Bending the curve of Hepatitis C virus infection in Machar Colony: A mass screen-and-treat intervention in a slum settlement in Karachi, Pakistan

Muhammad Khawar Aslam, Will de Glanville, Yves Wailly, Marta Miazek, Saeed Hamid, Petros Isaakidis

Ethics

The study was approved by the Pakistan National Bioethics Committee (No.4–87/NBC-883/22/185) and by MSF Ethics Review Board (ID:2221). People of all ages screened in the community were invited to opt out of their data being used for research purposes. Adults initiated on treatment provided written informed consent and children (12–17 years) initiated on treatment provided written informed assent.

Conflicts of interest

All authors declare no competing interests.

Machar Colony: Context

- **Slum Settlement in Karachi** close to Karachi fish harbor.
- HCV seroprevalence of 13.5%[1] i.e., **doubled the HCV prevalence in Pakistan**
- **Unsafe injection** practices among informal health providers major infection driver.[1]
- Concentration of HCV in slum settlements **health seeking behavior, accessibility, and acceptability of health services.**
- **Potential site** for HCV micro-elimination-based intervention.

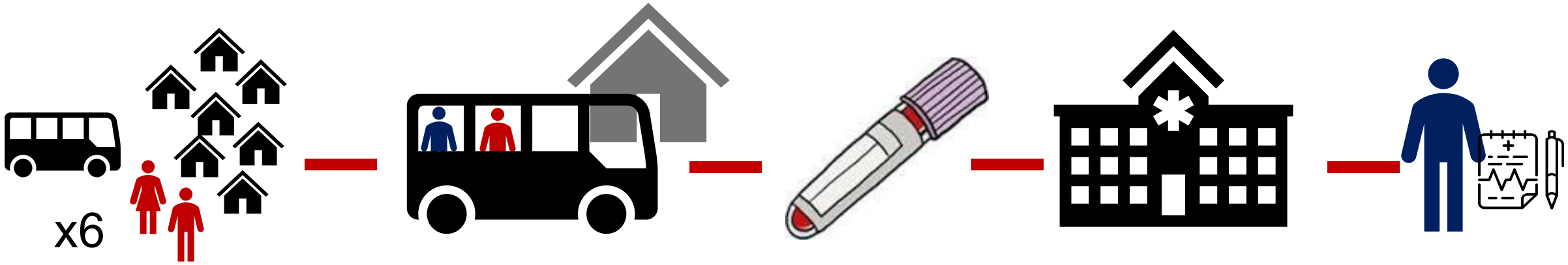
1.Mansoor et al (2023) Prevalence and risk factors for hepatitis C virus infection in an informal settlement in Karachi, Pakistan. *PLOS Glob Public Health*.3(9): e0002076

MEDECINS SANS FRONTIERES

SCIENTIFIC DAYS

Bending the Curve: Continuum of care

Easily accessible and comprehensive HCV care for this population aiming to reduce the prevalence of hepatitis C virus infection



Door-to-Door Sensitization & mobilization for HCV screening

Mobile van OR in-house screening

Reflex blood collection for PCR

Sample transported to clinic

Tx initiation 24-48hrs (HCV PCR positives)

Bending the Curve: Key Features

Unrestricted screening & DAA treatment for all

Wide range of screening modalities

Point of Care GeneXpert Testing

Screen to initiation in 24-48 hours

12 weeks SOF/DAC treatment for all

Availability of 2nd & 3rd line DAAs for failure cases

Bending the Curve: Important Numbers

74,658 screened & 9% seropositive

83% agreed to test during mobilization

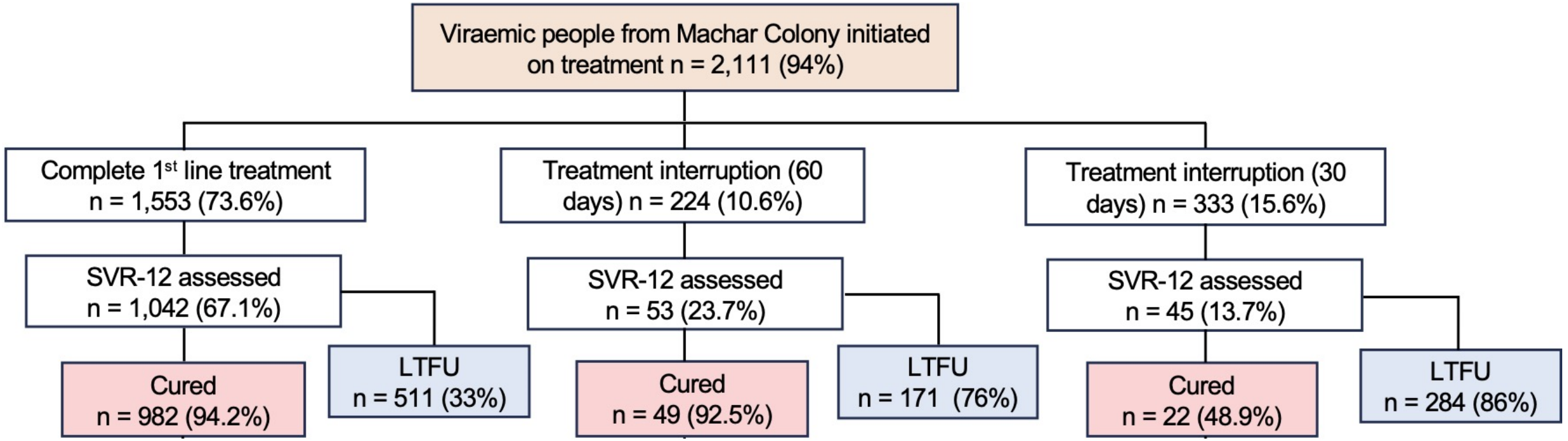
91% sero-positives provide reflex PCR sample

37% viraemic ratio

2111 patients initiate treatment

49% lost to follow-up treatment

Bending the Curve: Treatment Outcomes



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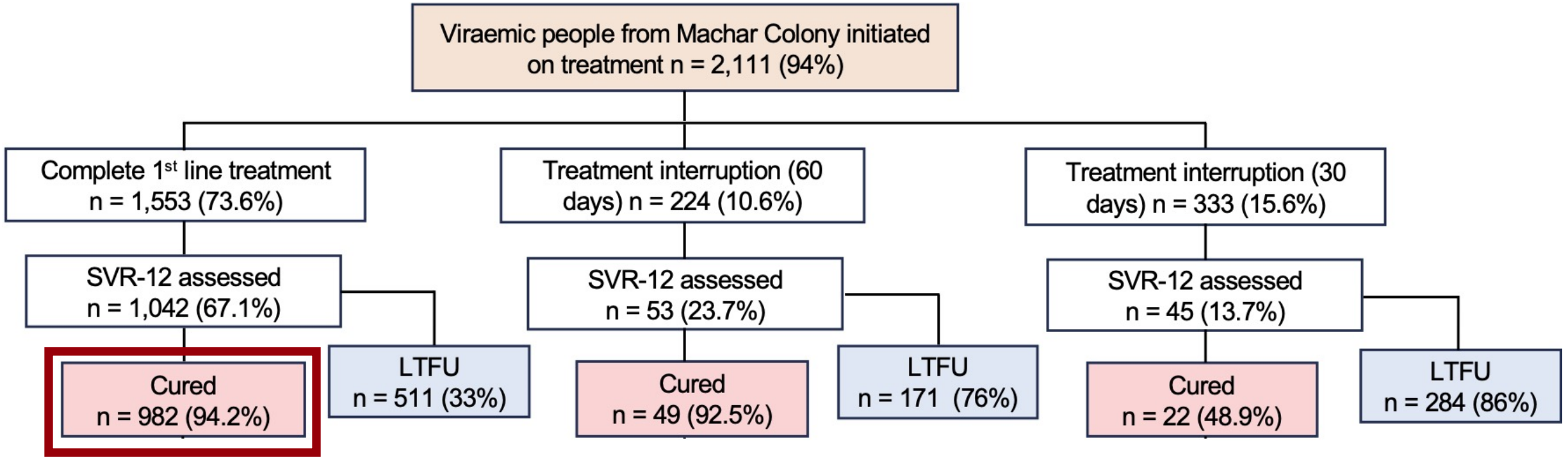

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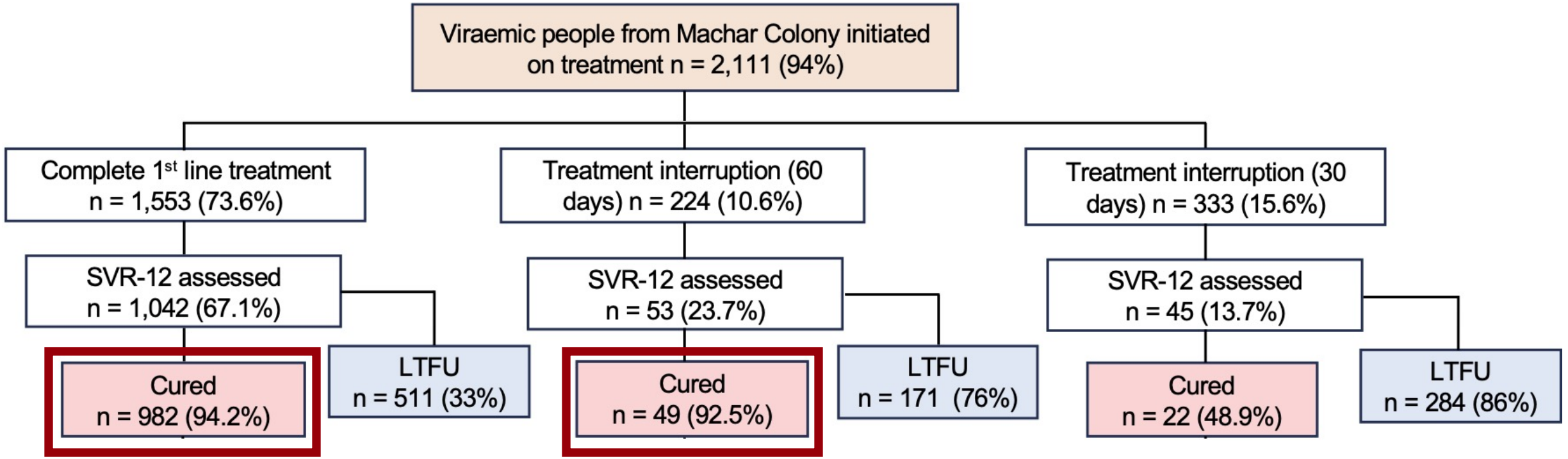

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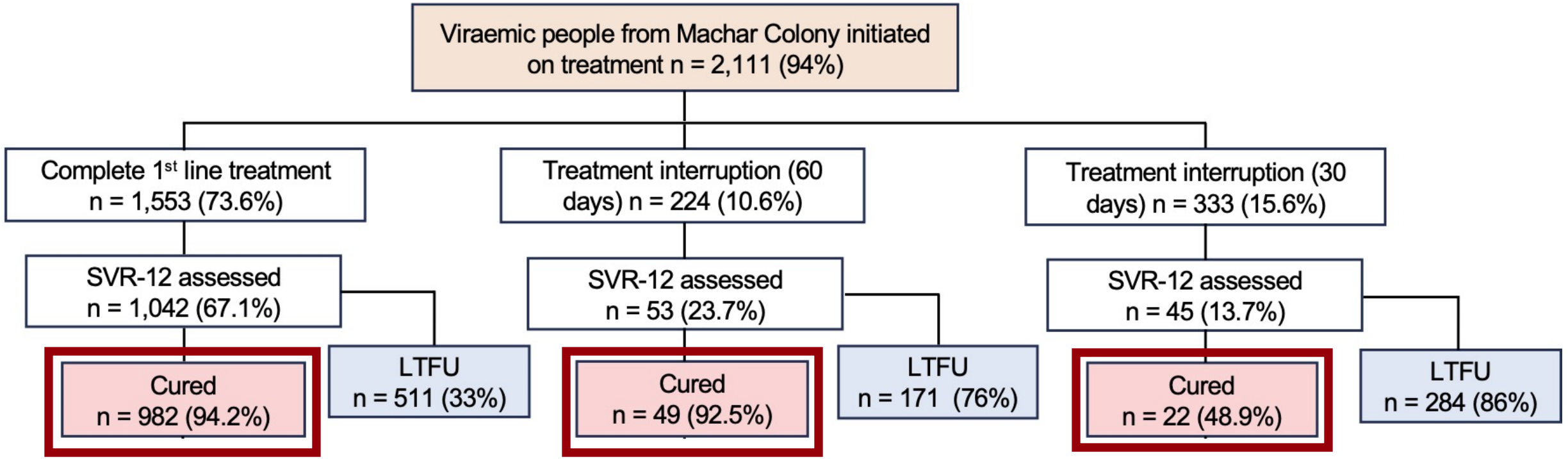
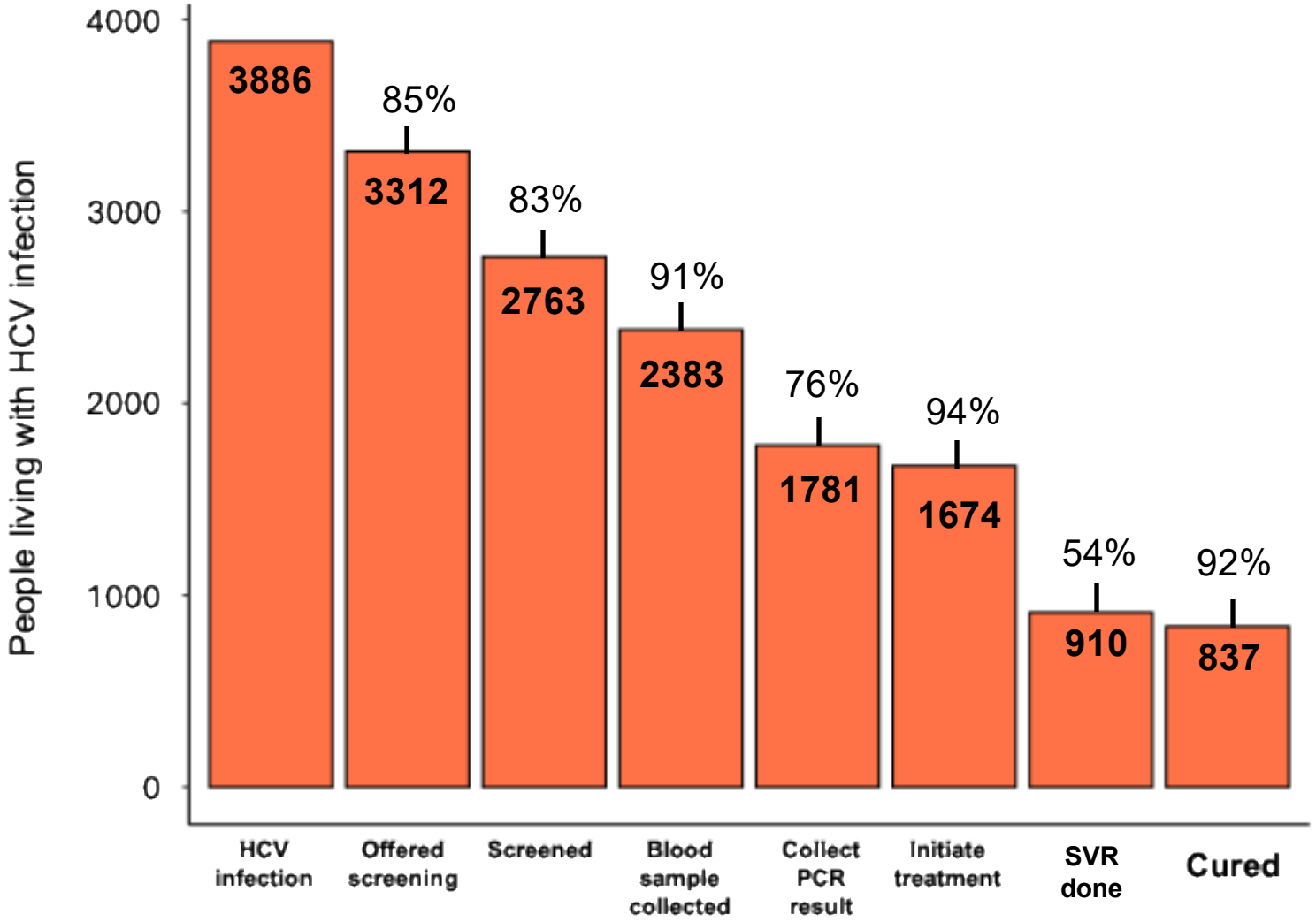


Bending the Curve: Initial cascade analysis



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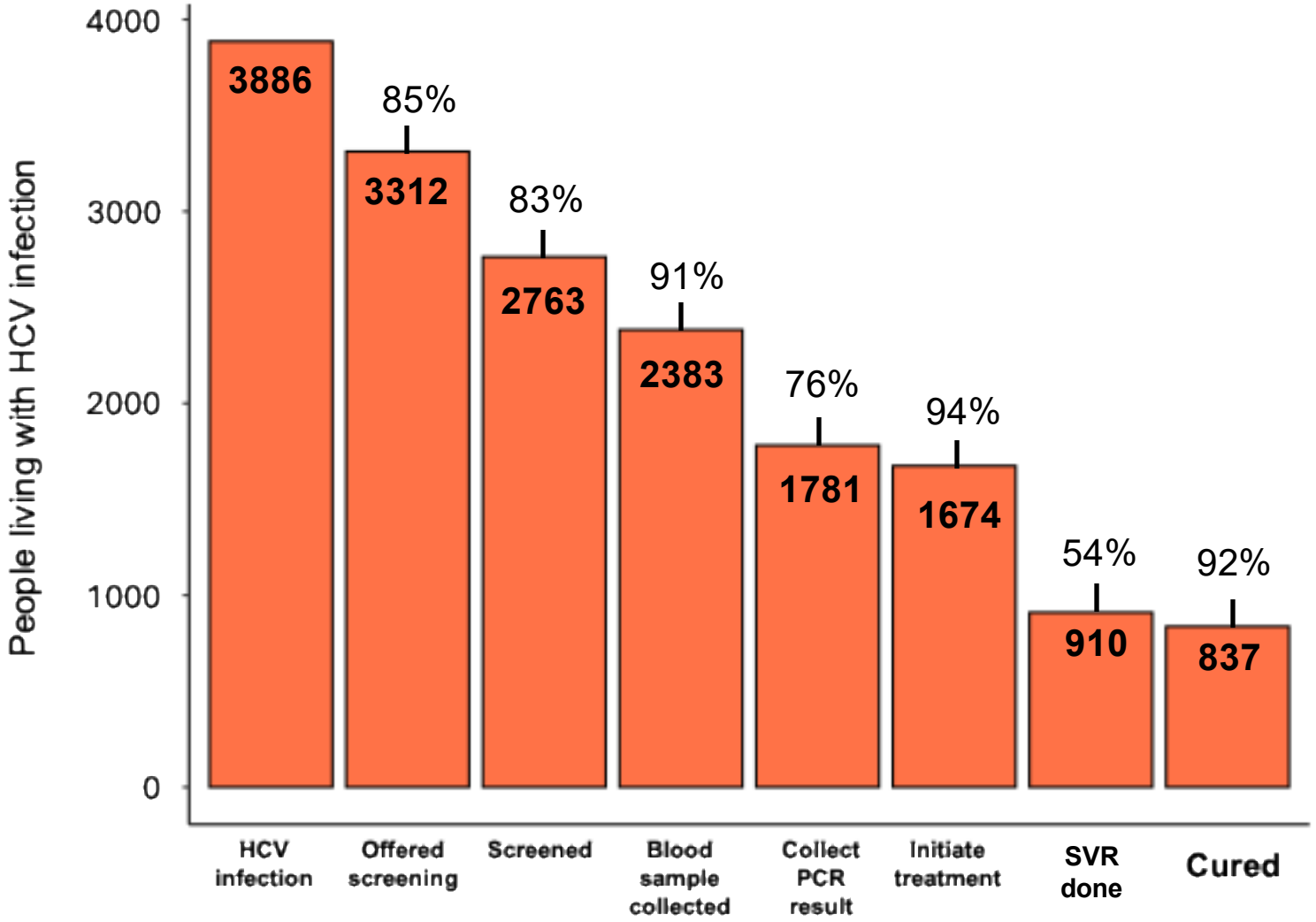

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Need for alternative approach for HCV care cascade in this setting because:

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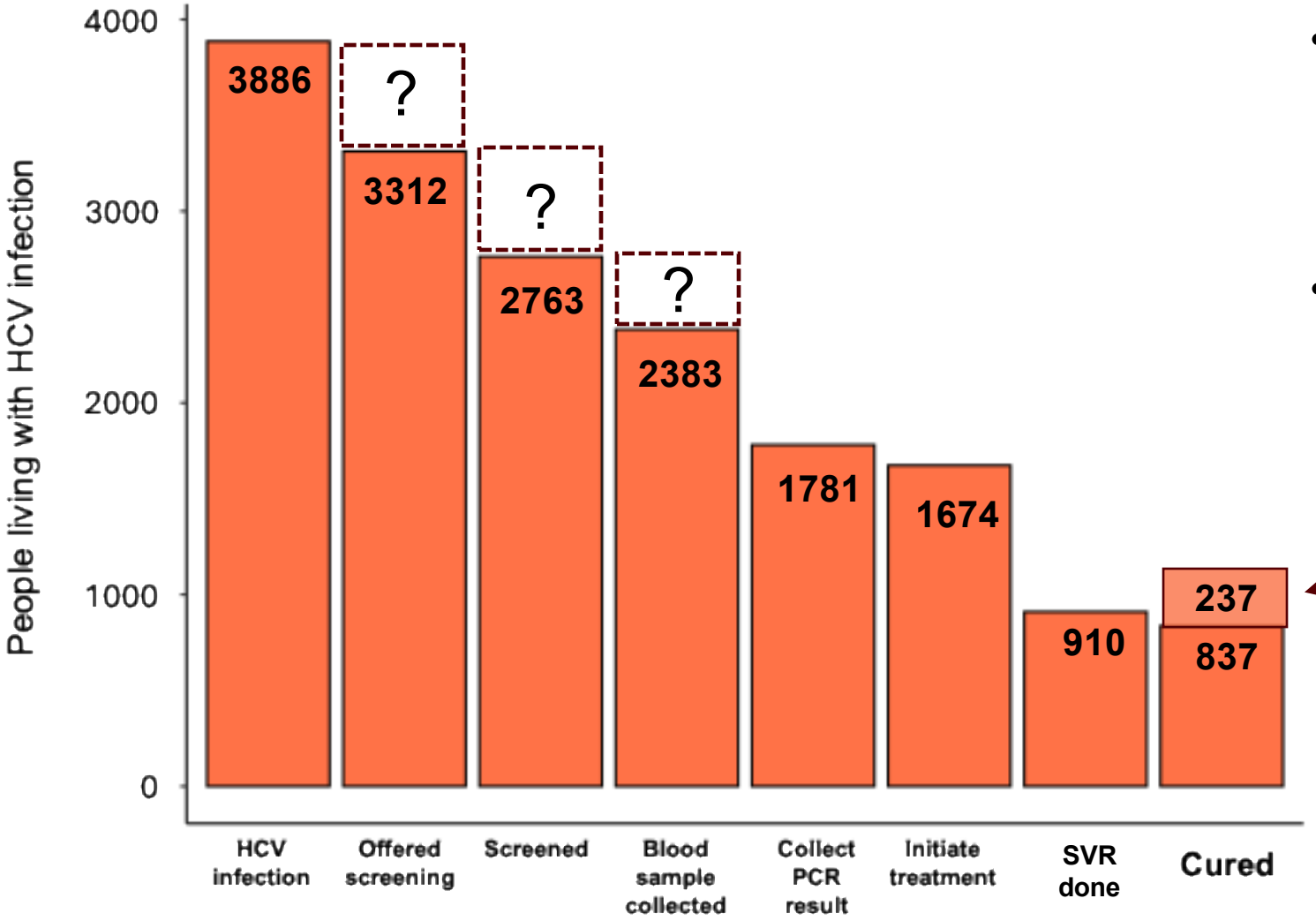

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1. Some people "falling out" of early stages of outreach cascade attended clinic as walk-ins and were cured

Walk-ins from Machar Colony cured

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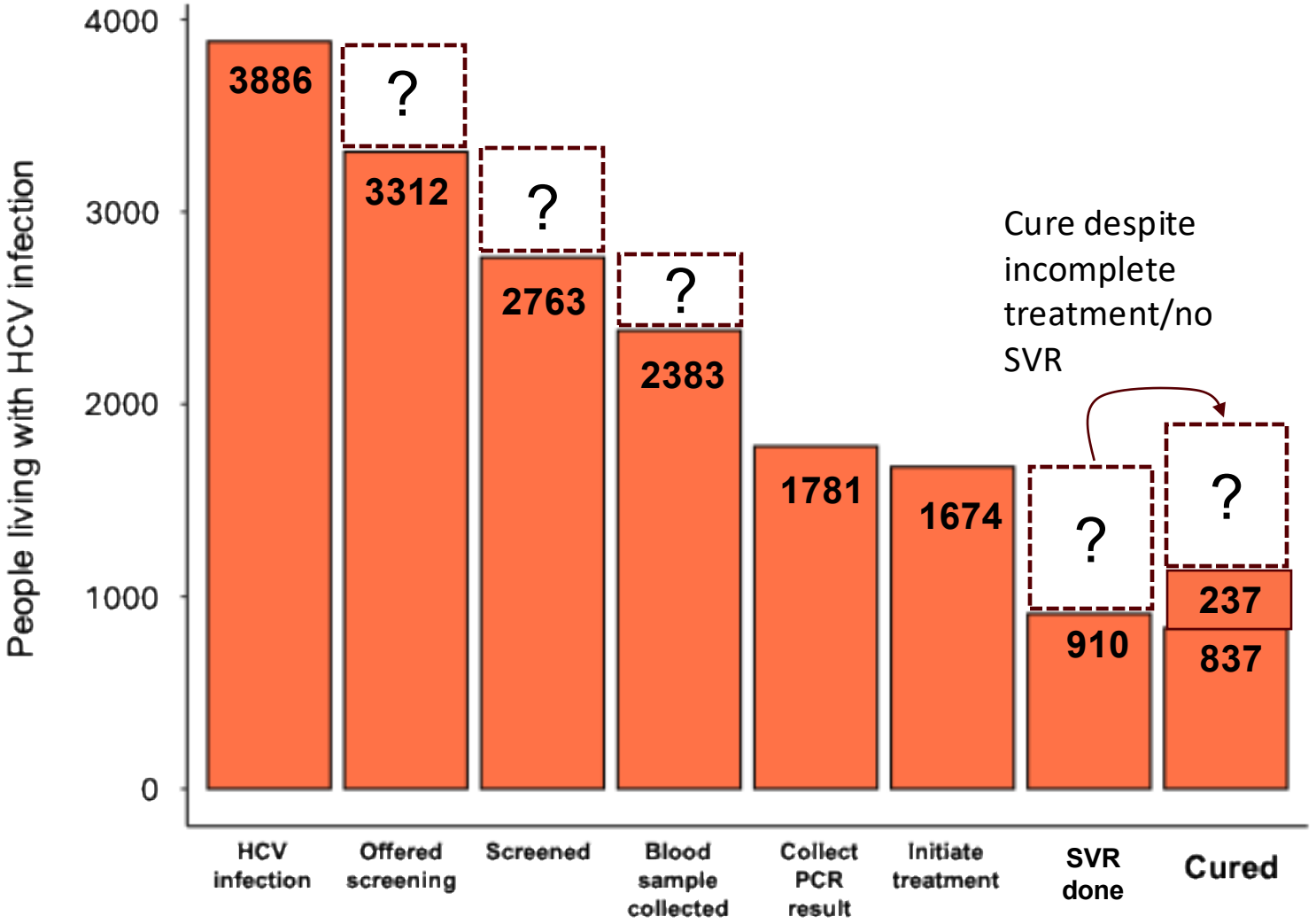

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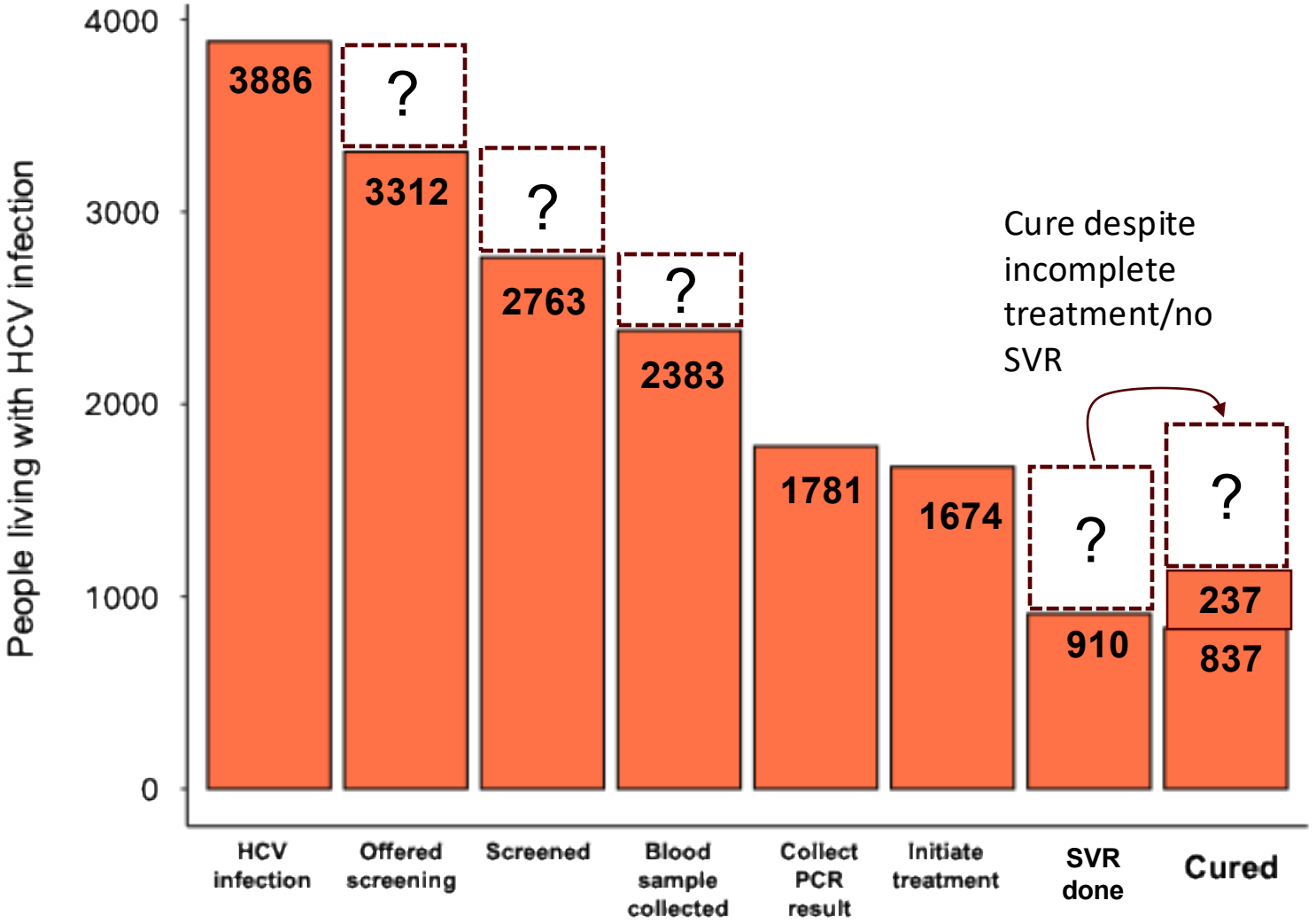

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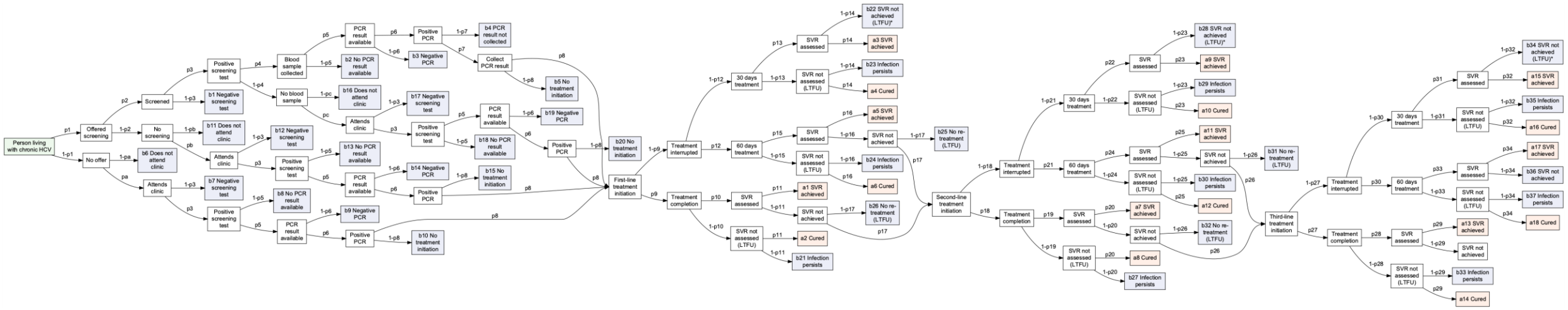
Overall numbers cured under-estimated
<u>AND</u> true number uncertain

Bending the Curve: Event tree

- “Event trees” (also called decision tree) commonly used in field of risk analysis to describe sequence of probabilistic events leading to an outcome
- Intuitive way to characterize complex systems (such as HCV care in Machar Colony)
- Allows integration of uncertainty in each of the probabilities without complicated mathematics



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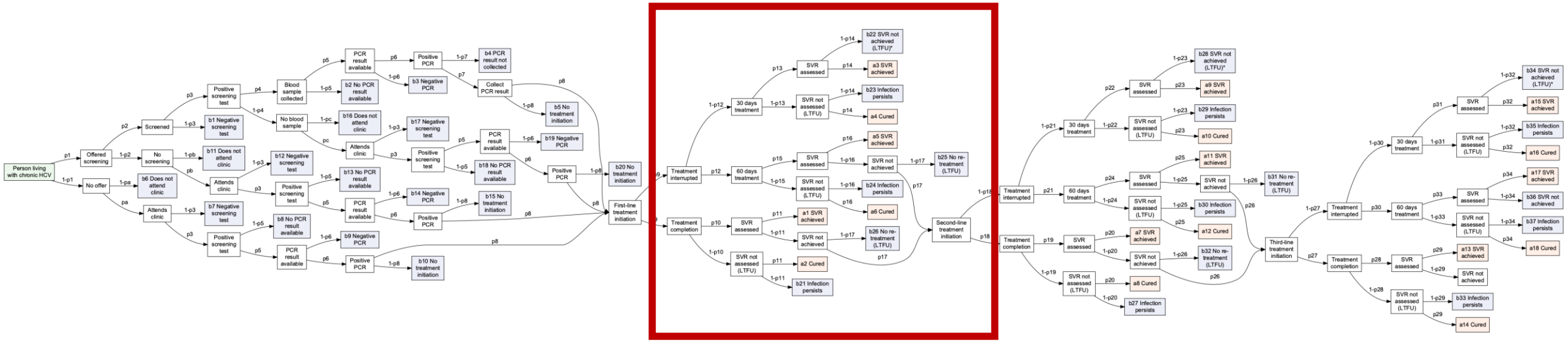

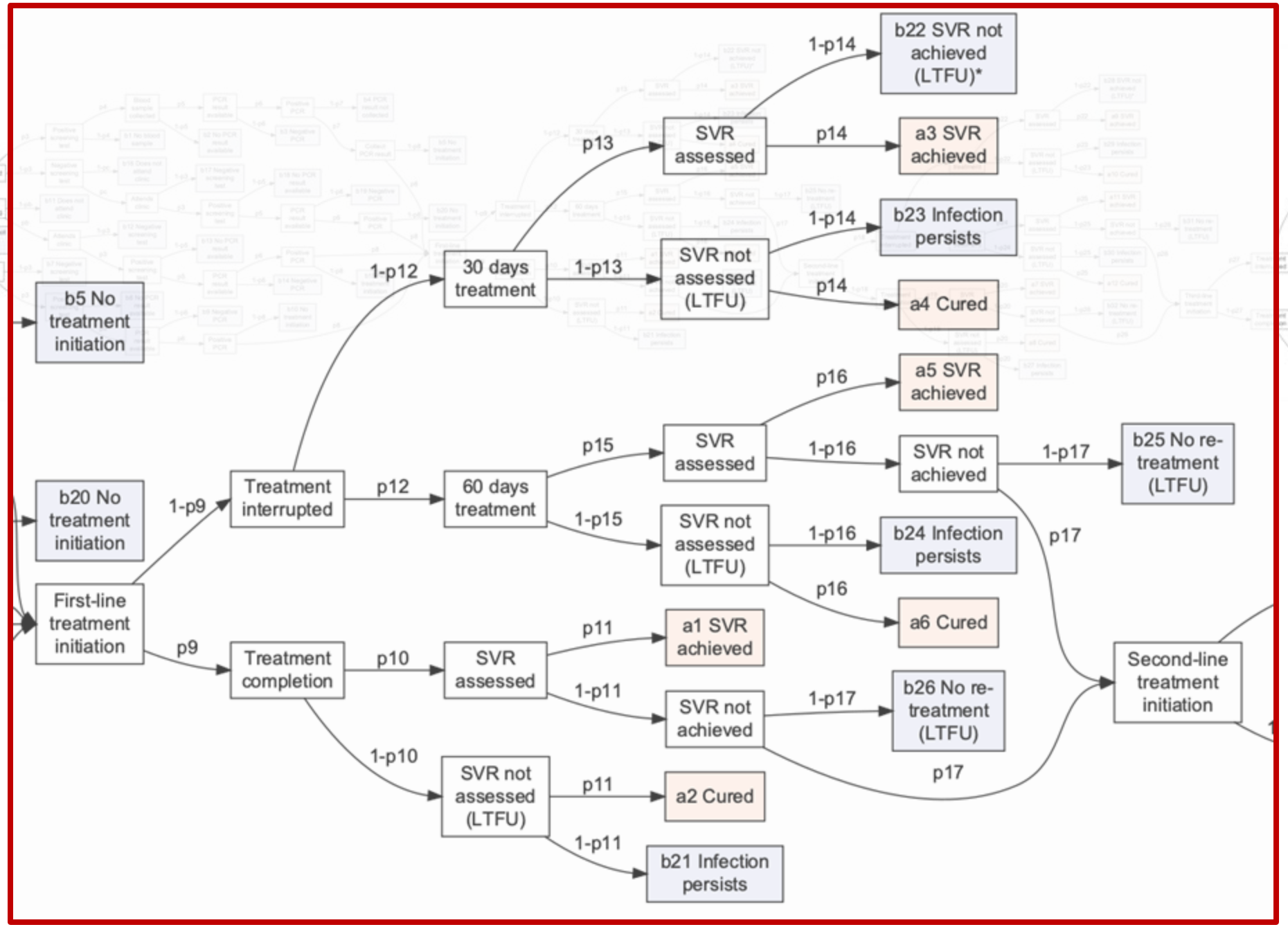
b5 No treatment initiation
b20 No treatment initiation
First-line treatment initiation
1-p9
p9
Treatment interrupted
Treatment completion
1-p12
p12
1-p10
p10
30 days treatment
60 days treatment
SVR not assessed (LTFU)
1-p13
p13
p15
1-p15
p11
1-p11
SVR assessed
SVR not assessed (LTFU)
SVR assessed
SVR not achieved
1-p14
p14
1-p14
p14
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p16
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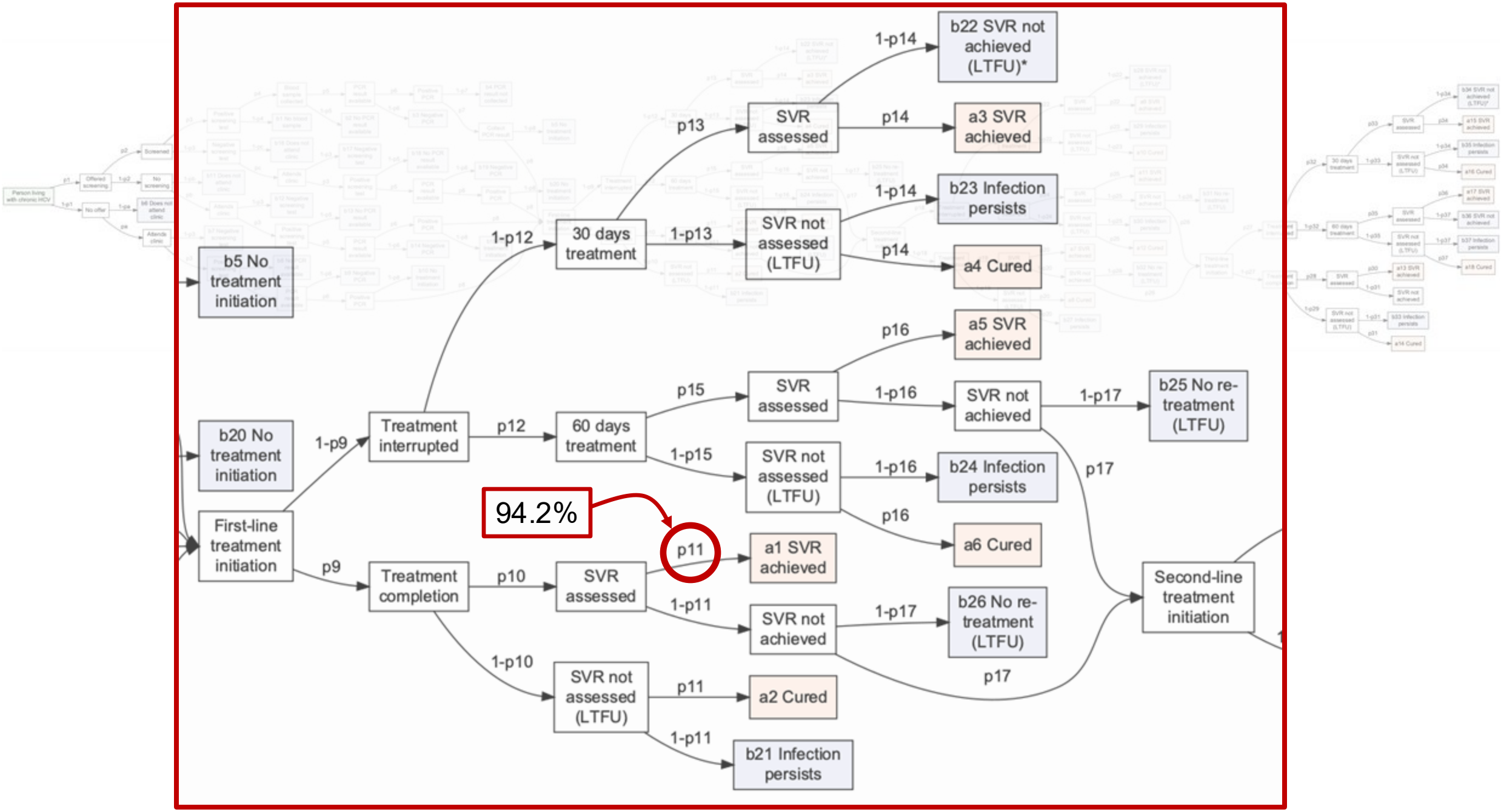
Second-line treatment initiation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p17
94.2%
p9
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p10
SVR assessed
p11
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SVR not achieved
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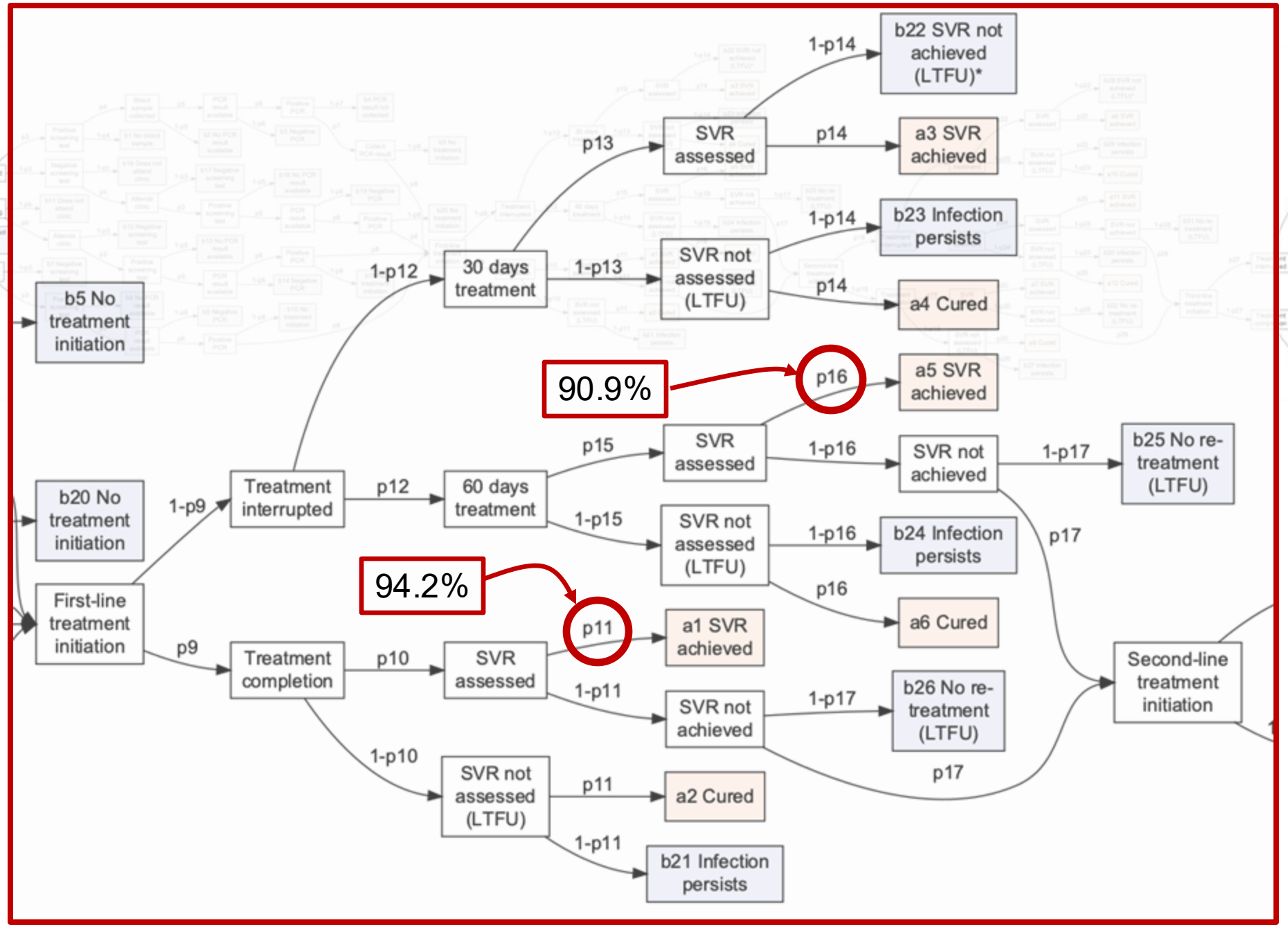
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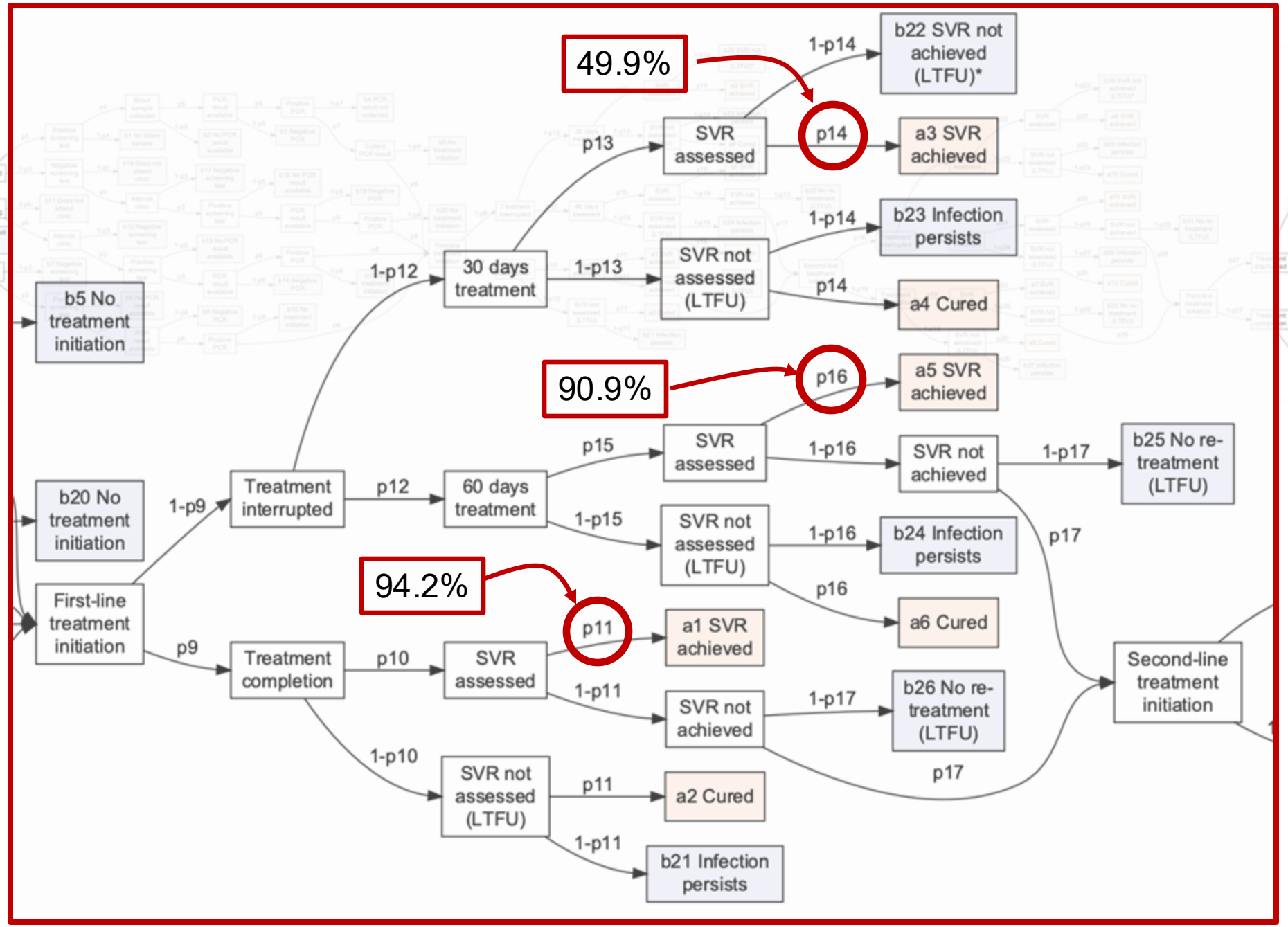
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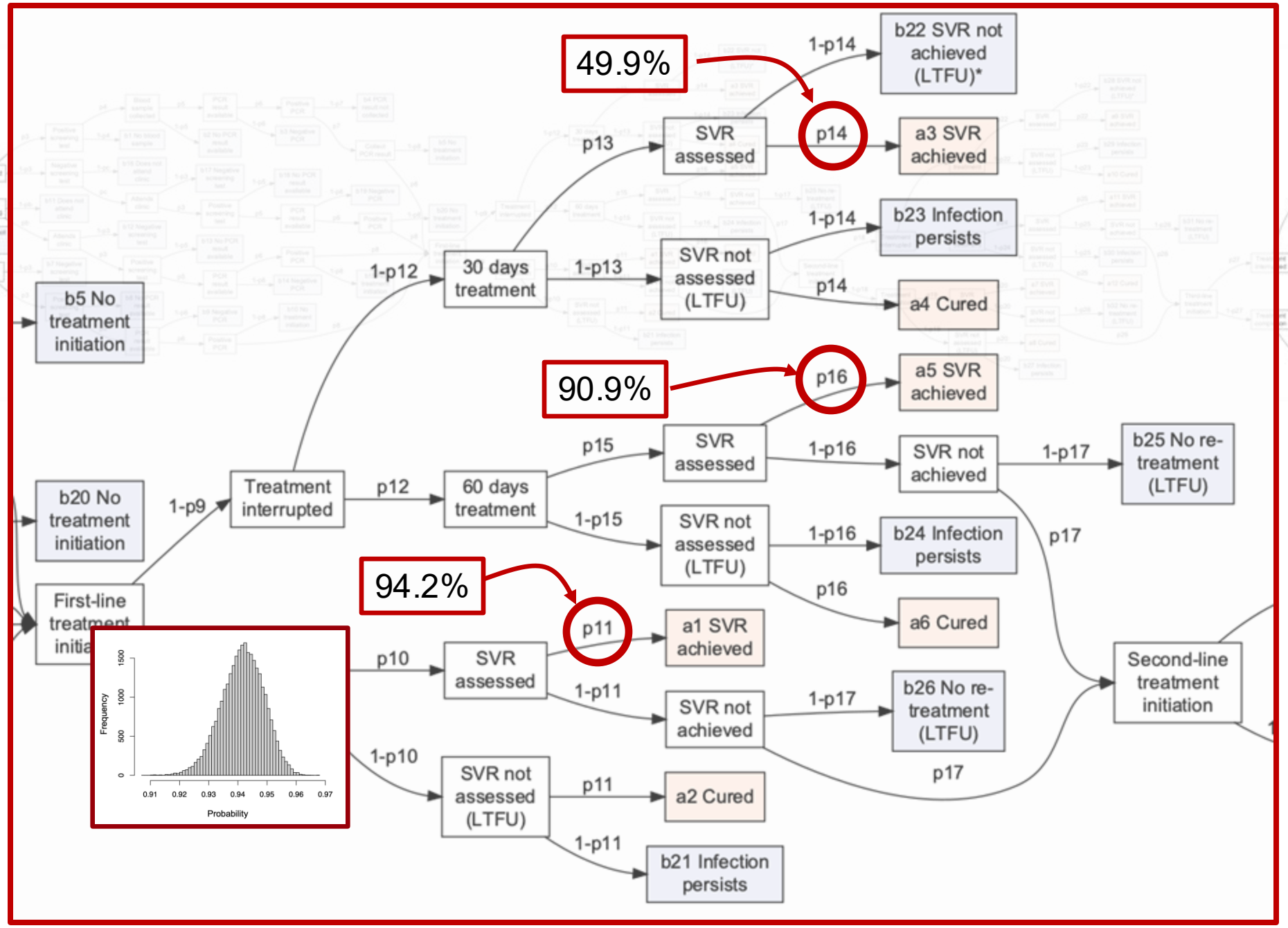
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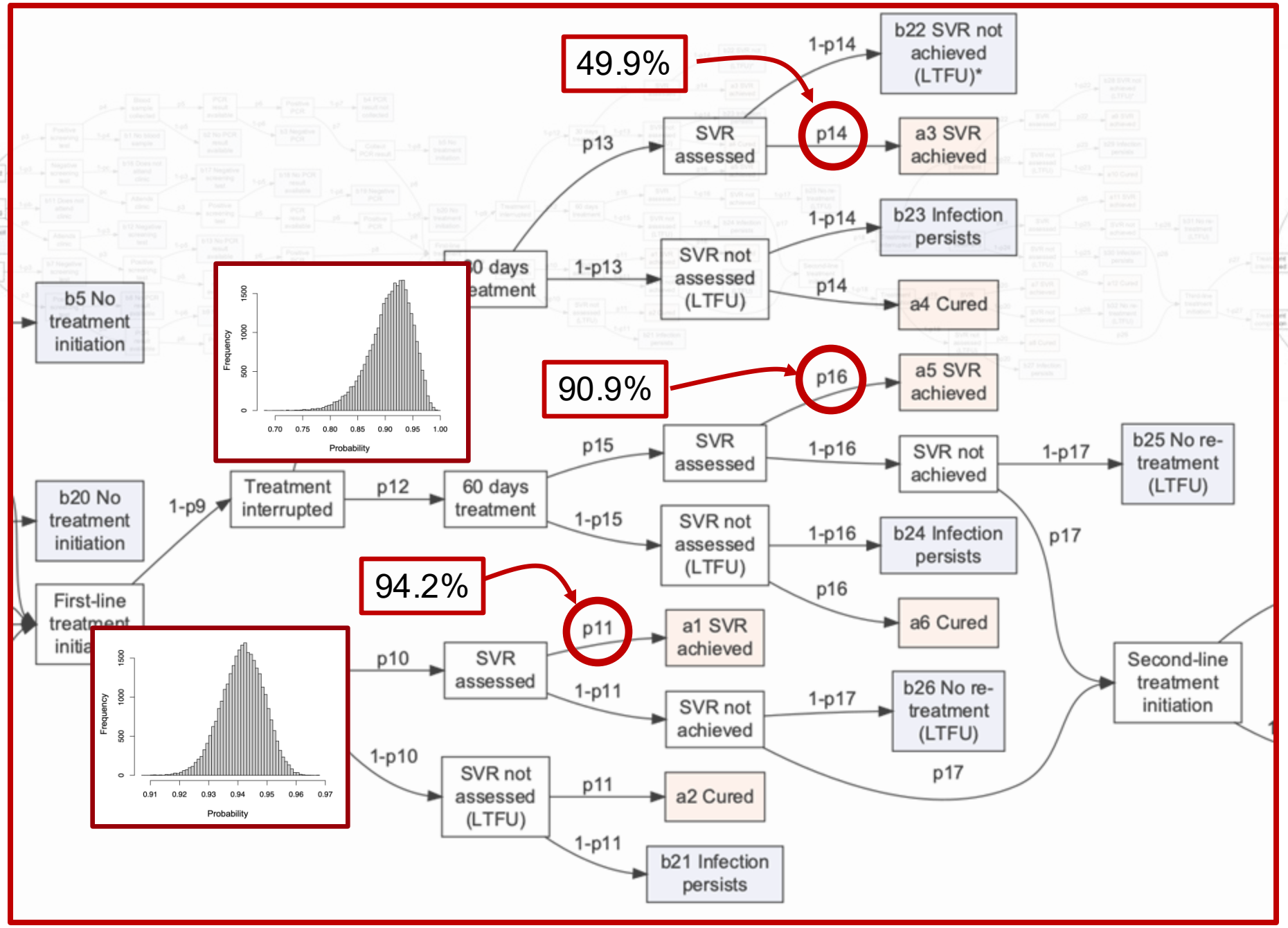
Frequency
0
500
1000
1500
0.91
0.92
0.93
0.94
0.95
0.96
0.97
Probability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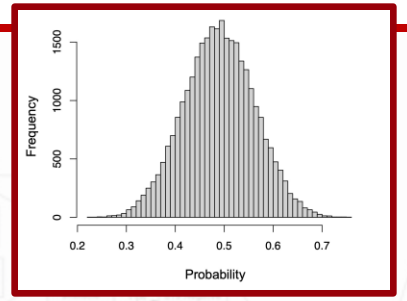
0 500 1000 1500
0.91 0.92 0.93 0.94 0.95 0.96 0.97



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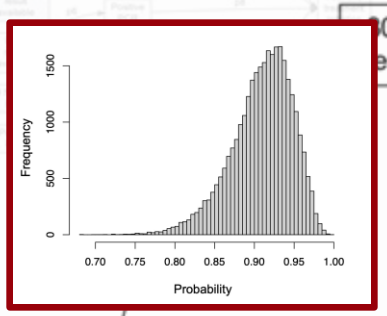

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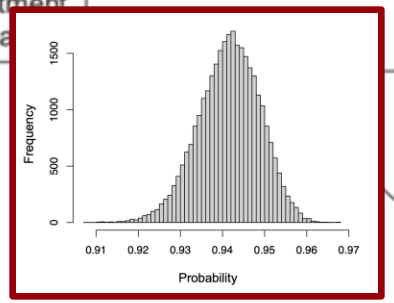

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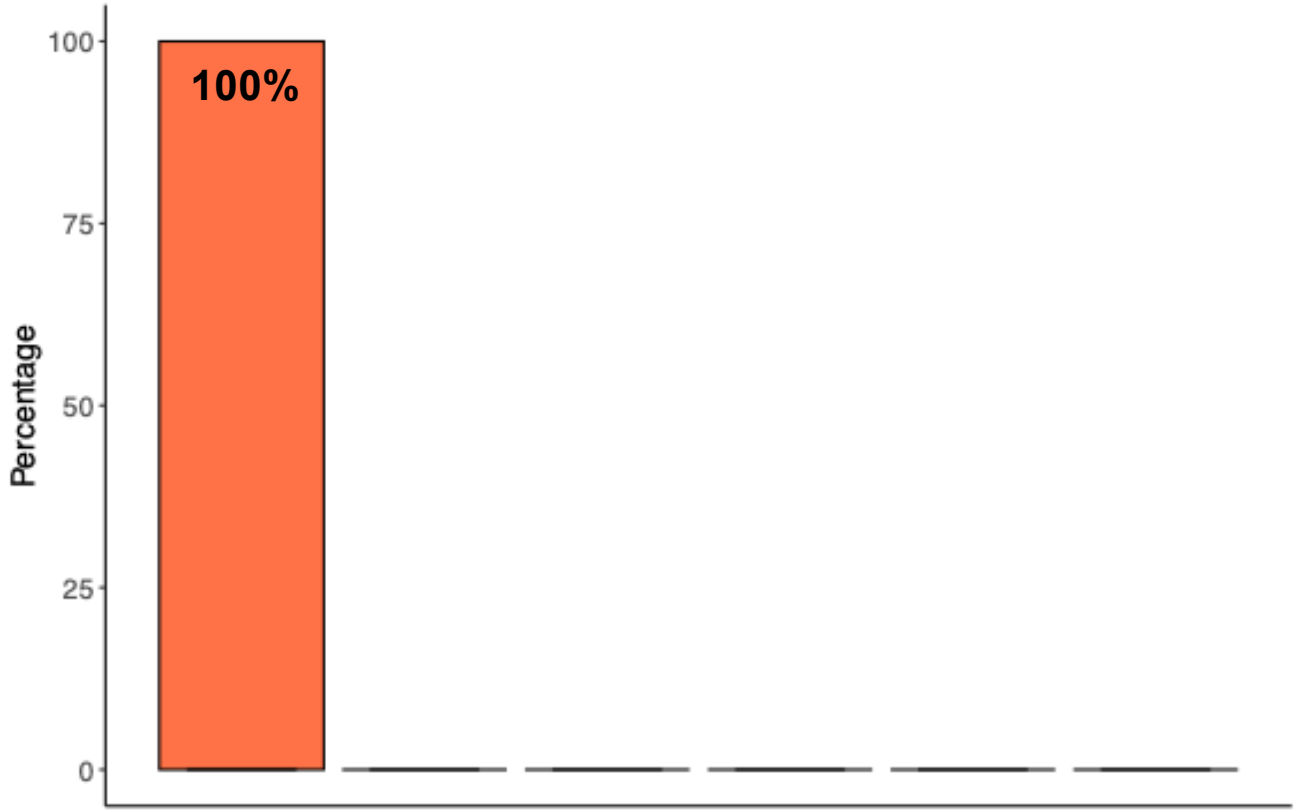

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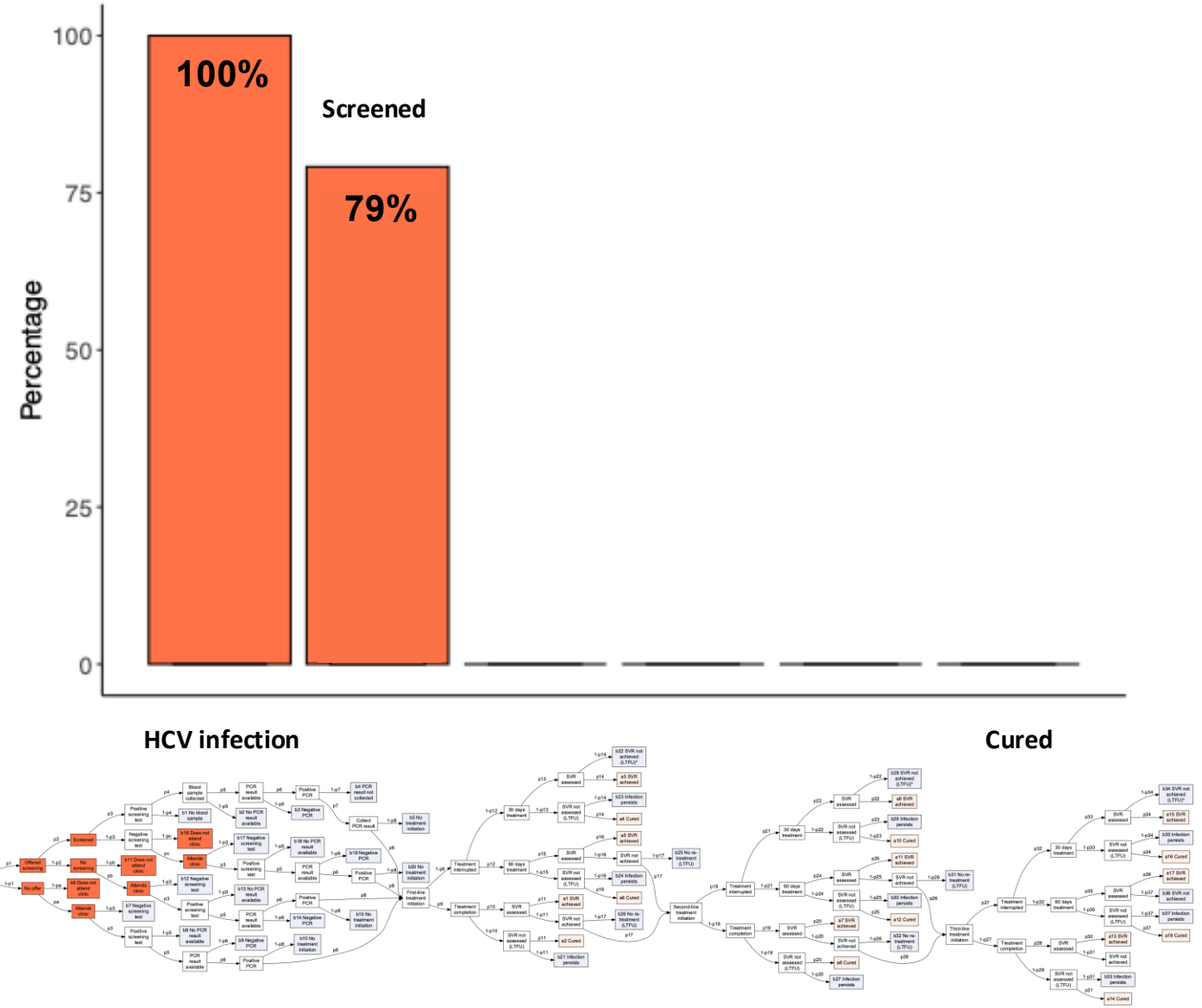

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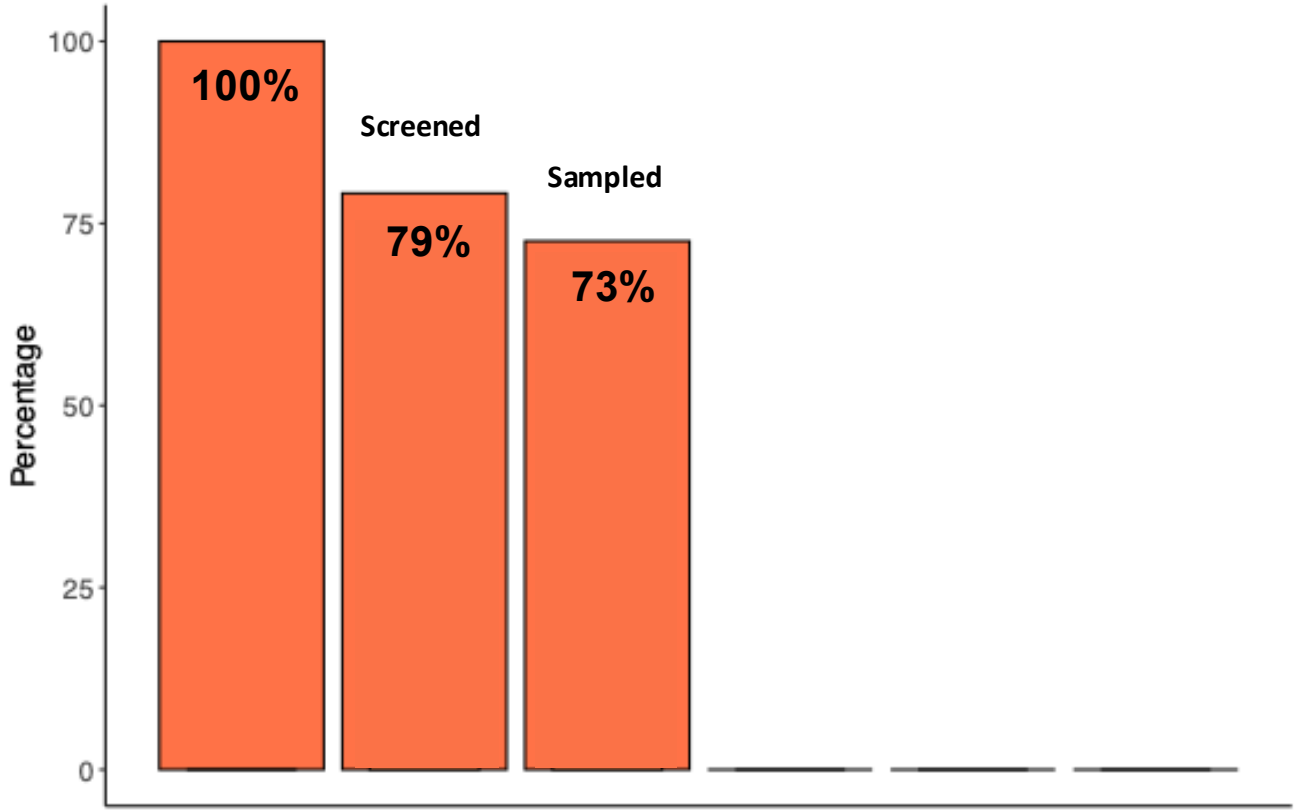

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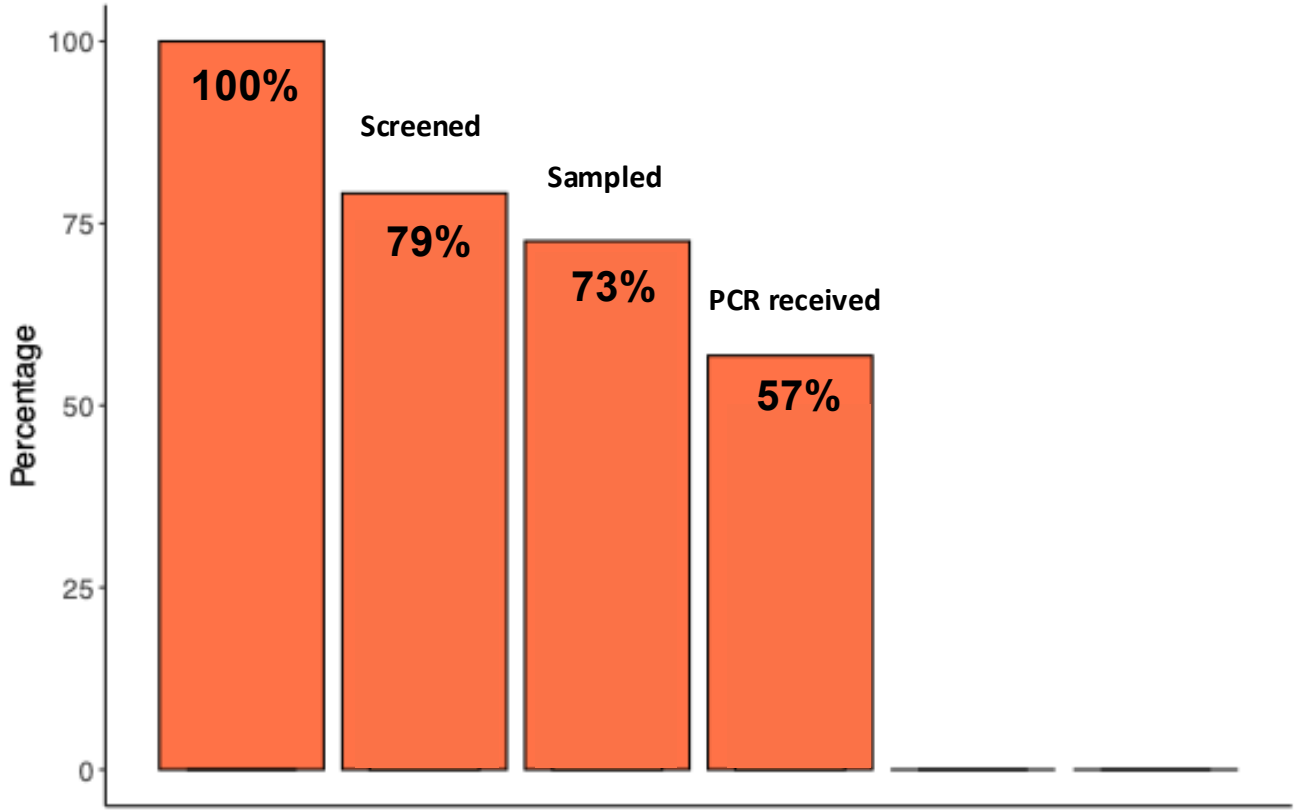

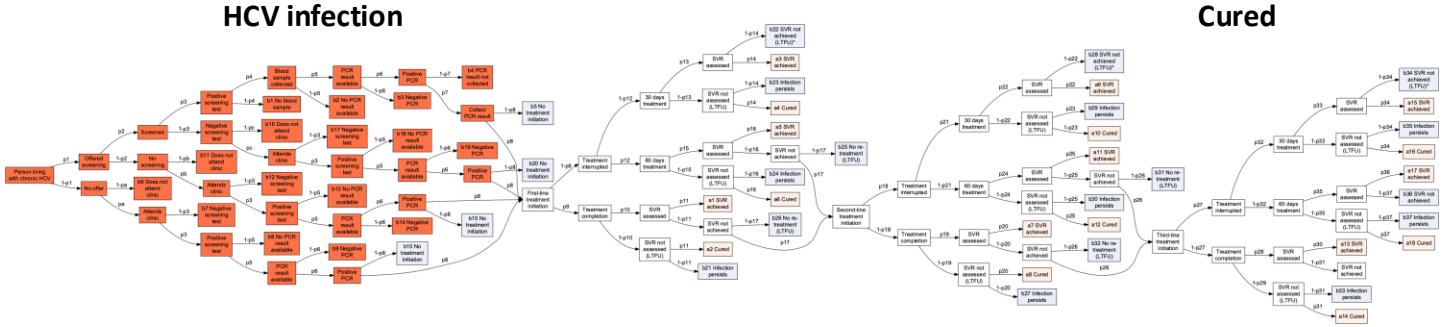

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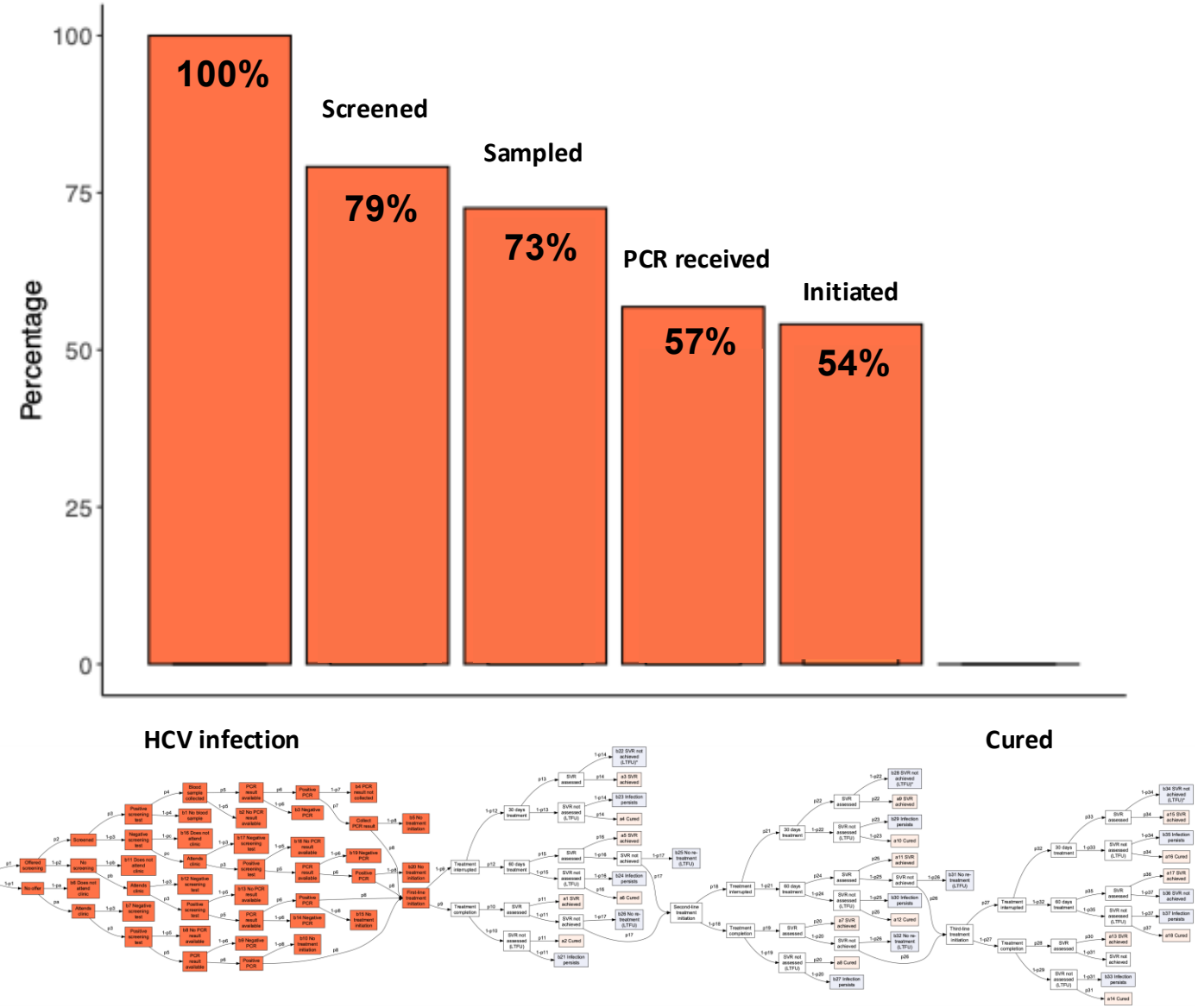

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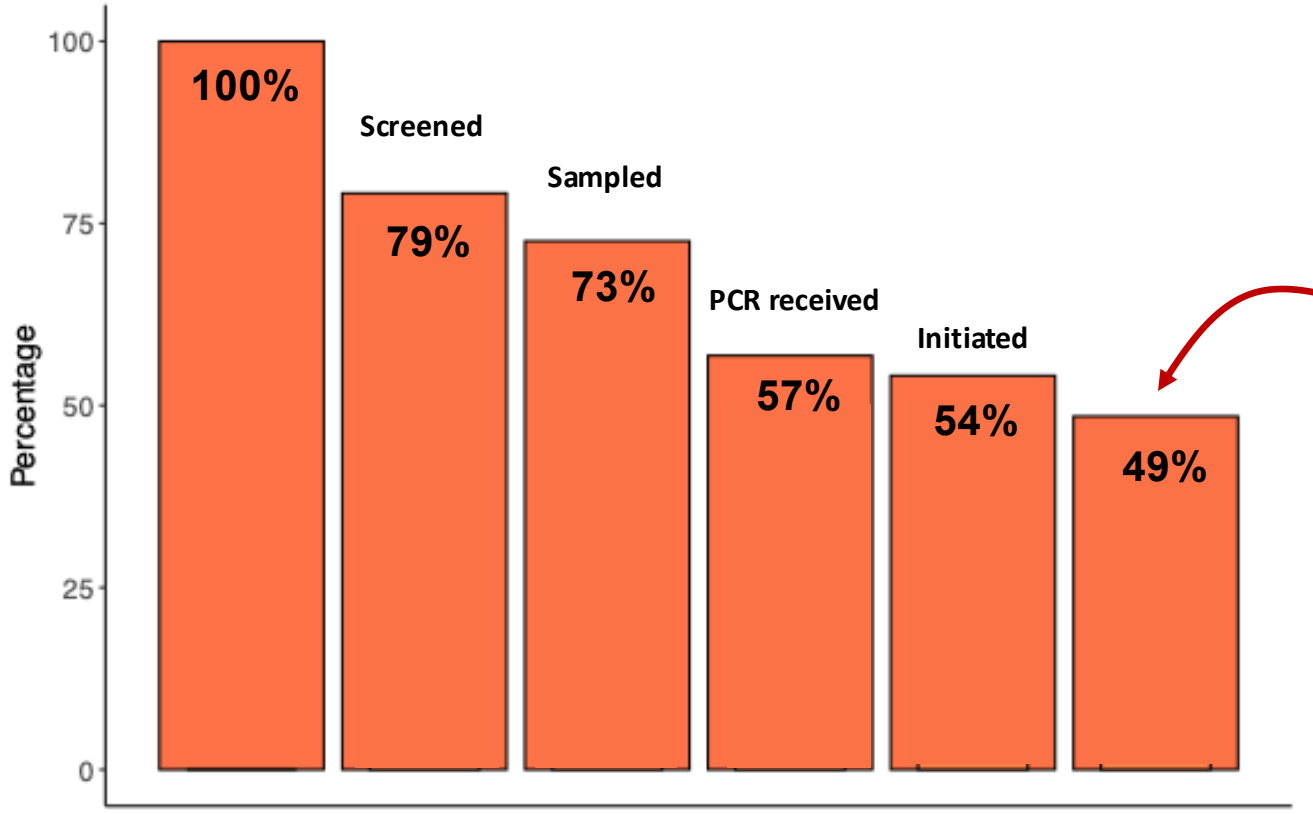
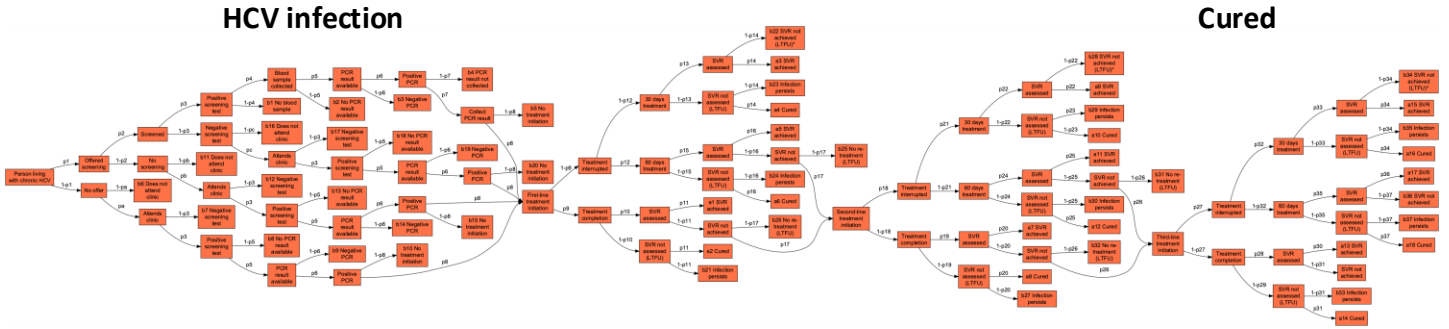


Overall cure ratio (intervention effectiveness)
48.5% (95% UI 43.4–55.3)

Estimated **1,878** (95% UI 1,826 – 1,928) **people living with HCV cured**



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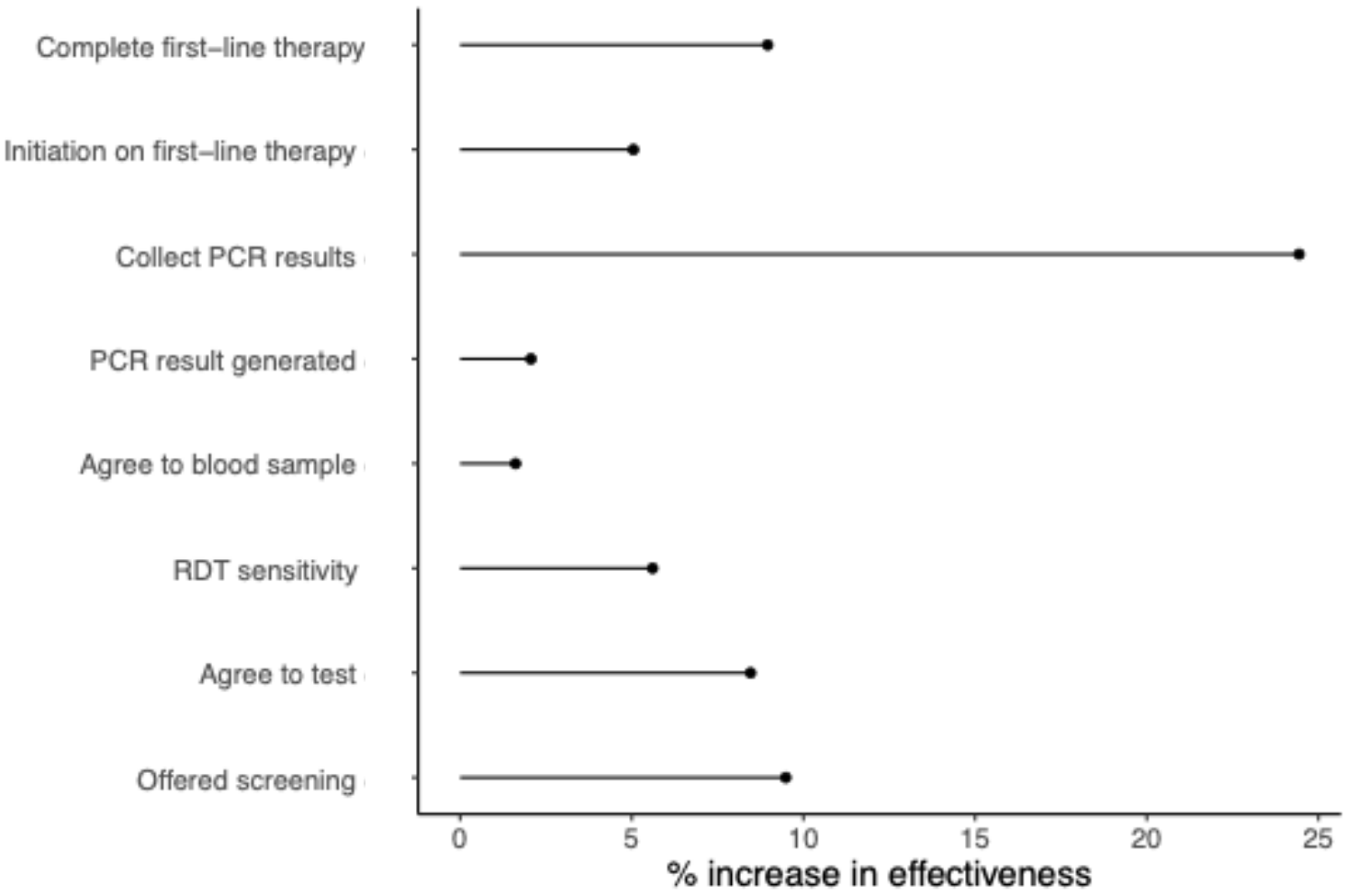

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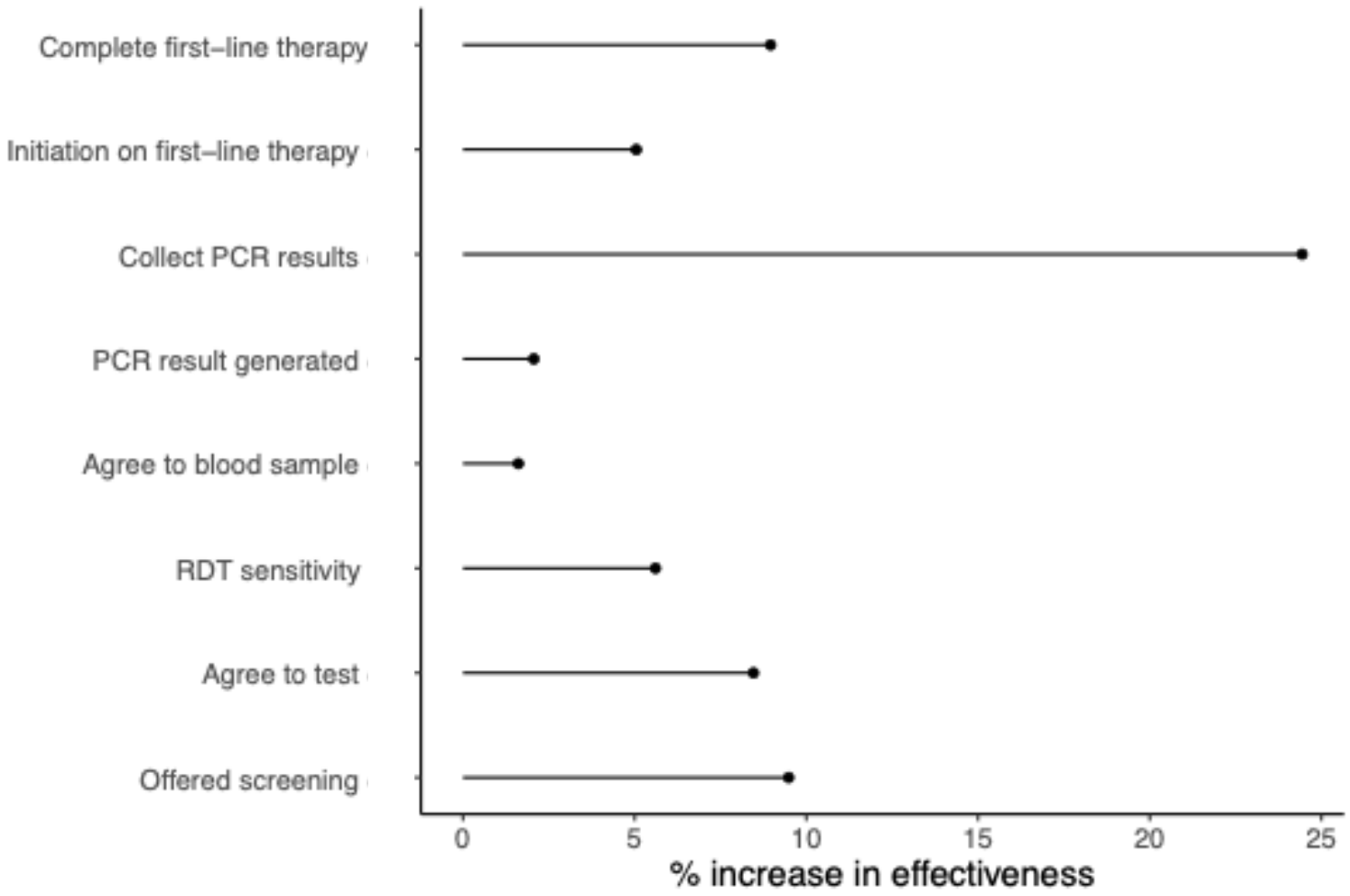

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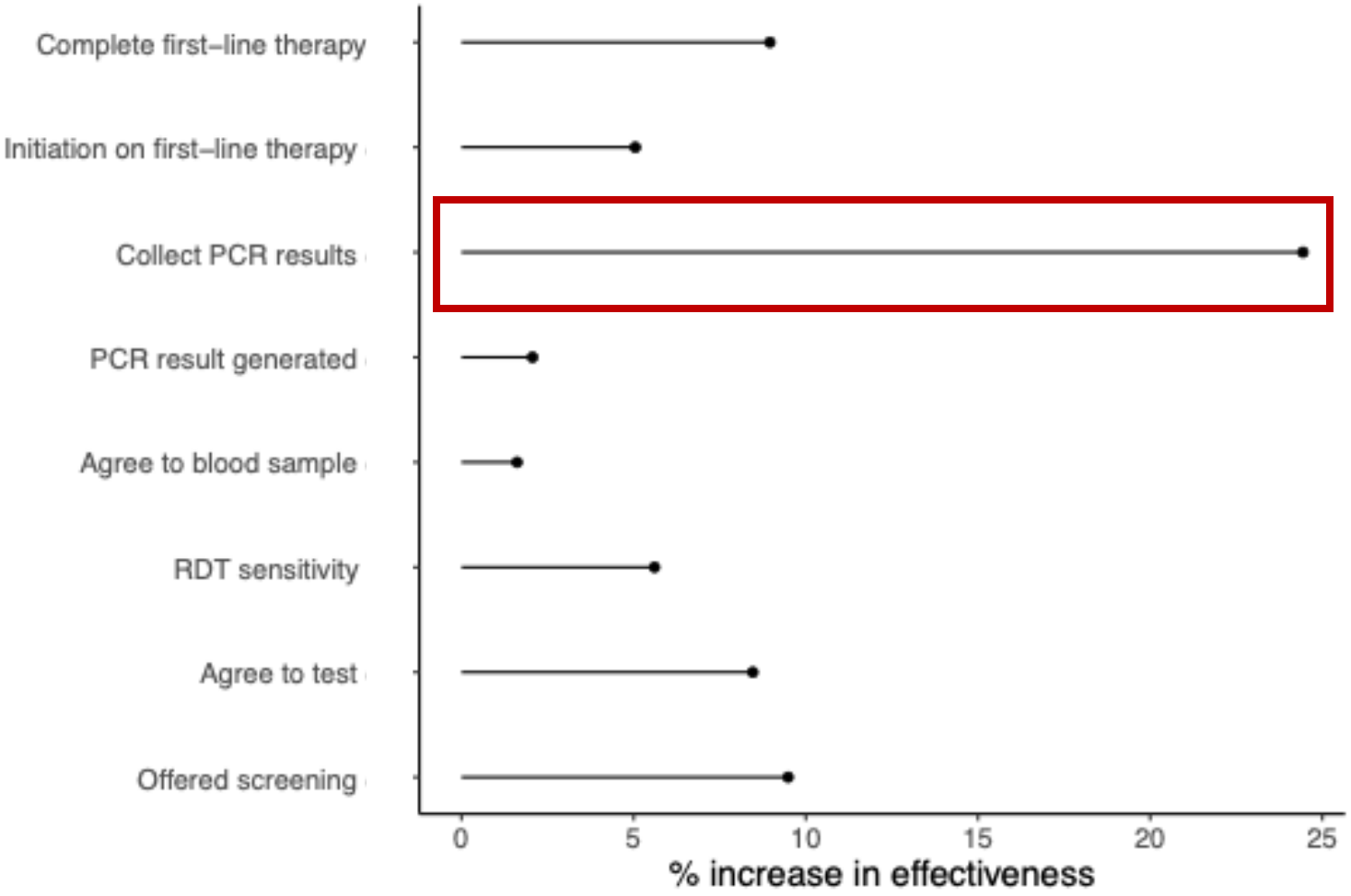

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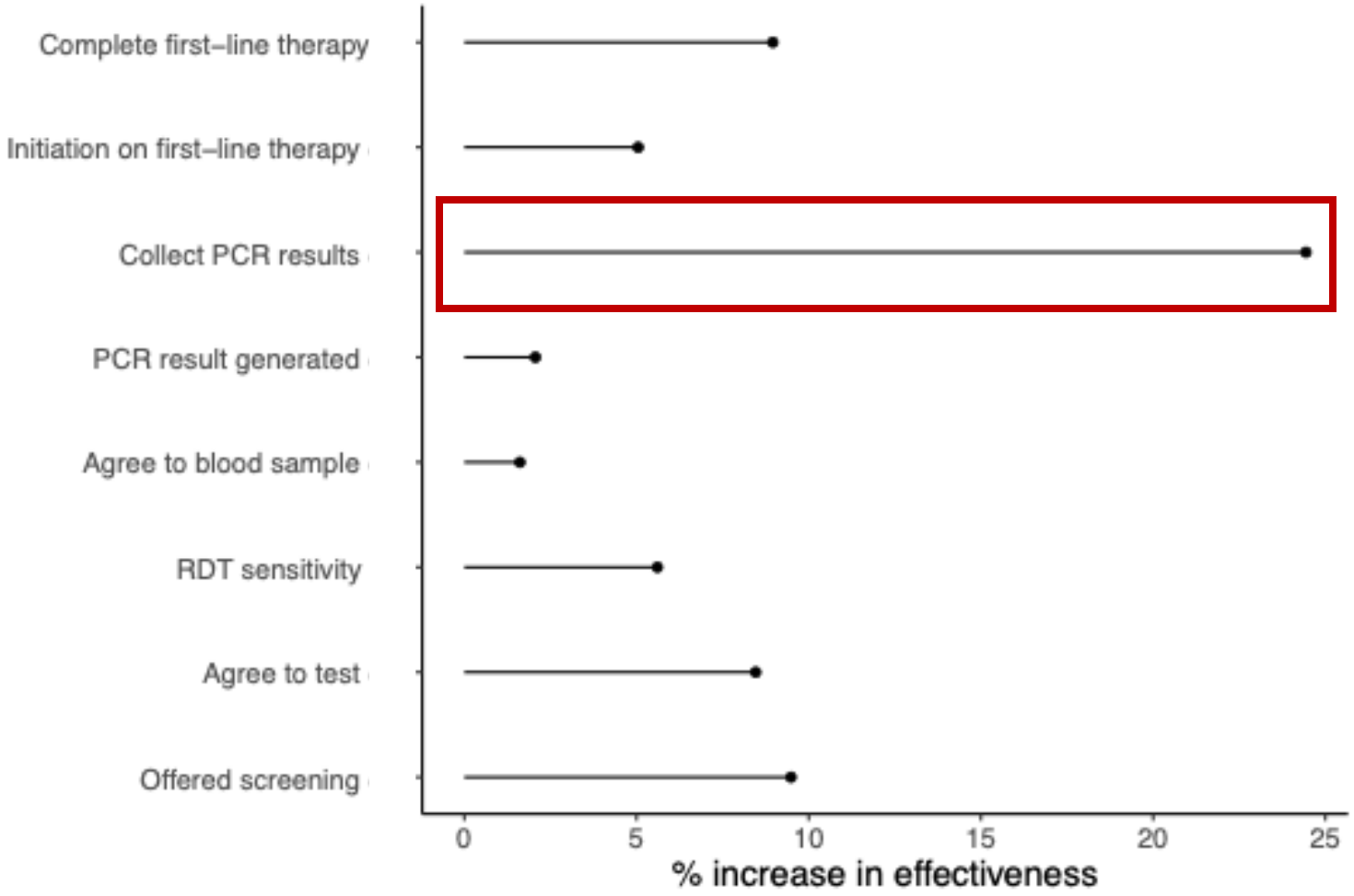

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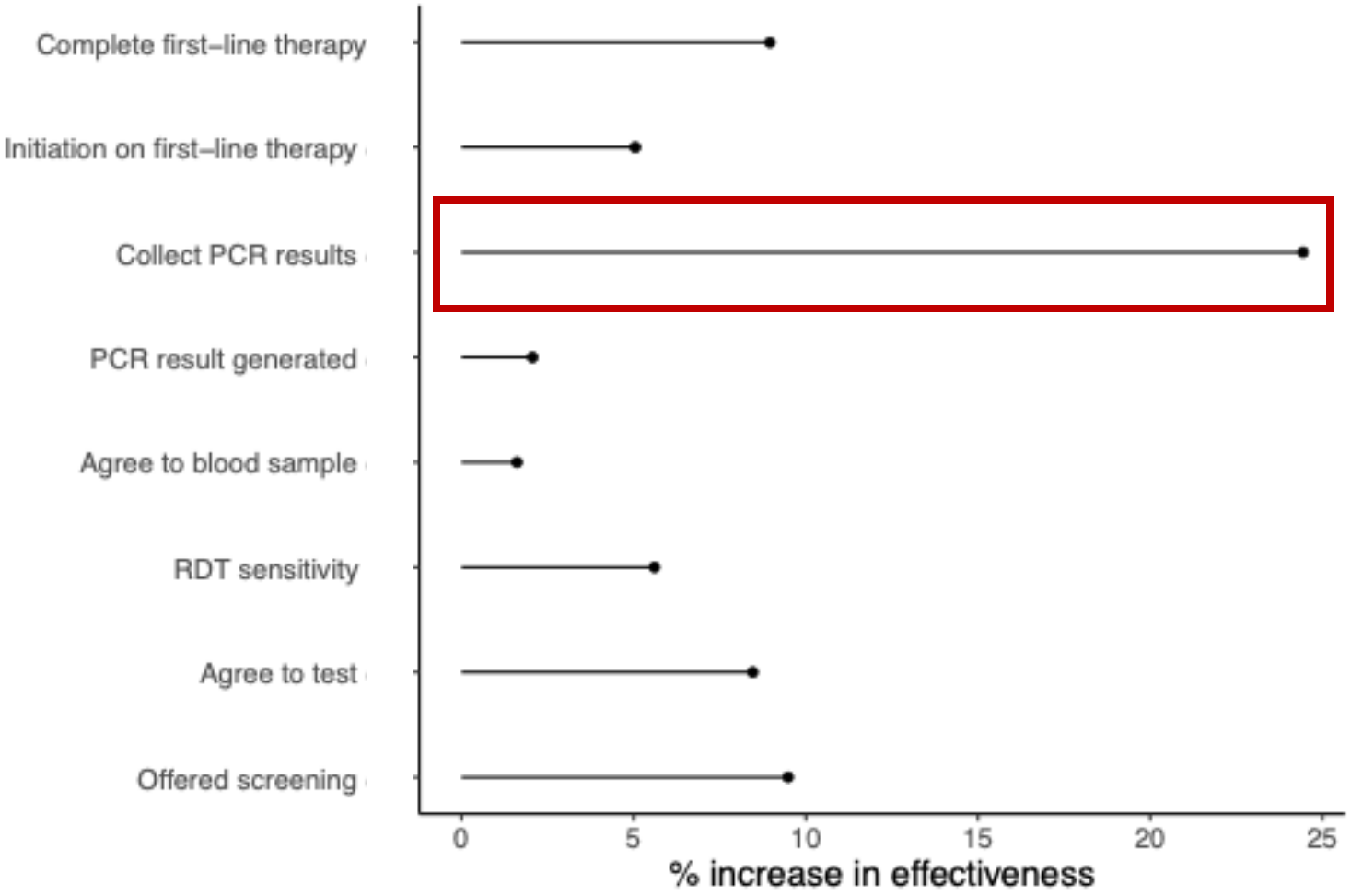
- Using this approach, if **all people had collected their PCR results** from the clinic, overall probability of cure would have increased from **48.5%** to **61%**

Bending the Curve: Sensitivity Analysis



- We can change any probability in the event tree to assess impact on overall cure ratio
- For example, change each probability to 1 one at a time
- Using this approach, if **all people had collected their PCR results** from the clinic, overall probability of cure would have increased from **48.5%** to **61%**
- Alternatively, to **achieve overall cure ratio of 80%**, we would need to **reduce losses in each step** with a modifiable probability by **79%**

Bending The Curve: Conclusions

Screening uptake was high **(83%)**

High **loss to follow up** observed **(49%)** but expect majority cured

Simplified treatment algorithm achieving SVR-12 of 94.2%

Community **awareness raising** about risk factors

Possibility **HCV prevalence bounce back** in case of status quo

Micro-elimination is hard!

Bending the Curve: Recommendations

Baseline qualitative evaluation-tailor micro elimination

Understanding community & context

"Treatment without prevention is simply unsustainable"

Cascade analysis for M&E on regular intervals

Establishing strong partnerships with Stakeholders

Bending the Curve: Acknowledgements

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Thank you for listening