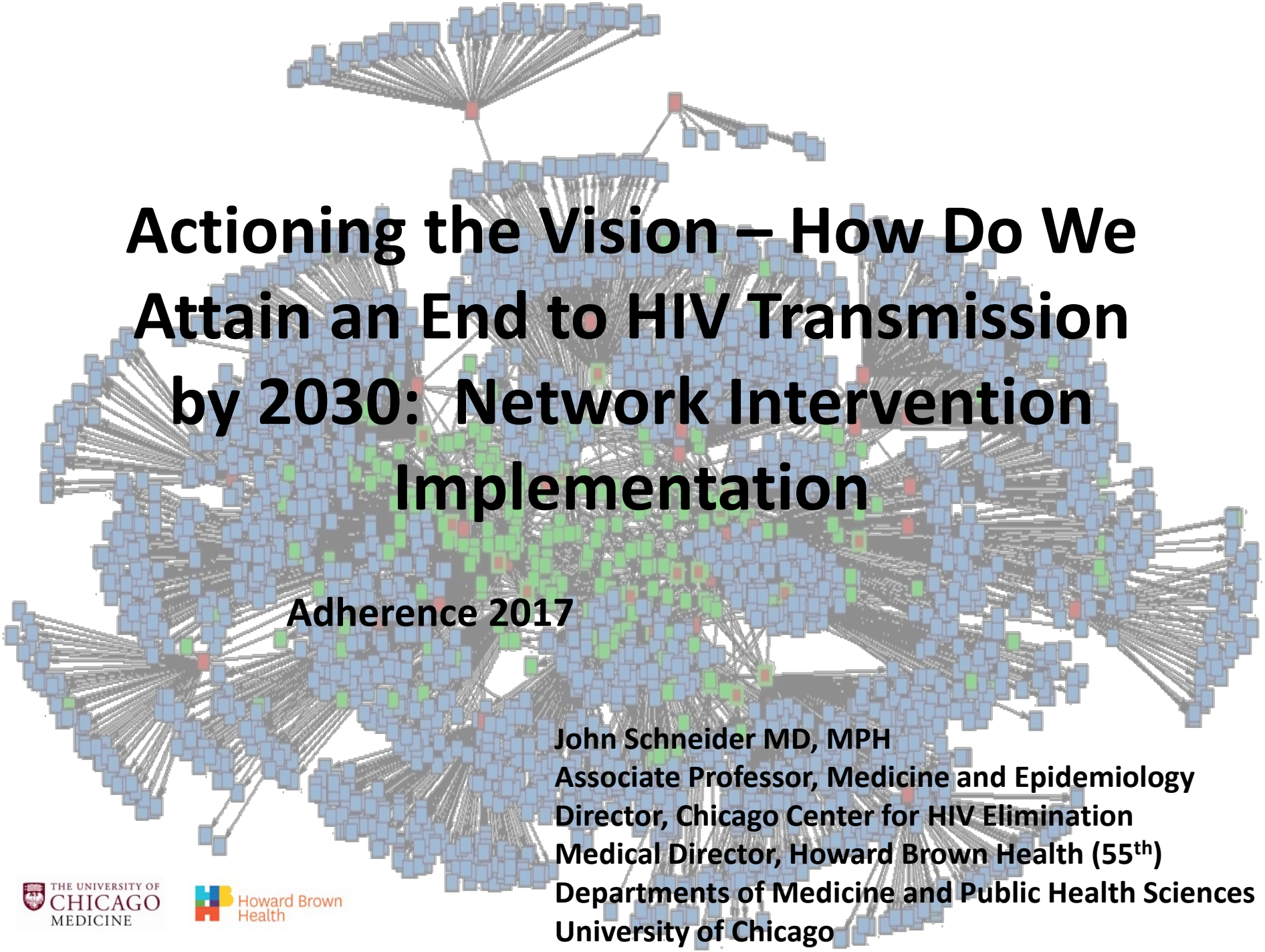


Actioning the Vision – How Do We Attain an End to HIV Transmission by 2030: Network Intervention Implementation

Adherence 2017

John Schneider MD, MPH
Associate Professor, Medicine and Epidemiology
Director, Chicago Center for HIV Elimination
Medical Director, Howard Brown Health (55th)
Departments of Medicine and Public Health Sciences
University of Chicago

THE UNIVERSITY OF CHICAGO MEDICINE

Howard Brown Health

Disclosures

- NIH, CDC, Chicago Department of Public Health

Outline

- HIV Transmission Elimination Efforts
  - Projections
  - Examples
- Care Continuum Network Intervention Implementation

HIV Elimination*† ‡

*Elimination of new transmission events (not cure)

†Domestic by 2041

‡Assuming investment at current levels

CCHE
The Chicago Center for HIV Elimination

Epidemic Transmission Dynamics

- Reproductive rate $R_0 < 1$; epidemic is not sustainable

- $R_0 = (T(x)/100) * D$
  - T(x) is the annualized transmission rate (number of HIV transmissions to HIV seronegative partners of 100 HIV infected persons)
    - Incidence/prevalence x 100
  - **D, duration of infectiousness**

May, *Nature* 1987

- In 2006, T(x) less than 5.0 in the US; in 2015 was 2.6

- National AIDS Strategy goal is T(x) decrease by 30%
  - This could then get R_0 <1 and on the path to elimination

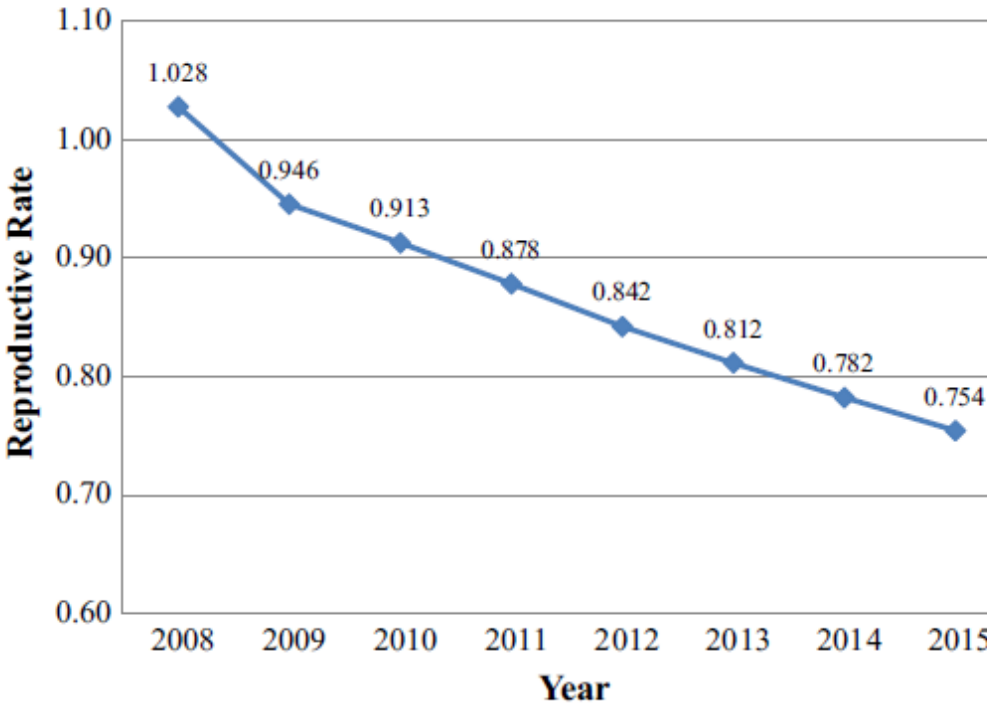


Fig. 1 Estimated change in basic HIV reproductive rate in the U
2008–2015

Bonacci, *ABE* 2016; Holtgrave, *PHR* 2011

Focus on Transmitter - Duration of infectiousness (D)

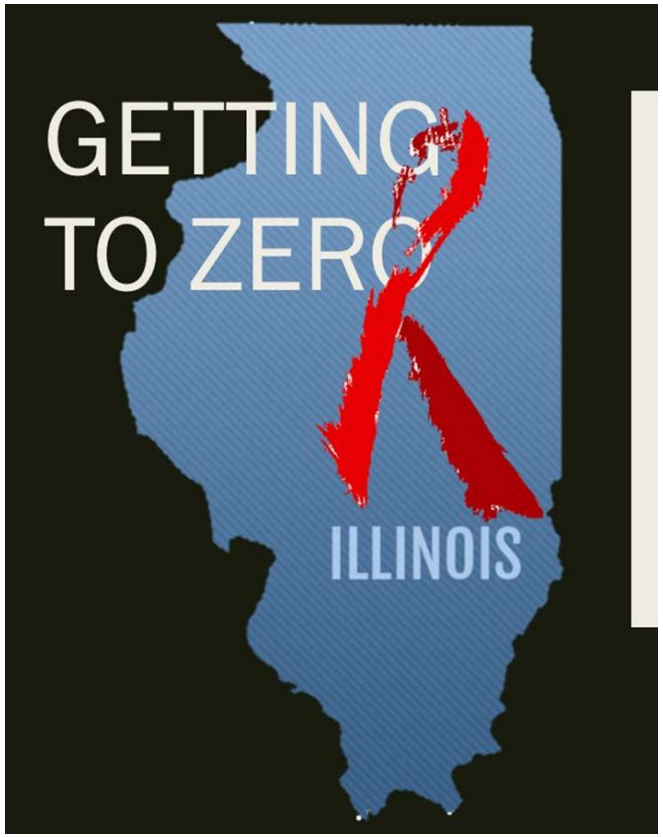
- Some use 28.9 years of life expectancy following a diagnosis as infectious period. But…..
  - Viral suppression decreases infectiousness
  - Previously - advanced illness; 9-12 months following diagnosis. Are these really infectious periods?

- Age of the candidate transmitter is important
  - Sex frequency, concurrency and number of partners declines with age
  - Only 28% of molecular ties among YBMSM 20-24 years of age are with older partners (at least 5 years)

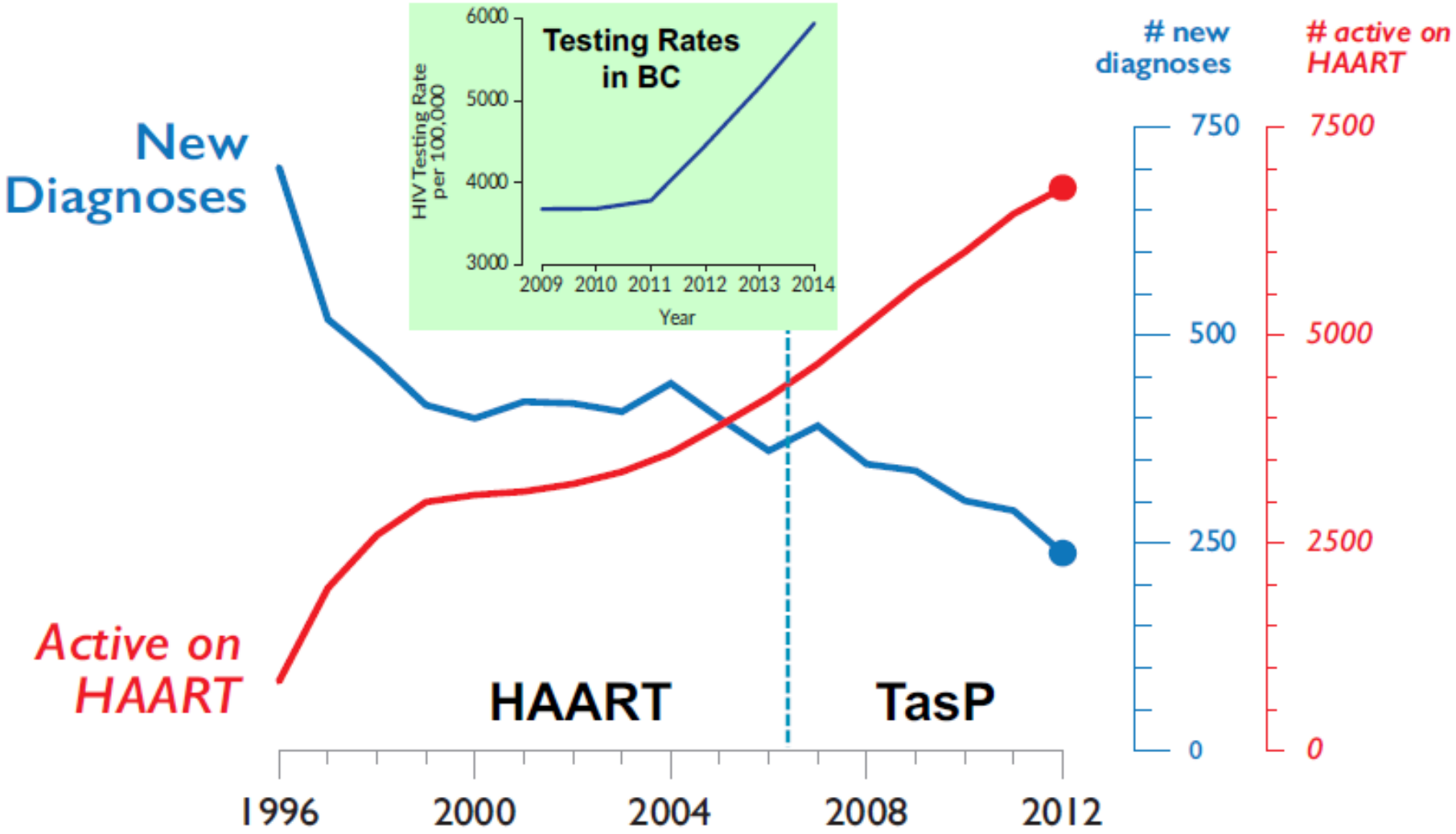
Paneer, *CROI* 2017; Laumann 2003; Siddiqi, *JAIDS* 2016

HIV elimination programs

- Vancouver
- New York
- Washington
- Arizona
- San Francisco
- Cambodia
- *And others*



New HIV Diagnoses and HAART Use



Shortened time to care, ART, virologic suppression

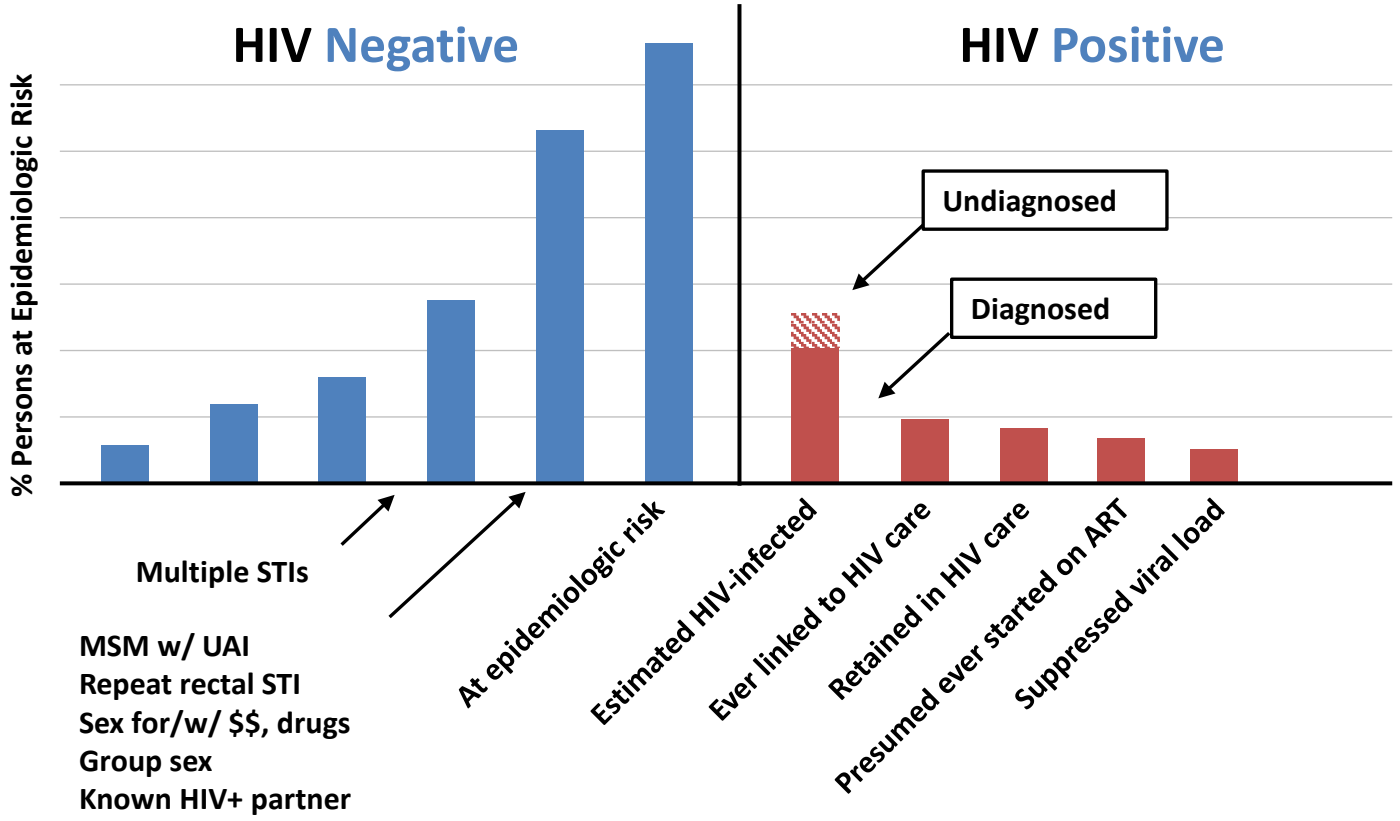
Metric	2013	2014	2015	2016 Q2
Median Days				
Diagnosis -> Care	8	7	7	5
Care -> ART	27	16	6	0
Diagnosis -> VL<200	133	91	75	51
Cases	*331*	*286*	*249*	*116*
Missing	*69*	*43*	*47*	*18*
Total N	*400*	*329*	*296*	*134*

Care->ART	2013	2014	2015	2016 Q2
% Not in care	6.75	3.95	5.07	4.48
% 0-2 days	11.80	21.00	31.80	45.50
% 3-5 days	2.50	4.56	6.42	5.22
% 6-7 days	2.25	3.65	7.09	4.48
% >7 days	60.50	53.50	35.80	24.60
% None	16.30	13.40	13.90	15.70

GETTING TO ZERO SAN FRANCISCO
www.GettingToZeroSF.org

Courtesy of Oliver Bacon

The New HIV (and HCV and 1 Care+) Prevention and Treatment Continuum, NYC



HIV CARE AND PREVENTION ARE THE SAME = GETTING TO HIV NEUTRAL

A Human Rights Approach:
Access to Primary Care and Prevention

HIV Elimination is Possible: New York City

NYC Health

PrEP Implementation Planning

Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 90, No. 6
doi:10.1007/s11524-013-9830-y

Estimating the Number of Young Black Men who have Sex with Men (YBMSM) on the South Side of Chicago: Towards HIV Elimination within US Urban Communities

Britt Livak, Stuart Michaels, Keith Green, Charles Nelson, Montre Westbrook, Yaa Simpson, Nikhil G. Prachand, Nanette Benbow, and John A. Schneider

- University of Chicago and Department of Public Health collaboration starting in 2011
  - Estimated 5,578 YBMSM (NHBS/SRN HIV seropositive rate 23.4%/27.8%)

Unique PrEP starts (n=4151)
1/12- 5/17 at HBH

age	Frequency	Percent
<18	14	0.34
18-24	937	22.57
25-29	1,193	28.74
30-34	782	18.84
35-39	467	11.25
40-49	521	12.55
>=50	237	5.71

msm	Frequency	Percent
MSM	3,677	88.58
non-MSM	474	11.42

insurance	Frequency	Percent
Private	2,235	53.84
Medicaid	697	16.79
Uninsured	1,219	29.37
Missing	0	0.00

gender	Frequency	Percent
cis-male	3,797	91.47
cis-female	85	2.05
transfemale	191	4.60
transmale	44	1.06
GNC	31	0.75
Unknown	3	0.07

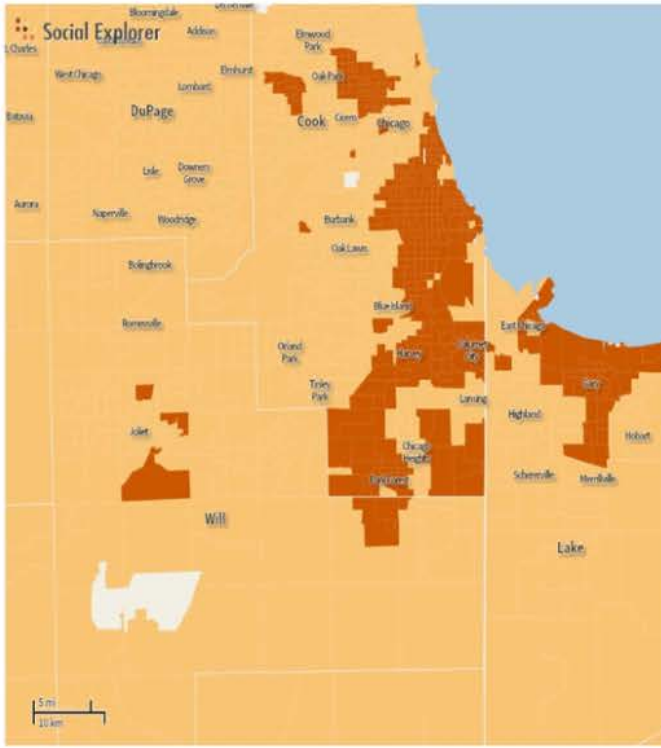
Year of PrEP	Starts/Month	Percent
2012	2/month	0.58
2013	5/month	1.54
2014	47/month	13.61
2015	93/month	26.79
2016	135/month	39.00
2017	153/month	18.48

R/E	Frequency	Percent
NH White	2,355	56.73
NH Black	663	15.97
Hispanic	805	19.39
NH Asian	221	5.32
Unknown	107	2.58

First Patient seen
55th street (4/16)
63rd street (6/16)

Howard Br
Health

Chicagoland
Thursday, May 15, 2014
8:32 PM



Region	Population of Majority African American Census Tracts
Cook County South-side, IL	761,134
Cook County West-side, IL	179,531
Will County , IL	7,048
Lake County, IN	85,777
Total	1,033,490

Map from http://www.socialexplorer.com/e8350b9c0d

Census data taken from Census 2010 Summary File Tables P3 and P6.

Pickett J. CROI 2016.

One pill. Once a day. Protect against HIV.

#CatchDesire

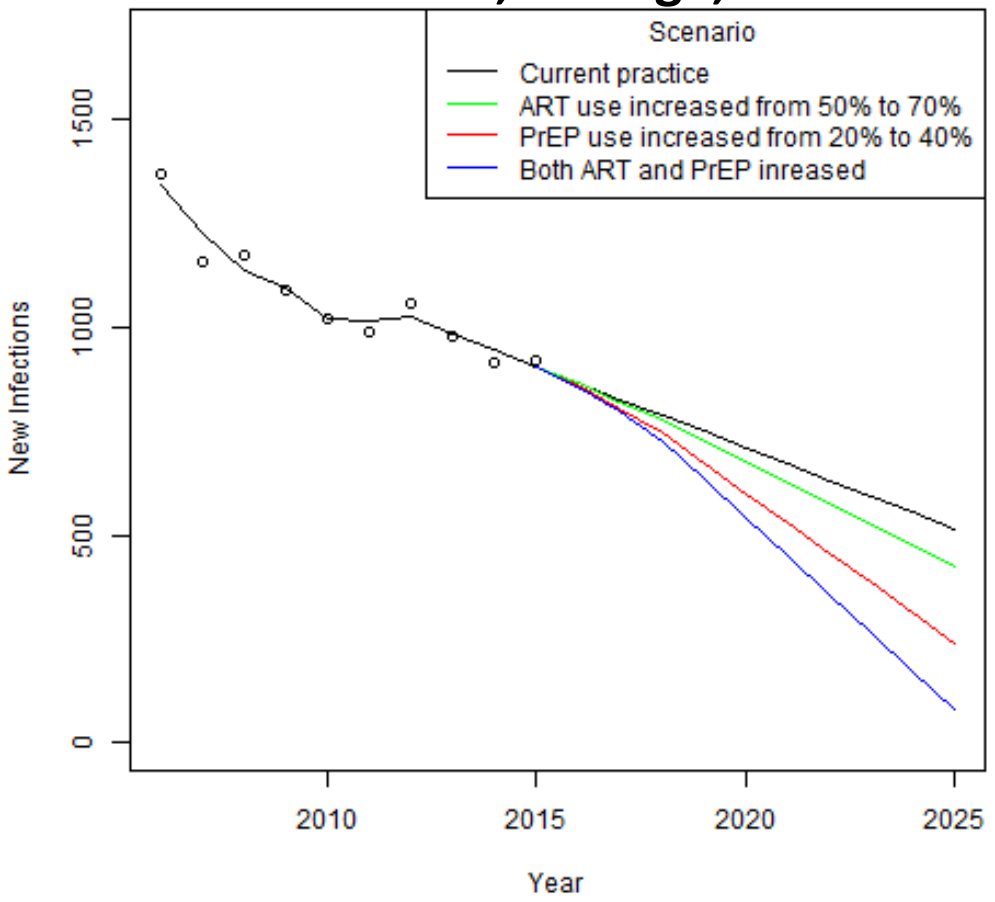
#ContractHeat

#SpreadTingle

#TransmitLove

Twenty-twenty (T2) intervention

New HIV Infections, Chicago, 2006-2025



- Fitted smooth line through incidence data (slope -39)
- In 2025, we will expect 531 new infections at current rate of incidence reduction.
- Current Howard Brown estimates indicate that about 20% of negative MSM on PrEP
- uConnect data suggests 10% of BMSM on PrEP
- <100 new cases by 2030

Center for Education, Research, Advocacy

B.A.R.S

Khanna et al., BARS modeling team

Other Infectious Disease elimination programs

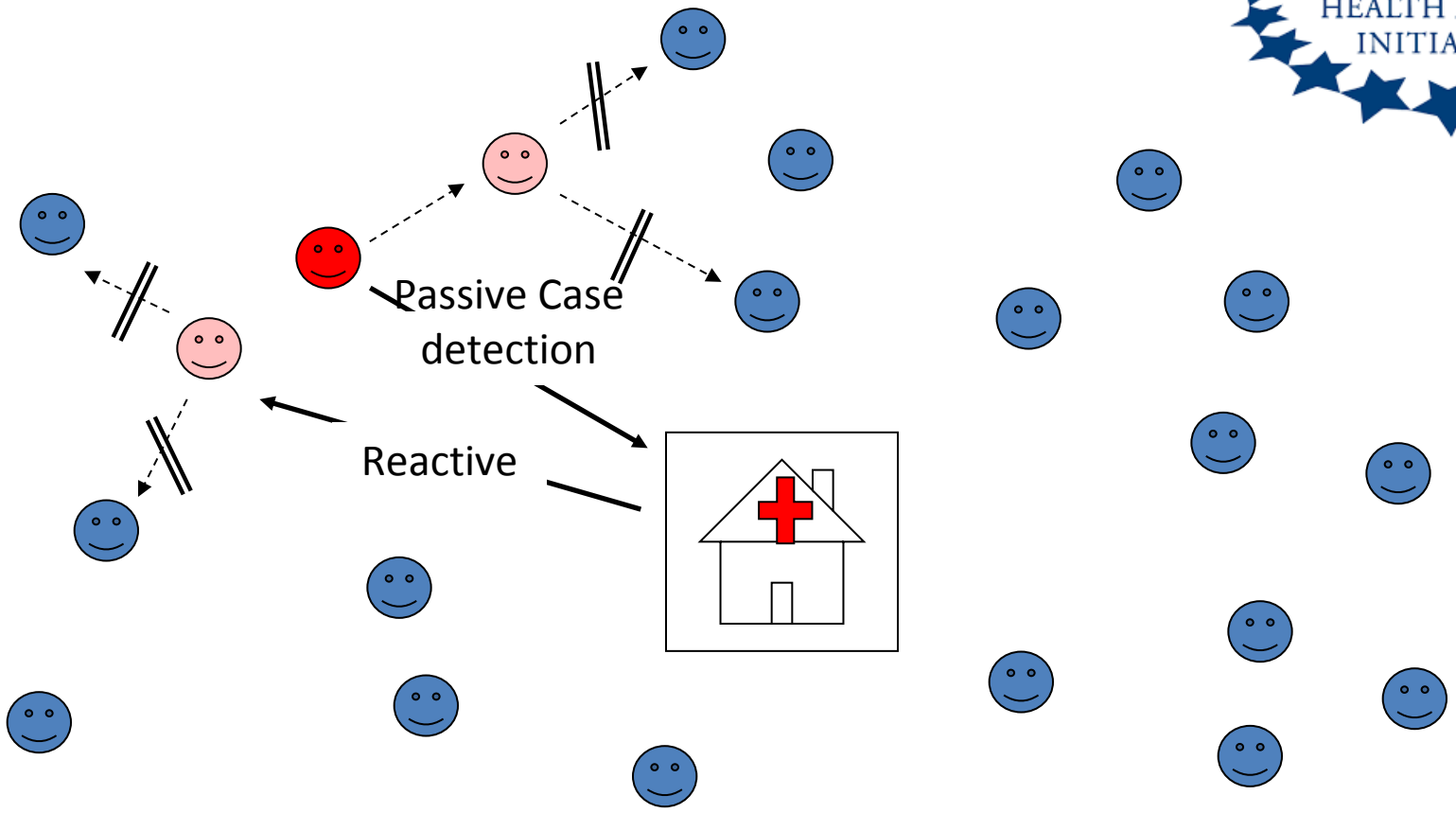
- Smallpox/Polio
  - Smallpox/Polio both with effective vaccine
  - HIV/smallpox/polio all have human reservoirs only
  - Stigma with smallpox/polio

- Smallpox/polio surveillance and containment strategy – "cocooning"
  - Identify cases → Vaccinate contacts → Vaccinate contacts' contacts
  - Contact tracing - "network analysis and intervention"

- What if we can't identify contacts?
  - Social network tracing, network analysis

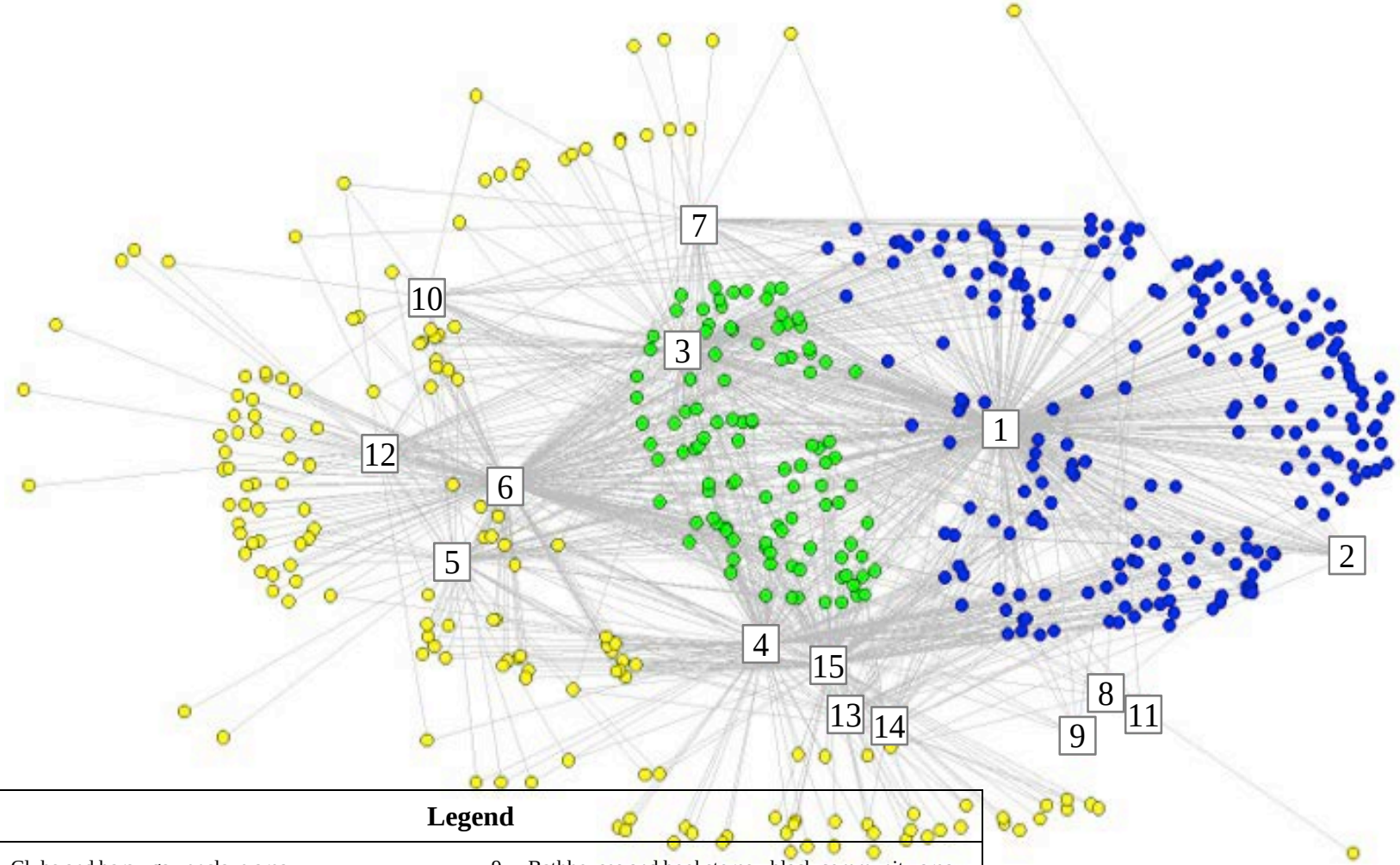
- What if we don't have an *effective* vaccine?
  - Network alerts; Testing for acute HIV; PreP/PEP; Treatment as prevention

Malaria transmission elimination strategy in Southern Africa and MeKong Delta



Households or individuals within a specified area, typically a pre-determined radius around a locally acquired case, are screened or radically treated with the goal of preventing further malaria transmission by identifying additional infections,

Young Black Men Who have Sex with Men Venue Affiliations in Chicago uConnect Study, 2013-2016 (n=618): A Two-Mode Network Analysis and Visualization



Legend

1	Clubs and bars - gay enclave area
2	Clubs and bars - ethnically mixed area
3	Clubs and bars - black community area
4	Public spaces - gay enclave area
5	Public spaces - ethnically mixed area
6	Public spaces - black community area
7	Bathhouses and bookstores - gay enclave area
8	Bathhouses and bookstores - ethnically mixed area
9	Bathhouses and bookstores - black community area
10	Gyms - gay enclave area
11	Gyms - ethnically mixed area
12	Gyms - black community area
13	Ball events – gay enclave area
14	Ball events – ethnically mixed area
15	Ball events – black community area

Blue – Gay enclave cluster
Green – Bridge cluster
Yellow – Black community cluster

Behler, *ABE*, 2017

Network Interventions

Any change program that uses network data to: Define groups

- Select change agents
- Affect network structure
- Assist behavior change program implementation

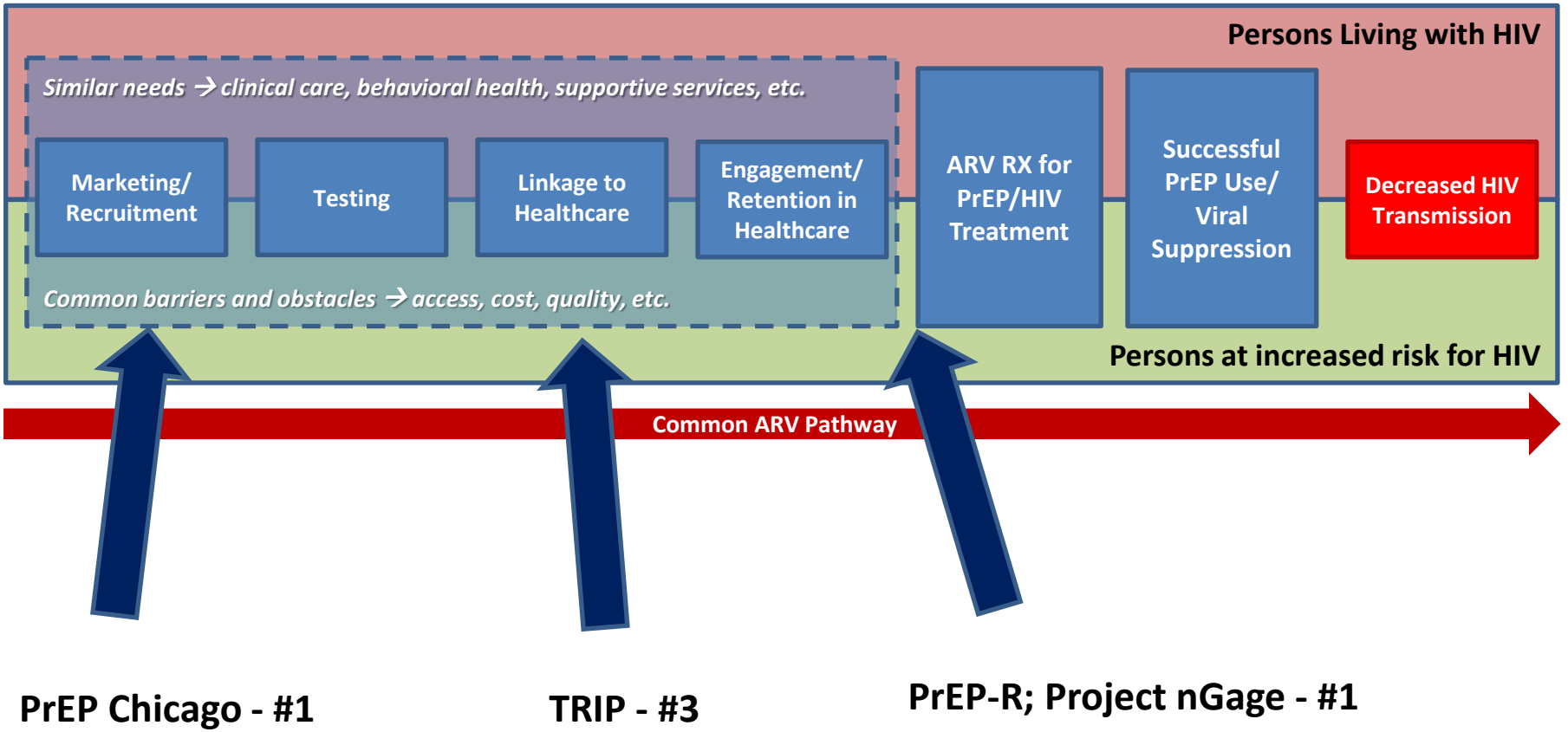
4 General Types

1. **Identify Individuals "Change Agents" – opinion leaders, key players, bridges (positional)**
2. Segmentation – Identify Groups, Identify leaders within groups or match leaders to groups
3. **Induction – Recruitment of sub-networks or word of mouth - Respondent Driven Sampling / Snowballing / Contact tracing**
4. Alteration – Adding deleting nodes/ties, rewire Networks

Valente, *Science* 2012

Common Antiretroviral Pathway

Chicago Department of Public Health



PrEP Chicago - #1

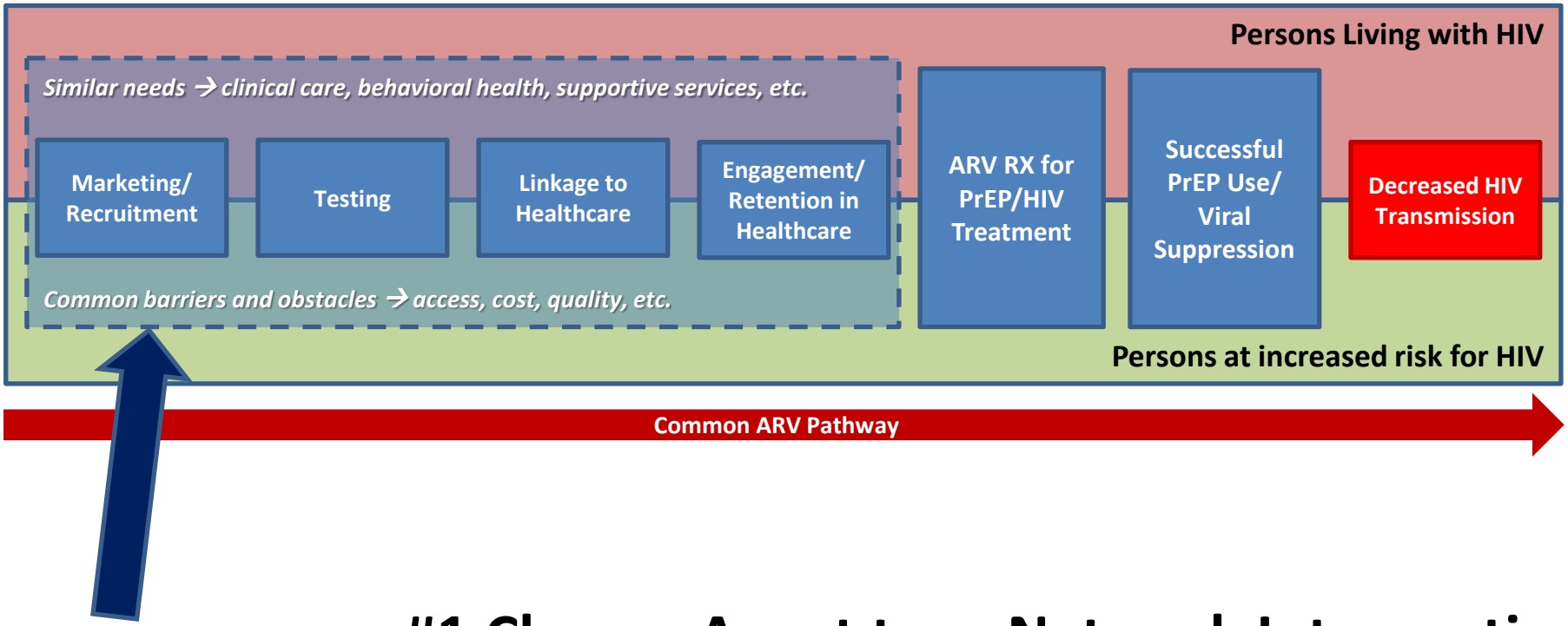
TRIP - #3

PrEP-R; Project nGage - #1

Network Intervention match

Common Antiretroviral Pathway

Chicago Department of Public Health



#1 Change Agent type Network Intervention

PrEP Chicago

Network Intervention match

Network Extraction Tool

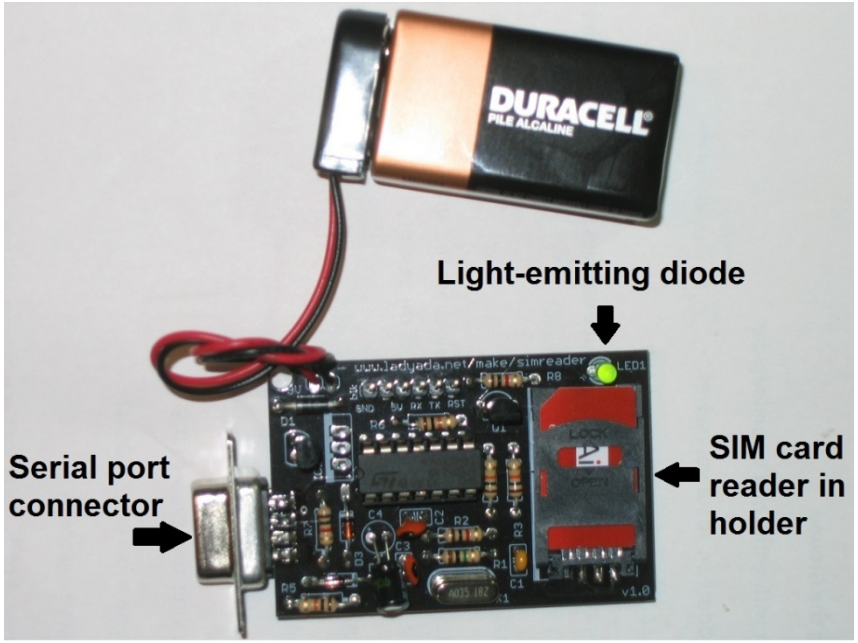
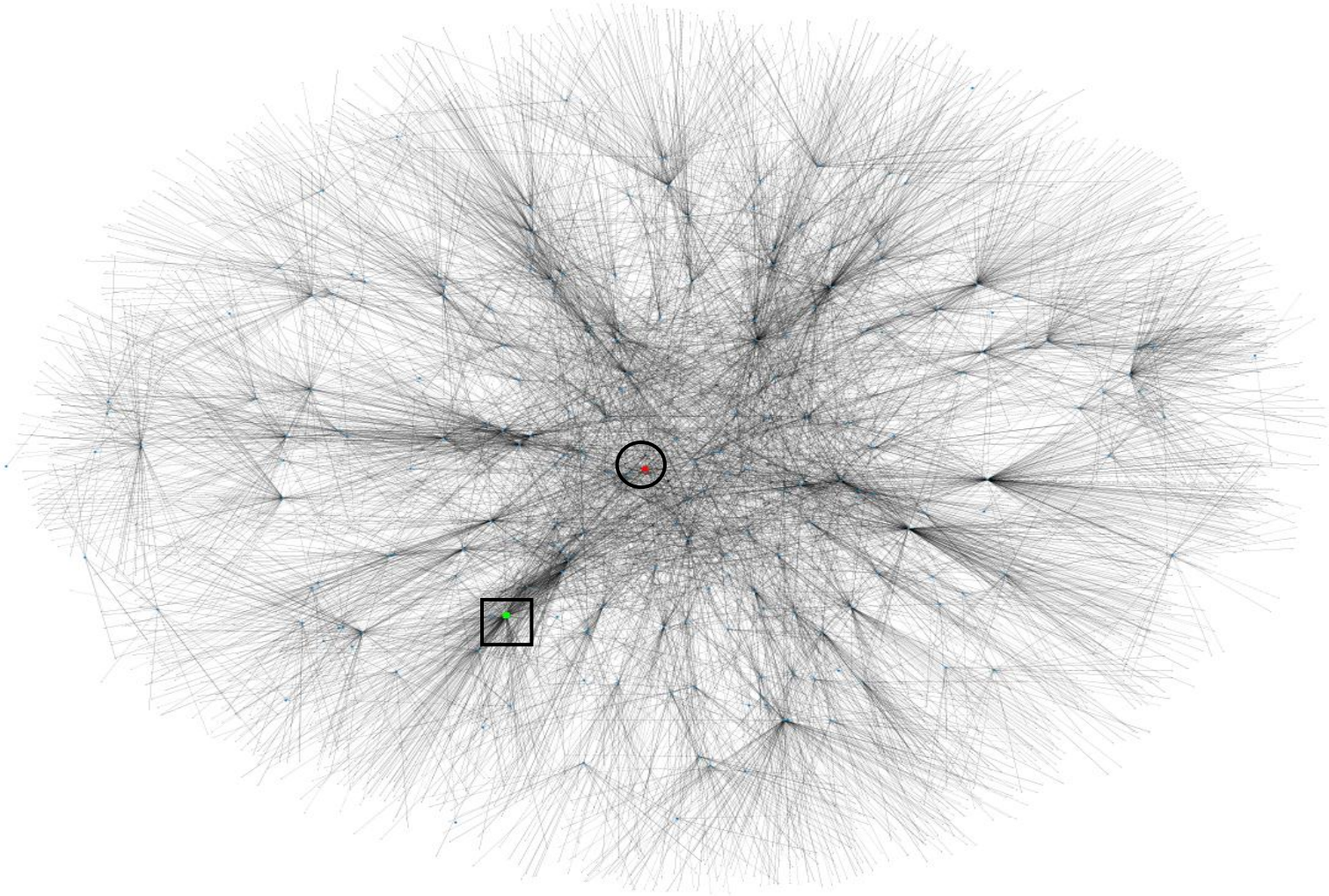
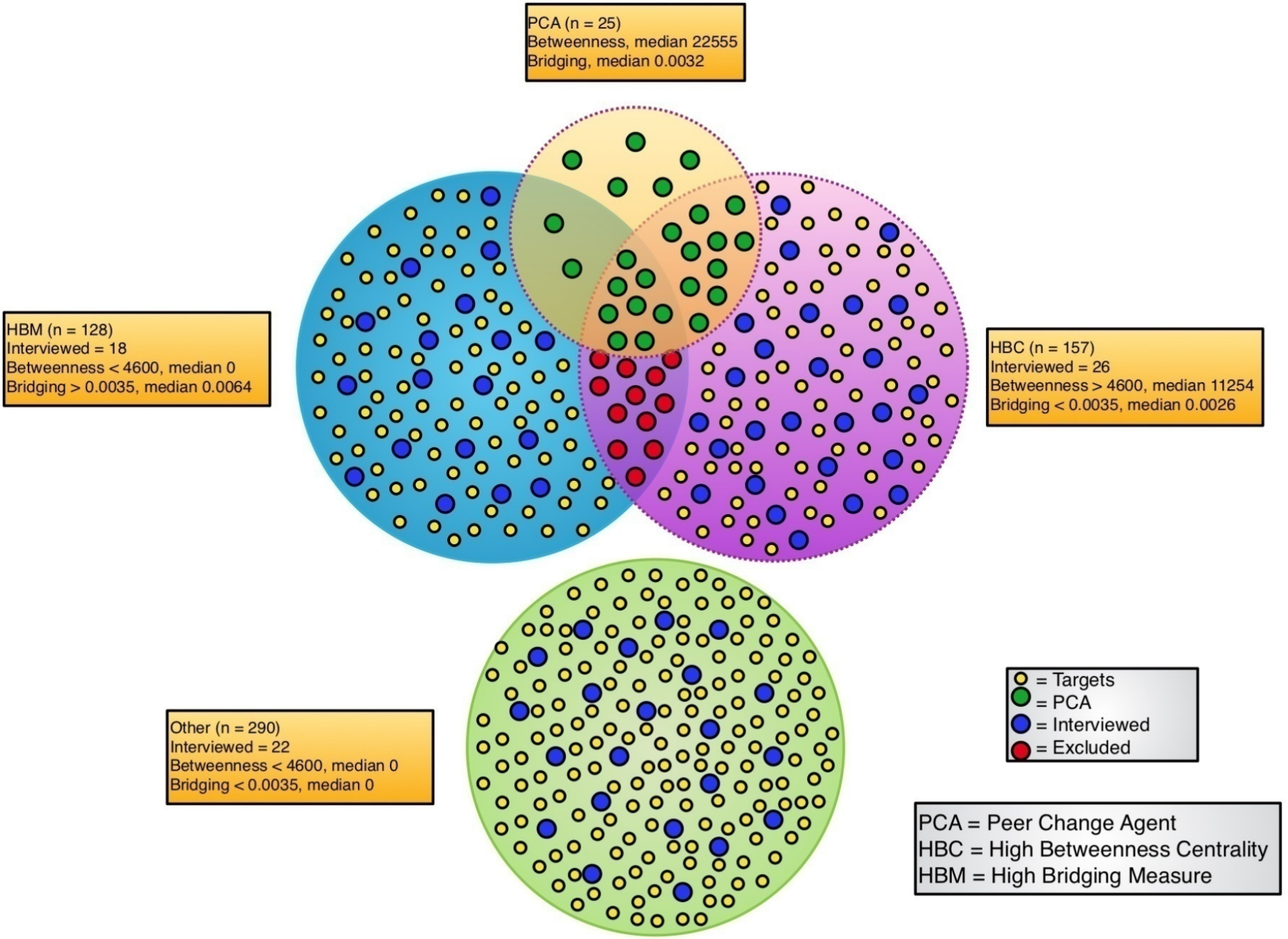


Figure 1. SIM card reader

Indian Men who have sex with men communication network (n= 4,583) generated from linked study respondents (n=245)[1].



[1]Circled actor represents individual with highest centrality (in-degree=39), most characteristic of an *opinion leader* (Valente and Pumpuang 2007); Squared actor represents individual with both the greatest bridging (constraint=0.08) and lower centrality (in-degree=6). (In-degree is one centrality measure and here measures *how many* participants had a given individual in their cell-phone contact list). *IAS 2010*



Schneider, *Social Science and Medicine* 2014

PrEP Chicago: Applying a diffusion framework…

Diffusion is the process through which an innovation is communicated through certain channels over-time among members of a social system.

(the innovation)

face to face

facebook

(communication channels)

(social system)

...to an intervention context

The Intervention:

- Identify and recruit peer change agents who are affiliated with the YBMSM/transwomen community in Chicago
- Train and support them in their efforts to inform and motivate their social networks around PrEP

Discussion | Members | Events | Photos | Files

Anthony

Anthony

Carmen Anthony
March 20

Project PrEP.

CARMEN-LIFE.COM

MEMBERS **91 members (6 new)**

+ Add People to Group

Invite by Email

DESCRIPTION Edit

Welcome to PrEP Chicago, a project of the Chicago Center for HIV Elimination (CCHE) at Universit... See More

TAGS: Edit

HIV · AIDS · HIV/Aids

CREATE NEW GROUPS

Network

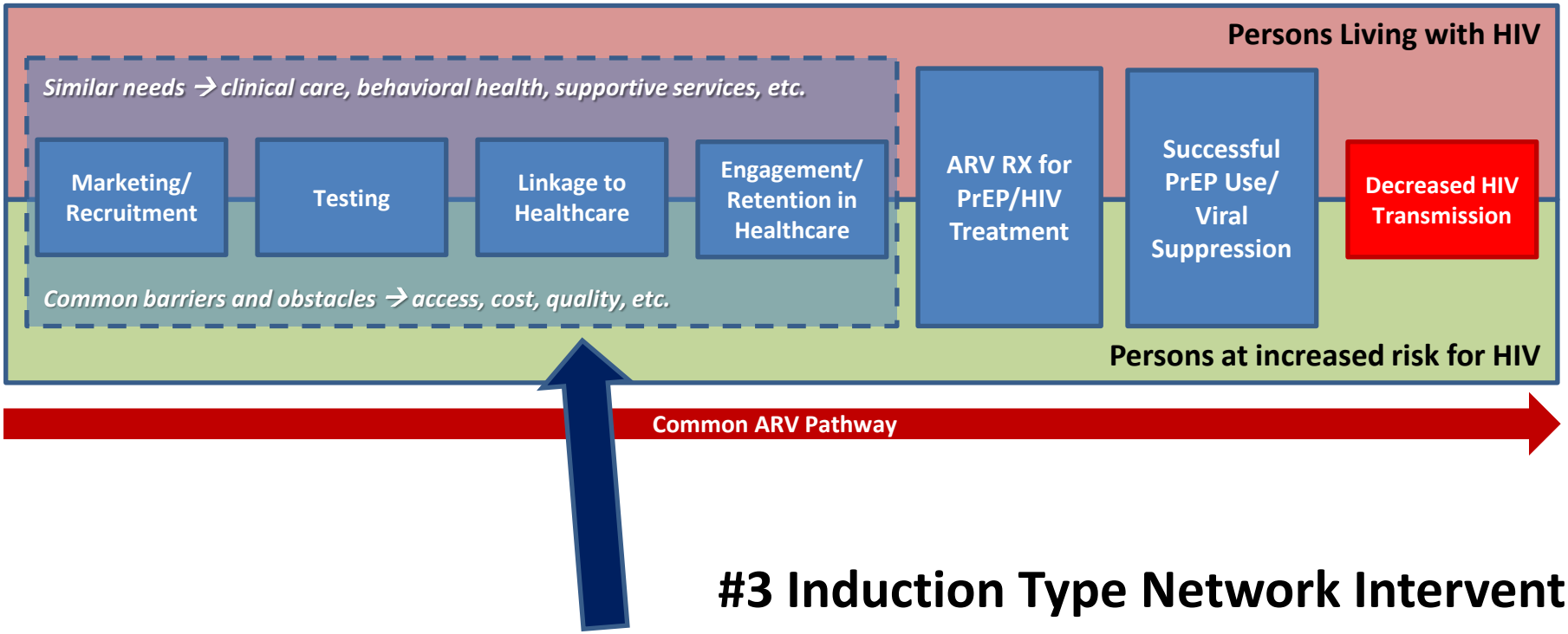
- **Proximity to individuals in key structural positions matters**

	Persistently PrEP Unaware vs. **Became PrEP Aware**	
	Mean (median)	Mean (Median)
High Betweeness	27% (33%)	32% (37%)
High Eigenvector	27% (28%)	37% (45%)
High Bridging	8% (9%)	11% (11%)

Khanna et al. *Annals of Epi*, 2017

Common Antiretroviral Pathway

Chicago Department of Public Health



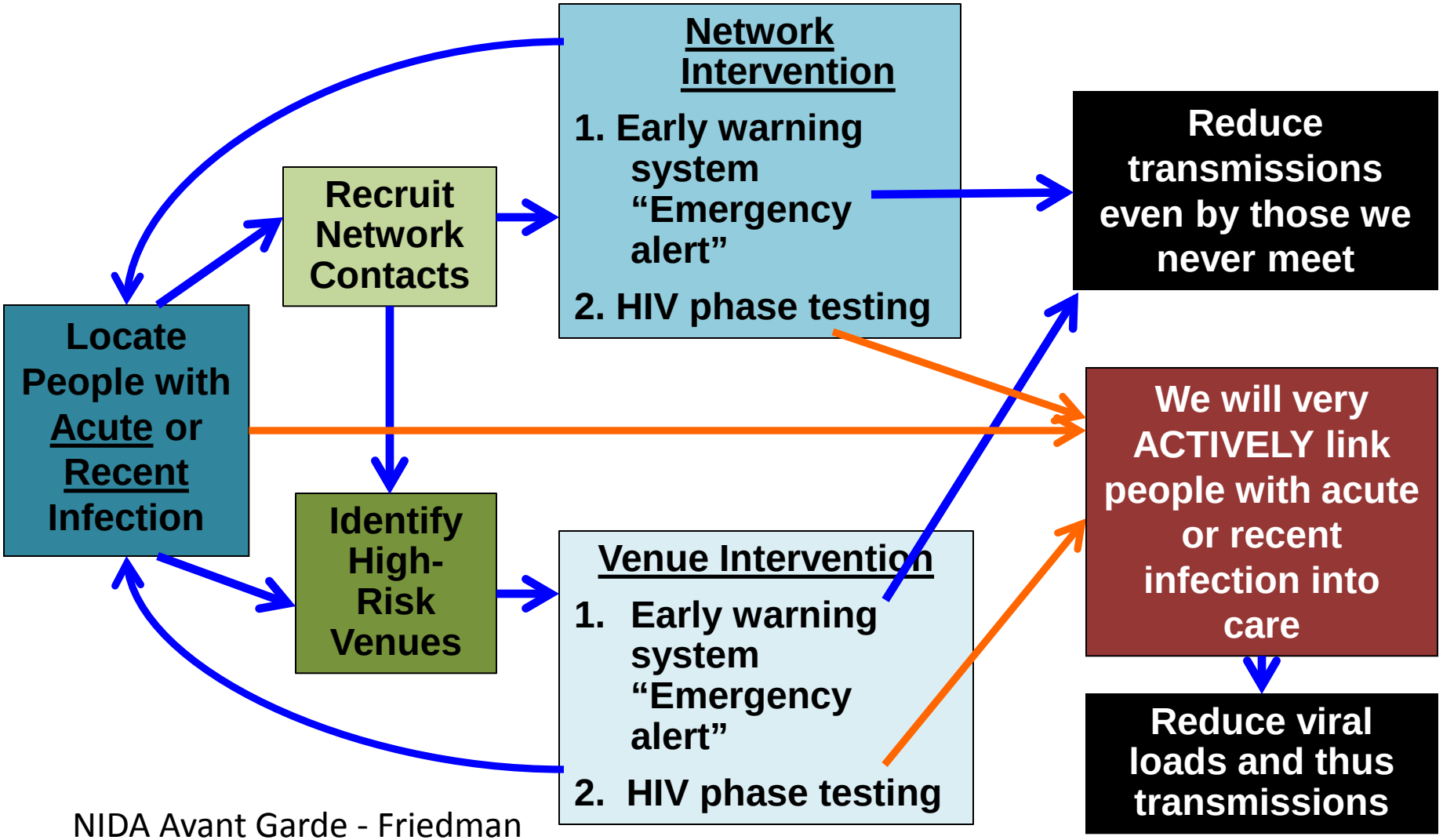
#3 Induction Type Network Intervention

TRIP (Transmission Reduction Intervention Project)

Network Intervention match

TRIP - Process of the Intervention

Community education about acute and recent infection and reasons not to stigmatize those with early infection



NIDA Avant Garde - Friedman

Table 2. Yield ratios for strategic identification of recent infections for the Transmission Reduction Intervention Project (TRIP) in Chicago, IL, 2014-2016 (n=185)

Network Contact Tracing Yield	**Network of Recent Seeds (NRS)**	**Recent Seeds (RS)**	**NRS/RS**	**Network of Control Seeds (NCS)**	**Control Seeds (CS)**	**NCS/CS**	**(NRS/RS) / (NCS/CS)**
HIV-diagnosed	36	24	1.50	6	21	0.29	5.17
HIV-diagnosed unaware	6	24	0.25	0	21	0.00	–[2]
Recent HIV infection	1	24	0.04	0	21	0.00	–[2]
Active syphilis infection[1]	11	24	0.46	1	21	0.05	9.20

[1]Defined as titer ≥ 1:8

[2]Undefined

Index is comparable to 5.28 among injectors in Athens.
Nikolopoulos et al. *Scientific Reports*, 2017

Preliminary Results

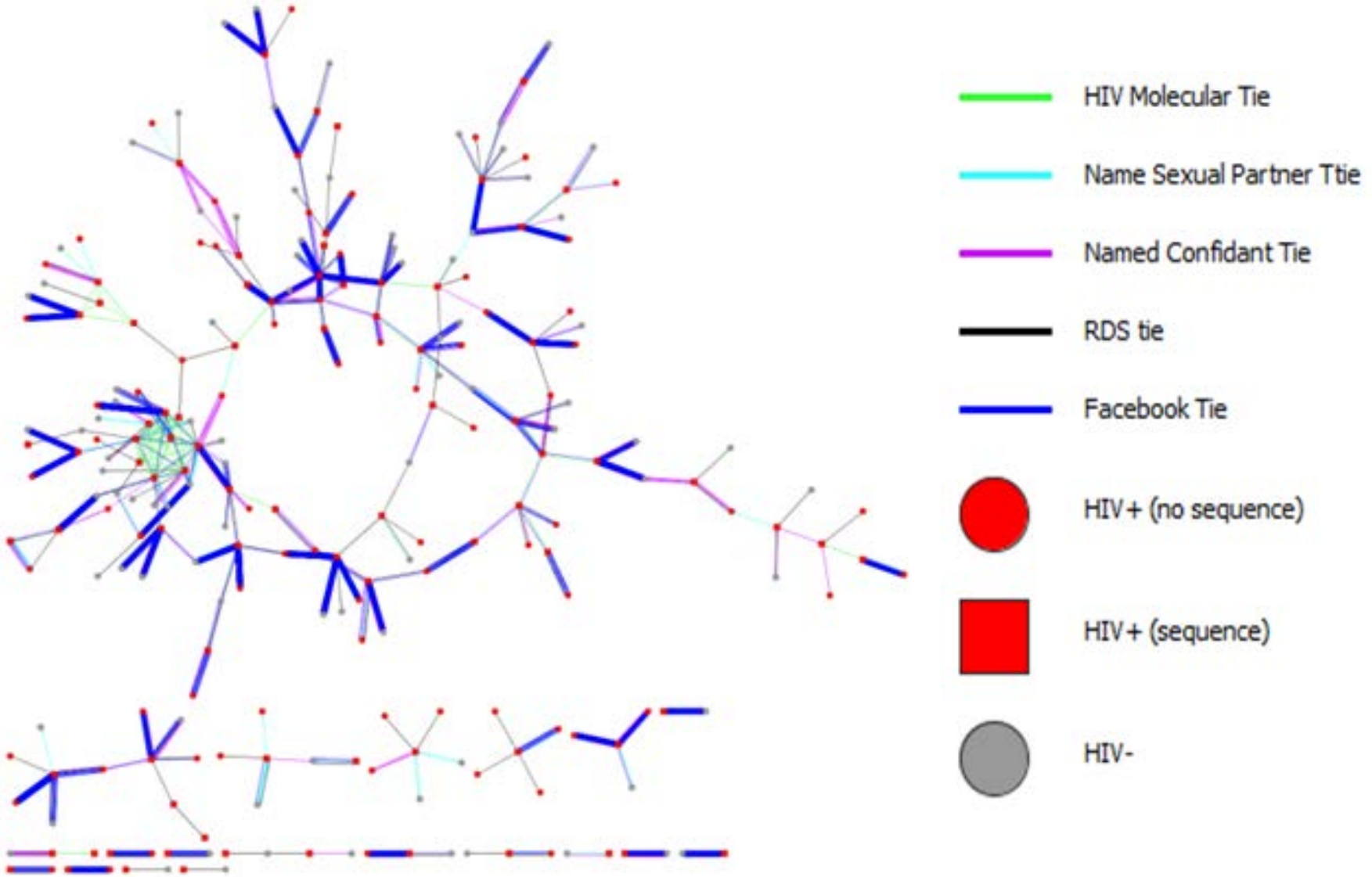
- Largely a YBMSM/Transwoman epidemic
  - 24 recents/acutes
  - Positives among network members: 26 (26/52 or 50%)
  - 8 (31%) highly infectious (VL >60K)
  - Surprisingly few recents/acutely infected in the networks of recent/acutely infected

- Differs from epidemics in Indiana, Greece and Ukraine among PWID

- Yield of new infections is no different when we ask for social contacts compared to risk contacts
  - Recruitment of social contacts less challenging than sex contacts

- **Shift to network services instead of partner services**
- **Shift to re-engagement in care**

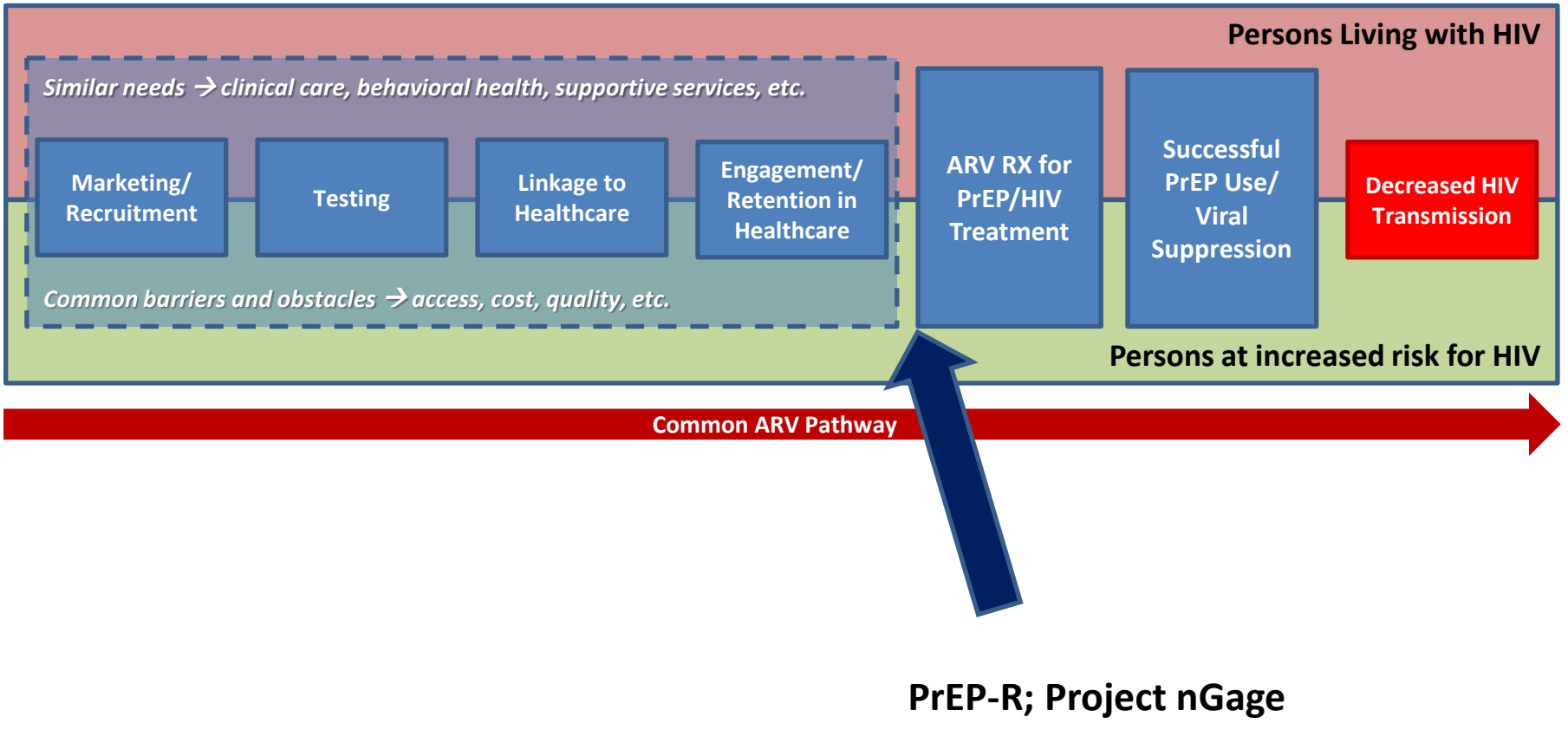
Sociomolecular approach



Molecular ties overlap with sex or Facebook ties less than half of the time

Common Antiretroviral Pathway

Chicago Department of Public Health

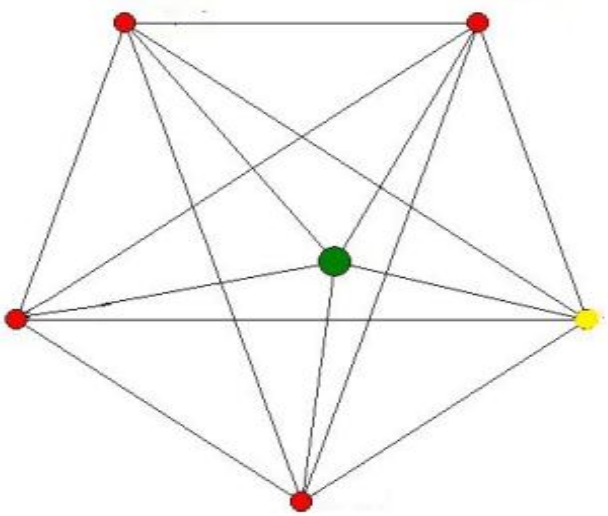


PrEP-R; Project nGage

Change Agent Type Network Intervention

Network Intervention match

Project nGage: Network Supported Engagement in Care for YBMSM/TW Living with HIV



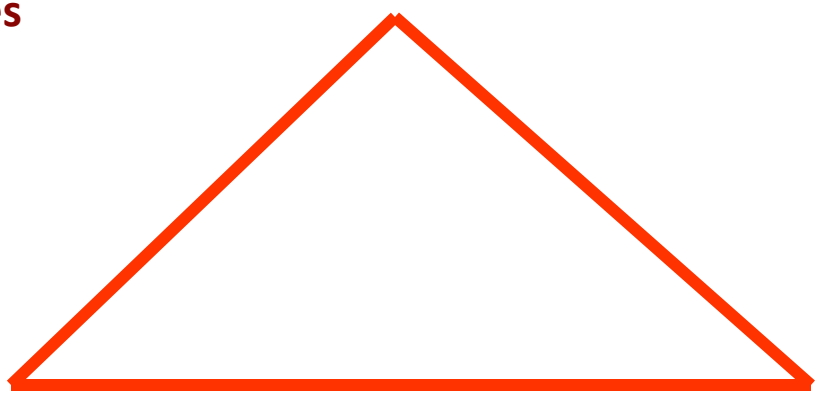
Project nGage: Results

- Intervention condition participants were 2.70 times more likely to be retained in care with at least 3 provider visits
- Intervention condition participants were 2.9 times more likely to be 90% adherent to antiretrovirals than the control condition
- No differences in viral load suppression across groups
- Currently testing similar approach for PrEP retention in care

Global HIV Imperative

Food security
Education
Housing, safety
Women, children, families
Environment
Job, income security
Non-discrimination

Human Rights



"HIV illustrates…that individual & population ***vulnerability*** to disease, disability, & premature death
is linked to the status of respect for human rights."
- J Mann, HHR, p 17

Prevention

(epidemiology)

Care

(support)

Final Thoughts

- Network analysis and intervention for HIV Elimination Efforts is intuitive and makes sense
- Infectious diseases (and non-infectious; e.g., social contagion) work through networks – *social, digital, sexual, molecular*
- Epidemiologic data where unit of analysis is the individual benefits when network analysis is conducted on each of these units - or in parallel
- Implementation that utilizes network interventions is key to HIV elimination
- Ethical considerations are not trival; but are managed with greater precaution than other research including 3rd party data

Thank-you!

Collaborators

CCHE Students and Staff

Funders

Preventing HIV one pill at a time.

http://hivelimination.uchicago.edu
https://www.facebook.com/hivelimination
@HIVElimination