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Optimizing Social Network Sampling to Find Undiagnosed HIV-infected PWID

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BACKGROUND

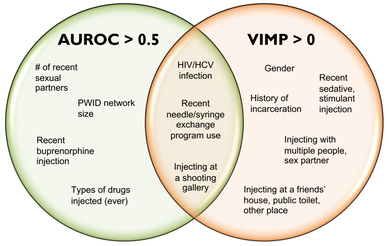
- People who inject drugs (PWID) experience high HIV burden globally and many are not engaged in HIV services
- Diagnosis is largest drop off in the HIV care continuum for PWID in India[1]
- Novel strategies are needed to identify and engage PWID living with HIV in order to reach UNAIDS 95-95-95 targets
- Respondent-driven sampling (RDS) is a type of chain-referral sampling using peer network connections
- Network-based approaches are already used in routine programming (e.g., EPOA, SNS)
- RDS might be leveraged as an intervention to reach undiagnosed people living with HIV
- ***Aim:*** **To examine whether identification of undiagnosed HIV-infected PWID via RDS can be enhanced through a precision RDS (pRDS) approach**

METHODS

PREDICTING RECRUITMENT OF UNDIAGNOSED HIV-INFECTED PWID

- *Data:* Previously collected RDS data from northern India as part of NCA Study[2] (2013, n=4002)
- *Outcome:* Recruiting at least one eligible and enrolled undiagnosed HIV-infected PWID into the RDS
- *Candidate predictors:* Recruiter's HIV and HCV status, socio-demographics, sexual and drug use-related risk behaviors, and network size
- *Analysis:* Univariable logistic regression (AUROC) and a random forest (VIMP) identified predictors of recruiting undiagnosed PWID
- Multivariable prediction algorithm built including all factors with an AUROC > 0.5 *or* VIMP > 0 (**Figure 1**)
- Cut-point in predicted probability from algorithm determined to divide sample into 2 groups: 1) *likely* vs. 2) *unlikely* to recruit an undiagnosed PWID

Figure 1 Algorithm predictors by method of identification

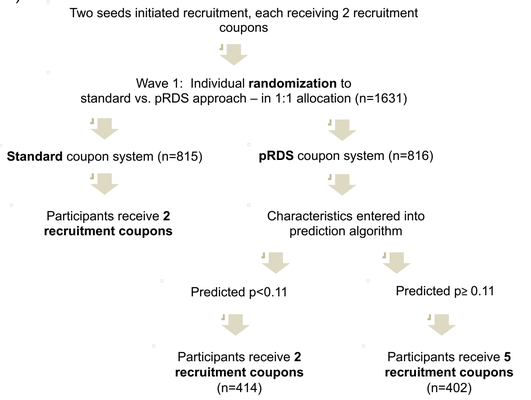


- 16 predictors
- AUROCs range: 0.51 to 0.53
- VIMPs range: 0.00002 to 0.00225
- Algorithm AUROC: 0.58

pRDS APPROACH EVALUATION

- pRDS approach tested in Morinda, Punjab among PWID (2018)
- Participants randomized to standard or pRDS approach (**Figure 2**)
- pRDS participants received differential number of coupons based on probability from prediction algorithm
- Compared identification rate and number needed to recruit (NNR) for standard vs. pRDS approach
- Identification rate = average number of undiagnosed PWID identified per week
- NNR = average number recruited in order to identify one undiagnosed PWID

Figure 2 Randomization and coupon distribution



RESULTS

Figure 3 RDS recruitment tree by approach, Morinda

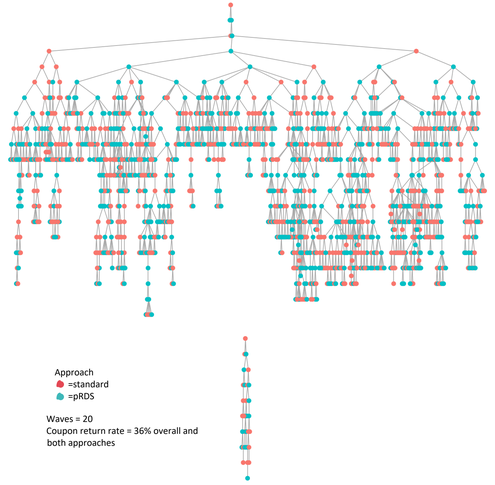


Figure 4 NNR over months of recruitment by RDS approach

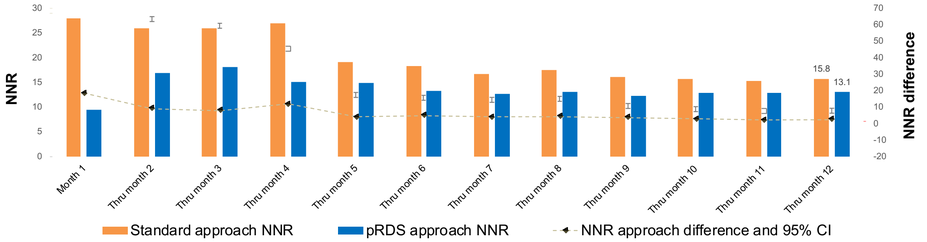


Figure 5 Identification rate over months of recruitment by RDS approach

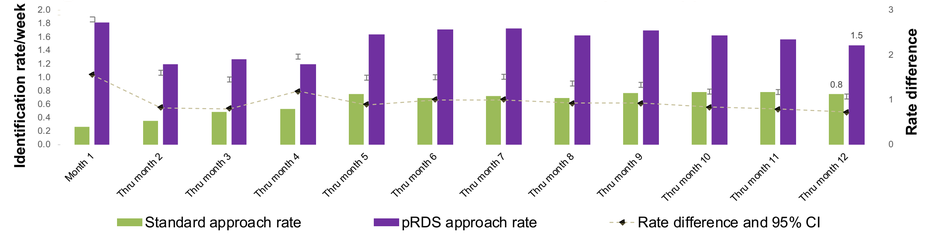


Table 1 PWID recruited via standard vs. pRDS in Morinda, Punjab

Characteristic(s) median (IQR) / n (%)	**Recruiter's approach**	
	standard (n=615)	**pRDS (n=1012)**
Age	26 (22-32)	26 (22-33)
Male	615 (100)	1012 (100)
Injection drug use in prior 6 mo.		
None	124 (20.2)	221 (21.8)
Less than daily	348 (56.6)	598 (59.1)
Daily	143 (23.3)	193 (19.1)
Shared needle/syringe in prior 6 mo.	138 (28.1)	204 (25.8)
HIV-infected	54 (8.8)	110 (10.9)
HCV-infected	242 (39.4)	437 (43.2)
HIV/HCV co-infected	46 (7.5)	101 (10.0)
Undiagnosed HIV-infected (among full sample)	39 (6.3)	77 (7.6)
HIV test in prior year	191 (31.1)	307 (30.3)
PWID network size	11 (6-15)	11(6-16)

CONCLUSIONS

- HIV/HCV co-infection, network size, harm reduction utilization, and the injection environment predicted who was mostly likely to recruit undiagnosed HIV-infected PWID
- However, predictive ability of factors in algorithm was generally low
- NNRs were not significantly different between the two approaches
- pRDS identified nearly twice as many undiagnosed PWID and cost ~USD 10 less to identify one undiagnosed PWID than the standard approach
- pRDS identified undiagnosed PWID significantly faster than the standard approach
- pRDS may be particularly useful in outbreaks, when rapidly reaching undiagnosed individuals is needed

References

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Acknowledgements

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