

# HIV and HCV: From Specialist to Internist Pearls and Pitfalls

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# Learning Objectives:

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- Be informed of facts surrounding HIV in the US and Oklahoma
- Identify symptoms related to HIV infection
- Understand the diagnostic algorithm of HIV
- Be able to summarize treatment options and clinical care in HIV
- Be informed of facts surrounding hepatitis C in the US and Oklahoma
- Identify symptoms related to hepatitis C infection
- Understand the diagnostic algorithm of hepatitis C
- Be able to summarize treatment options and clinical care in hepatitis C
- Recognize the statistics and importance of identify HIV/hepatitis C co-infection
- Understand the considerations related to treatment of HIV/hepatitis C co-infection
- Develop treatment plans for HIV/hepatitis C co-infection with acknowledgement of drug-drug interactions

# HIV

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HIV in the US – National Statistics

HIV in Oklahoma – State Statistics

Clinical Presentation and Care in HIV

# **HIV IN THE US – NATIONAL STATISTICS**

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# HIV in the US – National Statistics

- Approximately 1.2 million people in the U.S. have HIV
- In 2022, an estimated 31,800 people acquired HIV in the U.S.
- Disproportionate impacts:
  - Gay
  - Bisexual
  - Men who have sex with men (MSM)

**1.2 Million**

Approximately how many  
people are living with  
HIV in the US  
*(diagnosed & undiagnosed)*

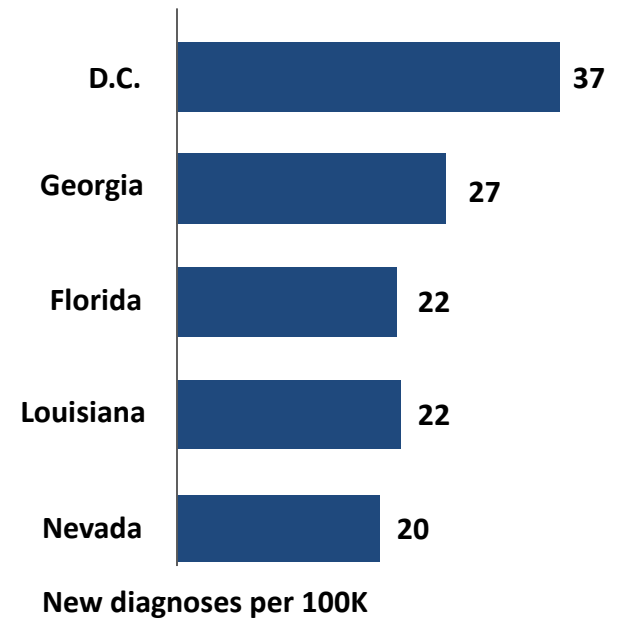
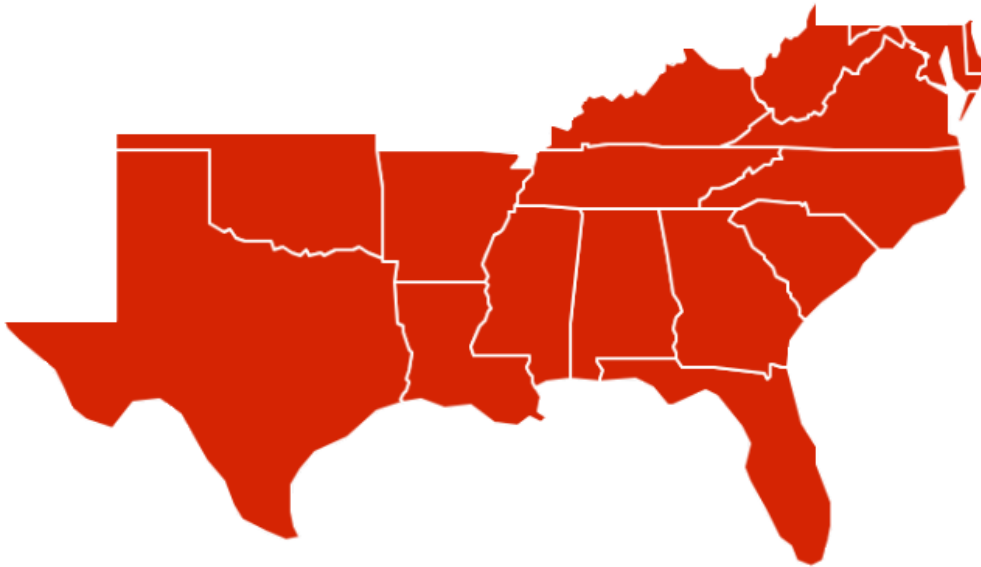
**13%**

People with HIV who  
do not know they  
have it

# HIV in the US – National Statistics

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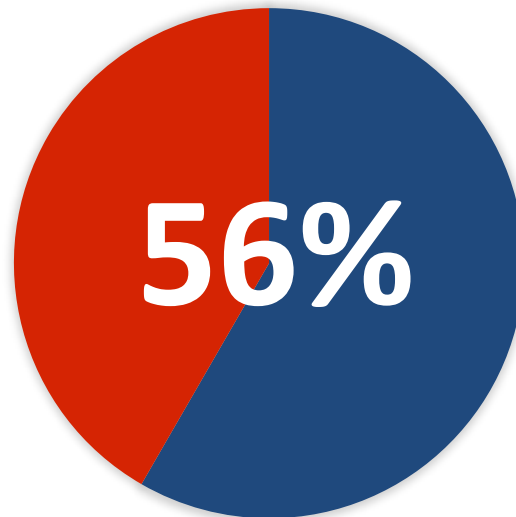
- From 2018 to 2022, new HIV infections decreased 12%



# HIV in the US – National Statistics

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- From 2018 to 2022, new HIV infections decreased 12%
- About 56% of persons aged 13 to 34 accounted for new infections

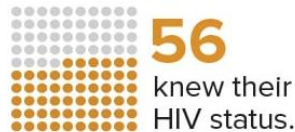


# HIV in the US – National Statistics

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- From 2018 to 2022, new HIV infections decreased 12%
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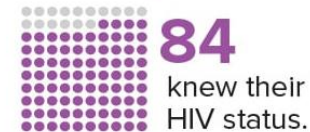
For every 100 people  
with HIV aged 13 to 24



For every 100 people  
with HIV aged 25 to 34



For every 100 people  
with HIV aged 35 to 44



For every 100 people  
with HIV aged 45 to 54



For every 100 people  
with HIV aged 55 to 64



For every 100 people  
with HIV aged 65 and older

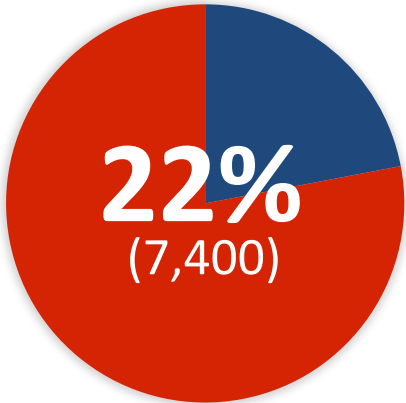


\* Data not available for children aged 12 and under.

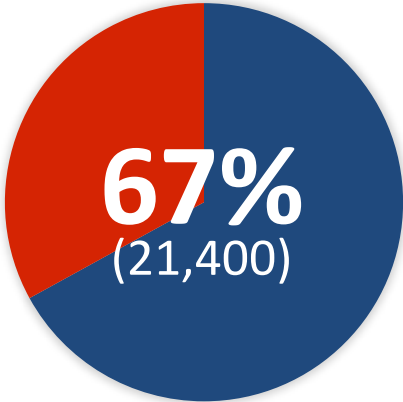


# HIV in the US – National Statistics

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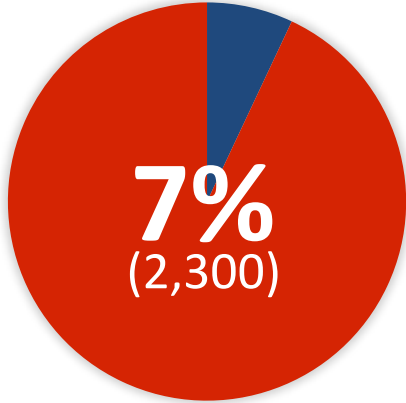


persons who reported heterosexual contact



gay, bisexual, and men who reported male-to-male sexual contact\*

**31,800 new HIV infections in 2022**



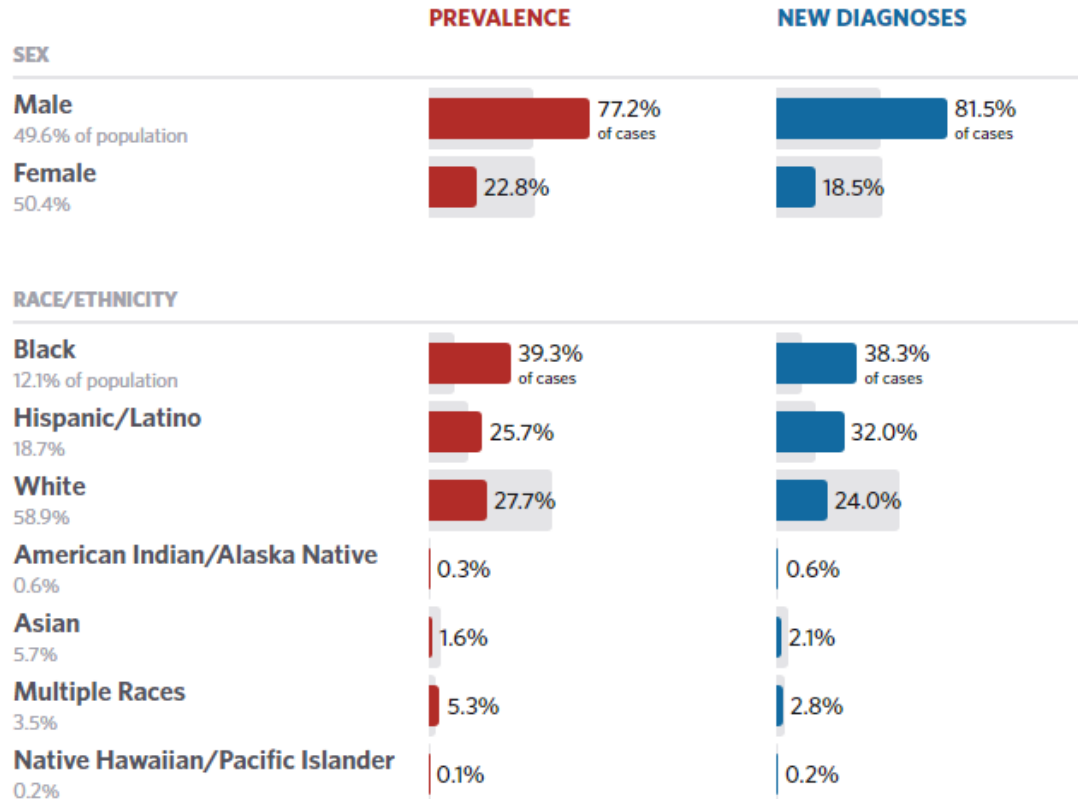
persons who inject drugs

\* Includes infections attributed to male-to-male sexual contact *and* injection drug use (men who reported both risk factors).

Source: CDC. Estimated HIV incidence and prevalence in the United States, 2018–2022. *HIV Surveillance Supplemental Report*, 2024; 29(1).

# HIV in the US – National Statistics

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# **HIV IN OKLAHOMA — STATE STATISTICS**

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# HIV in the Oklahoma – State Statistics

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- Approximately 7,264 people are living with HIV in Oklahoma in 2022
- In 2022, an estimated 394 people acquired HIV in Oklahoma
- Disproportionate impact in rural Oklahoma

**7,264**

Approximately how many people are diagnosed with HIV in OK

**17%**

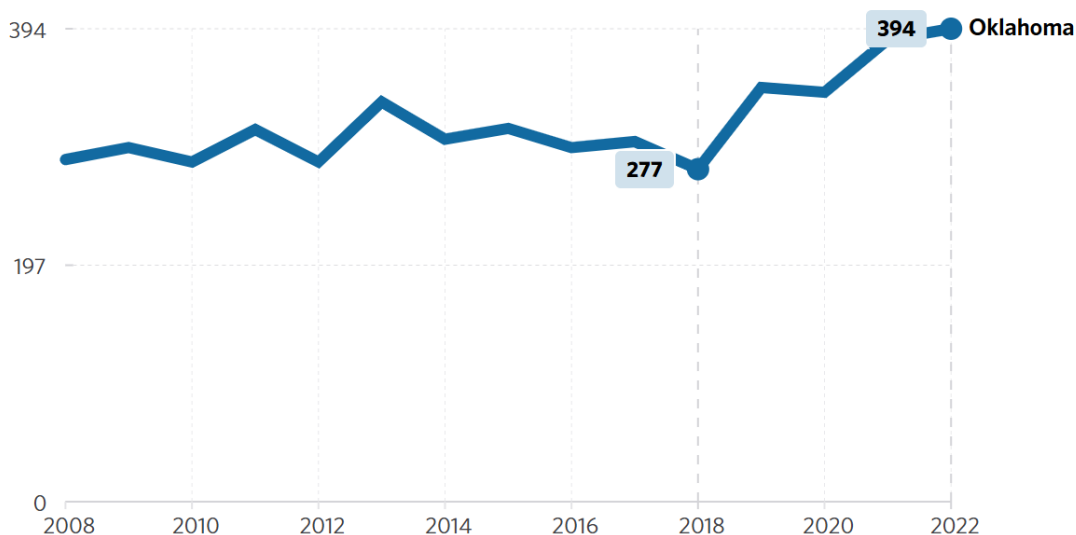
People with HIV that don't know they have it

# HIV in the Oklahoma – State Statistics

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- From 2018 to 2022, new HIV infections increased by 42%

NEW DIAGNOSES CASES, 2008-2022

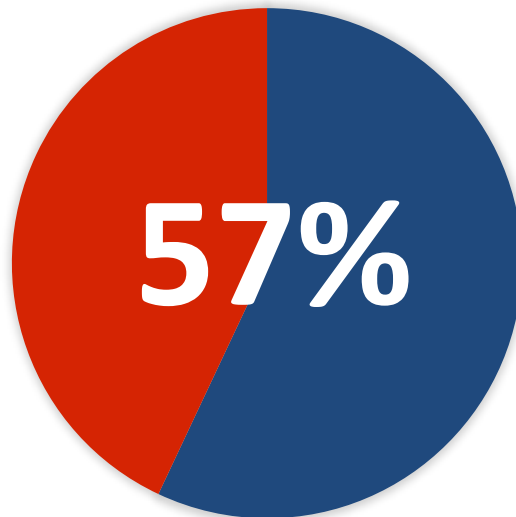


Due to the COVID-19 pandemic, data from 2020 and 2021 should be interpreted with caution.

# HIV in the Oklahoma – State Statistics

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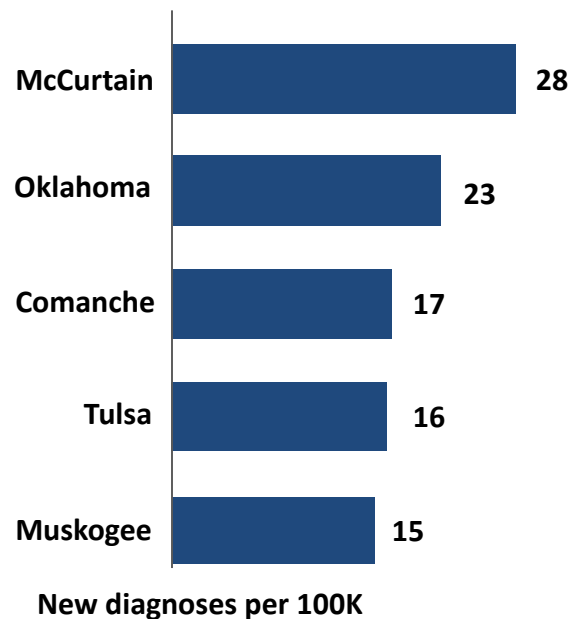
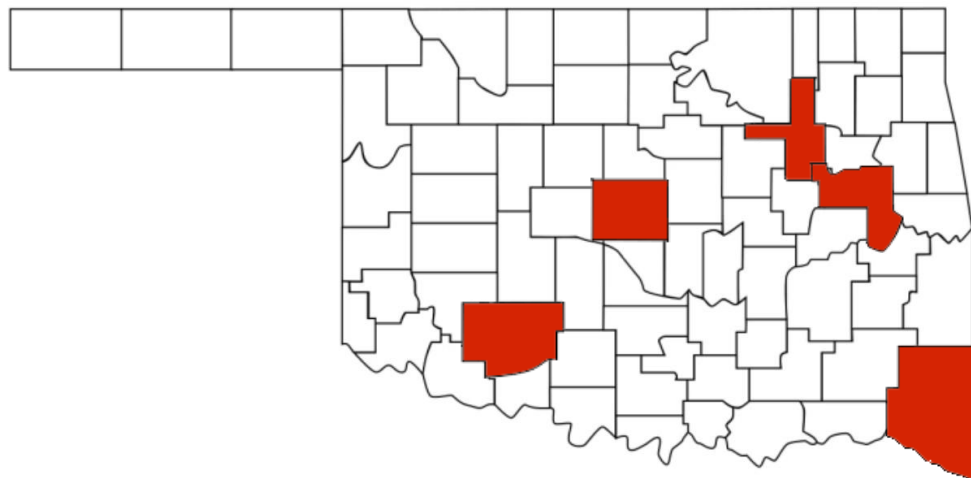
- From 2018 to 2022, new HIV infections increased by 42%
- About 57% of persons aged 13 to 34 accounted for new infections



# HIV in the Oklahoma – State Statistics

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- Estimated infections in 2022 disproportionately effected specific areas



# HIV in the Oklahoma – State Statistics

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- Estimated infections in 2022 disproportionately effected specific areas

**HIV  
Criminalization**

**HIV  
Stigma**

**Lack of  
Transportation**

**Food & Housing  
Insecurity**

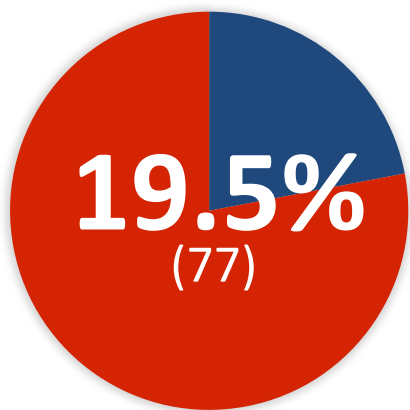
**Lack of  
Providers**



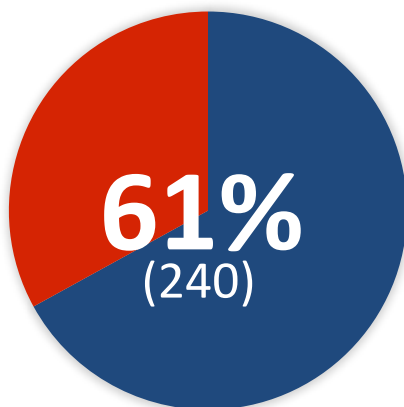
# HIV in the Oklahoma – State Statistics

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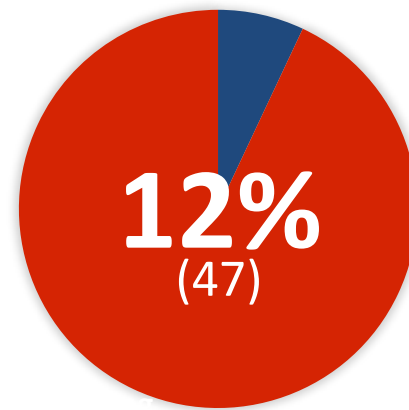
- Estimated infections in 2022 disproportionately effected specific populations



persons who reported  
heterosexual contact



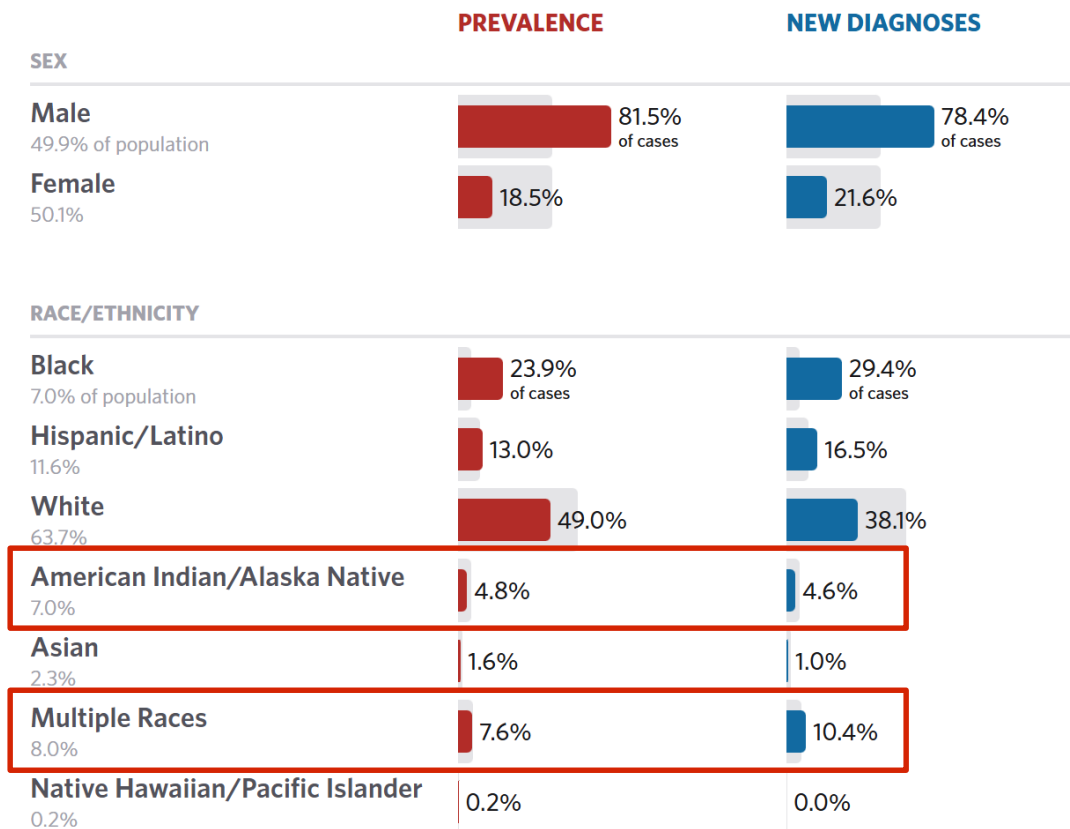
gay, bisexual, and men who reported  
male-to-male sexual contact



persons who inject  
drugs

**394 new HIV  
infections in 2022**

# HIV in the Oklahoma – State Statistics

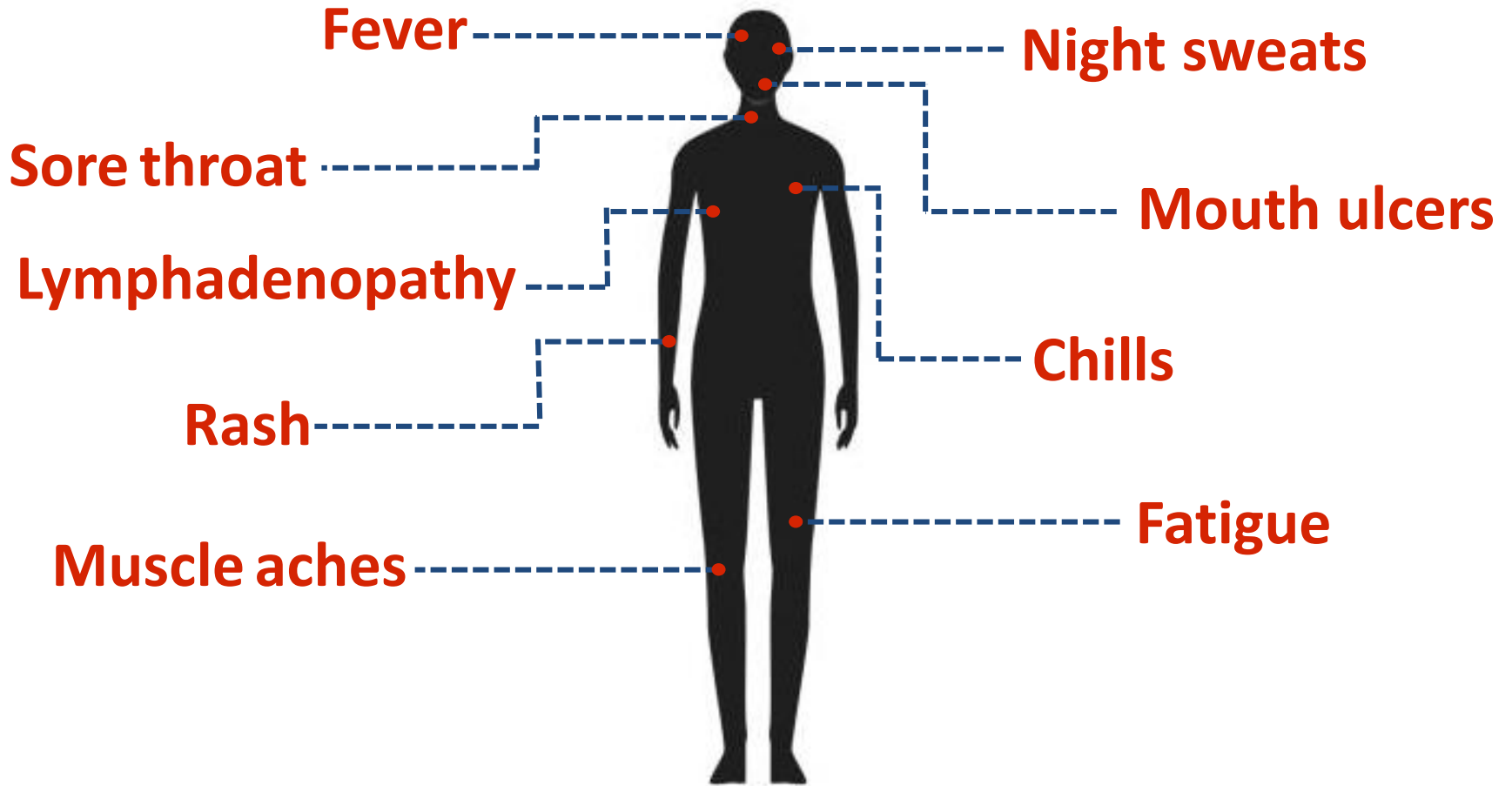


# **CLINICAL PRESENTATION AND CARE IN HIV**

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# HIV Symptoms

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# HIV Symptoms

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Fever

Night sweats

Sore

Other illnesses present very similarly. Not all is HIV.

Lymphadenopathy

Mouth ulcers

Some individuals don't develop any symptoms at all.

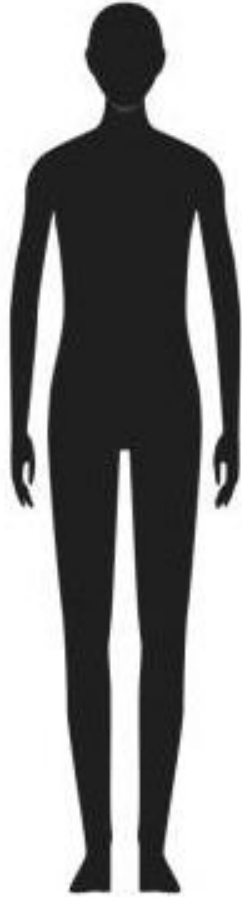
Muscle aches

Fatigue



# HIV Stages

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## Stage 1 – Acute HIV Infection

- Development of flu-like symptoms
- Lots of virus in the blood and very contagious

## Stage 2 – Chronic HIV Infection

- “Asymptomatic infection” or “clinical latency”
- Virus is active and can be spread if untreated
- Without treatment, typically progresses in 10 years

## Stage 3 – Acquired Immunodeficiency Syndrome

- Risk of opportunistic infections
- Continued risk of spread if untreated
- Without treatment, life expectancy is about 3 years

# HIV Diagnosis

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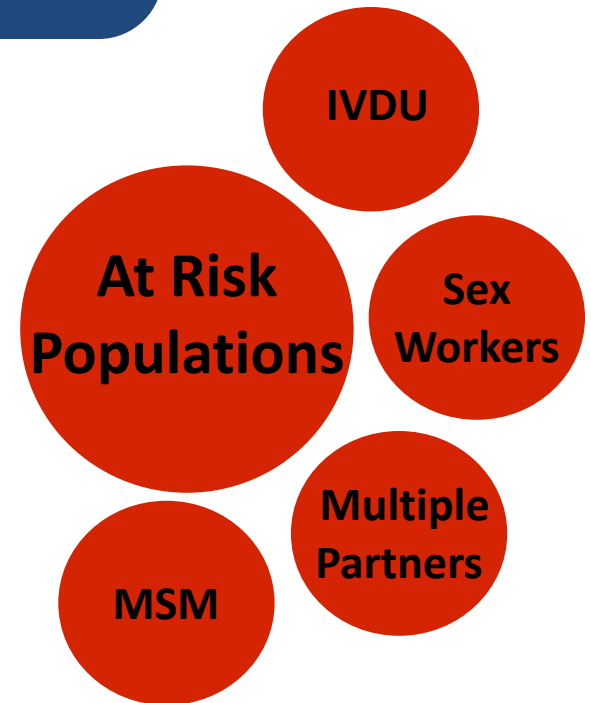
## Who to Screen



Ages 15 - 65



Pregnant persons



# HIV Diagnosis

**HIV-1/2 Antigen/Antibody Immunoassay**

**HIV-1/2 Antibody Differentiation Immunoassay**

(-)  
Negative Result  
No HIV infection

HIV-1 (+)  
HIV-2 (-)

HIV-1 (-)  
HIV-2 (+)

HIV-1 (+)  
HIV-2 (+)

HIV-1 (-)  
HIV-2 (-)

**HIV-1 NAT**

HIV-1 NAT (+)  
HIV Infection

HIV-1 NAT (-)  
No HIV Infection



# HIV Clinical Care

## Resistance Testing

1985-89	1990-94	1995-99	2000-04	2005-09	2010-14	2015-19	2020-24
<b>1987</b> Zidovudine (NRTI)	<b>1991</b> Didanosine* (NRTI)	<b>1995</b> Lamivudine (NRTI) Saquinavir Mesylate* (PI)	<b>2000</b> Didanosine EC* (NRTI) Kaletra (FDC) Trizivir* (FDC)	<b>2005</b> Tipranavir* (PI)	<b>2011</b> Complera (FDC) Nevirapine XR (NNRTI) Rilpivirine (NNRTI)	<b>2015</b> Evotaz (FDC) Genvoya (FDC) Prezcoibix (FDC)	<b>2020</b> Fostemsavir* (AI) Tivicay PD (INSTI)
	<b>1992</b> Zalcitabine* (NRTI)	<b>1996</b> Indinavir* (PI) Nevirapine (NNRTI) Ritonavir (PI)	<b>2001</b> Tenofovir DF (NRTI)	<b>2006</b> Atripla* (FDC) Darunavir (PI)	<b>2012</b> Stribild (FDC) Truvada (PrEP)	<b>2016</b> Descovy (FDC) Odefsey (FDC)	<b>2021</b> Cabenuva (FDC) Cabotegravir (INSTI) Cabotegravir (PrEP)
	<b>1994</b> Stavudine* (NRTI)	<b>1997</b> Combivir* (FDC) Delavirdine* (NNRTI) Nelfinavir* (PI) Saquinavir* (PI)	<b>2002</b> Stavudine XR* (NRTI)	<b>2007</b> Maraviroc (CA) Raltegravir (INSTI)	<b>2013</b> Dolutegravir (INSTI)	<b>2017</b> Juluca (FDC) Raltegravir HD (INSTI)	<b>2022</b> Triumeq PD (FDC) Lenacapavir (CI)
		<b>1998</b> Abacavir (NRTI) Efavirenz (NNRTI)	<b>2003</b> Atazanavir (PI) Emtricitabine (NRTI) Enfuvirtide (FI) Fosamprenavir* (PI)	<b>2008</b> Etravirine (NNRTI)	<b>2014</b> Cobicistat (PE) Elvitegravir* (INSTI) Trimeq (FDC)	<b>2018</b> Biktarvy (FDC) Cimduo (FDC) Delstrigo (FDC) Doravirine (NNRTI) Ibalizumab-uiyk (PAI)	<b>2024</b> Rilpivirine PED (NNRTI)
		<b>1999</b> Amprenavir* (PI)	<b>2004</b> Epzicom* (FDC) Truvada (FDC)			<b>2019</b> Dovato (FDC) Descovy (PrEP)	

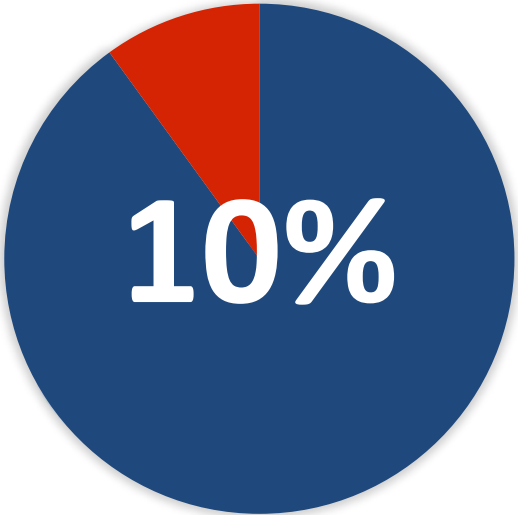
For more information, visit [HIVinfo.NIH.gov](https://HIVinfo.NIH.gov).



## HLA-B\*5701 Testing

# HIV Clinical Care

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# HIV Clinical Care

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## Routine Screenings

**CBC**

**CMP**

**Lipids**

**CD4 Count**

**Syphilis  
Screening**

**Tuberculosis  
Screening**

**Viral Load**

**Hepatitis B & C  
Screening**

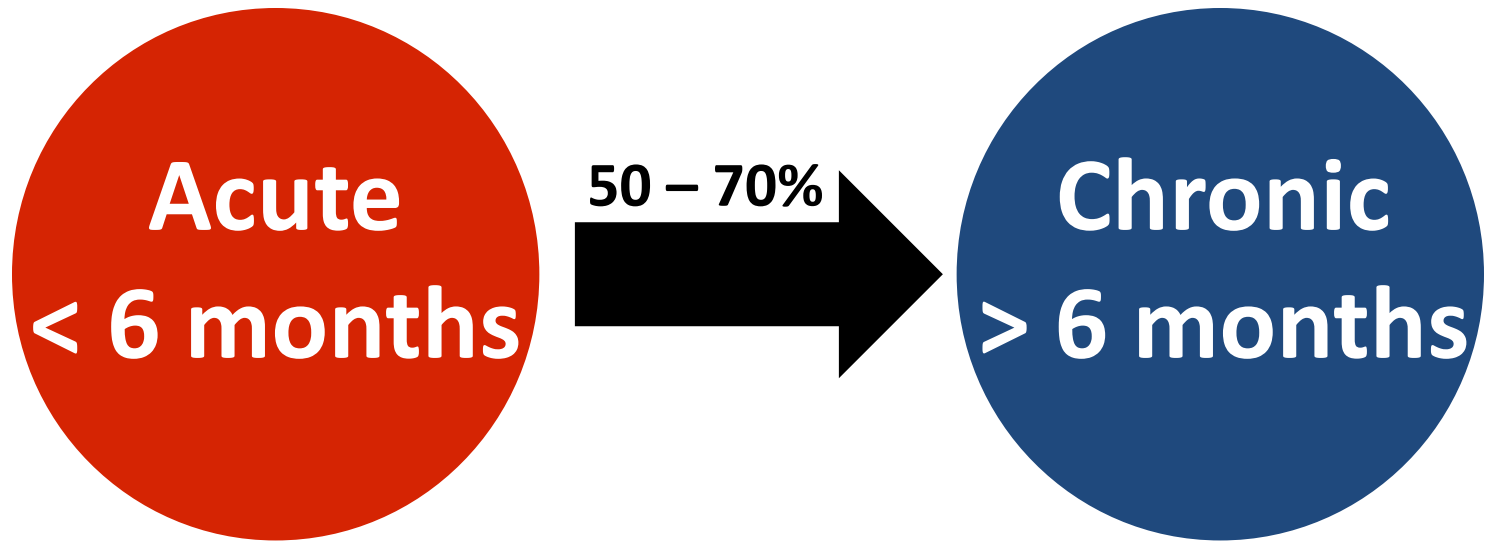
# **Hepatitis C**

HCV in the US – National Statistics

HCV in Oklahoma – State Statistics

Clinical Presentation and Care in HCV

# Hepatitis C



# **HCV IN THE US – NATIONAL STATISTICS**

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# HCV in the US – National Statistics

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- There's an estimated 2.2 million persons with HCV (**acute** and **chronic**)
- In 2021, it's estimated that there were 69,800 new **acute** infections
- For **chronic** infections, the reported number is 107,540
- Disproportionately impacts person who inject drugs

**2.2 million**

Approximately how many people are diagnosed with HCV

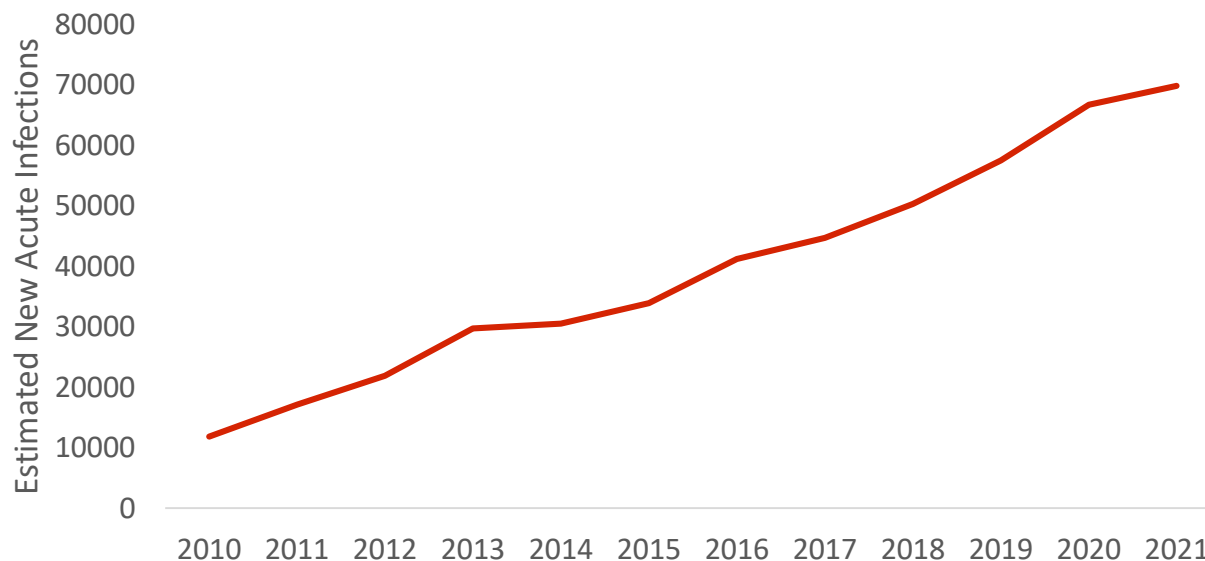
**56%**

People with HCV that don't know they have it

# HCV in the US – National Statistics

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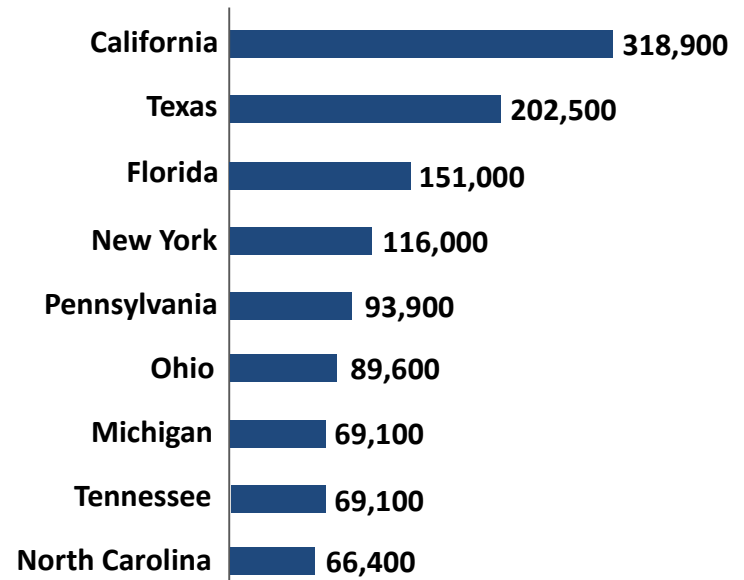
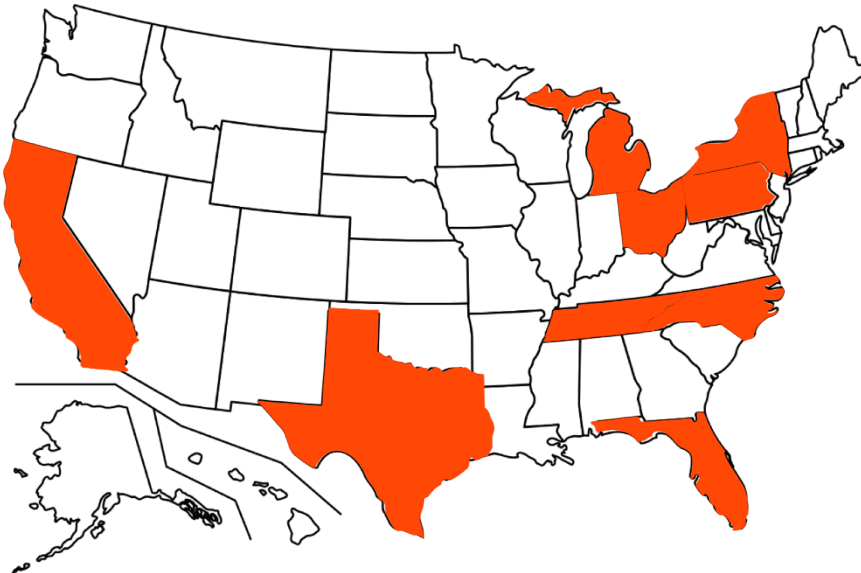
- From 2010 to 2021, new **acute** cases increased by 492%
- New **chronic** cases increased by 148%





# HCV in the US – National Statistics

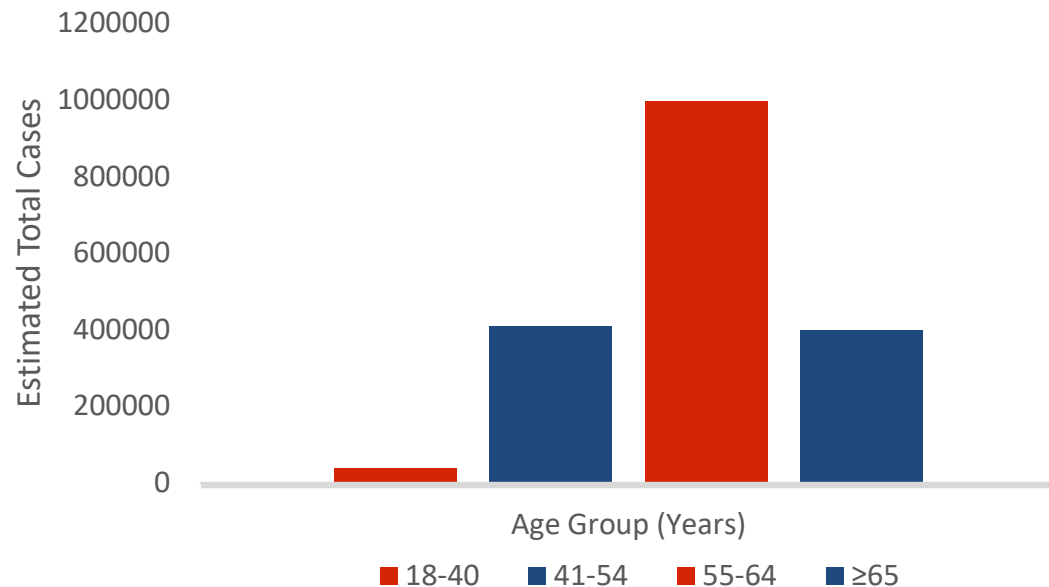
Estimated 2.2 million total HCV cases



# HCV in the US – National Statistics

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- For total infections, more than 50% of people with HCV are age 55 years or older

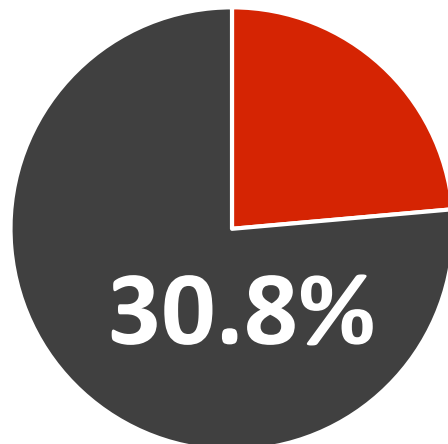


# HCV in the US – National Statistics

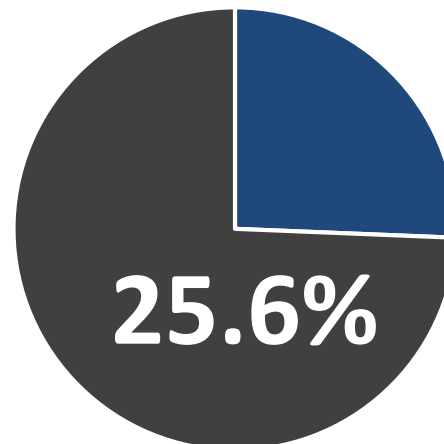
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- For total infections, more than 50% of people with HCV are age 55 years or older
- For both new **acute** and **chronic** infections, those aged 30-39 make up the majority in 2021

Reported Acute Infections



Reported Chronic Infections

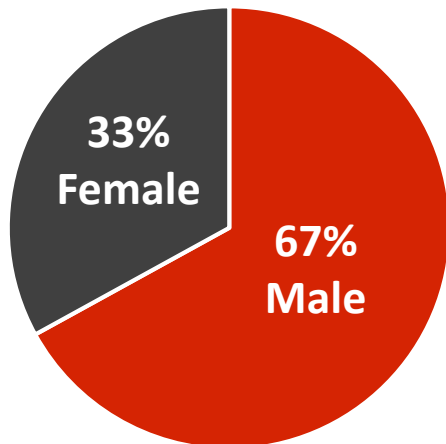


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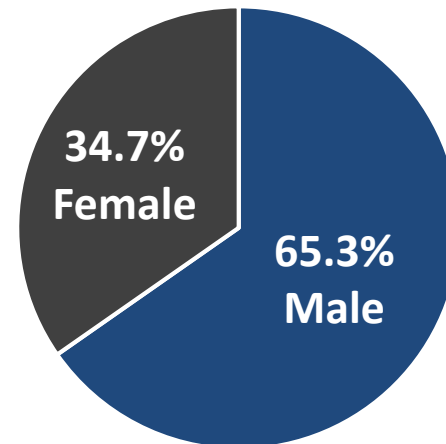
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- For both **acute** and **chronic** infections, males largely predominant incidences of infection

Reported Acute Infections

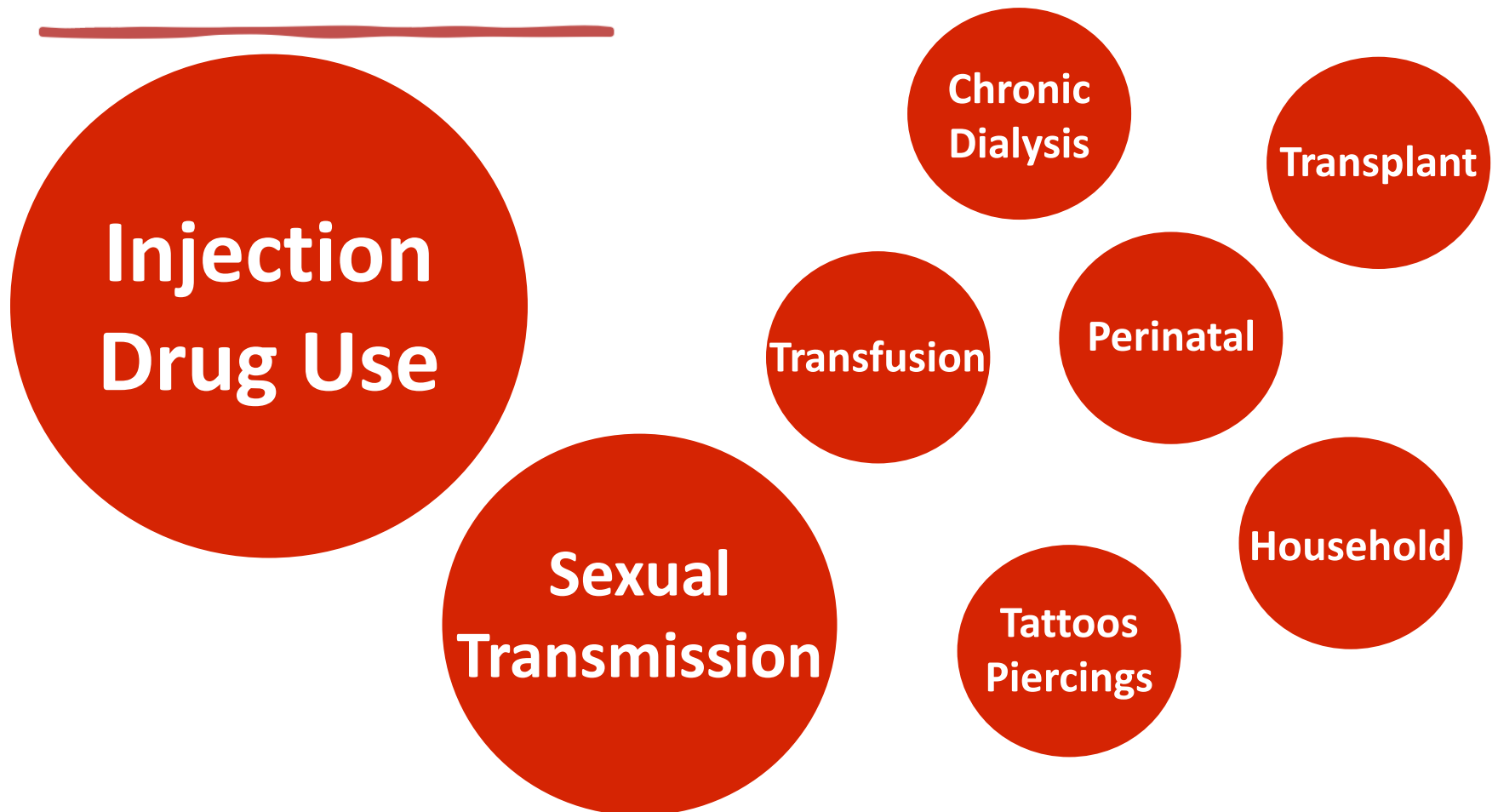


Reported Chronic Infections



# HCV in the US – National Statistics

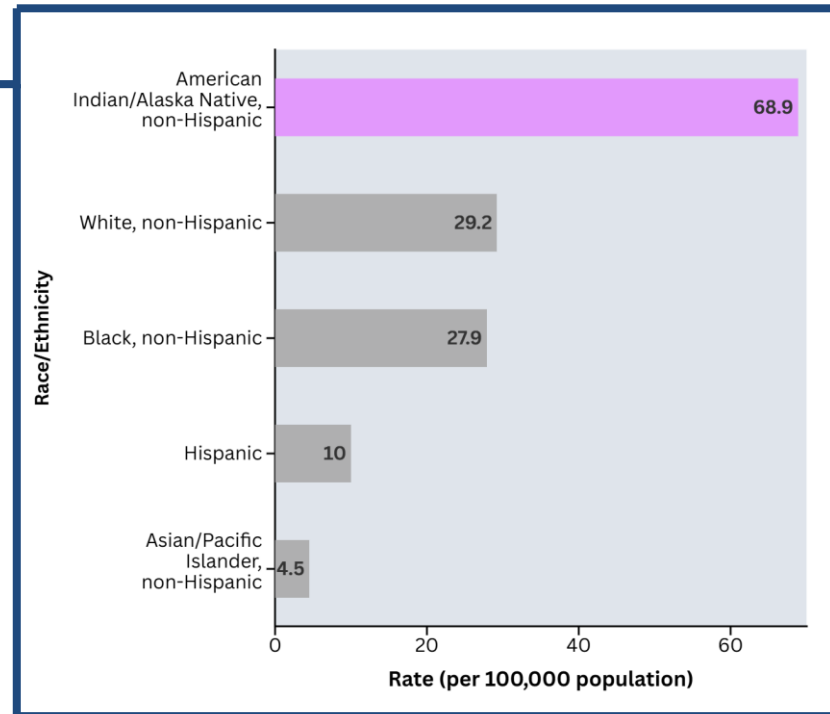
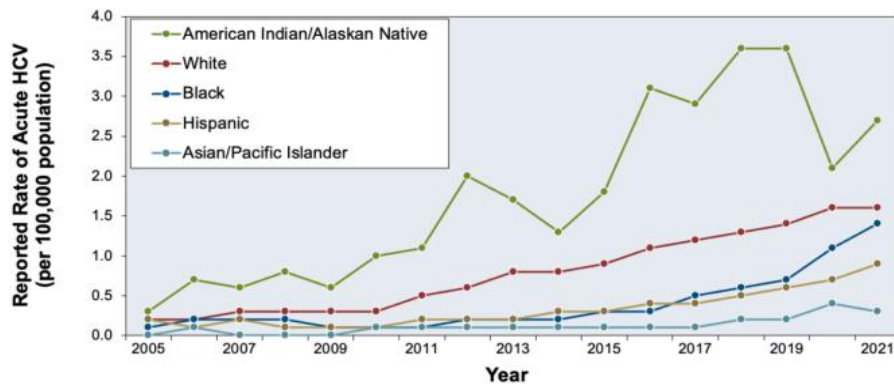
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# HCV in the US – National Statistics

## Reported Chronic Cases

## Reported Acute Cases



# **HCV IN OKLAHOMA – STATE STATISTICS**

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# HCV in Oklahoma – State Statistics

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- There's an estimated 53,000 persons with HCV in Oklahoma (**acute** and **chronic**)
- Oklahoma is **#2** in the nation for prevalence of hepatitis C infections
- Oklahoma is **#1** in the nation for newly reported **chronic** infections

**53,300**

Approximately how many people are diagnosed with HCV in Oklahoma

**#1**

For rate of new chronic hepatitis C infections



# HCV in Oklahoma – State Statistics

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## Oklahoma Risk Factors

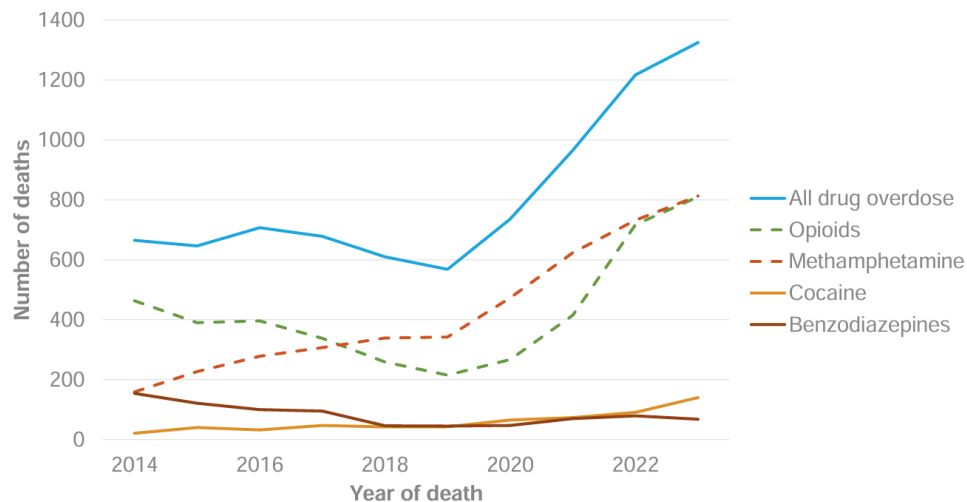


# HCV in Oklahoma – State Statistics

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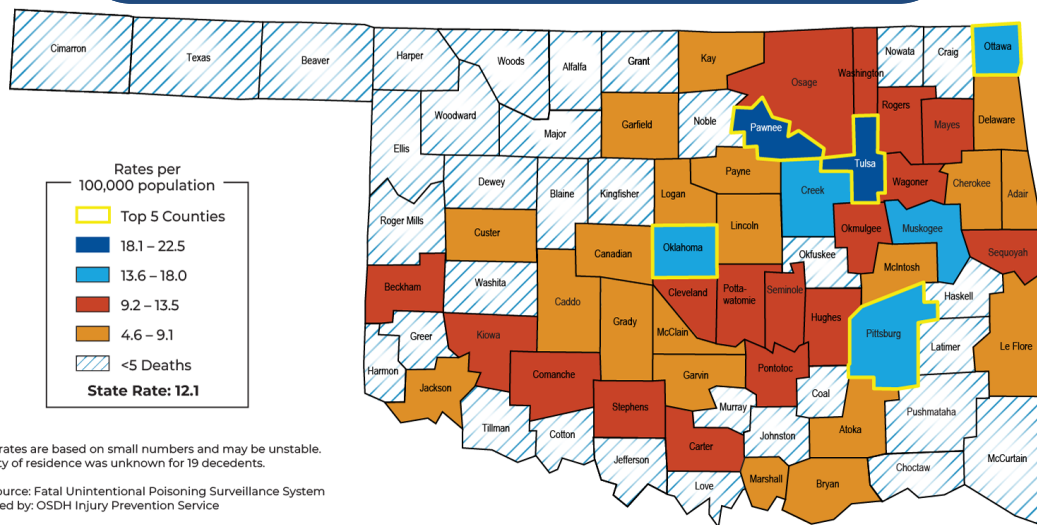
## Unintentional Drug Overdose Deaths 2014 - 2023



# HCV in Oklahoma – State Statistics



## Unintentional Opioid Overdose Deaths 2019 - 2023

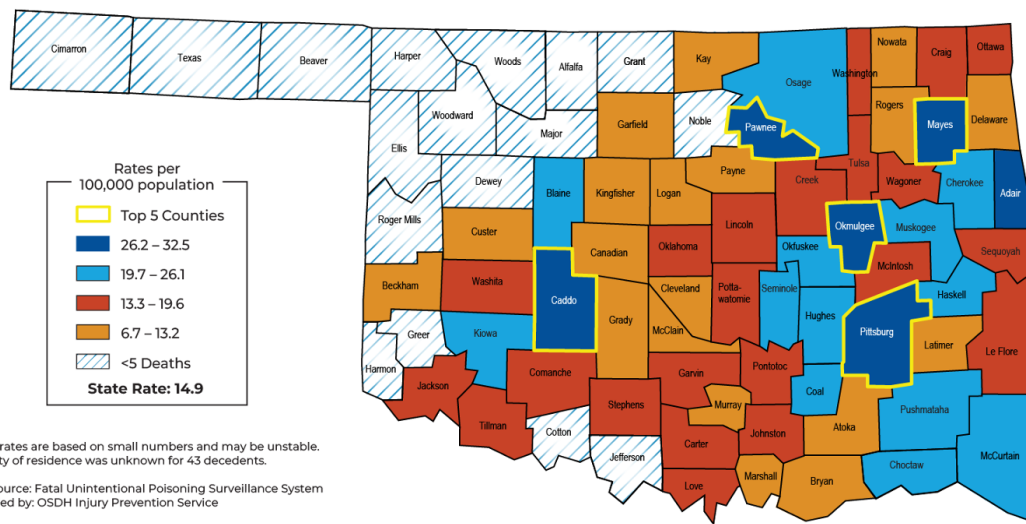


# HCV in Oklahoma – State Statistics

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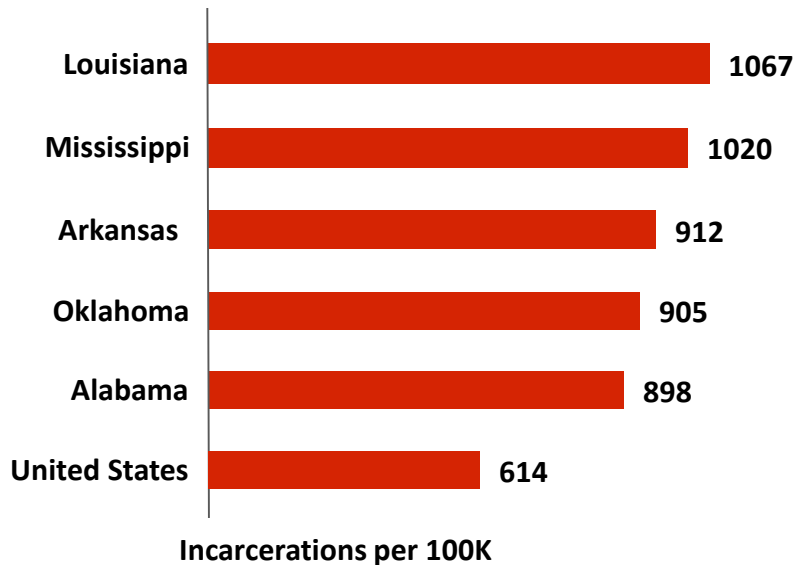
## Unintentional Meth Overdose Deaths 2019 - 2023



# HCV in Oklahoma – State Statistics

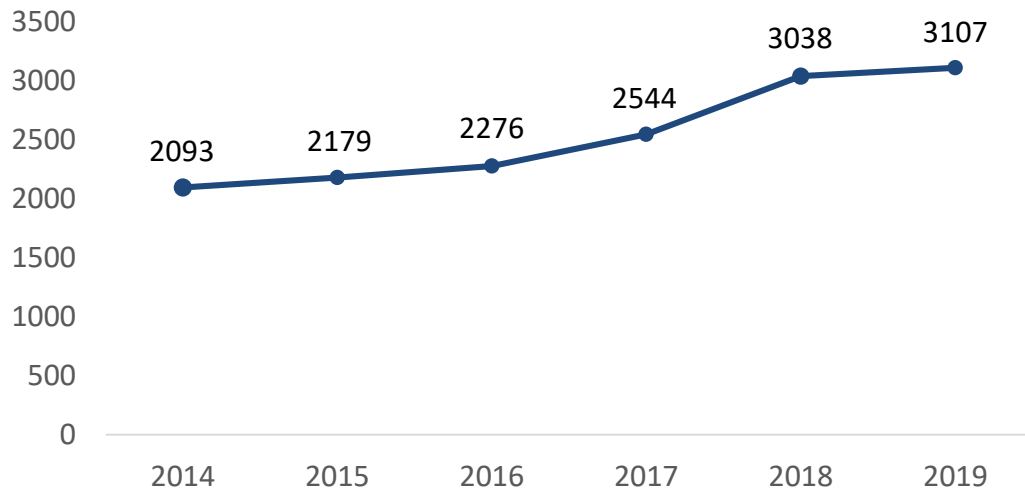
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## State Incarceration Rates



# HCV in Oklahoma – State Statistics

## Incarceration Infection Rates



# HCV in Oklahoma – State Statistics

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Treatment Costs



Lack of Insurance



# HCV in Oklahoma – State Statistics

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## PREVALENCE, 2013-2016

### SEX

#### Male

49.9% of population



#### Female

50.1%



### RACE/ETHNICITY

#### Black

7.0% of population



#### Non-Black

93.0%



### AGE

#### Less than 50

66.1% of population



#### 50 to 74

27.4%



#### 75+

6.5%



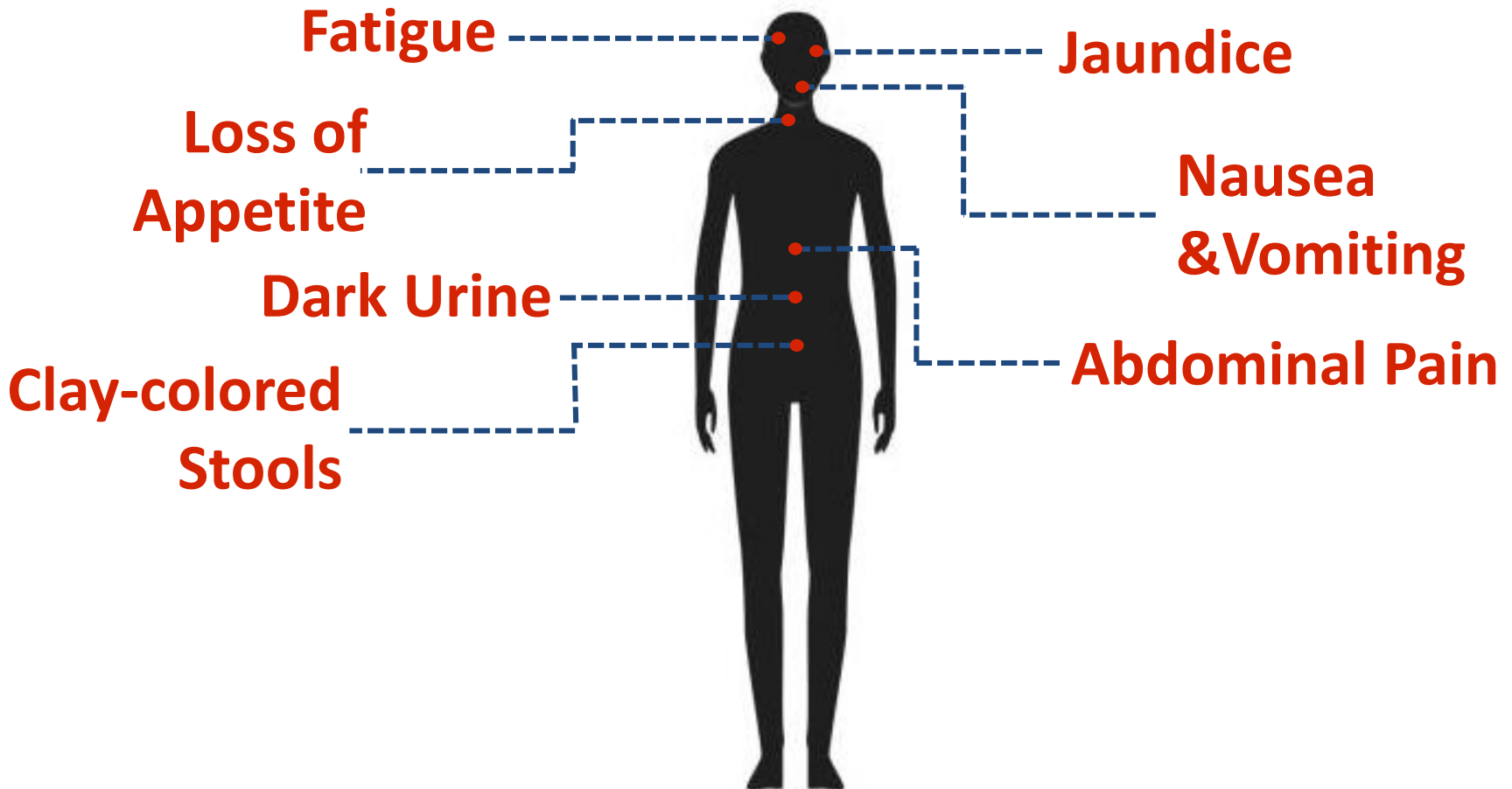


# **CLINICAL PRESENTATION AND CARE IN HCV**

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# HCV Symptoms

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# HCV Symptoms

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Fatigue

Jaundice

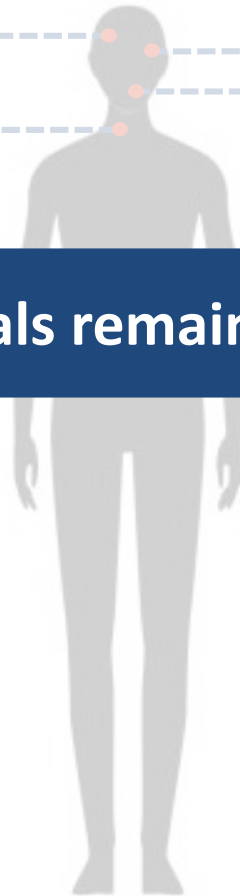
Loss of  
Appetite

Nausea

Some individuals remain asymptomatic.

Clay-colored  
Stools

Abdominal Pain



# HCV Diagnosis

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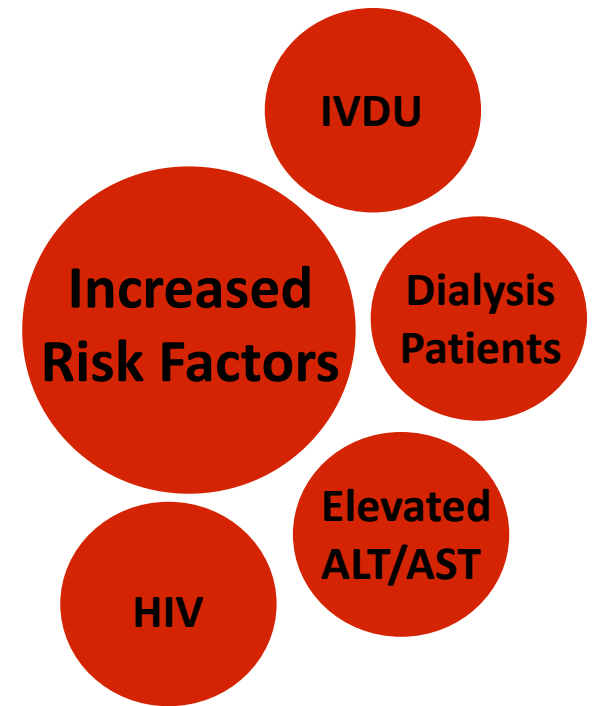
## Who to Screen



Ages 18+

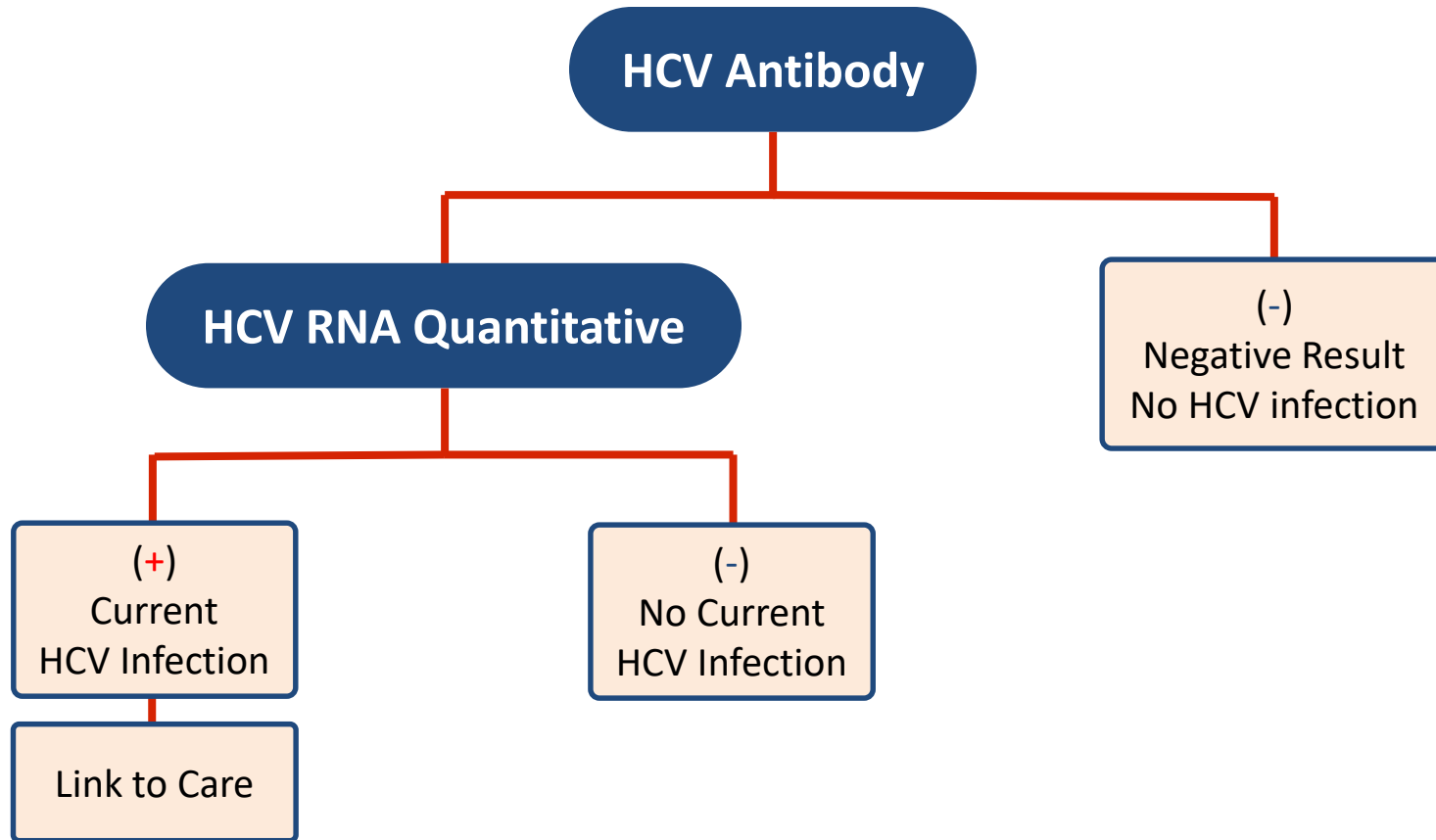


Pregnant persons



# HCV Diagnosis

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# HCV Clinical Care

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## Prior to Treatment

### CBC

- Platelet count

### CMP

- AST/ALT
- Bilirubin

### Coagulation

- INR

### Ultrasound

- Visualization

### Fibrosis

- Fibrosis testing

### HCV RNA

- Viral load

### Genotype

- Treatment options

### Hepatitis A

- HAV Antibody

### Hepatitis B

- HBsAg, HBcAb
- HBsAb

### HIV

- Treatment options

# HCV Clinical Care

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## Chronic Hepatitis C

### Eligible for Simplified

- Adults with chronic hepatitis C, without cirrhosis, and are treatment naïve
- Adults with chronic hepatitis C, with compensated cirrhosis, and are treatment naïve

### *Not Eligible for Simplified*

- Have previously been treated for hepatitis C
- Hepatitis B surface antigen positive
- Current pregnancy
- Known or suspected hepatocellular carcinoma
- Prior liver transplantation

# HCV Clinical Care

## Chronic Hepatitis C

Eligible for Simplified





# HCV Clinical Care

## Chronic Hepatitis C

Eligible for Simplified



**For genotypes 1-6**  
**Three pills, once daily, with food**  
**Total of 8 weeks**

# HCV Clinical Care

## Chronic Hepatitis C

Eligible for Simplified

For genotypes 1, 2, 4, 5, & 6  
One pill, once daily  
Total of 12 weeks

Genotype 3

NS5A Resistance Testing

Y93H Resistance

Add  
Ribavirin

Switch to  
Vosevi



# HCV Clinical Care

## Chronic Hepatitis C

Eligible for Simplified



Add  
Ribavirin

Switch to  
Vosevi



# HCV Clinical Care

## Chronic Hepatitis C

Eligible for Simplified

Genotype 1a

NS5A Resistance Testing

M28, Q30, L31, Y93

16-week Course



# HCV Clinical Care

## Acute Hepatitis C



# HCV Clinical Care

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## Treatment Monitoring

- Confirm compliance
- Potential side effects
- Drug-drug interactions

## Routine Monitoring

### CMP

- Monitoring transaminases

### CBC

- Monitoring drug-drug interactions

## Special Monitoring

### Blood glucose

- If diabetic

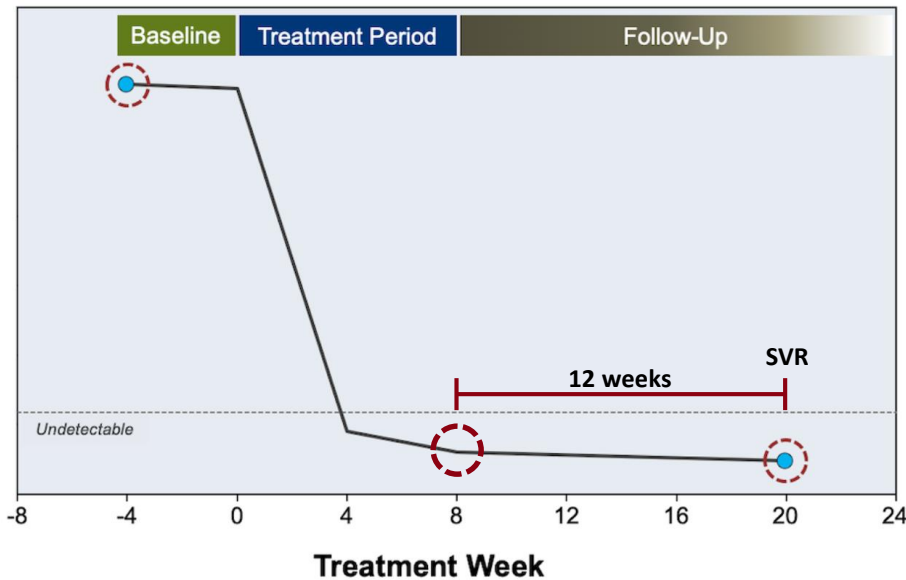
### INR

- If on warfarin

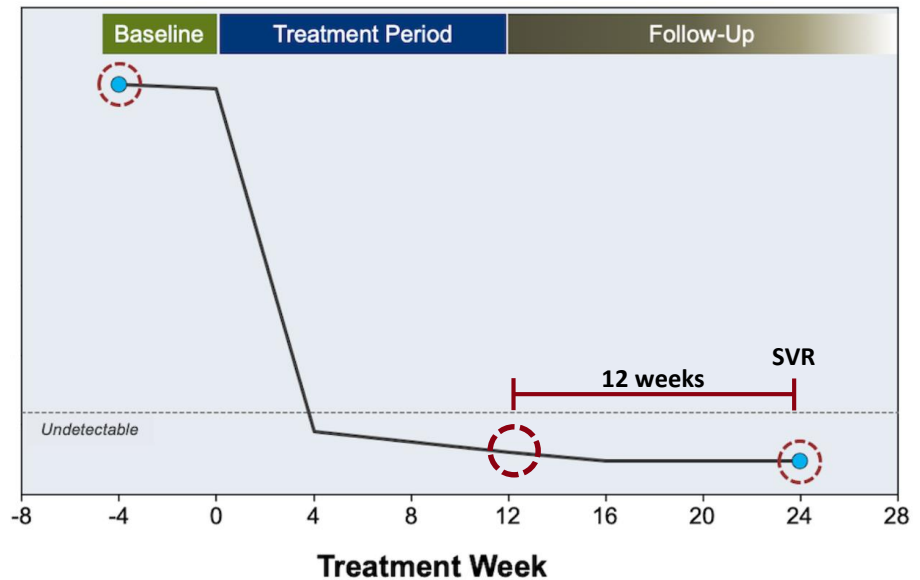
# HCV Clinical Care

## Treatment Monitoring

### 8-week Treatment Course



### 12-week Treatment Course



# HCV Clinical Care

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**After Treatment**

**Recurrent Exposures**

**Annual HCV  
Screenings**

**Presence of Cirrhosis**

**Biannual HCC  
Screenings**



# **Co-Infection – HIV & HCV**

Co-Infection Clinical Information

Treatment in Co-Infection

**CO-INFECTION**

**CLINICAL INFORMATION**

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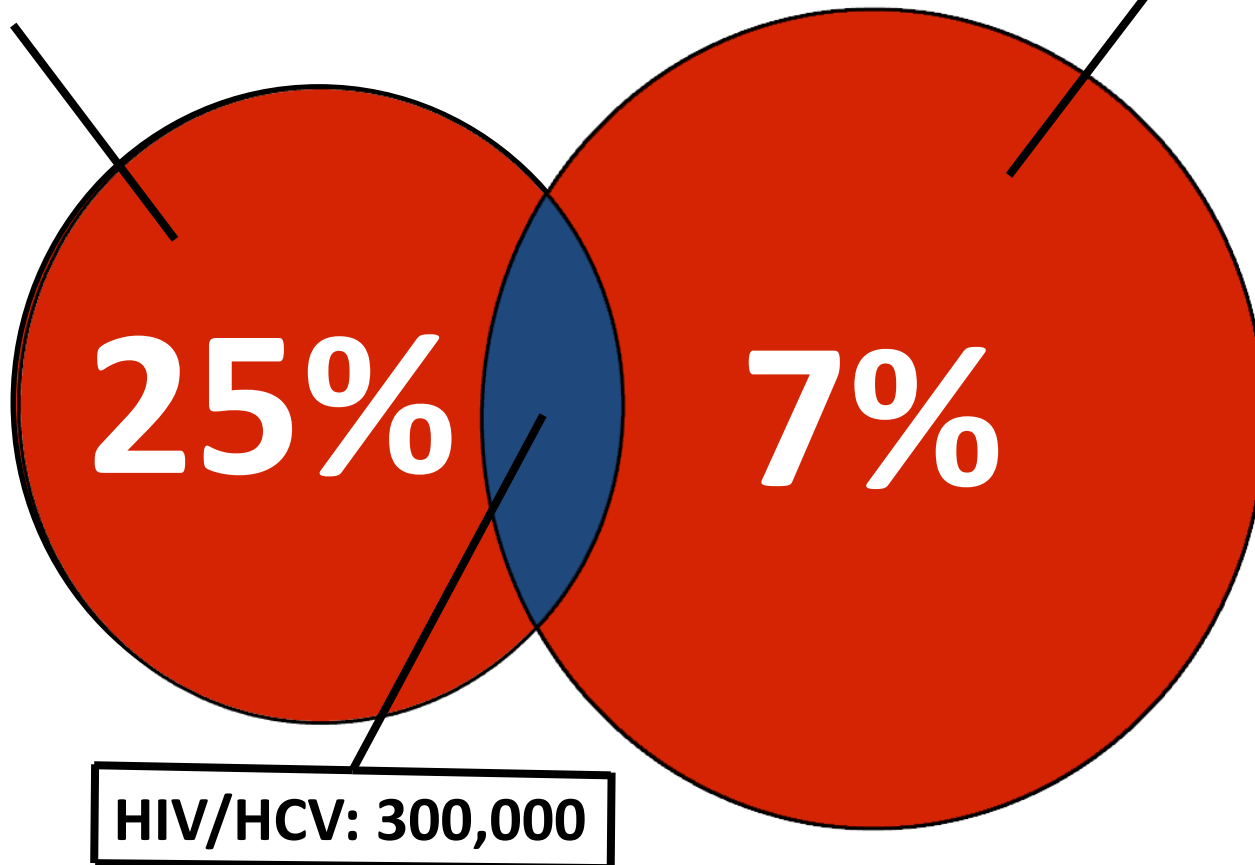
# Co-Infection

## Clinical Information

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HCV: 2.2 million

HIV: 1.2 million

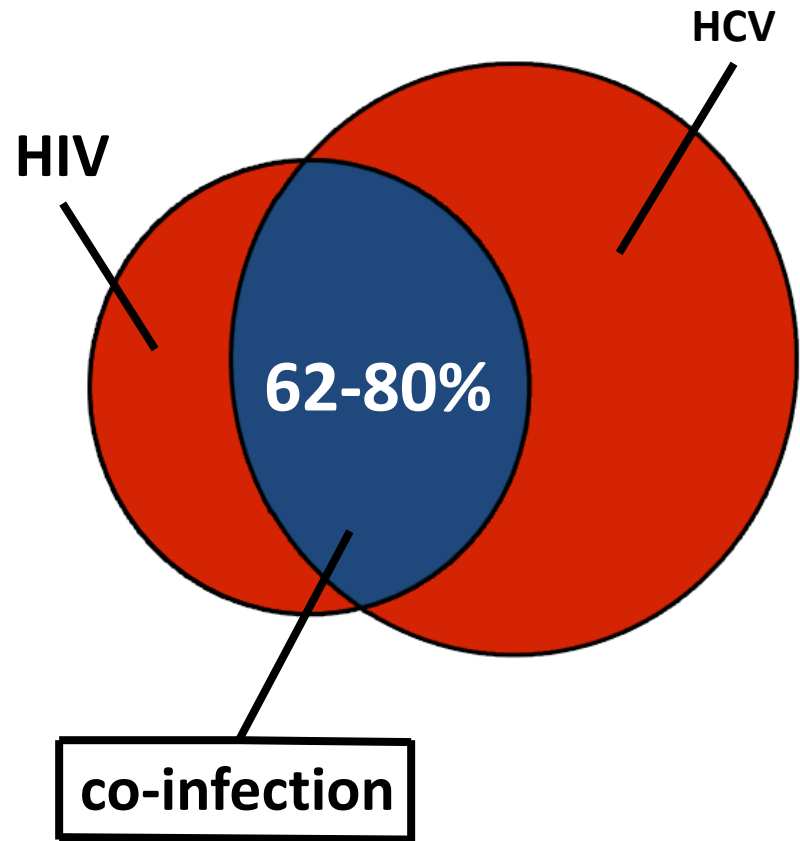


HIV/HCV: 300,000

# Co-Infection

## Clinical Information

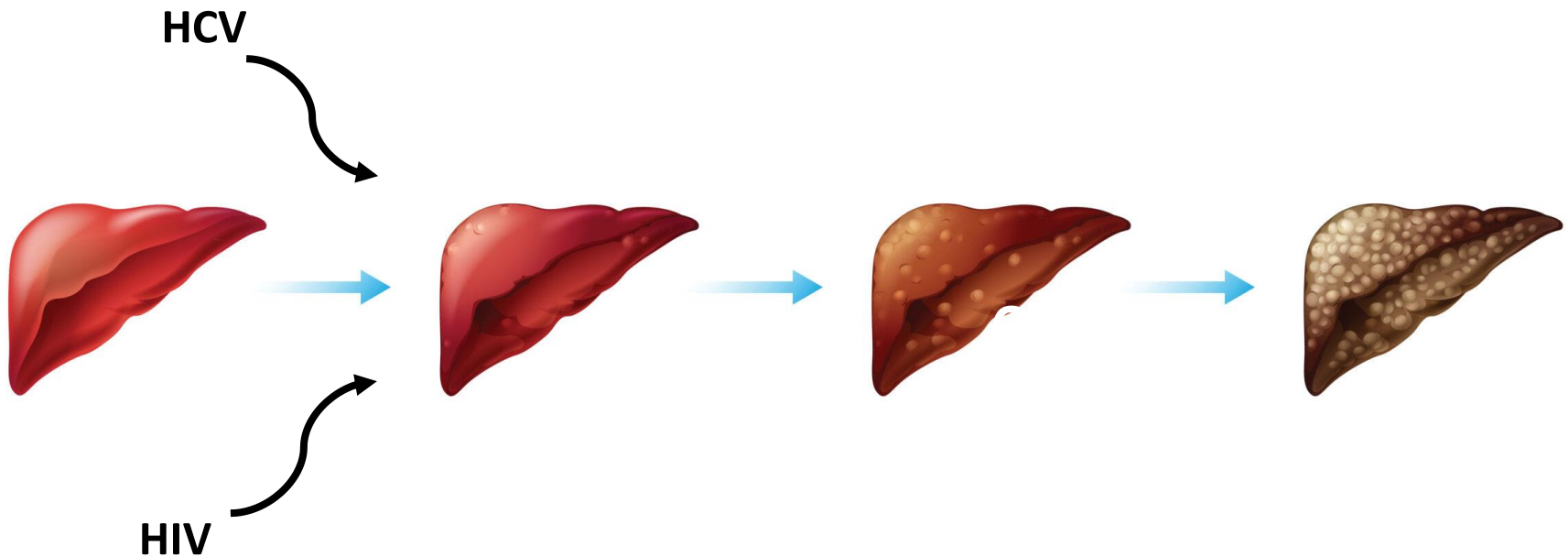
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# Co-Infection

## Clinical Information

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# TREATMENT IN CO-INFECTION

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# Co-Infection

## Treatment Considerations

**Treatment is always considered.**

**Slow Disease Progression**

**Unique Motivation**

# Co-Infection

## Treatment Considerations

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### Additional Considerations

Low CD4

≠

No HCV Treatment

HCV Complications

≠

No HIV Treatment

Do not pause HIV treatment

Same outcomes for co-infection  
and HCV mono-infection

Consider GI/hepatology referral  
in cirrhosis cases



# Co-Infection Treatment Options

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**Simplified**



***Not Simplified***

- Prior HCV treatment
- Decompensated cirrhosis
- ART with tenofovir DF with CKD
- Certain ART therapies
- Untreated HBV infection
- Pregnancy

# Co-Infection

## Treatment Options

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Untreated HBV infection

**TDF or TAF  
+  
FTC or 3TC**

*Not Simplified*

- Prior HCV treatment
- Decompensated cirrhosis
- ART with tenofovir DF with CKD
- Certain ART therapies
- 
- Pregnancy

# Co-Infection

## Drug-drug Interactions

		Ledipasvir/ Sofosbuvir (LDV/SOF)	Sofosbuvir/ Velpatasvir (SOF/VEL)	Elbasvir/ Grazoprevir (ELB/GRZ)	Glecaprevir/ Pibrentasvir (GLE/PIB)	Sofosbuvir/ Velpatasvir/ Voxilaprevir (SOF/VEL/VOX)
Protease Inhibitors	Boosted Atazanavir	A	A			
	Boosted Darunavir	A	A			
	Boosted Lopinavir	ND, A	A			ND
NNRTIs	Doravirine		ND		ND	ND
	Efavirenz				ND	ND
	Rilpivirine					
	Etravirine	ND	ND	ND	ND	ND
Integrase Inhibitors	Bictegravir			ND	ND	
	Cabotegravir	ND	ND	ND	ND	ND
	Cobicistat-boosted elvitegravir	C	C			C
	Dolutegravir					ND
	Raltegravir					ND
Entry Inhibitors	Fostemsavir	ND	ND	ND	ND	ND
	Ibalizumab-uiyk	ND	ND	ND	ND	ND
	Maraviroc	ND	ND	ND	ND	ND
NRTIs	Abacavir		ND	ND		ND
	Emtricitabine					
	Lamivudine		ND	ND		ND
	Tenofovir disoproxil fumarate	B, C	B, C			C
	Tenofovir alafenamide	D	D	ND		D

# Co-Infection

## Drug-drug Interactions



**Mavyret  
(glecaprevir/pibrentasvir)**

**Three pills, once daily, with food  
Total of 8 weeks**

Component	Example
Abacavir	Triumeq
Bictegravir	Biktarvy
Cabotegravir	Cabenuva
Dolutegravir	Dovato, Tivicay, Triumeq
Doravirine	Delstrigo, Pifeltro
Elvitegravir	Genvoya
Emtricitabine*	Biktarvy, Descovy, Odefsey, Truvada
Lamivudine*	Delstrigo, Dovato, Triumeq
Maraviroc	Selzentry
Raltegravir	Isentress
Rilpivirine	Cabenuva, Odefsey
Tenofovir (DF & AF)*	Biktarvy, Delstrigo, Descovy, Odefsey, Truvada

\*hepatitis B coverage

# Co-Infection

## Drug-drug Interactions

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**Mavyret  
(glecaprevir/pibrentasvir)**

**Three pills, once daily, with food  
Total of 8 weeks**

Component	Example
Atazanavir	Reyataz
Efavirenz	Atripla, Sustiva
Etravirine	Intelence
Nevirapine	Viramune
Ritonavir	Kaletra, Norvir

Found in Paxlovid

# Co-Infection

## Drug-drug Interactions

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Component	Example
Most antiretrovirals!	

**Epclusa**  
**(sofosbuvir/velpatasvir)**

**One pill, once daily**  
**Total of 12 weeks**

# Co-Infection

# Drug-drug Interactions

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## Epclusa (sofosbuvir/velpatasvir)

One pill, once daily  
Total of 12 weeks

Component	Example
Efavirenz	Atripla, Sustiva
Etravirine	Intelence
Nevirapine	Viramune
Tipranavir	Aptivus

# Co-Infection

## Drug-drug Interactions



**Vosevi**  
(sofosbuvir/velpatasvir/voxilaprevir)

**One pill, once daily**  
**Total of 12 weeks**

Component	Example
Abacavir	Triumeq
Bictegravir	Biktarvy
Cabotegravir	Cabenuva
Dolutegravir	Dovato, Tivicay, Triumeq
Doravirine	Delstrigo, Pifeltro
Emtricitabine*	Biktarvy, Descovy, Odefsey, Truvada
Lamivudine*	Delstrigo, Dovato, Triumeq
Maraviroc	Selzentry
Raltegravir	Isentress
Rilpivirine	Cabenuva, Odefsey
Tenofovir (DF & AF)*	Biktarvy, Delstrigo, Descovy, Odefsey, Truvada

\*hepatitis B coverage



# Co-Infection

## Drug-drug Interactions

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Component	Example
Atazanavir	Reyataz
Efavirenz	Atripla, Sustiva
Etravirine	Intelence
Lopinavir	Kaletra

### Vosevi

(sofosbuvir/velpatasvir/voxilaprevir)

**One pill, once daily**  
**Total of 12 weeks**

# Co-Infection

# Drug-drug Interactions



Component	
Most antiretrovirals!	

**Harvoni**  
**(ledipasvir/sofosbuvir)**

**One pill, once daily**  
**Total of 12 weeks**

# Co-Infection

## Drug-drug Interactions



Component	Example
Tipranavir	Aptivus

**Harvoni**  
**(ledipasvir/sofosbuvir)**

**One pill, once daily**  
**Total of 12 weeks**

# Co-Infection

## Drug-drug Interactions



**Zepatier  
(elbasvir/grazoprevir)**

**One pill, once daily  
Total of 12 weeks**

Component	Example
Abacavir	Triumeq
Bictegravir	Biktarvy
Cabotegravir	Cabenuva
Dolutegravir	Dovato, Tivicay, Triumeq
Doravirine	Delstrigo, Pifeltro
Emtricitabine*	Biktarvy, Descovy, Odefsey, Truvada
Lamivudine*	Delstrigo, Dovato, Triumeq
Maraviroc	Selzentry
Raltegravir	Isentress
Rilpivirine	Cabenuva, Odefsey
Tenofovir (DF & AF)*	Biktarvy, Delstrigo, Descovy, Odefsey, Truvada

\*hepatitis B coverage

# Co-Infection

## Drug-drug Interactions



**Zepatier  
(elbasvir/grazoprevir)**

**One pill, once daily  
Total of 12 weeks**

Component	Example
Atazanavir	Reyataz
Cobicistat	Genvoya, Prezcobix, Stribild, Symtuza
Darunavir	Prezista
Efavirenz	Atripla, Sustiva
Etravirine	Intelence
Lopinavir	Kaletra, Aluvia
Nevirapine	Viramune

- <https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics?>
- [Fast Facts: HIV in the US by Age | HIV | CDC](#)
- [Understanding the Current HIV Epidemic in the United States – AIDSvu](#)
- <https://www.cdc.gov/hiv/data-research/facts-stats/index.html?>
- [HIV Prevention: Oklahoma](#)
- [Oklahoma Among Seven States With Highest Rural HIV Burden](#)
- [HCV Epidemiology in the United States - Core Concepts](#)
- [Recommendations for Testing, Managing, and Treating Hepatitis C | HCV Guidance](#)
- [Core Concepts - Treatment of HCV in Persons with HIV Coinfection - Treatment of Key Populations and Unique Situations - Hepatitis C Online](#)
- [Hepatitis C Virus Infection: Adult and Adolescent OIs | NIH](#)
- [Table 3.5 – Chronic – Case Rates by Jurisdiction | 2022 Hepatitis Surveillance | CDC](#)
- [Figure 3.2 – Acute – Case Rates by Jurisdiction | 2022 Hepatitis Surveillance | CDC](#)
- [Figure 3.9 – Map of Death Rates | 2022 Hepatitis Surveillance | CDC](#)
- [Figure 3.3 – Acute – Map of Case Rates | 2022 Hepatitis Surveillance | CDC](#)

<https://map.aidsvu.org/profiles/state/oklahoma/overview>

<https://www.hiv.gov/blog/oklahoma-s-ending-the-hiv-epidemic-efforts-extend-reach-to-people-in-rural-areas#:~:text=Oklahoma's%20Ending%20the%20HIV%20Epidemic%20Efforts%20Extend%20Reach%20to%20People%20in%20Rural%20Areas,-Content%20From:%20HIV&text=State%20and%20local%20partners%20in,health%20professionals%20serving%20rural%20communities.>

<https://nau.edu/sherc/supplement-ending-the-aids-epidemic-in-rural-oklahoma-ehero/#:~:text=Oklahoma%20has%20the%20highest%20proportion,STI%20prevention%20work%20in%20Oklahoma.>

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<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/human-immunodeficiency-virus-hiv-infection-screening#bootstrap-panel--6>

<https://www.hiv.uw.edu/go/screening-diagnosis/diagnostic-testing/core-concept/all#laboratory-hiv-testing-algorithm-as-recommended-cdcaph1>

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<https://pmc.ncbi.nlm.nih.gov/articles/PMC11599108/#:~:text=cases%20%5B16%5D,-Despite%20a%20favourable%20course%20in%20the%20majority%20of%20patients%2C%20approximately,exceeding%20six%20months%20%5B16%5D.>

<https://www.hepatitisc.uw.edu/go/screening-diagnosis/epidemiology-us/core-concept/all>

<https://www.cdc.gov/hepatitis-surveillance-2022/hepatitis-c/figure-3-3.html>

<https://map.hepvu.org/hepc-prevalence/state/case/none/none/usa?geoContext=OK>

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