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# Cost-effectiveness of HCV Screening and Linkage in MMT: Relevance of HIV Co-infection

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## Purpose

- We evaluated the cost-effectiveness of an HCV screening and linkage to care intervention in US methadone maintenance treatment (MMT) patients using data from a randomized trial conducted in New York City and San Francisco.

## Background

- People who inject drugs are at high risk of infection with hepatitis C virus (HCV) and HIV infection due to unsafe injection practices.
- Many people who use susbtances do not have a regular source of medical care, and may be more likely to get HCV testing and linkage services at substance use treatment programs.
- A randomized trial of HCV care coordination in MMT programs in San Francisco and New York City found care coordination improved linkage to care in MMT (OR= 4.10; 95% CI=2.35,7.17) (Masson et al *AJPH* 2013).
- We performed an economic analysis to address the value of HCV care coordination interventions among HIV infected and HIV uninfected MMT clients.

## Methods

- We used a decision analytic model to compare the cost-effectiveness of 4 strategies: 1) **no intervention**; 2) HCV screening and education (**control**); 3) HCV screening and education for all and care coordination for all HCV-infected (**intervention**); and 4) HCV screening and education for all and care coordination for **only HCV mono-infected** patients (to explore trial results indicating that HIV co-infected participants linked through other systems of care).
- Data derived from the trial include population characteristics (67% male, mean age 48 years, 50% HCV mono-infected, 8% HCV/HIV co-infected) and linkage outcomes for HCV mono-infected patients (33% control, 65% intervention) and HCV/HIV co-infected patients (79% control, 84% intervention).
- We projected quality-adjusted life expectancy (QALYs) and lifetime medical costs using an established computer simulation model of HCV (HEP-CE). Incremental cost-effectiveness ratios (ICERs) are in 2015 US$/QALY discounted 3% annually.
- We calculated ICERs as additional cost per QALY gained compared to the next least expensive strategy after eliminating strategies due to extended dominance (when a combination of alternative strategies is a more efficient use of resources than the dominated strategy).

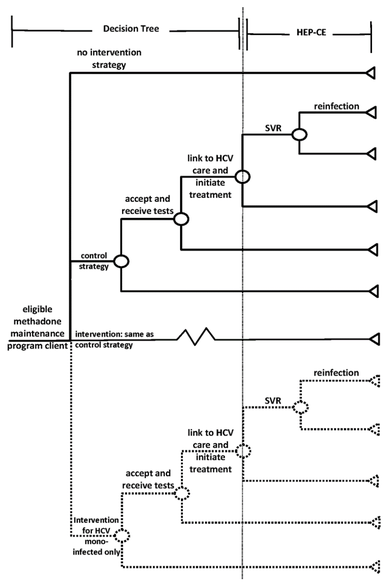
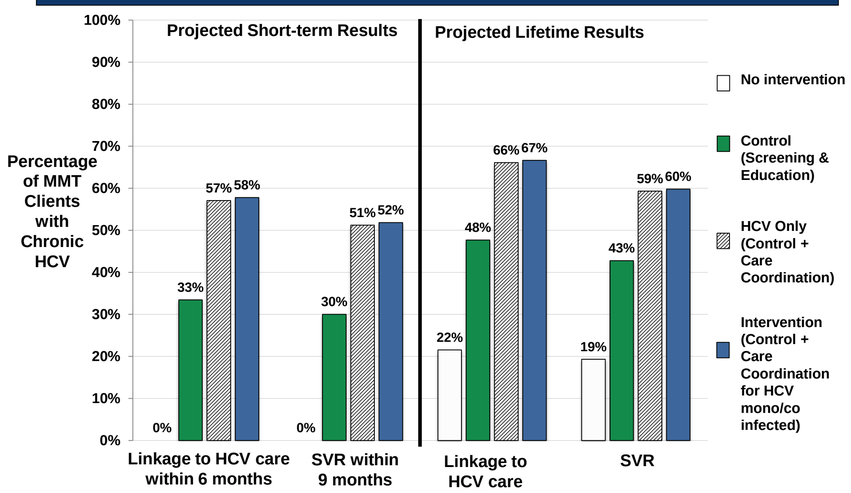



**Figure 1: Model Schematic. Black line indicates strategies modeled in the base case and sensitivity analyses. Dotted line indicates hypothetical scenario where the intervention strategy is only offered to HIV-uninfected HCV antibody positive individuals only.**

## Continuum of Care Results




## Cost-Effectiveness of Linkage Strategies

**Base Case Results**

| Strategy | Cost | Incremental Cost | Effectiveness | Incremental Effectiveness | ICER |
|---|---|---|---|---|---|
| No Intervention | $129,820 | --- | 6.923 | --- | --- |
| Control | $139,880 | $10,060 | 7.299 | 0.377 | dominated |
| HCV Only | $147,090 | $7,220 | 7.624 | 0.324 | $24,600 |
| Intervention | $147,350 | $270 | 7.627 | 0.003 | $78,900 |

**Quality of Life Minimum Estimator Scenario***

| Strategy | Cost | Incremental Cost | Effectiveness | Incremental Effectiveness | ICER |
|---|---|---|---|---|---|
| No Intervention | $129,820 | --- | 7.310 | --- | --- |
| Control | $139,880 | $10,060 | 7.602 | 0.292 | dominated |
| HCV Only | $147,090 | $7,220 | 7.850 | 0.247 | $32,000 |
| Intervention | $147,350 | $270 | 7.852 | 0.003 | $91,000 |

*Base case scenario uses multiplicative method to calculate health state quality of life values. Quality of life minimum scenario chooses the lowest value for each health state (Wittenberg *Value in Health* 2016).

**High Incidence of Reinfection Scenario***

| Strategy | Cost | Incremental Cost | Effectiveness | Incremental Effectiveness | ICER |
|---|---|---|---|---|---|
| No Intervention | $129,750 | --- | 6.503 | --- | --- |
| Control | $139,870 | $10,120 | 6.776 | 0.273 | dominated |
| HCV Only | $147,160 | $7,290 | 6.995 | 0.220 | $35,400 |
| Intervention | $147,420 | $260 | 6.999 | 0.003 | $77,700 |

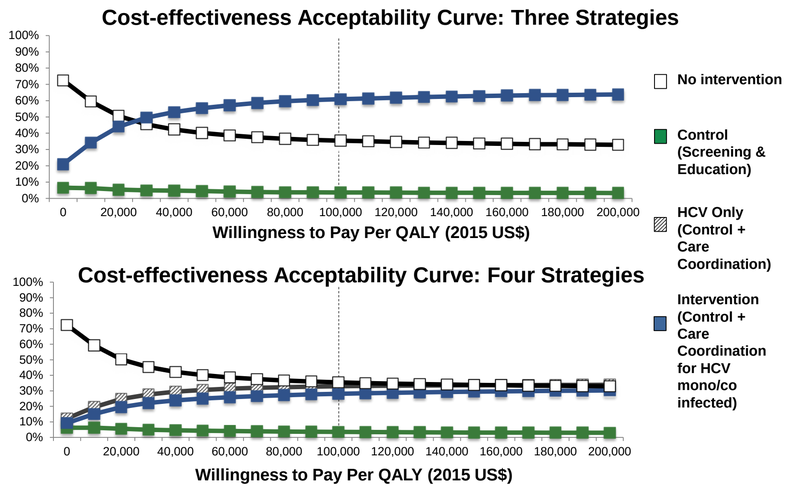
*Base Case scenario assumes 4.3 HCV new infections per 100 person years. The High Incidence of Reinfection scenario assumes 10.0 new HCV infections per person years.

**Early Stage Disease Treatment Restriction Scenario***

| Strategy | Cost | Incremental Cost | Effectiveness | Incremental Effectiveness | ICER |
|---|---|---|---|---|---|
| No Intervention | $129,280 | --- | 6.912 | --- | --- |
| Control | $138,500 | $9,210 | 7.264 | 0.352 | dominated |
| HCV Only | $144,150 | $6,660 | 7.565 | 0.302 | $24,300 |
| Intervention | $145,390 | $250 | 7.568 | 0.003 | $73,100 |

*Base Case scenario assumes no treatment restrictions. The Treatment Restriction scenario assumes HCV mono-infected patients with F0-F2 liver staging will not be treated.

## Probabilistic Sensitivity Analysis




## Limitations

The trial was conducted during the era of interferon-containing treatment regimens and may not reflect current linkage rates. Although the trial provided data regarding linkage to care, the subsequent steps along the cascade of care were derived from existing literature. Linkage rates for HIV co-infected patients reflect resources available in New York City and San Francisco that may not be generalizable to other settings in the United States.

## Conclusions

HCV care coordination interventions that include screening, education and linkage to care in MMT settings have a cost effectiveness ratio < $100,000/QALY for both HCV mono-infected and HIV co-infected patients. Delivering the intervention to all mono/ co-infected participants was preferred in 61% of probabilistic sensitivity analyses; focusing on mono-infected participants was also a reasonable treatment strategy where HIV co-infected participants have access to other care coordination resources.

## Acknowledgments

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