A comparison group analysis aimed at assessing HIV care coordination program effectiveness

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NYC Health

CHORDS
Cost, Health Outcomes & Real-world Determinants of Success in HIV Care Coordination

CUNY The City University of New York
SCHOOL OF PUBLIC HEALTH

Conflict of Interest Disclosure

Denis Nash, PhD, MPH

Has no real or apparent
conflicts of interest to report.

HIV Care Coordination in NYC

- In 2009, NYC began implementing a comprehensive HIV care coordination program (CCP) at 28 Ryan White funded agencies
  - The CCP targets patients at high risk for suboptimal care outcomes
- The CCP intervention combines various evidence-based programmatic elements into a package*:
  - Case management, patient navigation, directly observed therapy (DOT), structured health promotion in home/field visits, and outreach
  - Intensity and focus can be tailored
- Service delivery program – No randomization

*For more details, see CDC's Compendium of Evidence-Based Interventions:
http://www.cdc.gov/hiv/pdf/prevention/research/compendium/cdc-hiv-HIVCCP_EI_Retention.pdf

Improvements in HIV Care Engagement and Viral Load Suppression Following Enrollment in a Comprehensive HIV Care Coordination Program

MAJOR ARTICLE   HIV/AIDS
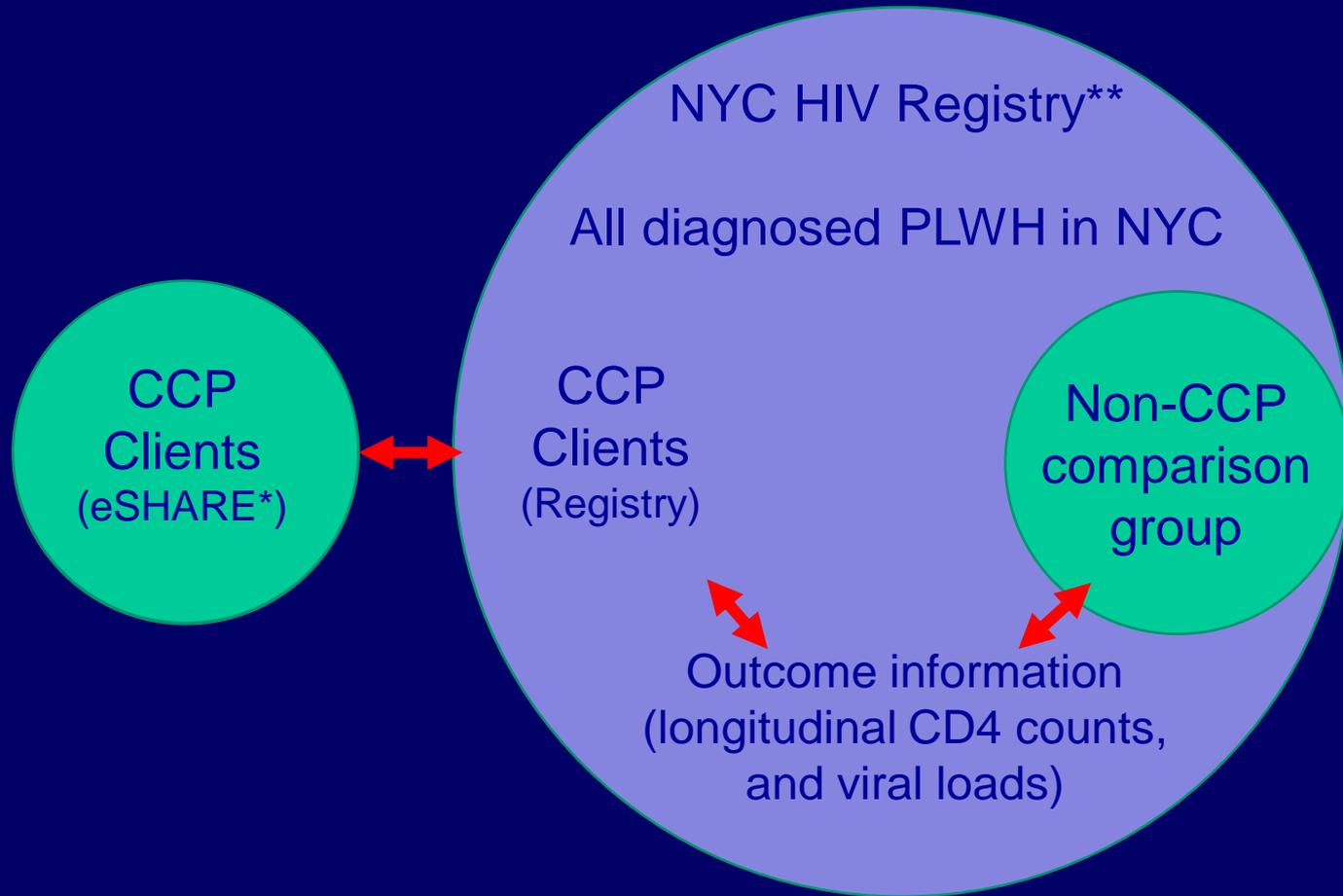
Clinical Infectious Diseases

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- Pre-post analysis restricted to those participating in CCP (i.e., no contemporary control group)

- Outcome data from HIV surveillance registry

- Observed significant improvements in the 12 months post-enrollment vs. 12 months prior:
  - Engagement in care: RR=1.24 (95% CI 1.21-1.27)
  - Viral suppression: RR=1.58 (95% CI 1.50-1.66)

- Role of secular improvements?

M Irvine et al. CID 2015

Objective

- To compare care engagement and HIV viral suppression among care coordination clients (CCP) over the 12 months following program enrollment with that of similar PLWH who, during the same time period, did not enroll in HIV care coordination.

Methods - Design

NYC HIV Registry**

All diagnosed PLWH in NYC

CCP Clients (eSHARE*) ⟷ CCP Clients (Registry)

Non-CCP comparison group

Outcome information (longitudinal CD4 counts, and viral loads)

*Electronic System for HIV/AIDS Reporting and Evaluation (eSHARE)
**The NYC HIV Registry contains information on new HIV diagnoses, diagnosis date, demographics, risk factors, history of AIDS, longitudinal viral load and CD4 count results, and vital status.

# CCP Study Population
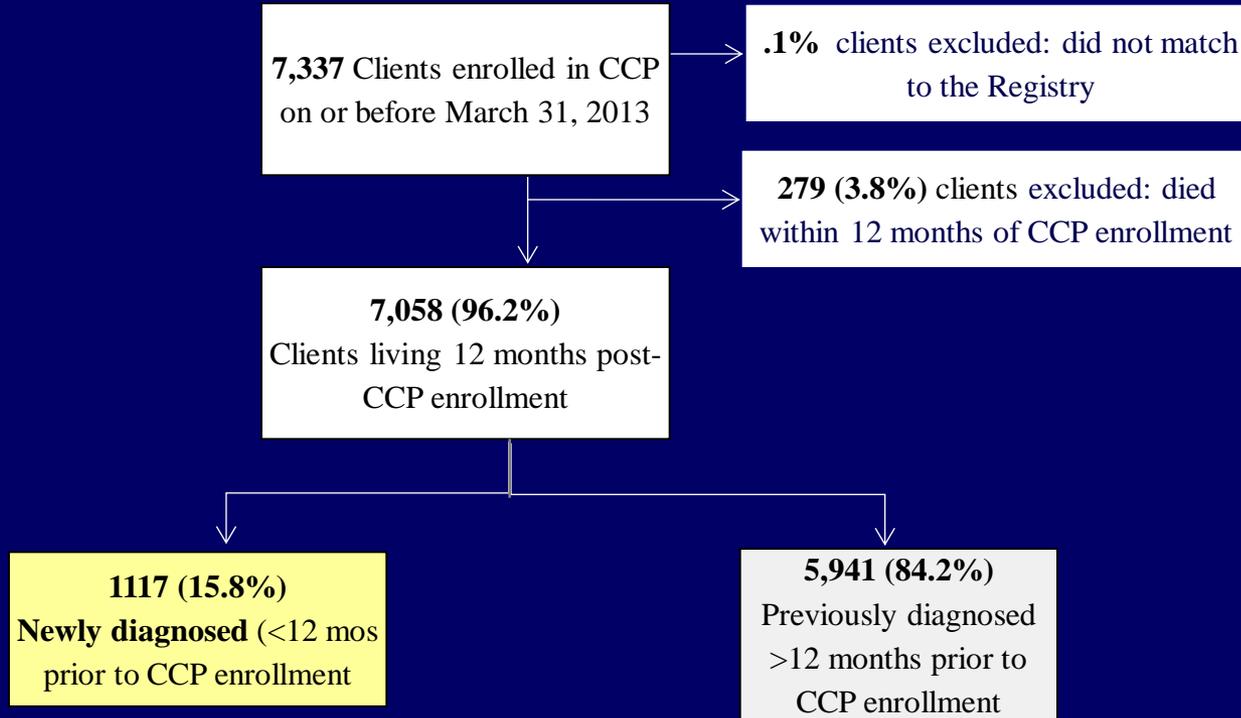
Methods – Comparison Group Selection

- Step 1: Identify PLWH in the HIV surveillance registry who meet CCP eligibility criteria but did not enroll in CPP
  - NYC PLWH with at least 1 CD4/VL reported to surveillance December 1, 2007 – March 31, 2013
  - Had not enrolled in the CCP as of March 31, 2013
  - Met CCP eligibility anytime December 2009 or after HIV diagnosis, whichever is later:
    - Newly diagnosed
    - >9 month gap in care
    - High VL (≥10,000 copies/mL)
    - Evidence of VL rebound
    - Treatment naïve
    - Poor ART adherence

N=62,828 non-CCP persons eligible at any time during 2007-2013

Methods – Comparison Group Selection

- <u>Step 2</u>: Assign a 'pseudo enrollment date' to those non-CCP PLWH who met CCP eligibility criteria
  - Pseudo enrollment date defines start of 12 month period to assess outcomes for non-CCP
  - To control for secular trends, assign pseudo enrollment dates to non-CCP eligible PLWH so as to mimic enrollment date distribution of CCP clients.
    - i.e. if 10% of CCP clients enrolled March 2012, we would want 10% of non-CCP PLWH who are eligible for CCP to have an pseudo enrollment dates in March 2012
  - Assign pseudo enrollment dates for non-CCP PLWH based during periods 'windows' where they met CCP eligibility criteria
    - 92% (N = 57,876/62,828) assigned a pseudo enrollment date

Mimicking the enrollment date distribution between CCP and non-CCP who meet eligibility criteria

Cumulative Percent Enrolled (N = 7,058) vs Assigned Anchor Date (N = 57,876)
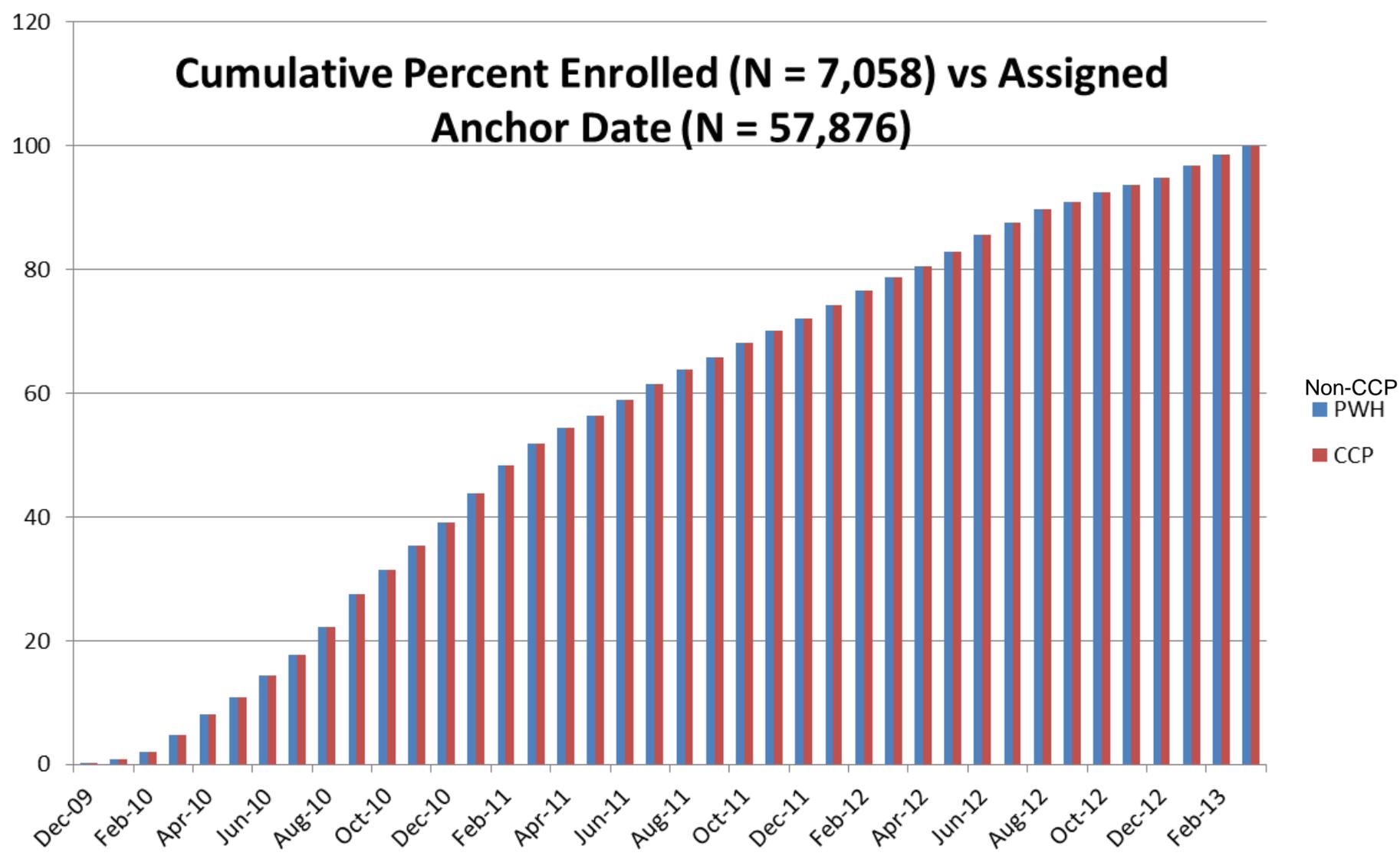
Methods – Comparison Group Selection

- <u>Step 3</u>: Among those meeting CCP eligibility criteria, identify and select those most similar to CCP enrollees
  - Propensity score matching of CCP and non-CCP:
    - Within strata of newly diagnosed* vs. previously diagnosed.
    - Among previously diagnosed, matched within strata of baseline EiC** and VLS*** status:

		Viral load suppression (VLS)	
		<u>Yes</u>	**<u>No</u>**
Engaged in care (EIC)	**Yes**	EiC+VLS	EiC+No VLS
	No	No EIC+VLS	No EiC + no VLS

<u>*Newly Diagnosed:</u> Diagnosed within one year of enrollment or pseudo enrollment date
<u>**Engaged in care (EiC):</u> 2 visits at least 3 months apart in the full year leading up to CCP enrollment date or pseudo enrollment date.
<u>***Viral suppression (VLS):</u> Latest viral load in the year leading up to CCP enrollment date or pseudo enrollment date is undetectable. Missing VL considered detectable

CCP Propensity Model

- A priori selected a variety of factors (N = 21) that may predict CCP enrollment
- Used backward selection to identify the best statistical predictors of CCP enrollment
- Adjusted the model identified via backward selection by adding and removing variables one at a time
- Fit was examined at each step: using AIC, R-square and percent concordance

Final model included
1. Baseline CD4
2. Baseline viral suppression
3. Race
4. Baseline ZIP of residence
5. Country of birth
6. Transmission risk group
7. Year of diagnosis
8. Sex
9. Linkage to care within 3 month
10. AIDS within one year

Interaction terms

1. Baseline CD4*baseline VL
2. Baseline CD4*race
3. Risk*year of diagnosis

Estimated Probability of CCP Enrollment

1:1 match on predicted probability of CCP enrollment
Match was stratified by newly diagnosed and baseline care status (previously diagnosed)

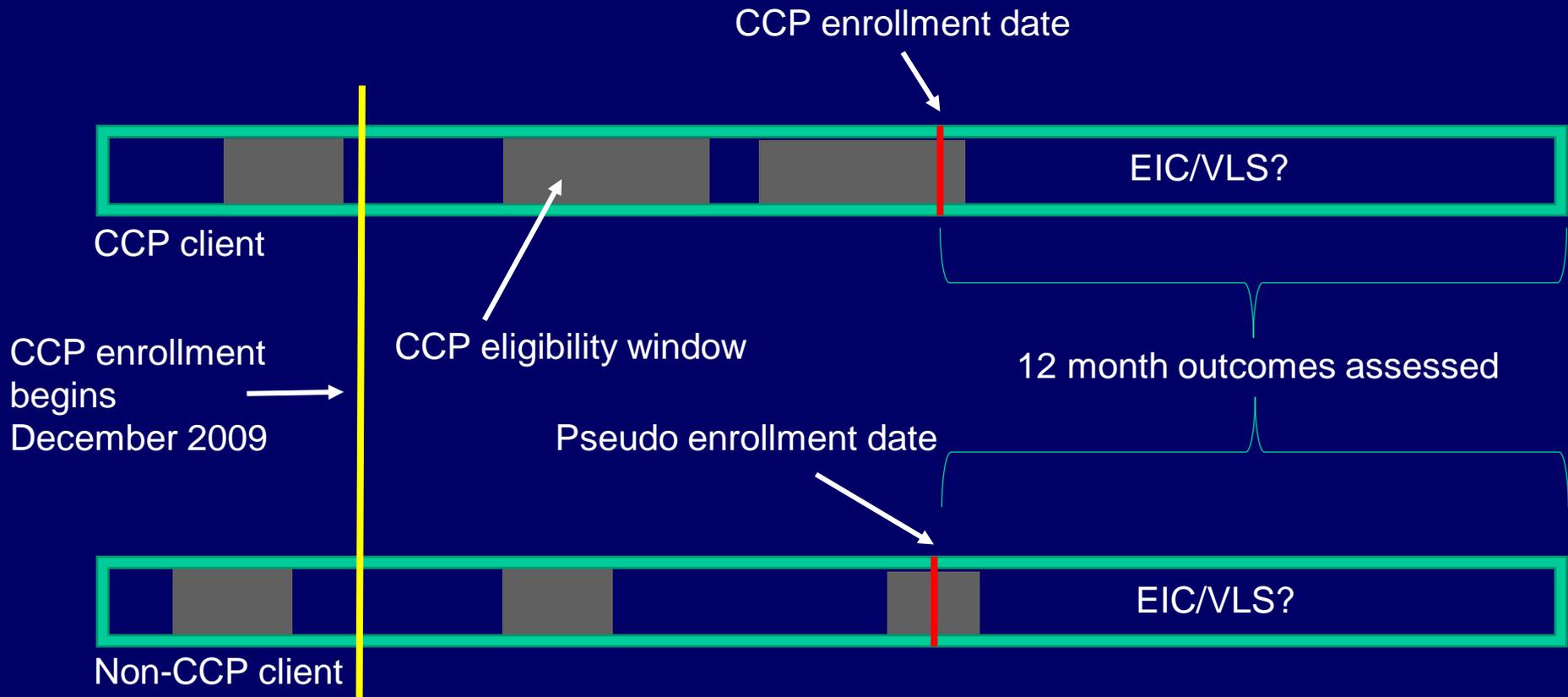**Pre Propensity Match (N = 64,804)**

Non-CCP (N = 57,746)

CCP (N = 7,058)

Post Propensity Match (N = 14,060)
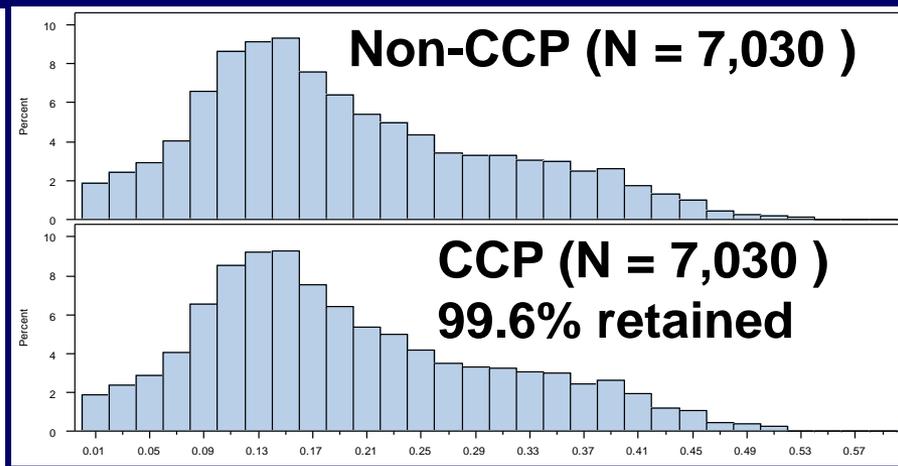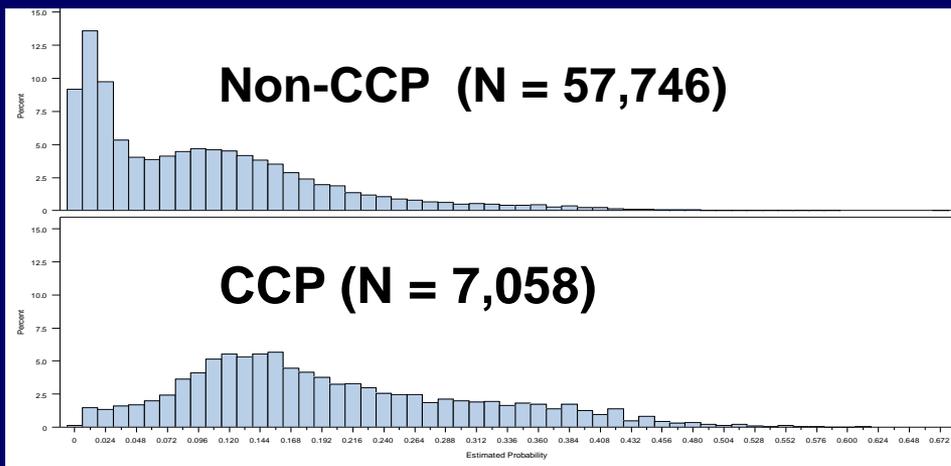
Non-CCP (N = 7,030)

CCP (N = 7,030)
99.6% retained

Characteristics of CCP and non-CCP comparison group before and after propensity match

Baseline Characteristics	Pre Match		
	Non-CCP N (%)	CCP N (%)	
Total	57,746 (100)	7,058 (100)	
Male	42,067 (72.9)	4,525 (64.1)	
Non-White	45,606 (79.0)	6,622 (93.8)	
18-44	27,329 (47.2)	3,554 (50.4)	
Foreign Born	10,463 (18.1)	1,629 (23.1)	
Baseline Viral Load >200*	37,271 (64.5)	4,862 (68.9)	
Baseline CD4 <200	6,999 (12.1)	2,303 (32.6)	
Men who have Sex with Men	22,887 (38.6)	2,064 (29.2)	
Injection Drug Use History	8,698 (15.1)	1,920 (21.1)	

Characteristics of CCP and non-CCP comparison group before and after propensity match

Baseline Characteristics	Pre Match		Post Match	
	Non-CCP N (%)	CCP N (%)	Non-CCP N (%)	CCP N (%)
Total	57,746 (100)	7,058 (100)	7,030 (100)	7,030 (100)
Male	42,067 (72.9)	4,525 (64.1)	4,508 (64.1)	4,513 (64.1)
Non-White	45,606 (79.0)	6,622 (93.8)	6,627 (94.3)	6,594 (93.8)
18-44	27,329 (47.2)	3,554 (50.4)	3,427 (48.7)	3,537 (50.3)
Foreign Born	10,463 (18.1)	1,629 (23.1)	1,508 (21.5)	1,608 (22.8)
Baseline Viral Load >200*	37,271 (64.5)	4,862 (68.9)	4,756 (67.7)	4,834 (68.8)
Baseline CD4 <200	6,999 (12.1)	2,303 (32.6)	2,227 (31.7)	2,275 (32.4)
Men who have Sex with Men	22,887 (38.6)	2,064 (29.2)	2,031 (28.9)	2,059 (29.3)
Injection Drug Use History	8,698 (15.1)	1,920 (21.1)	1,545 (22.0)	1,905 (21.1)

Follow-up periods for CCP and non-CCP study participants and outcome definitions

CCP enrollment date

EIC/VLS?

CCP client

CCP eligibility window

CCP enrollment begins December 2009

Pseudo enrollment date

12 month outcomes assessed

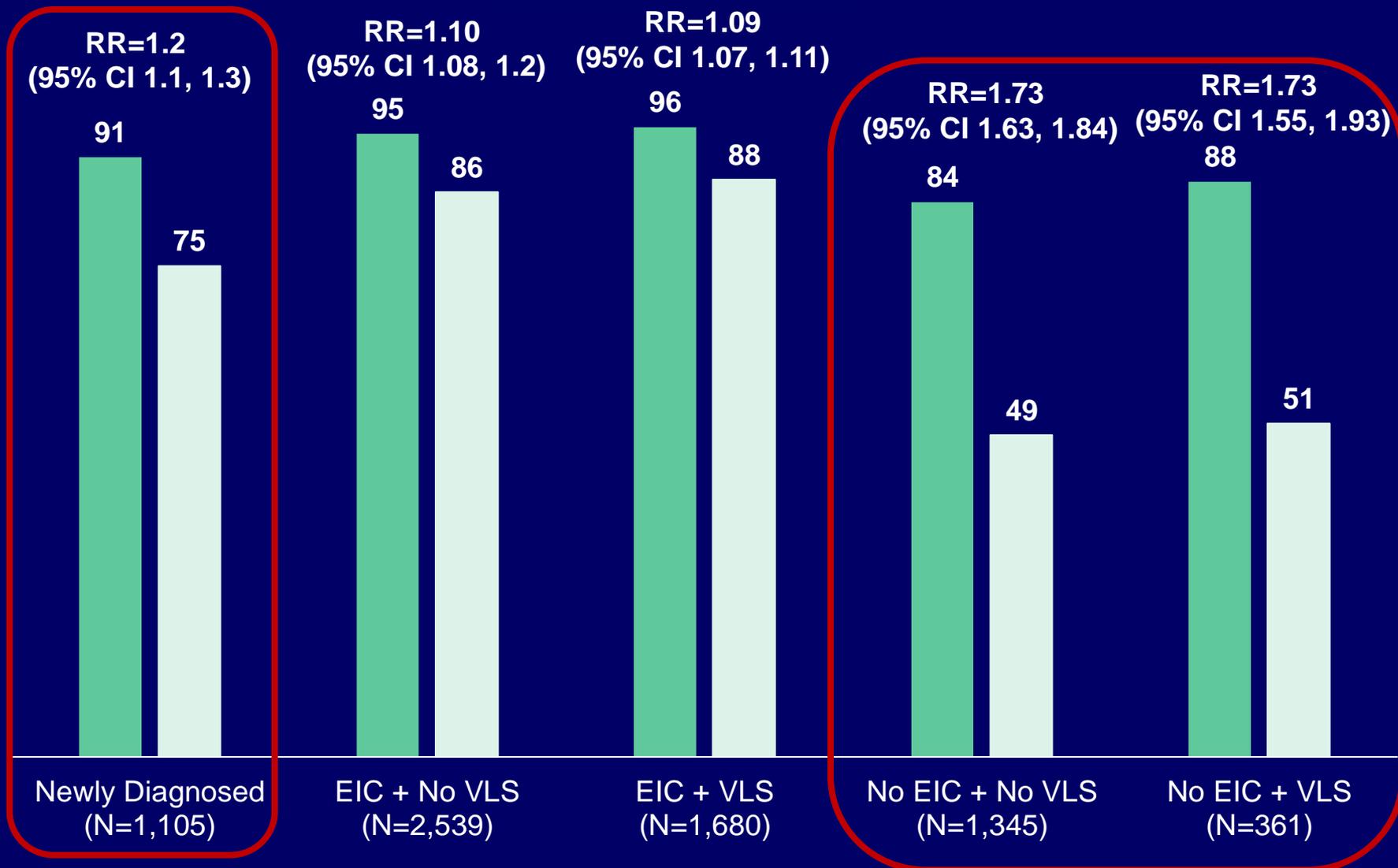EIC/VLS?

Non-CCP client

**Engaged in care (EiC): 2 visits at least 3 months apart in the full year following the CCP enrollment date or pseudo enrollment date.

***Viral suppression (VLS): Latest viral load in the year following the CCP enrollment date or pseudo enrollment date is undetectable. Missing VL considered detectable.

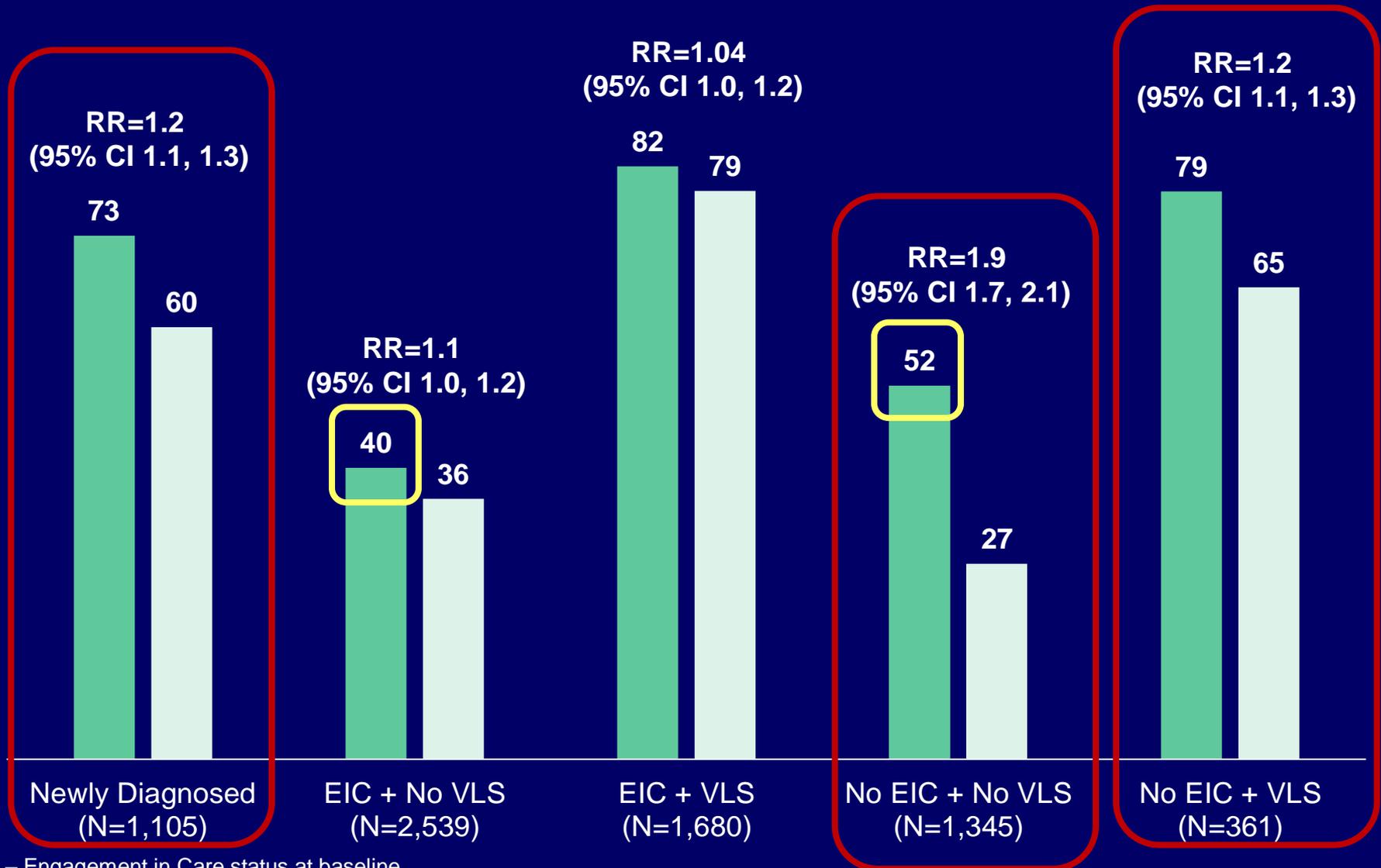# Care engagement at 12 months of follow-up (%) – CCP versus Non-CCP, by baseline care status

■CCP ■Non-CCP

RR=1.2
(95% CI 1.1, 1.3)

RR=1.10
(95% CI 1.08, 1.2)

RR=1.09
(95% CI 1.07, 1.11)

RR=1.73
(95% CI 1.63, 1.84)

RR=1.73
(95% CI 1.55, 1.93)

91

75

95

86

96

88

84

49

88

51

Newly Diagnosed
(N=1,105)

EIC + No VLS
(N=2,539)

EIC + VLS
(N=1,680)

No EIC + No VLS
(N=1,345)

No EIC + VLS
(N=361)

EIC – Engagement in Care status at baseline
VLS – Viral suppression status at baseline

Viral suppression at 12 months of follow-up (%) – CCP versus Non-CCP, by baseline care status

■ CCP   ■ Non-CCP

RR=1.04
(95% CI 1.0, 1.2)

RR=1.2
(95% CI 1.1, 1.3)

RR=1.2
(95% CI 1.1, 1.3)

73

82

79

79

60

65

RR=1.9
(95% CI 1.7, 2.1)

52

RR=1.1
(95% CI 1.0, 1.2)

40

36

27

Newly Diagnosed
(N=1,105)

EIC + No VLS
(N=2,539)

EIC + VLS
(N=1,680)

No EIC + No VLS
(N=1,345)

No EIC + VLS
(N=361)

EIC – Engagement in Care status at baseline
VLS – Viral suppression status at baseline

Strengths and limitations

Strengths
- Population-based comparison group
- Large enough sample size of non-CCP that a match was found for 99.6% of CCP sample
- Outcome data for CCP and non-CCP came from the same source, and available regardless of care location

Limitations
- Uncontrolled or poorly controlled confounding due to factors that were not identified and included.
  - Limited to variables in the HIV surveillance registry
- Propensity matching methods limits ability to stratify effectiveness estimates (e.g., by sex, risk, etc)

Conclusions

- Developed and advanced a surveillance-based method for comparison group selection in an observational effectiveness study
  - May be useful for studying the effectiveness of other interventions/strategies/programs
- Application of this method to NY's CCP suggests that the intervention is effective
  - especially for newly diagnosed persons and those who are not engaged in care or virally suppressed at baseline
- After 12 months, there is still a lot of room for improvement in VLS among CCP participants
  - CCP may take more time to work in many clients
    - Need to examine longer term outcomes

Acknowledgements

- CHORDS Study team
- Care Coordination Program Service Providers and Clients
- DOHMH CCP TA providers
- Bruce Levin, PhD (Columbia University)

Extra slides

Care Coordination

- "The deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of health care services." (AHRQ, 2003)

- Institute of Medicine report identified care coordination as a "cross-cutting" priority for improving healthcare quality (IOM 2003)
  - Insufficient evidence for effectiveness in HIV/AIDS care
    - (Lack of studies)

- Increasing need to examine combinations biomedical, behavioral and social interventions as a means of improving outcomes and achieving NHAS goals
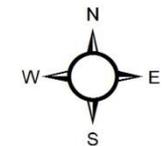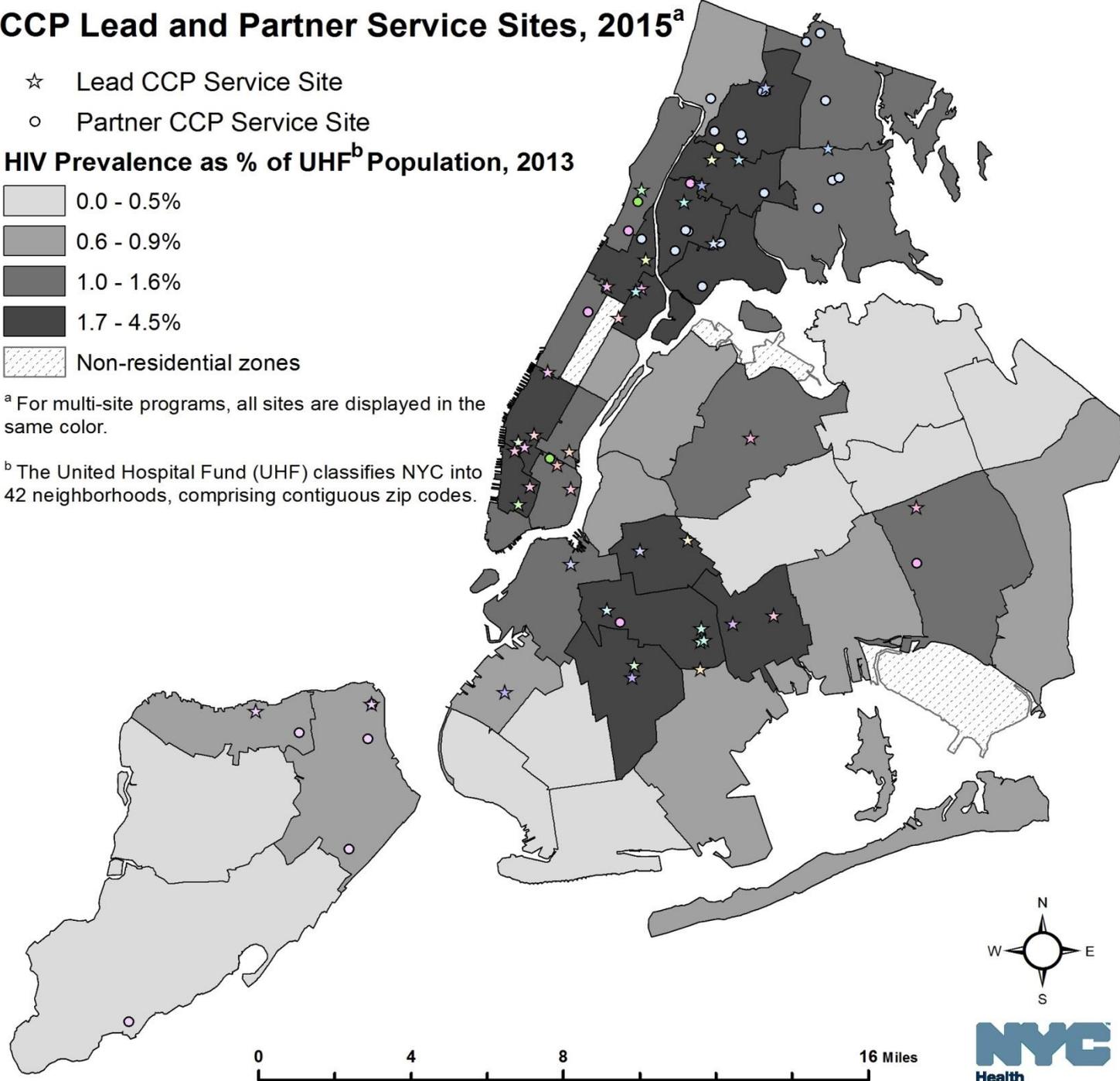
Map of the 28 CCP agencies in NYC

CCP Lead and Partner Service Sites, 2015[a]

☆ Lead CCP Service Site
○ Partner CCP Service Site

HIV Prevalence as % of UHF[b] Population, 2013

- 0.0 - 0.5%
- 0.6 - 0.9%
- 1.0 - 1.6%
- 1.7 - 4.5%
- Non-residential zones
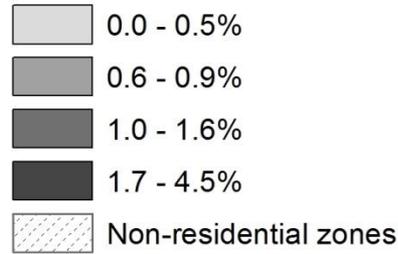
[a] For multi-site programs, all sites are displayed in the same color.

[b] The United Hospital Fund (UHF) classifies NYC into 42 neighborhoods, comprising contiguous zip codes.

0   4   8   16 Miles

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