection transmission category trends
- Summarize Indiana HIV and HCV outbreak and response
- Discuss underlying factors related to Indiana HIV outbreak
- Review CDC's HIV and HCV vulnerability assessment
- Discuss what can be done

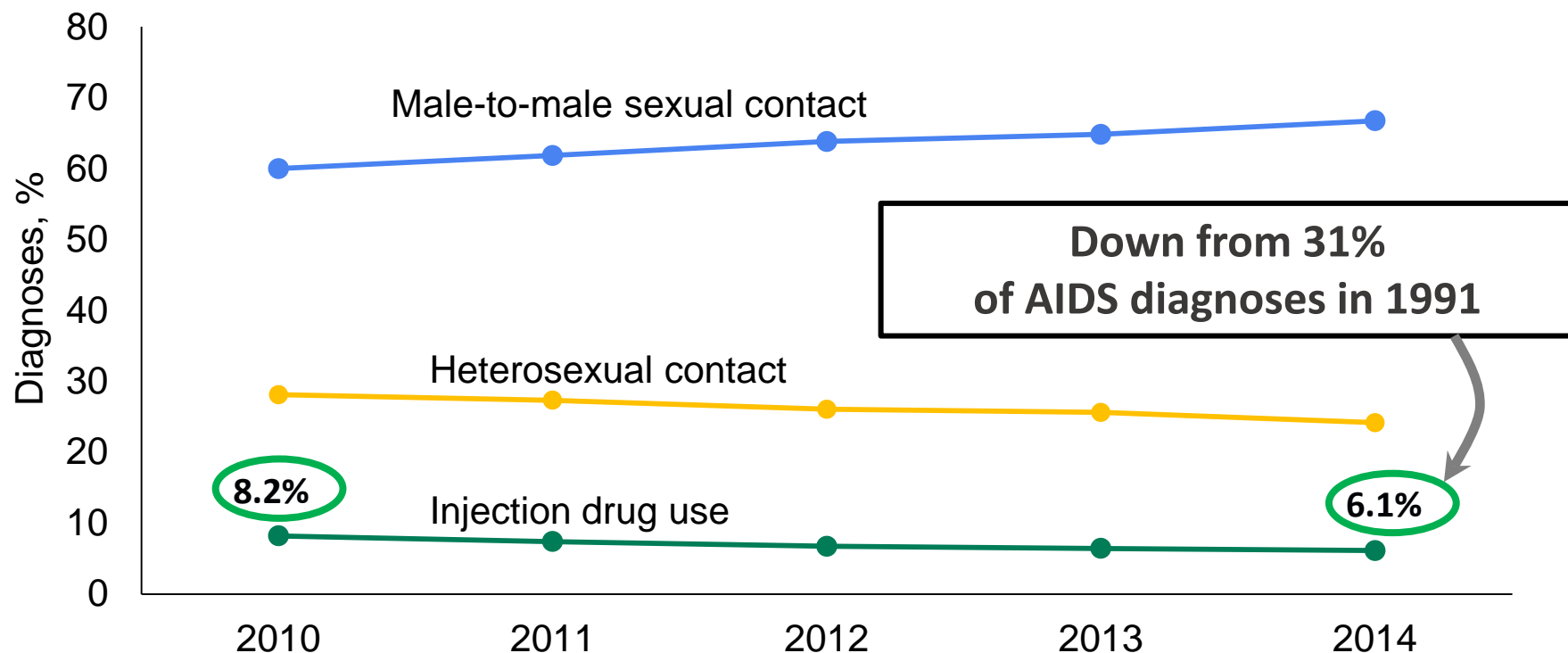
Diagnoses of HIV Infection among Adults and Adolescents, by Transmission Category, 2010–2014 - United States and 6 Dependent Areas



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Indiana HIV Outbreak

Indiana HIV Outbreak: Geography

Scott County pop. 24,000; Austin city pop. 4,200

- Rural southeastern region of state
- Scott County ranked 92nd in many health ar among Indiana's 92 counties
 - Lowest life expectancy
 - 9% unemployment
 - 19% poverty
 - 21% no high school degree
 - Many uninsured



Indiana HIV Outbreak Summary





- In early 2015, 11 new HIV infections diagnosed Scott County, IN
 - Over past decade, <1 new HIV infection in Scott County per year
 - As of February 1, 2016 → 188 new HIV diagnoses
 - >90% coinfecting with hepatitis C virus
- Response required a large and intensive collaboration of local, state and federal public health resources in partnership with the community
 - Establish extent of the HIV infections
 - Institute prevention and control measures
- Transmissions occurred in a dense network of persons who inject drugs
 - Opioid analgesic - oxycodone

Demographics of HIV-infected Cases (N=181)

- Median age 34 years, interquartile range 28 - 42
- 58% male
- 99% non-Hispanic white
- 96% injected drugs in past 12 months
 - 92% oxymorphone
 - 27% heroin, 23% methamphetamine, 9% cocaine

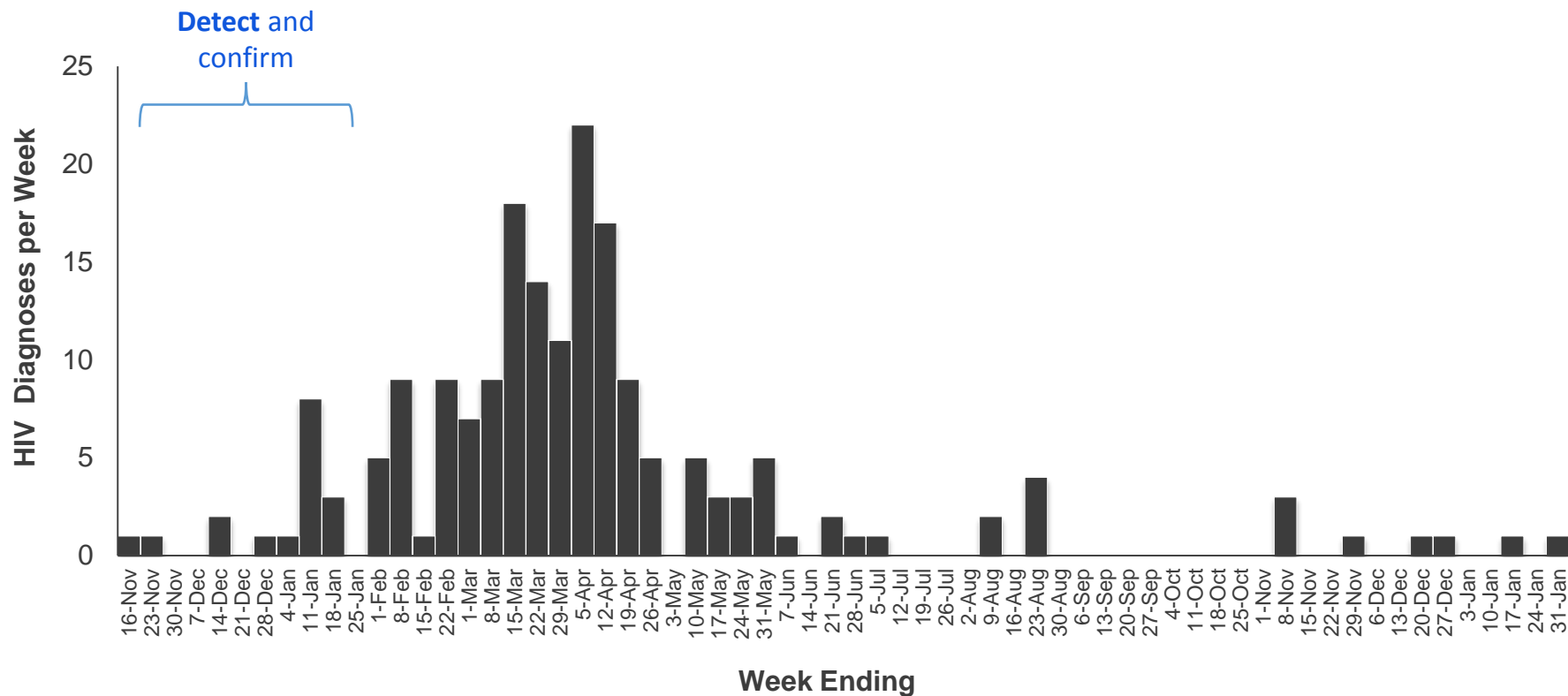
Drug Use among HIV-infected Cases (N=108)

- Multigenerational users
- Daily injections: 4-15
- Sharing of injection equipment common
- Number of needle-sharing partners per injection event: 1-6

Dosage Strength	OPANA [®] ER with INTAC [®] Tablet Images [*]	GENERIC oxymorphone ER Global Pharma (Impax) Tablet Images [*]
40 mg		
30 mg		

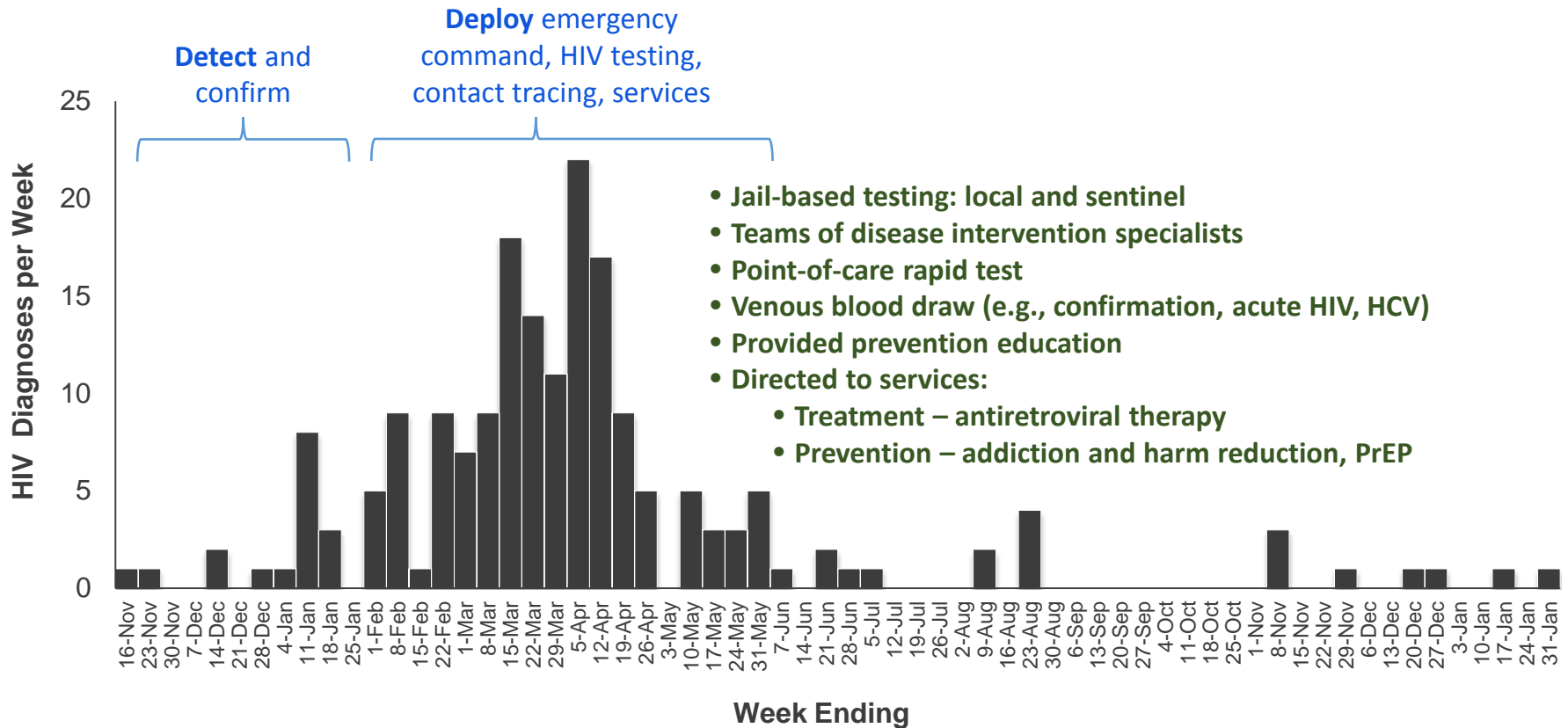
Early Release, MMWR Morb Mortal Wkly Report 2015, April 24, 2015

HIV Diagnoses by Week, Indiana HIV Outbreak (N=188)



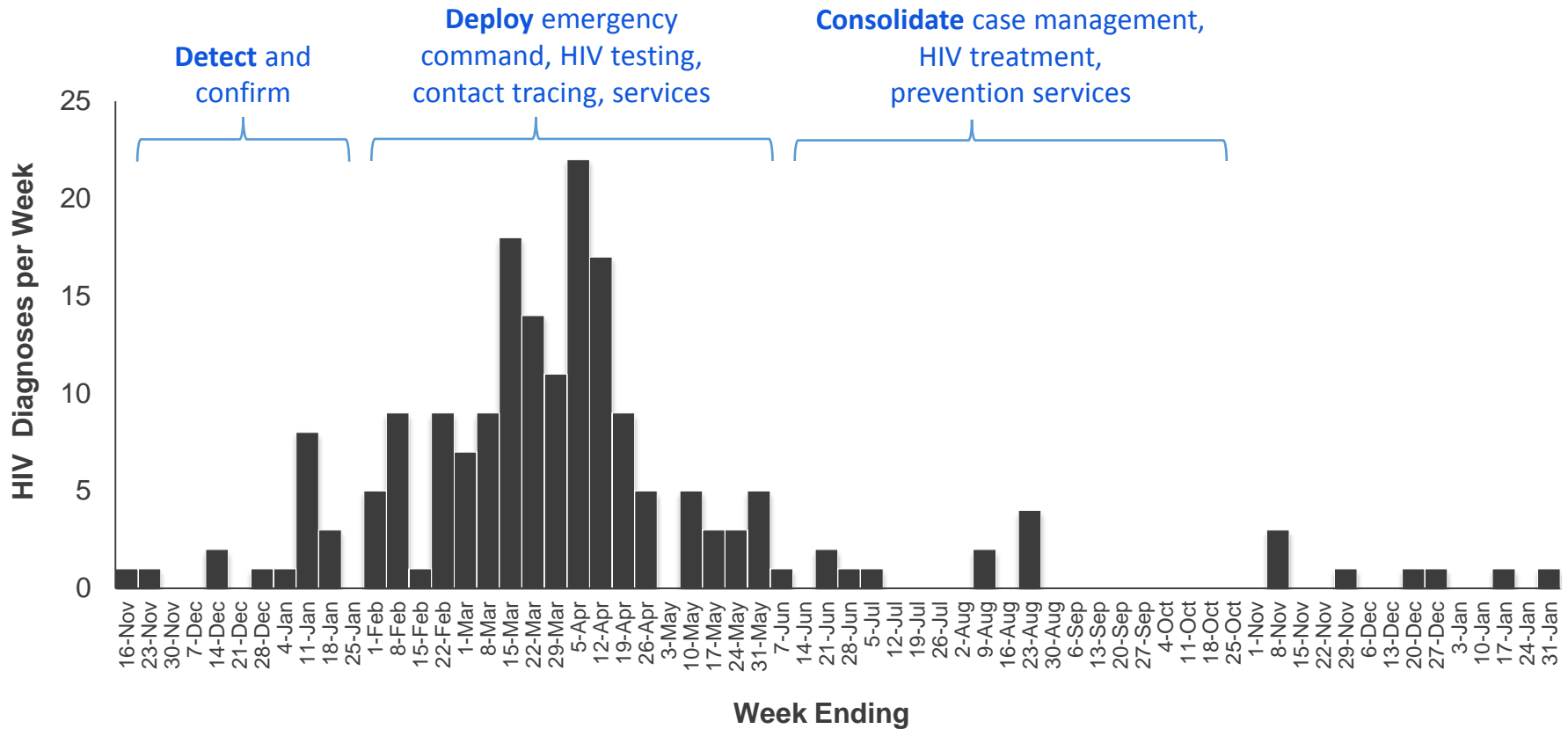
Peters P et al., under review and Indiana State Department of Health

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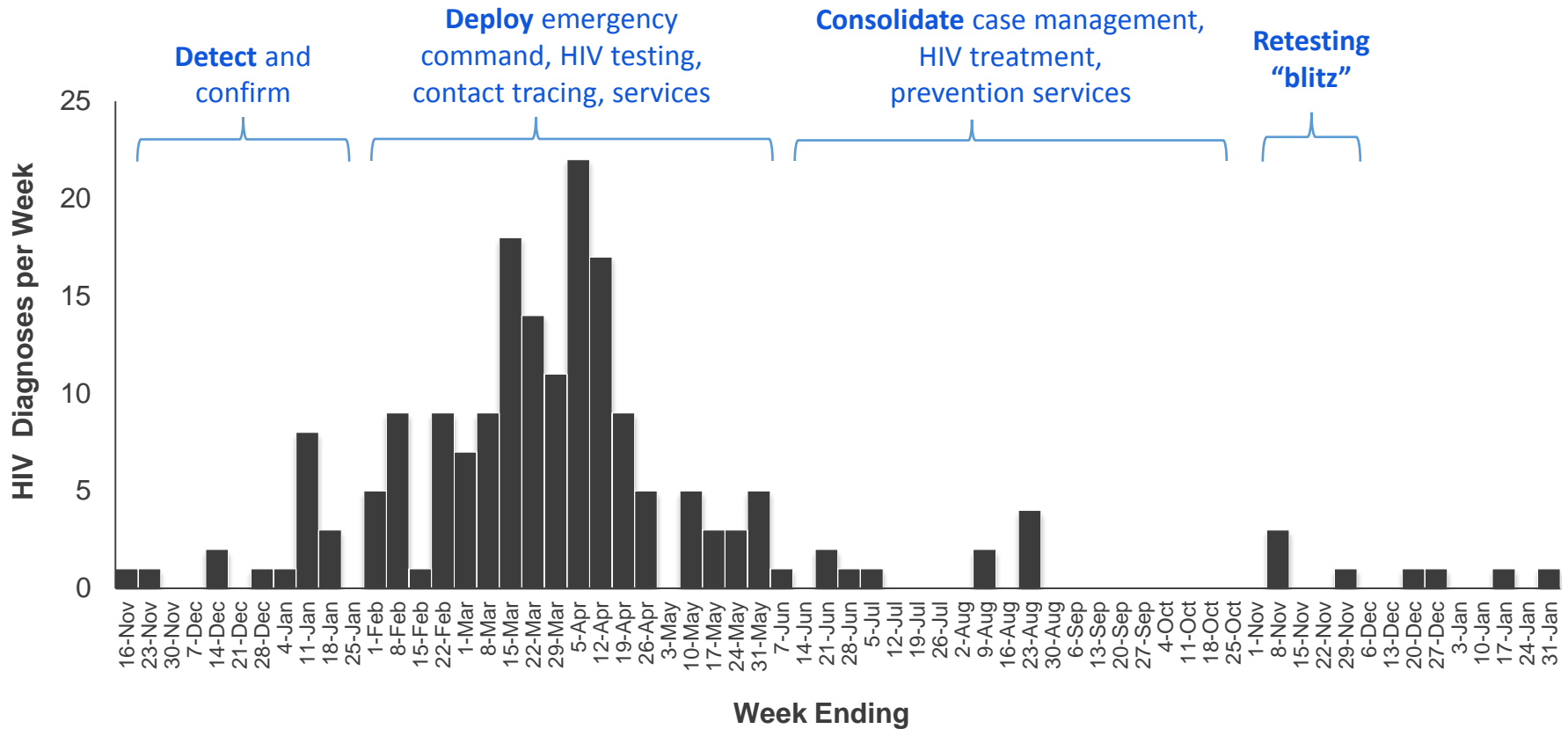
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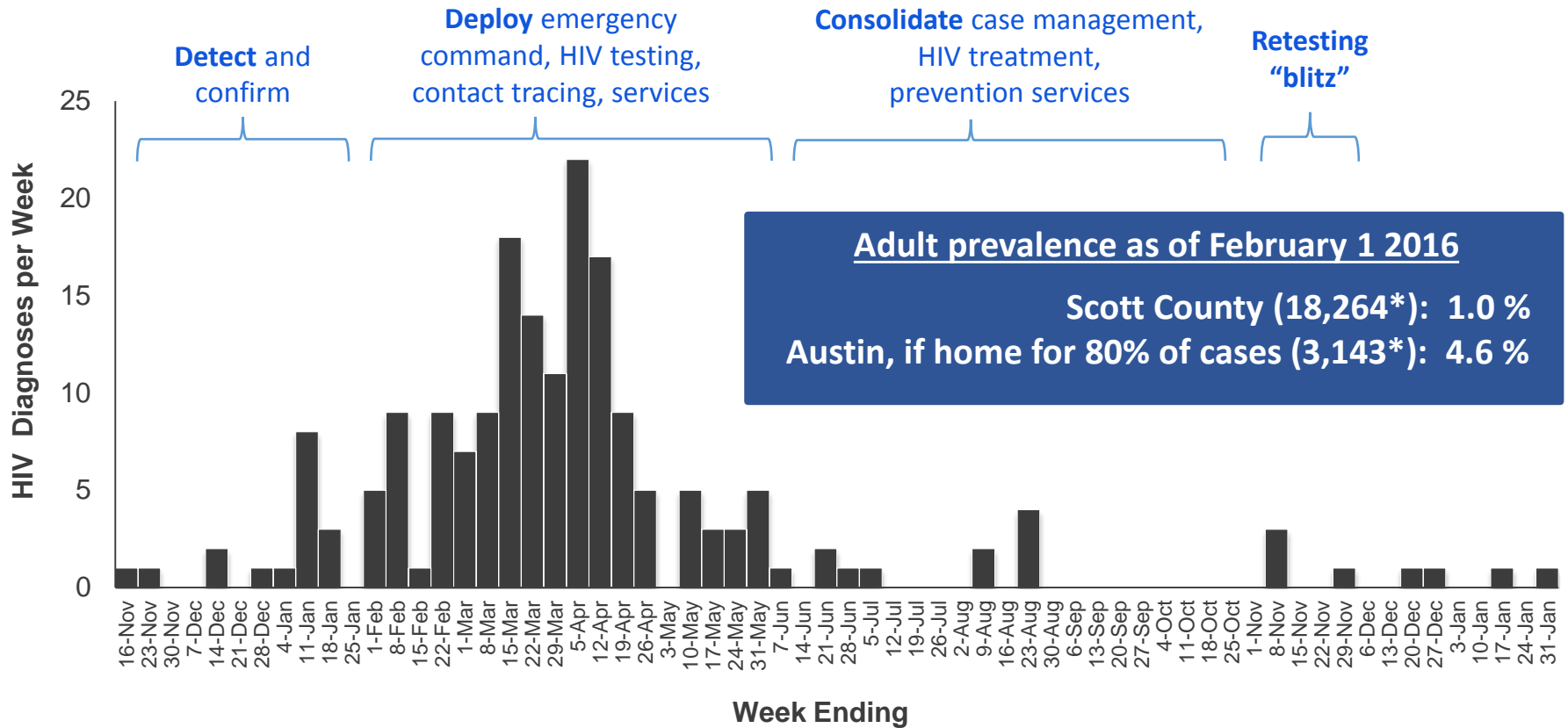
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Major Logistical Challenges Responding to Outbreak

- Very few affected persons were employed or insured
 - Lacked documents to enroll in state-supported program (“One-Stop Shop”)
- Limited HIV awareness, substantial misinformation
 - Unaware of transmission risks and treatment benefits
- Distrust between PWID community and law enforcement
- No outpatient HIV/HCV care available in the community
- Insufficient addiction services, including medication-assisted therapy
- Syringe service program not permitted by state law

H. R. 2029

One Hundred Fourteenth Congress
of the
United States of America

AT THE FIRST SESSION

*Begun and held at the City of Washington on Tuesday,
the sixth day of January, two thousand and fifteen*

An Act

Making appropriations for military construction, the Department of Veterans Affairs,
and related agencies for the fiscal year ending September 30, 2016, and for
other purposes.

*Be it enacted by the Senate and House of Representatives of
the United States of America in Congress assembled,*

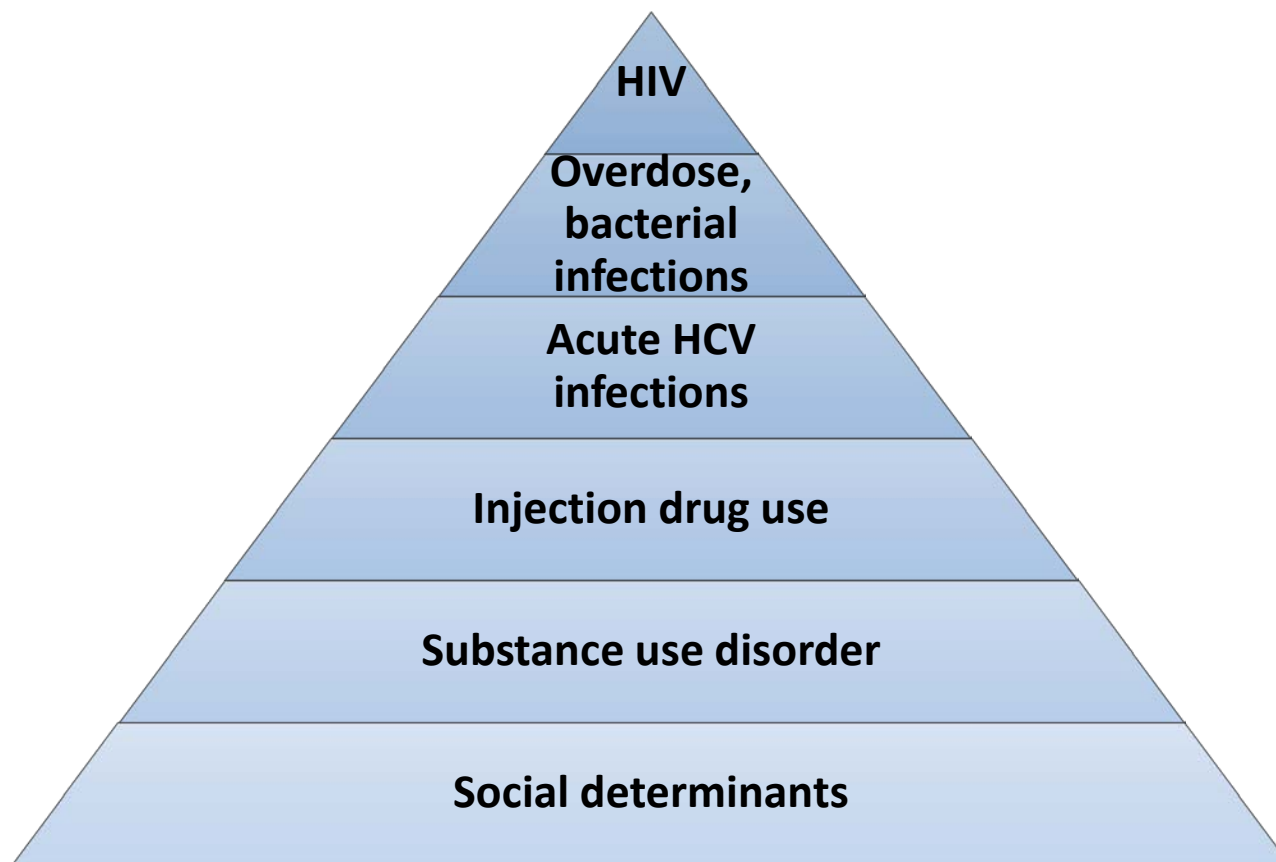
SECTION 1. SHORT TITLE.

This Act may be cited as the “Consolidated Appropriations
Act, 2016”.

Federal funds can be used for syringe service programs
(except purchase of needles and syringes)
if – in consultation with CDC – a need is demonstrated
(i.e., significant increase in hepatitis infections, HIV
outbreak)

What Had Changed – Underlying Factors

Context of an HIV Outbreak

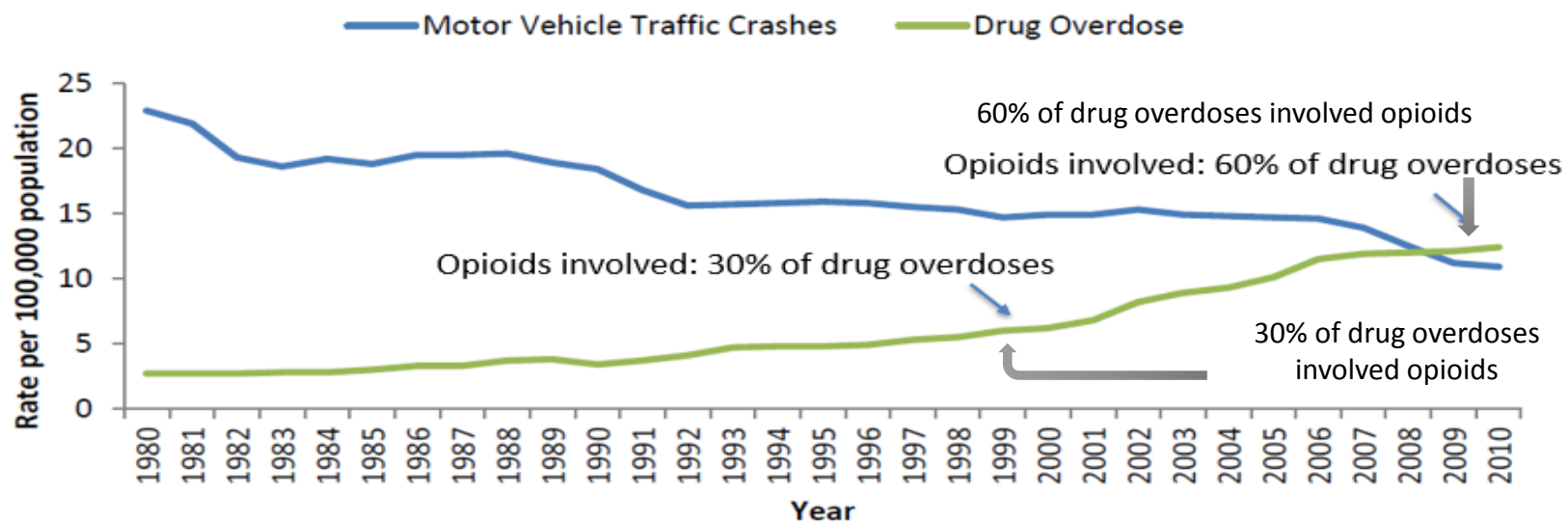


Time Magazine

June 15, 2015

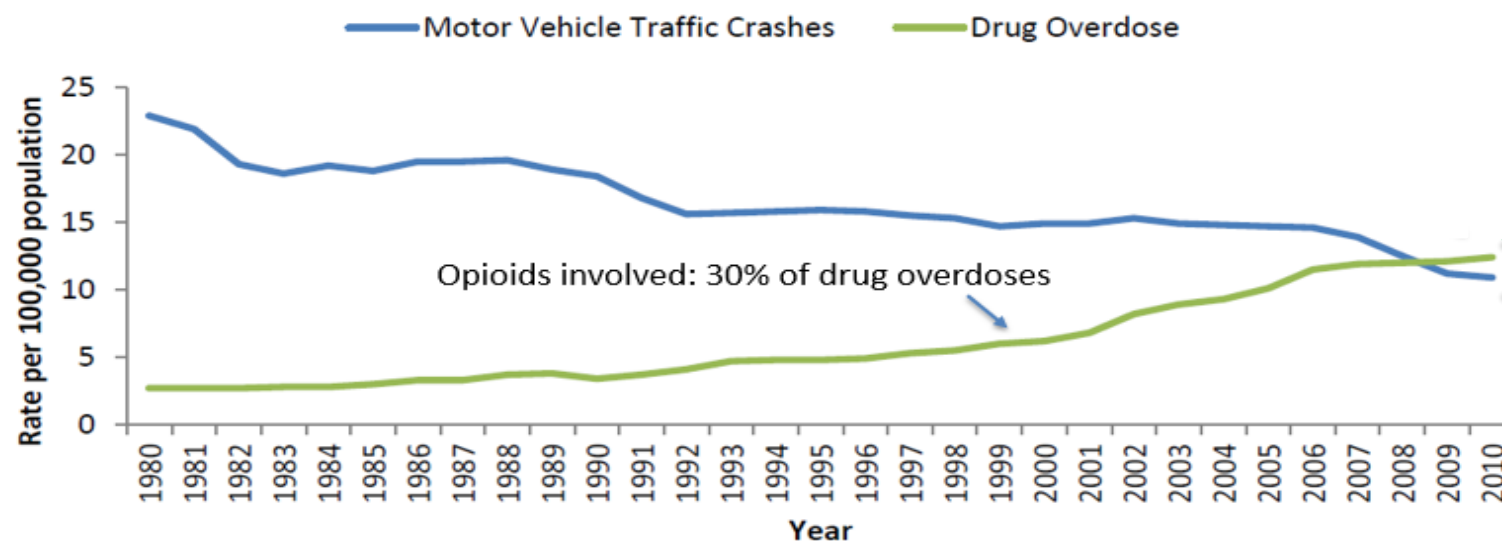


Rates of motor vehicle traffic and drug overdose deaths, United States



Source: DHHS, Addressing Prescription Drug Abuse in the United States Current Activities and Future Opportunities , September 2013

Rates of motor vehicle traffic and drug overdose deaths, United States



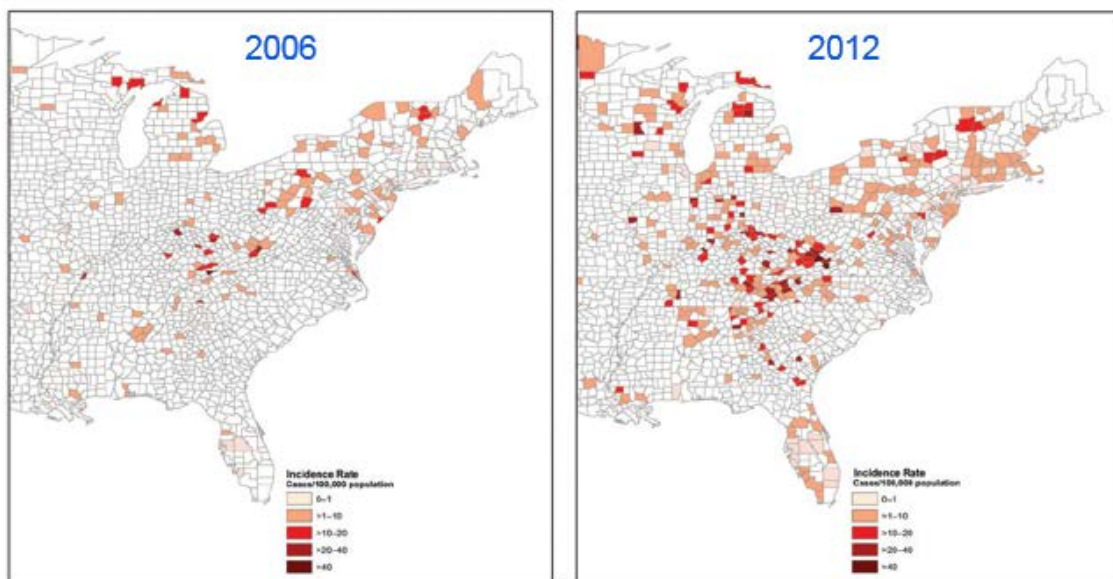
2014
47,055 *
32,675 **

Source: DHHS, Addressing Prescription Drug Abuse in the United States Current Activities and Future Opportunities , September 2013

Expanding Epidemic of Injection Drug Use Heralded by Dramatic Increase in Acute HCV Infections

- The infectious complications have been most evident with increases in acute HCV infections
- Communities affected are not those affected historically by injection drug use

Expanding epidemic of injection drug use
heralded by dramatic increase in acute HCV infections



Suryaprasad *Clin Infect Dis*; 2014, 59(10):1411-1419

Purpose

Identify counties in the United States potentially vulnerable to rapid dissemination of HIV/HCV infection among people who inject drugs.

Methods: Multi-step Approach

Which variables
are associated
with acute HCV
infection?

- **Poisson Regression Model**
 - Independent variables: county-level variables available recently and nationally
 - Outcome: acute HCV infection, proxy for unsterile injection drug use

Which counties
have highest
vulnerability to
HIV/HCV
outbreak?

- **Composite Index Score – “Vulnerability Score”**
 - Calculate score using variables significantly associated with outcome (i.e., acute HCV infection as proxy for unsterile injection drug use).
 - Rank counties by score to identify those with greatest potential vulnerability

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RESULTS: Outcome and Variables (n=15) selected to identify counties vulnerable to rapid dissemination of HIV/HCV infection among PWID

Outcomes/Variables	Data Source, Year(s) reported
HCV incidence (outcome)	National Notifiable Disease Surveillance System (NNDS), 2012-2013
Drug overdose deaths	National Center for Health Statistics (NCHS) / National Vital Statistics Systems (NVSS), 2012-2013
Prescription opioid sales	Drug Enforcement Administration - Automation of Reports and Consolidated Orders System, 2013
Mental health services	Center for Medicare and Medicaid Services (CMS), National Provider Identification, 2014
Insurance coverage	American Community Survey, 2012-2013 5-year estimates
Urgent care facilities	Homeland Security Infrastructure Program Gold Database, 2012
Vehicle access	American Community Survey, 2012-2013 5-year estimates
Access to interstate	ESRI maps and data, 2014
Buprenorphine Prescribing Potential	SAMHSA DATA 2000 Program Information, 2014
Education	American Community Survey, 2012-2013 5-year estimates
Income	American Community Survey, 2012-2013 5-year estimates
Poverty	American Community Survey, 2012-2013 5-year estimates
Race/ethnicity	American Community Survey, 2012-2013 5-year estimates
Unemployment	American Community Survey, 2012-2013 5-year estimates
Population density	US Census, 2010
Urban/Rural status	National Center for Health Statistics (NCHS), 2013

Results – Which variables best predicted acute HCV infection?

Variables	Final Model	
	Standardized Relative Risk	p-value
Percent White, Non-Hispanic Population ¹	1.68	<0.0001
Drug Overdose Deaths per 100k Persons	1.21	<0.0001
Per Capita Income ²	0.81	<0.0001
Percent Unemployed Population ³	1.14	0.012
Prescription Opioid Sales per 10k persons ⁴	1.09	0.013
Buprenorphine Prescribing Potential by Waiver per 10k Persons	1.08	0.010

1. Percent of the county population of white, non-Hispanic race/ethnicity
2. Mean income computed for every person in the county; derived by dividing the total income of all people 15 years and older by the total population; modeled as log base 10
3. Percent of civilian persons aged 16 years and older unemployed and actively seeking work
4. Rate of morphine milligram equivalent kilograms sold of opioid pain relievers per 10,000 population

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 - Rank counties by score to identify those with greatest potential vulnerability

Methods: Vulnerability Score Calculation

- Create “scoring” dataset of the significant variables (indicators) in the final model
 - Averaged data for the three indicators with 2 years of data
 - Imputed values for counties with missing data (i.e., 133 counties for drug overdose deaths)
- For each county, we calculated the composite index score as:

$$\text{Composite Index Score}_i = \sum (\beta_1 * X_{1i} + \beta_2 * X_{2i} + \beta_3 * X_{3i} + \beta_4 * X_{4i} + \beta_5 * X_{5i} + \beta_6 * X_{6i})$$

Where:

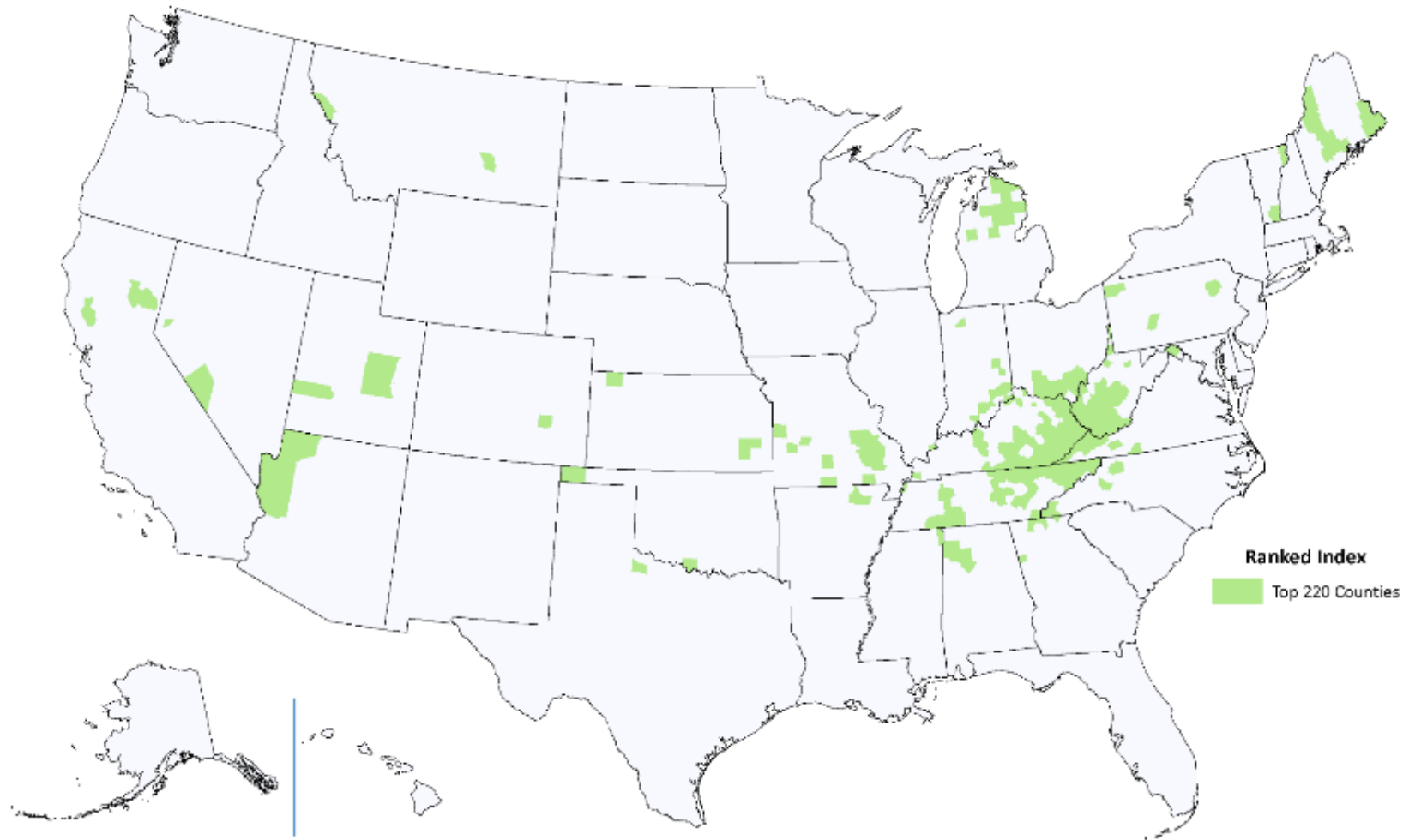
i = County

β = regression coefficient

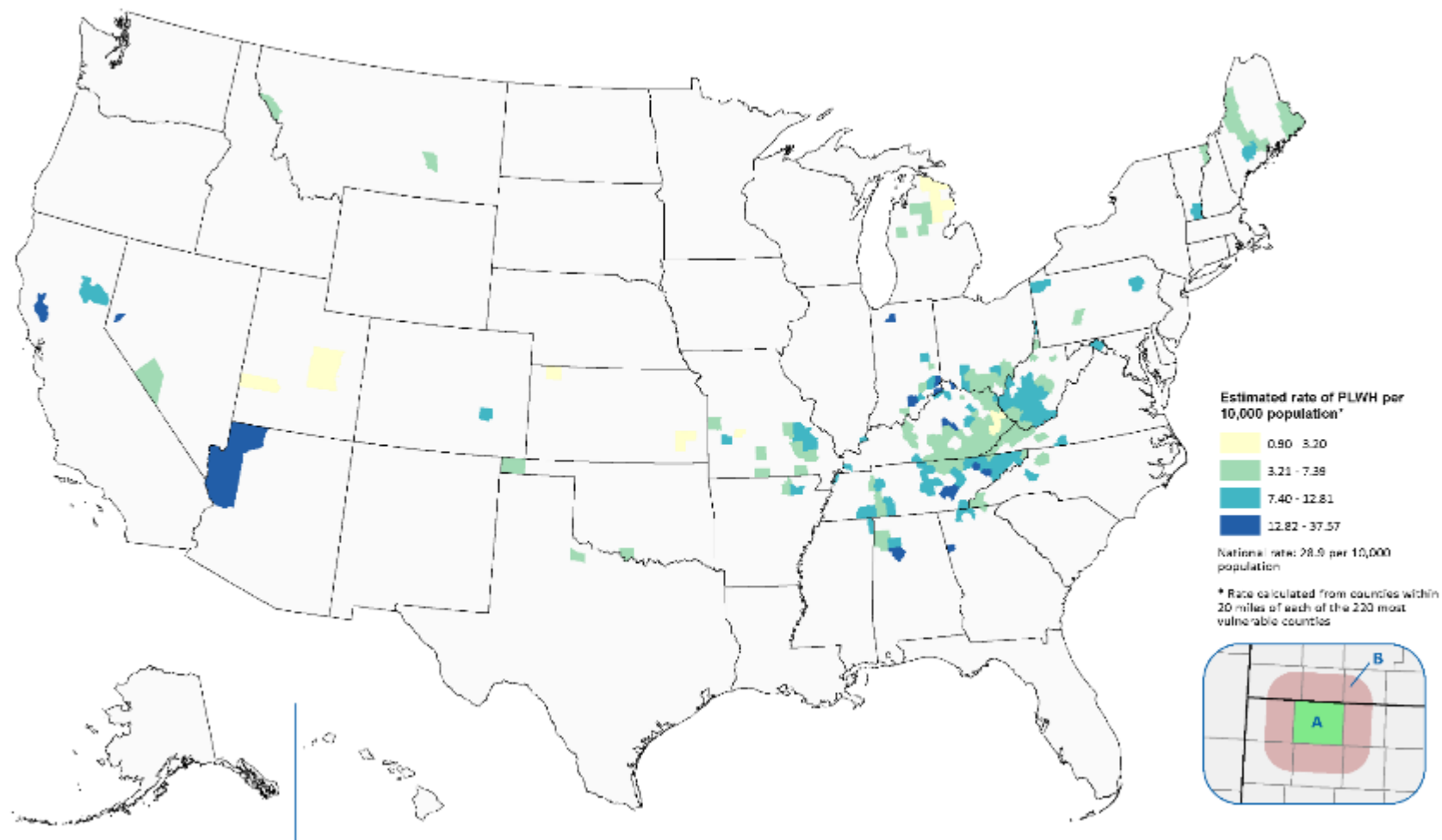
X = observed value for county i

- Thus, for each county, the score was the sum of the regression coefficients multiplied by the observed values for each indicator

Vulnerability to Rapid Dissemination of HIV/HCV Infections Among Persons Who Inject Drugs



Estimated HIV proximity rate of people living with diagnosed HIV infection per 10,000 population



Results – Which counties have highest vulnerability to HIV/HCV outbreak

- 123 counties (56%) were located in 3 states (Kentucky, Tennessee, and West Virginia)
- In four states, at least 15% of the state's population resides in counties identified as vulnerable
- Residing in an area identified as vulnerable does not indicate risk of infection for all residents

Limitations

- Inclusion criteria for indicators excluded some factors that may be associated with injection drug use, such as:
 - EMS calls and ER visits for drug overdose
 - Prescription drug monitoring program (PDMP) data
- Vulnerability to rapid dissemination of HIV or HCV dependent on prevalence in the region and injection drug use behaviors
 - A region with low HIV prevalence may be at lower risk for rapid dissemination than a region with high HIV prevalence
 - The number of times people inject per day may increase their risk for acquisition of HIV or HCV

Key Considerations

1. The epidemiology of IDU in the U.S. is changing

- The U.S. is experiencing an epidemic of non-prescription opioid use and expanding IDU in communities not previously considered at high risk for HIV infection
- All states should assess locally available data for evidence of areas where IDU may be occurring
- Data available to states will likely provide a better local picture

2. This is a dynamic planning exercise and findings will change

- This analysis can be updated as new and better information becomes available
- Improved (complete and rapid) reporting of acute HCV infections to the NNDSS will help state and local health departments and CDC better and more accurately assess communities at highest risk

3. Associations don't represent causation

- The association of an indicator with the outcome does not mean it caused the outcome.
- For instance, buprenorphine is used to treat substance use disorder in an outpatient setting, the variable “buprenorphine prescribing potential by waiver” reflects response to a need, not a failure of medication-assisted therapy.

What Can We Do?

Recommendations

1. Determine if unsafe injection of drugs is occurring
 - Monitor IDU and related indicators routinely
 - Improve surveillance for acute HCV infection to improve early detection of potential increases in injection drug use
2. Enhance testing for HIV and HCV infections
 - Providers of services for persons with substance use disorder
 - Jails and prisons
 - Emergency departments and in-patient settings
3. Prepare an action plan for a potential HIV outbreak
 - What steps can you take to prepare if determine vulnerable?
 - Know your HIV (and HCV) treatment landscapes

Summary

- To prevent future outbreaks like that which occurred in Indiana, CDC conducted an analysis to identify other communities at high-risk of rapid spread of HIV/HCV among persons who inject drugs by
 - Identifying variables highly associated with acute HCV infection, best proxy for injection drug use
 - Applying indicator data to identify areas at highest risk for rapid spread of HIV/HCV among persons who inject drugs
- Local-level data can be used to better characterize risk profiles
- State, local, and federal authorities can work together to continue ongoing monitoring of the risk for an HIV/HCV outbreak and control it if detected

Summary

- The U.S. is experiencing an expanding prescription drug and heroin epidemic that is driving increases in injection drug use
- A new and growing group of U.S. residents has become vulnerable to potentially explosive spread of HIV and HCV infection
- The events in Indiana were devastating but they were preventable
- Other communities are at risk and the number could grow
- It could happen again but it doesn't have to

Acknowledgments

- Centers for Disease Control and Prevention
 - Division of HIV/AIDS Prevention
 - Division of Viral Hepatitis
 - Division of STD Prevention
 - National Center for Injury Prevention and Control
 - Office of Public Health Preparedness and Response
- Health Resources and Services Administration
- Substance Abuse and Mental Health Services Administration
- Scott and Clark County Health Departments
- Scott County Sheriff's Office
- Foundations Family Medicine
- Scott Memorial Hospital
- Indiana State Department of Health
- Indiana Family and Social Services Administration
- Indiana University
 - School of Medicine
 - School of Public Health
- Louisville 550 Clinic



Thank you