Modeling what is required to prevent HIV and HCV among people who inject drugs in the U.S.

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HCV AND HIV PREVENTION INTERVENTIONS AMONG PWID
HARM REDUCTION EFFECTIVENESS ON HIV AND HCV

<table>
<thead>
<tr>
<th></th>
<th>HIV incidence</th>
<th>HCV incidence</th>
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<tbody>
<tr>
<td>Opiate agonist therapy (OAT)</td>
<td>↓ 54%</td>
<td>↓ 50%</td>
</tr>
<tr>
<td>Needle and syringe programs (NSP)</td>
<td>↓ 34%</td>
<td>↓ 76%*</td>
</tr>
<tr>
<td>Combined harm reduction (OAT+ high coverage NSP)</td>
<td></td>
<td>↓ 74%</td>
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*In Europe, weaker effect in North America

OAT IMPACT ON HIV TREATMENT

• Systematic review and meta-analysis found OAT associated with:
  – 69% increase in recruitment onto antiretroviral treatment (ART)
  – 2-fold increase in ART adherence
  – 23% decrease in odds of ART attrition
  – 45% increase in odds of viral suppression

HCV TREATMENT HIGHLY EFFECTIVE AMONG PWID

Sustained viral response (%)

OAT: Opiate agonist therapy


Slide courtesy of G Dore
Liver Damage Restrictions

An analysis of 2017 Fee-For-Service Medicaid data demonstrates that several Medicaid programs have eliminated liver damage requirements for patients seeking to access hepatitis C (HCV) cures, while others highly restrict access.

Sobriety Restrictions

An analysis of 2017 Fee-For-Service (FFS) Medicaid data demonstrates that several Medicaid programs have eliminated sobriety requirements for patients seeking to access hepatitis C (HCV) cures, while others highly restrict access.
TALK OUTLINE

• HCV elimination among PWID in the U.S.
• HIV prevention among PWID in the U.S.
• Incarceration – challenges and opportunities to prevent HIV and HCV among PWID
WHAT IS NEEDED TO ELIMINATE HCV AMONG PWID IN THE U.S.?
WHO AND NASEM HCV ELIMINATION TARGETS

• **Goal:** Eliminate viral hepatitis as a public health threat by 2030

• **IMPACT TARGETS:**
  • 90% reduction in new HCV and HBV infections by 2030
  • 65% reduction HCV and HBV-related mortality by 2030
HCV TREATMENT... AS PREVENTION?

• Harm reduction important in averting infections but can’t achieve HCV elimination in isolation\(^1,2\)

• Substantial interest in HCV treatment as prevention
  – Finite and curative
  – But, risk of reinfection?

• Modeling evidence that modest HCV treatment scale-up could substantially reduce HCV prevalence/incidence among PWID\(^2-4\)

HCV PREVENTION AMONG PWID IN US: COMPARING URBAN AND RURAL SETTINGS

San Francisco, CA
- Very high prevalence
- Lowest, stable incidence (~12/100py)

Scott County, IN
- High prevalence
- Increasing, higher incidence (>40/100py)

Perry County, KY
- High prevalence
- Moderate stable incidence (~20/100py)
HCV PREVENTION AMONG PWID IN SAN FRANCISCO, CA

- Model predicts fairly stable epidemic
- Further scale-up of harm reduction has modest impact as syringe exchange already high coverage
- Despite very high prevalence, elimination could be achieved with full HR + treating ~50/1000 PWID/yr

Fraser H, Martin NK, Vickerman P et al. in preparation
HCV PREVENTION AMONG PWID IN PERRY COUNTY, KY

- Slowly expanding epidemic
- Substantial impact with full harm reduction (NSP+MAT scale-up) but cannot achieve elimination
- Elimination could be achieved with full HR + treating <50/1000 PWID

Fraser H, Martin NK, Vickerman P et al. in preparation
FORECASTING THE HCV EPIDEMIC AMONG PWID IN SCOTT COUNTY, IN

- HCV chronic prevalence could rise to 83% in 2030 with no intervention
- Full harm reduction (50% MAT/NSP) key to prevention but cannot reverse increase
- Combined harm reduction + treat 20/1000 PWID/yr stabilizes prevalence
- Need more intervention in expanding epidemic setting

Fraser H, Martin NK, Vickerman P et al, Addiction 2018;113:173-82
RETREATMENT IS REQUIRED TO ACHIEVE ELIMINATION IN SCOTT COUNTY, IN

IF NO RETREATMENT OF REINFECTIONS:

- HCV epidemic can rebound due to reinfection
- Harm reduction can maintain impact
- BUT cannot reach WHO/NASEM target

Fraser H, Martin NK, Vickerman P et al, Addiction 2018;113:173-82
SETTINGS WITH INCREASING INCIDENCE REQUIRE MORE INTERVENTION

Treatments per 1000 PWID required for elimination

- Without harm reduction scale-up
  - <75/1000 PWID treated in SF & KY
  - Double treatment rate in Scott County, IN as incidence higher and increasing

- With harm reduction scale-up
  - Halves treatment rate in KY & IN
  - Less impact in SF due to higher baseline coverage of syringe exchange

EFFECT OF THE NETWORK: SHOULD WE TARGET SPECIFIC PWID FOR HCV TREATMENT?

- A study in Australia indicated a ‘treat your friend’ strategy may have more prevention impact\(^1\)

- But recent work incorporating the injecting network among PWID in Hartford, CT indicates a random treatment strategy has most impact\(^2\)

PREVENTING HIV AMONG PWID U.S. – INSIGHTS FROM MODELING
IDENTIFYING WHICH CARE CONTINUUM GAPS ARE CONTRIBUTING MOST TO HIV TRANSMISSION AMONG PWID

United States, 2009

IDENTIFYING WHICH CARE CONTINUUM GAPS ARE CONTRIBUTING MOST TO HIV TRANSMISSION AMONG PWID

- Undiagnosed HIV+ PWID 33% population but contribute >50% new infections in NYC
- Need to target diagnosis and initiation/retention on ART

NEW YORK CITY
COMBINATION PREVENTION TO MAXIMIZE HIV IMPACT

Modeled HIV incidence among PWID (/100py) in New York City in 2040

WHICH INTERVENTION TO PRIORITIZE?
COST-EFFECTIVENESS IN THE U.S.

- First scale-up OAT
- Then NSP
- Then HIV test & treat
- PrEP not cost-effective

THE ROLE OF INCARCERATION IN TRANSMISSION AND PREVENTION OF HIV/HCV AMONG PWID
INCARCERATION INCREASES RISK OF HIV AND HCV INCIDENCE AMONG PWID

• Systematic review and meta-analysis found that recent incarceration significantly increases risk of acquiring HIV (by 81%) and HCV (by 62%) compared to non-recent incarceration.

• This risk persists post release.

Stone J, Martin NK, Vickerman P et al. IAS 2017 poster TUPEC0767
PUBLIC HEALTH ORIENTED DRUG LAW REFORM COULD REDUCE HIV AMONG PWID: MEXICO CASE STUDY

- In 2009, Mexico decriminalized possession of select drugs for personal consumption and mandating drug treatment at third apprehension.

- To date, limited knowledge of the reform has hampered its implementation, resulting in little impact among PWID in Tijuana, Mexico\(^1,2\)

- If implemented properly, could avert 21% of new HIV infections among PWID in Tijuana from 2018-2030\(^2\)

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COMBINATION HIV PREVENTION IN PRISON COULD AVERT HIV AMONG COMMUNITY PWID: MEXICO CASE STUDY

**Percentage of new infections averted among PWID 2018-2030**

- **ART in prison and on release**: 12% (2 to 22%)
- **OAT in prison and on release**: 13% (6 to 24%)
- **ART+ OAT in prison and on release**: 18% (8 to 31%)

*1 year retention OAT, 20%/yr ART drop-out

Borquez A, Strathdee S, Vickerman P, Boily MC, Martin NK. IAS 2017 poster TUPEC0895
HCV SCREENING/TREATMENT IN PRISONS COULD SUBSTANTIALLY AVERT NEW INFECTIONS IN THE COMMUNITY


DISCUSSION
PREVENTION OF HCV AND HIV AMONG PWID

• Urgent need to tackle HCV and HIV epidemics among PWID, especially in outbreak settings
• Lack of harm reduction and restrictions on HCV therapy may result in very high HCV burden among PWID in some settings
• Need scale-up of combination harm reduction and HIV/HCV screening and treatment for prevention
  • Achievable HCV treatment rates (<100/1000 PWID/yr)
  • Retreatment of HCV reinfections without stigma
• Need public health oriented drug law reform and interventions to prevent harm among incarcerated PWID
• Setting specific approaches tailored to local epidemiology
FUTURE/FURTHER CONSIDERATIONS

• Need **better epidemiological data** to forecast epidemics and assess interventions required

• Need modeling examining differences in epidemic and intervention impact among subpopulations (race/ethnicity and gender)

• Need future work examining the **impact and economic consequences of drug policy changes** on infectious disease risk and transmission among PWID
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