Seminar

Precision Development and Implementation of Multi-Level HIV Prevention Interventions for Youth

Monday, April 3, 2023

Sarah Wood, MD, MSHP
University of Pennsylvania
Perelman School of Medicine
Children's Hospital of Philadelphia (CHOP)
Penn Center for AIDS Research
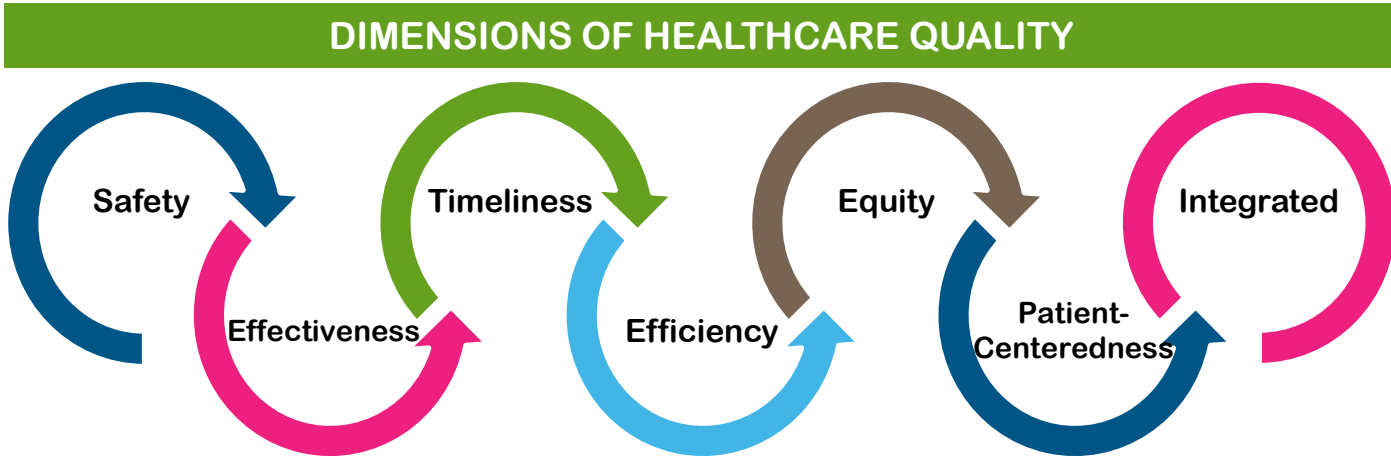
CONFLICTS OF INTEREST

I receive funding from Gilead Sciences through the Gilead Research Scholars Program

OBJECTIVES

- To demonstrate how multi-level health system data can measure gaps along the HIV treatment and prevention continuum

- To demonstrate the Implementation Research Logic Model (IRLM) as an implementation research tool to synthesize data and practice

- To describe challenges in measurement and analysis in implementation research

MISSION STATEMENT: PRECISION DESIGN

1. To identify gaps in adolescent HIV prevention service delivery using multi-level health system data.

DIMENSIONS OF HEALTHCARE QUALITY

Safety — Effectiveness — Timeliness — Efficiency — Equity — Patient-Centeredness — Integrated

2. To develop and test innovative strategies to advance HIV prevention service delivery using implementation science and human systems engineering.

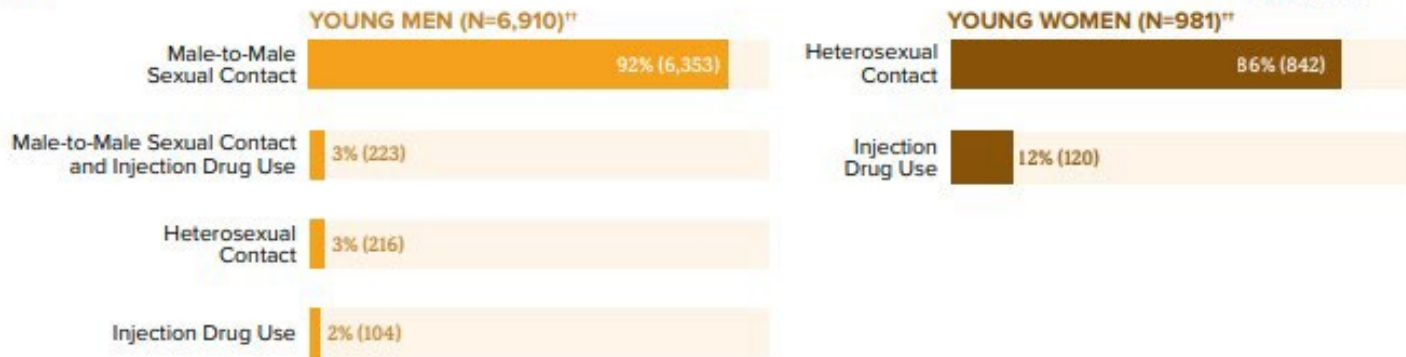# USING MULTI-LEVEL DATA TO MEASURE HIV PREVENTION OUTCOMES

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HIV and Youth

21% Of the **37,968 NEW HIV DIAGNOSES** in the US and dependent areas* in 2018, 21% (7,891) were among youth.[†]

Most new HIV diagnoses among youth were among young gay and bisexual men.[‡] [**]

YOUNG MEN (N=6,910)[††]

Male-to-Male Sexual Contact	92% (6,353)
Male-to-Male Sexual Contact and Injection Drug Use	3% (223)
Heterosexual Contact	3% (216)
Injection Drug Use	2% (104)

YOUNG WOMEN (N=981)[††]

Heterosexual Contact	86% (842)
Injection Drug Use	12% (120)

Does not include other and perinatal transmission categories; values may not equal the total.

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Source: CDC

PRE-EXPOSURE PROPHYLAXIS

Antiretroviral medication for prevention can reduce the incidence of HIV by >98%

THE STIGMA PROJECT

got prep?

AND YET...

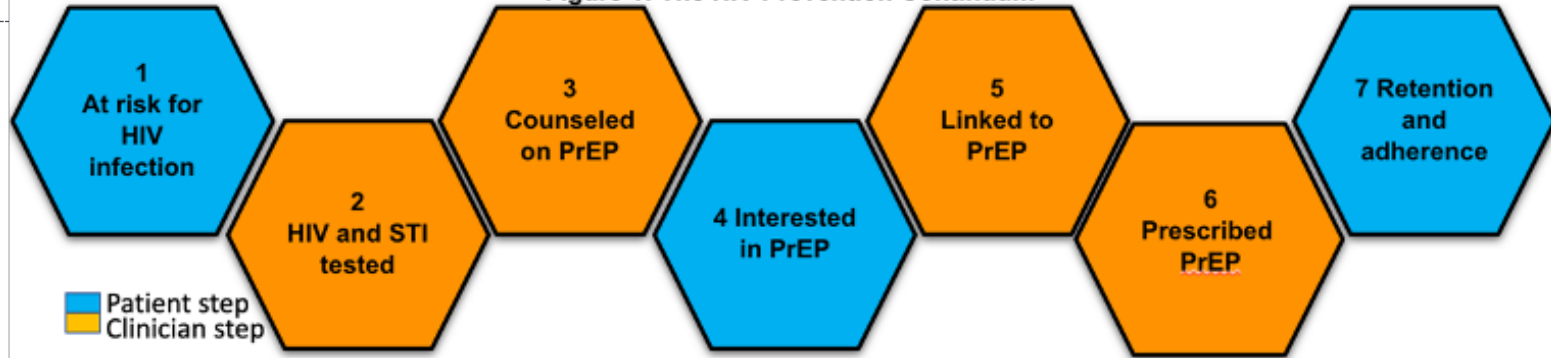
Only 8% of U.S. high school students have received an HIV test

<1% of PrEP prescriptions in the U.S. are for adolescents

Figure 1: The HIV Prevention Continuum

1 At risk for HIV infection

2 HIV and STI tested

3 Counseled on PrEP

4 Interested in PrEP

5 Linked to PrEP

6 Prescribed PrEP

7 Retention and adherence

Patient step
Clinician step

- **Screen EVERYONE for HIV**

- **Screen ALL sexually active folks for CT/GC**

- **Screen EVERYONE with STIs for HIV**
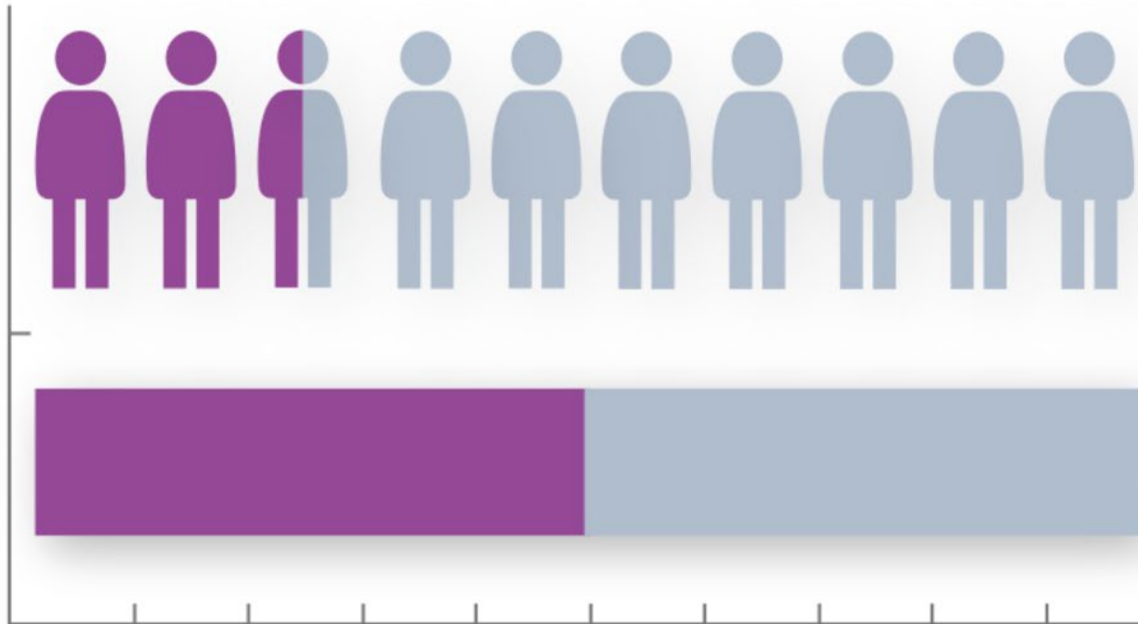
PrEP counseling for individuals with STIs

PrEP awareness for all!

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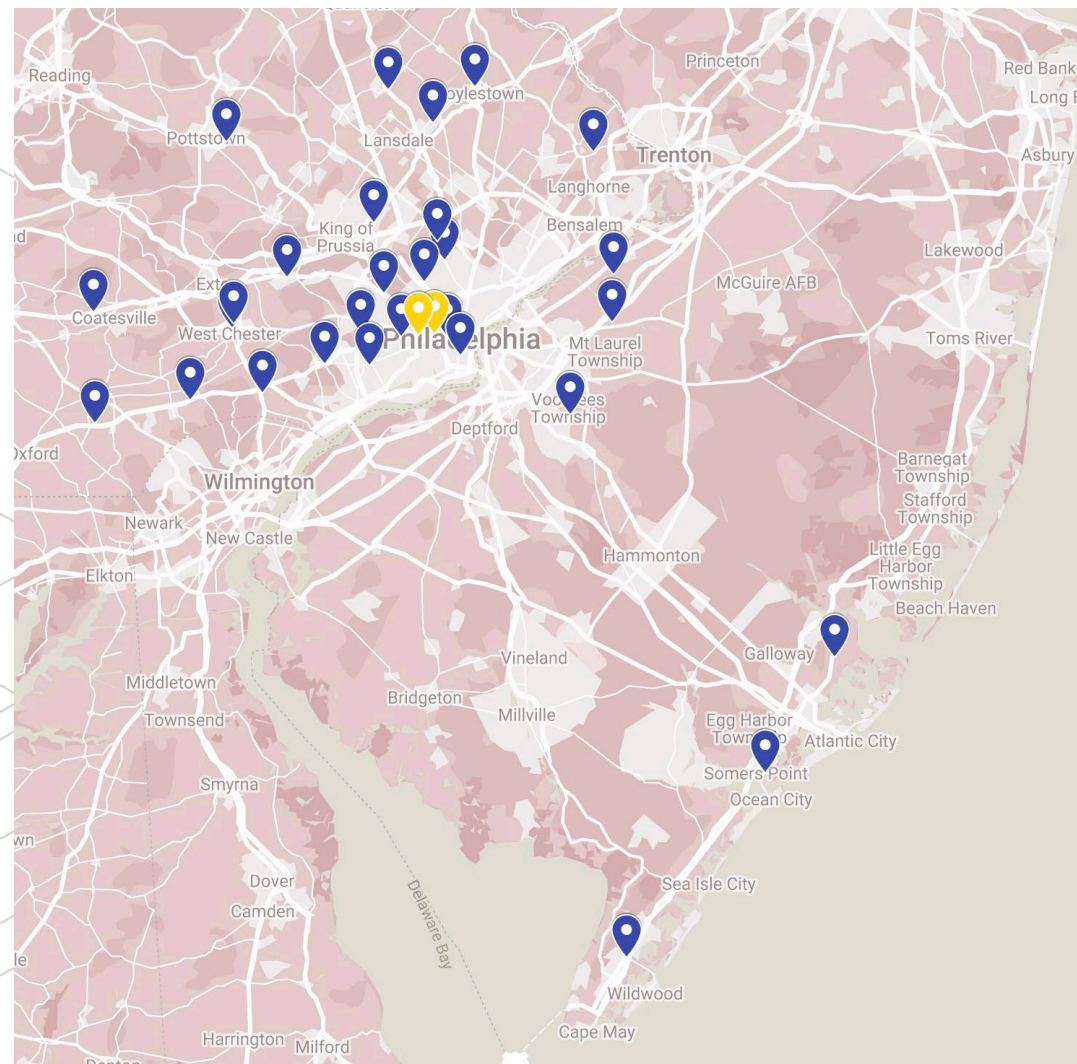Children's Hospital of Philadelphia
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Youth bear disproportionate share of STIs

Americans ages 15-24 make up just **27%** of the sexually active **population**

But account for **50%** of the **20M** new **STIs** in the U.S. each year
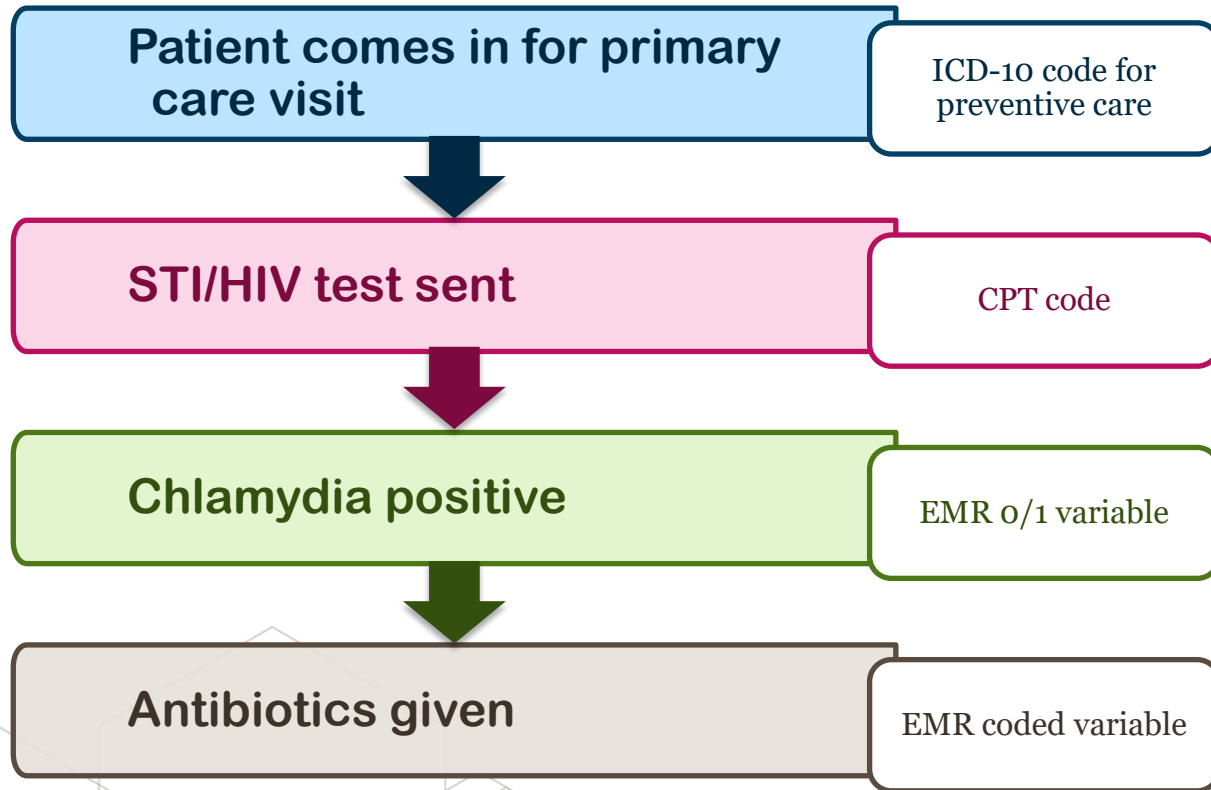
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CHOP PEDIATRIC PRIMARY CARE NETWORK
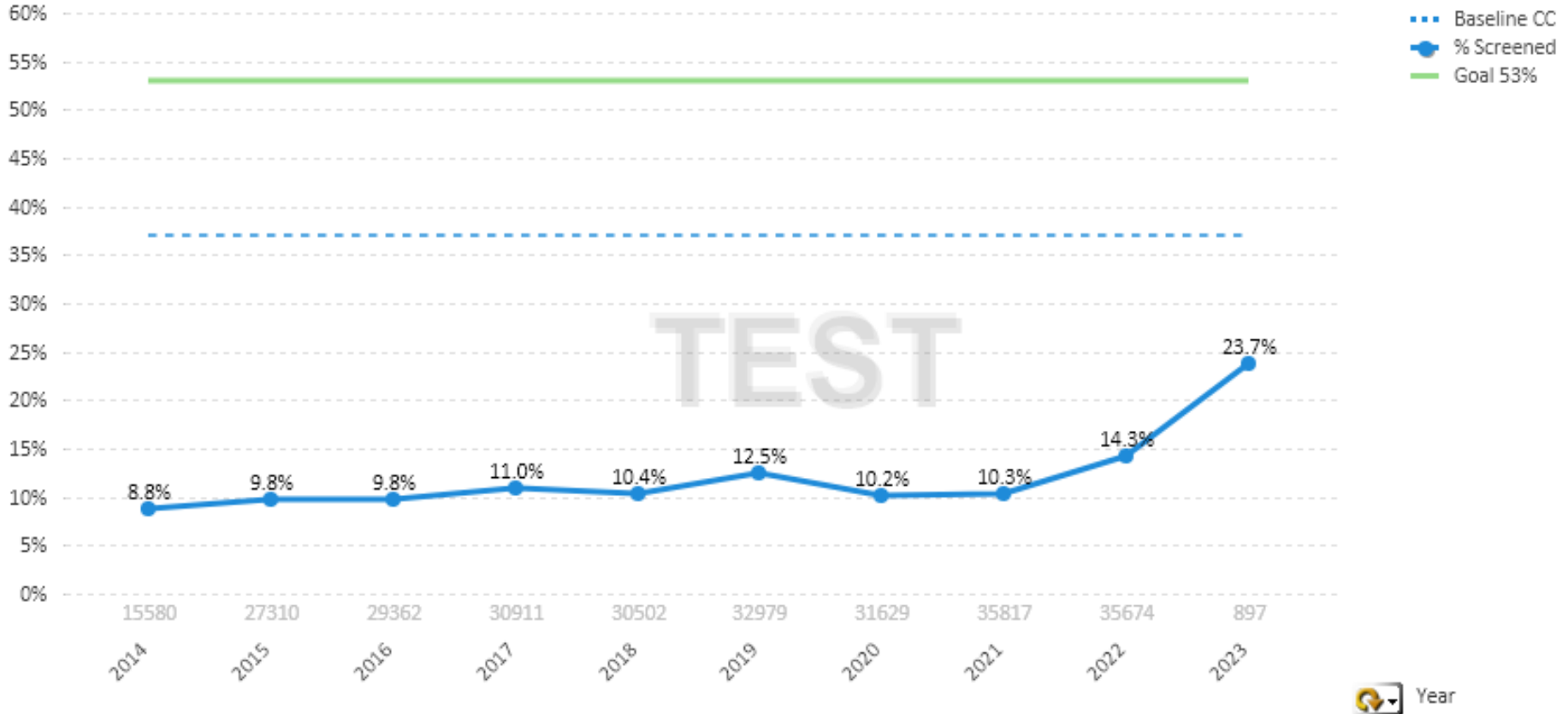
- **31 clinics**
- **>263,000 patients/year**
- **~26% Black/African American**
- **35% publicly insured**
- **2 Title X family planning clinics**

Patient comes in for primary care visit

ICD-10 code for preventive care

STI/HIV test sent

CPT code

Chlamydia positive

EMR 0/1 variable

Antibiotics given

EMR coded variable

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Tracking Annual Chlamydia Screening

Legend:
- Baseline CC (dotted line)
- % Screened (solid line with markers)
- Goal 53% (green line)

Data points (% Screened):
- 2014: 8.8%
- 2015: 9.8%
- 2016: 9.8%
- 2017: 11.0%
- 2018: 10.4%
- 2019: 12.5%
- 2020: 10.2%
- 2021: 10.3%
- 2022: 14.3%
- 2023: 23.7%

Denominator values by year:
- 2014: 15580
- 2015: 27310
- 2016: 29362
- 2017: 30911
- 2018: 30502
- 2019: 32979
- 2020: 31629
- 2021: 35817
- 2022: 35674
- 2023: 897

Year

%15-19 year olds with annual Chlamydia screening at well visit

Patient comes in for primary care visit

ICD-10 code for preventive care

Can we use these data to look identify multilevel barriers and facilitators of HIV prevention service delivery?

Chlamydia positive

EMR 0/1 variable

Antibiotics given

EMR coded variable

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MULTILEVEL MODELING TO ASSESS HIV TESTING IN YOUTH WITH STIS

Design and Participants: Retrospective study of youth with gonorrhea, chlamydia, or syphilis, 2014-2017

Setting: Two hybrid primary care/ family planning clinics

Primary Outcome: HIV test completion within 90 days of STI

Statistical methods: Mixed effects logistic regression accounting for clustering by patient

Policy relevance: CDC recommends testing for HIV in the presence of any new STI.

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MULTILEVEL MODELING APPROACH

Patient Factors

- Age

- Sex

- Race

- Ethnicity

- Prior STI

- Multipathogen infection

- Insurance

- Receipt of primary care

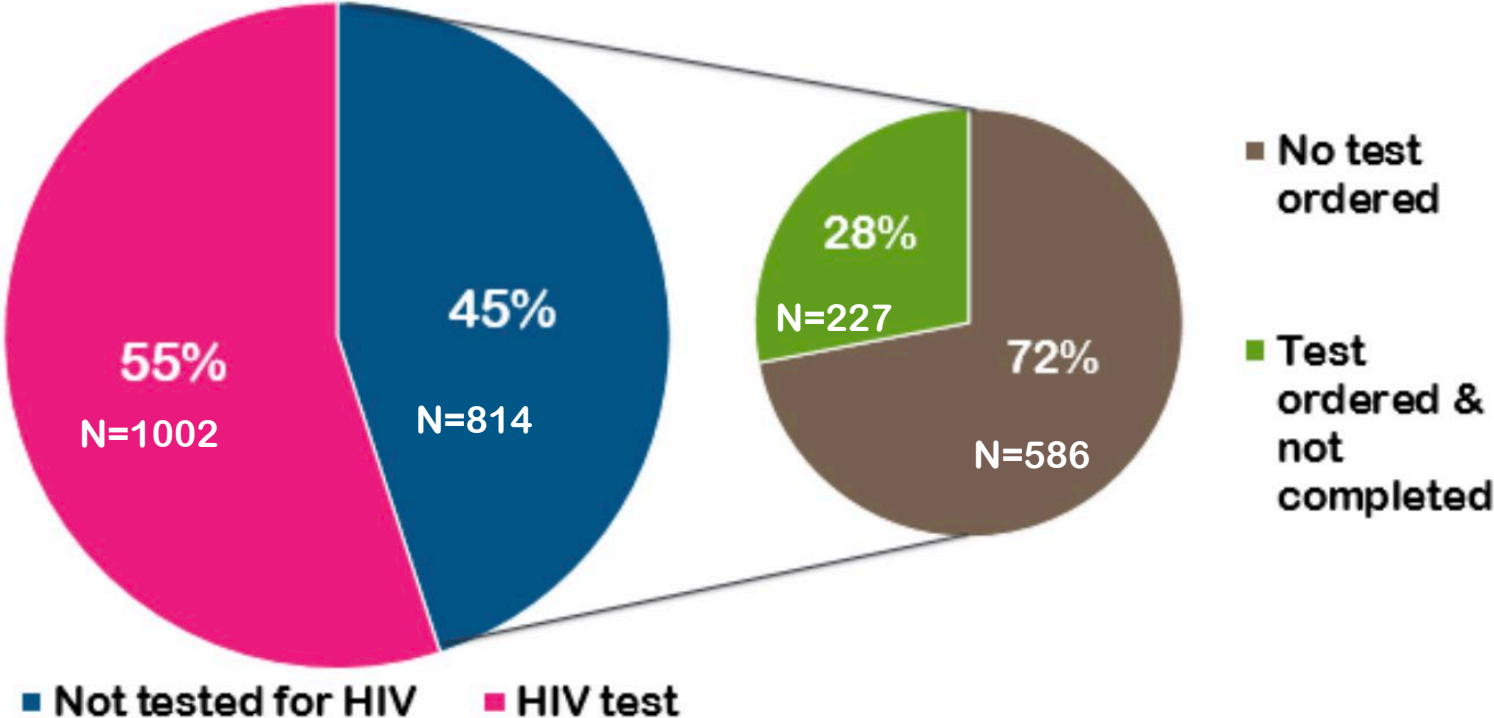## Clinician Factors

- Role

- Years in practice

Clinic Factors

- Clinic size

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WE ARE MISSING THE MARK…

Figure 2. HIV Testing within 90 days of STI diagnosis   N=1816

- Not tested for HIV: 45% N=814
- HIV test: 55% N=1002
- No test ordered: 72% N=586
- Test ordered & not completed: 28% N=227

Characteristic	aOR (95% Confidence Interval)
Multiple STIs at diagnosis	1.40 (0.98 – 2.00)
Prior STI history	0.60 (0.48 – 0.75)
Age	
13	
18-24 years-old	0.93 (0.76 – 1.15)
Fema	
Provider Type	
C	
General Pediatrician	1.36 (1.06 – 1.74)
Adolescent Medicine	1.73 (1.34 – 2.23)
General Pediatric	1 (1.53 – 4.13)
No insurance	0.43 (0.21 – 0.90)
Family planning	0.60 (0.43 – 0.83)
Primary care patient	1.40 (1.01 – 1.92)

[1] Certified registered nurse practitioner

Where are our race & ethnicity coefficients?

How does neighborhood influence these coefficients?

What about gender identity?

Sexual orientation?

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GETTING TO RACE AND BIAS→ DOES CHLAMYDIA SCREENING VARY BY PATIENT RACE?

From **July 2015** to **November 2019**

37,817 female 15-19-year-olds

were seen for **68,935** well visits

Across the **CHOP Primary Care** network

11.6% were screened for **Chlamydia** at these visits
n=7,820 tests

Annual **Chlamydia** screening rate across the clinics was **5.5%** (0-39%)

12.9% of tests were positive

MULTILEVEL MODELING APPROACH

Patient Factors

- Age
- Sex
- Race
- Ethnicity
- Prior STI
- Insurance

Clinician Factors

- Role
- Years in practice
- Proportion of Black patients in practice

Clinic Factors

- Clinic size
- Presence of Title X funding
- Proportion of Adolescent patients served
- Proportion of Black patients

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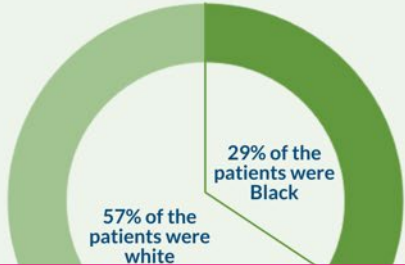# IMPLICIT BIAS IMPACTS CHLAMYDIA SCREENING TOO.,..

37,817

31,750

never got tested in a preventive visit year

6,067

got tested in a preventive visit year

29% of the patients were Black

57% of the patients were white

Accounting for all factors, individual clinicians were 88% more likely to screen their Black, compared to white, patients (aOR: 1.88, 95% CI: 1.65-2.15)

66% of the **Black** patients were screened
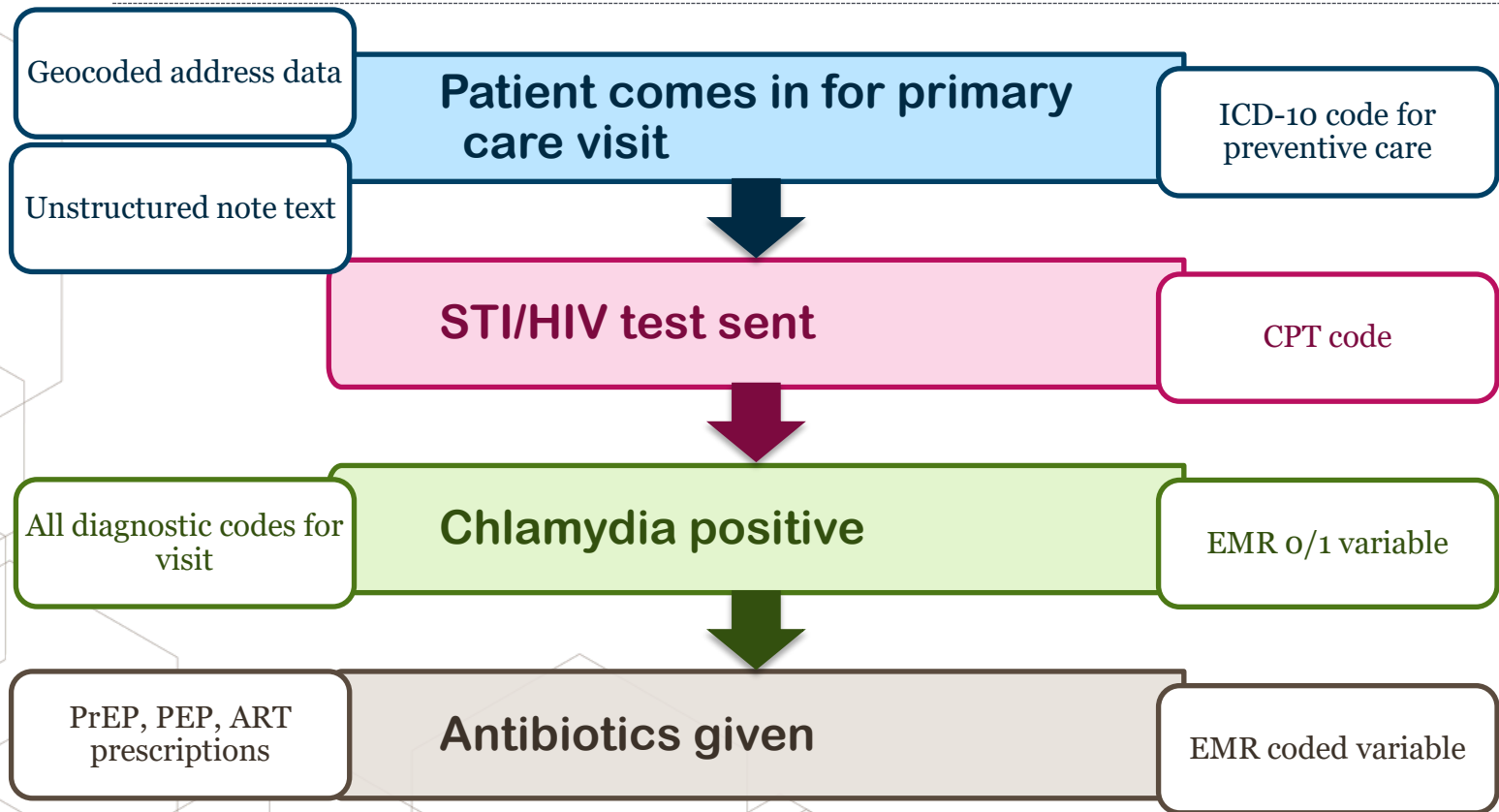VS
24% of the **white** patients

We don't screen for STIs OR HIV equitably

Our biases are a driver of inequities

We are underscreening EVERYONE

No quality PrEP delivery until we address quality and equity in HIV screening

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BUILDING A COMP SCIENCE SYSTEM: STILAB

Geocoded address data

Unstructured note text

Patient comes in for primary care visit

ICD-10 code for preventive care

STI/HIV test sent

CPT code

All diagnostic codes for visit

Chlamydia positive

EMR 0/1 variable

PrEP, PEP, ART prescriptions

Antibiotics given

EMR coded variable

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USING IMPLEMENTATION SCIENCE TO MOVE FROM MULTI-LEVEL DATA TO INTERVENTION DEVELOPMENT

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WHAT IS IMPLEMENTATION SCIENCE

Multi-disciplinary field seeking **generalizable knowledge** about the behavior of stakeholders, organizations, communities, and individuals in order to **understand the magnitude, reasons for** and **strategies** to **close the gap** between evidence and routine practice for health in real world contexts

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KEY TERMS IN IMPLEMENTATION RESEARCH

Intervention: What is the evidence-based practice we are trying to implement (aka THE THING)?

Determinants: What factors influence implementation of the THING?

Implementation Strategies: Which efforts and approaches that can support or otherwise enhance delivery of THE THING?

Outcomes: How do we know what we did worked?

- Implementation

- Service

- Patient

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We don't screen for STIs OR HIV equitably

Our biases are a driver of inequities

We are underscreening EVERYONE

How do we improve HIV screening in primary care to engender PrEP delivery?
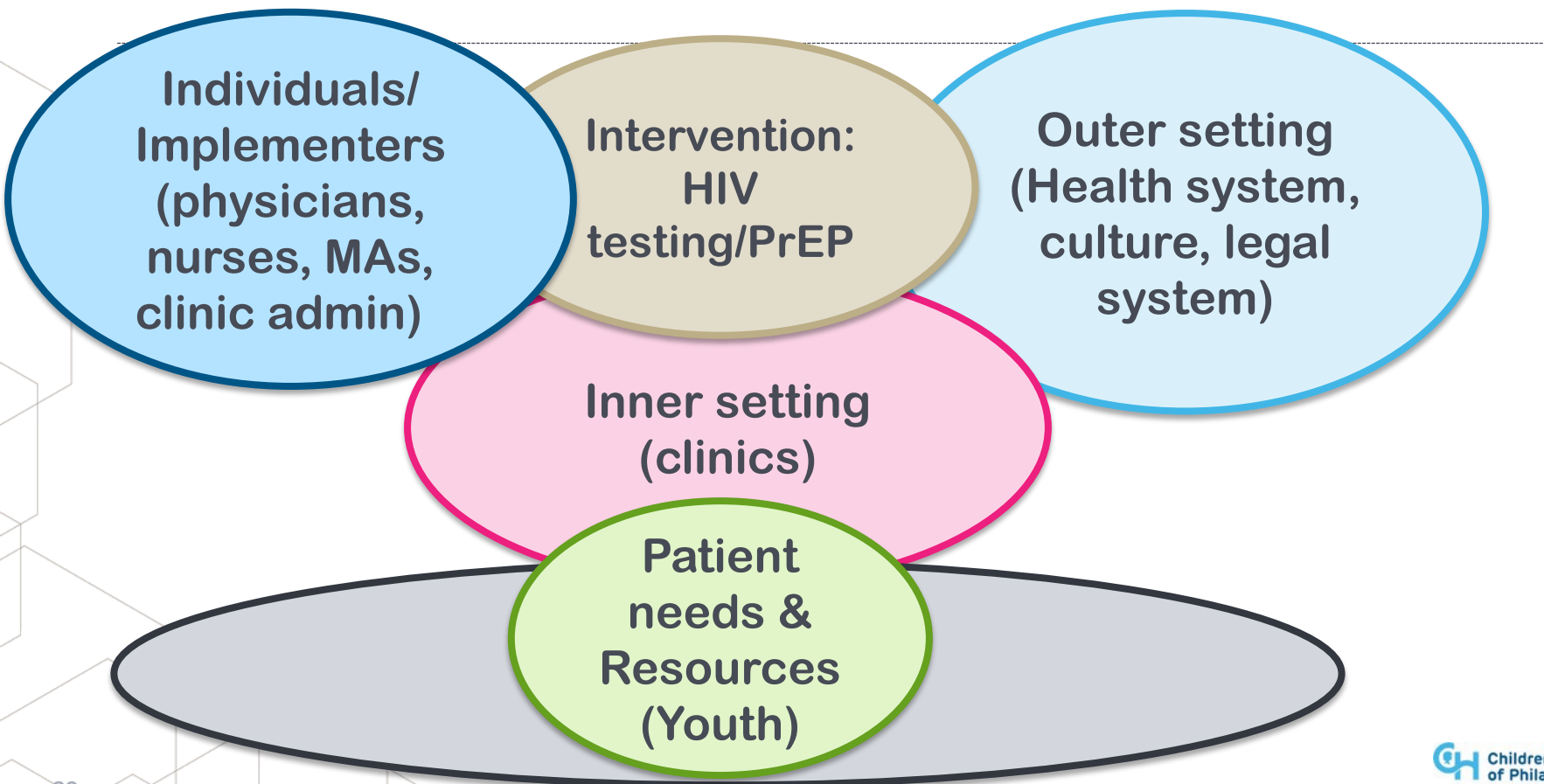
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Behavioral economics and human systems engineering:

- Designing practice environments to influence medical decision-making

- Steer decision-making towards evidence-based care

- Override unconscious bias

CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH

Individuals/ Implementers (physicians, nurses, MAs, clinic admin)

Intervention: HIV testing/PrEP

Outer setting (Health system, culture, legal system)

Inner setting (clinics)

Patient needs & Resources (Youth)

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IDEAL: IDENTIFYING EHR STRATEGIES FOR ADOLESCENT LINKAGE

Aim: To understand contextual barriers and facilitators of **clinical decision support** as an implementation strategy to improve HIV prevention service delivery to youth with STIs

Design: Cross-sectional multimethod (QUAL+quan)

Participants: Pediatric PCPs (MDs and NPs) (n=26)

Setting: n=4 Philly-based primary care clinics

STUDY PROCEDURES

- **Survey** measures

- **Work domain** analysis

  - Cognitive walkthrough of a process and identification of steps of work and who leads them

- **Semi-structured interview** grounded in the CFIR

- Analysis: Inductive CFIR-based coding approach to analyze contextual barriers and facilitators of PrEP delivery using a constant comparison process

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CLINICIAN PERSPECTIVES ON USING CDS TO HIV PREVENTION SERVICES

CDS Characteristics

- Standardization
- Adaptability to patient needs
- Workflow
- Usability

Consolidated Framework of Implementation Research

Outer Setting

- Minor confidentiality
- Private insurance risks to confidentiality
- Structural racism, sexism, homophobia

Clinician/Staff Characteristics

- HIV testing/PrEP knowledge
- Self efficacy w/ sexual history
- High mental workload
- Implicit bias

Inner Setting

- Resource availability
- Staffing structure
- Clinic culture
- Relative priority
- Parent presence

Patient Needs

"they don't think they are at risk"

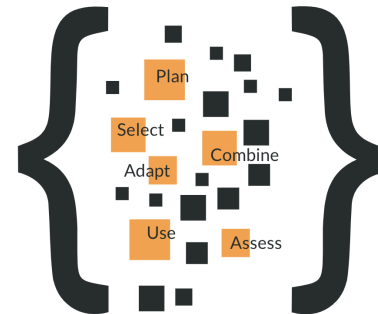# BUILDING IMPLEMENTATION RESEARCH LOGIC MODELS (IRLM)

- Draws from frameworks/models and theories of Implementation Research

- Describes complex relationships between elements of research and practice

- Allows reproducibility of research and practice

- Allows testing of theories of behavior change

- Tool for planning, executing, reporting, and synthesizing processes and findings

- Creates a roadmap for implementing teams

Helping Navigate Dissemination and Implementation Models

The D&I Models Webtool is an interactive, online resource designed to help researchers and practitioners navigate D&I theories, models, and frameworks (TMFs) through planning, selecting, combining, adapting, using, and linking to measures.

Access The D&I Models Webtool Here!

Smith, J.D., Li, D.H. & Rafferty, M.R. The Implementation Research Logic Model: a met planning, executing, reporting, and synthesizing implementation projects. Implementation *Sci* **15**, 84 (2020).

Implementation Research Logic Model

Clinical Evidence Based Practices

THE THING

Determinants	Implementation Strategies	Strategy Mechanisms	Implementation Outcomes
What factors influence implementation of the thing?	**How can we enhance implementation of the THING ?**	**How does the approach move the needle?**	**How do we know if our strategies are successful?**

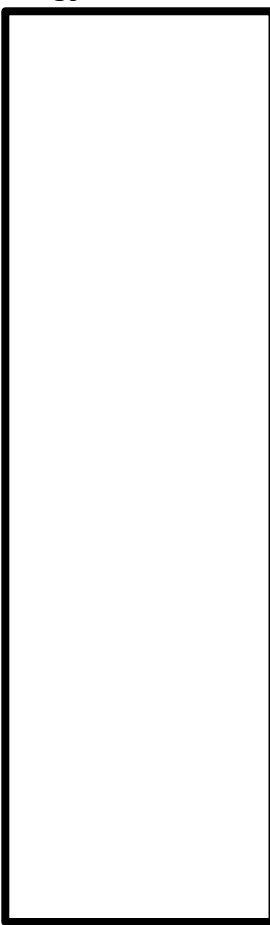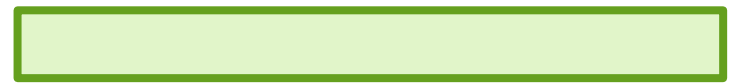# Implementation Logic Model: Comprehensive HIV Prevention Services in Adolescents With STIs

Determinants

Intervention Characteristics
- Standardization
- Adaptability to patient risk
- Timing in workflow
- Trialability

Outer Setting
- Minor confidentiality laws
- Private insurance risks to confidentiality
- Parent beliefs

Inner Setting
- Resource availability
- Staffing structure
- Clinic culture
- Relative priority
- Parent presence during visits

Characteristics of Individuals
- HIV prevention knowledge
- Self efficacy
- Implicit bias
- High mental workload
- Provider burnout

Patient Needs
- Stigma free spaces
- Right information/right time
- Ongoing relationships and communication
- Low threshold care
- Confidentiality
- Prompt result delivery
- Partner services

Clinical Evidence Based Practices

HIV testing + PrEP

Implementation Strategies

Strategy Mechanisms

Outcomes

Implementation
- Acceptability
- Feasibility
- **Equitable reach**

Service
- Guideline adherence
- Equitable delivery

Patient
- HIV testing
- PrEP counseling
- PrEP prescription

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IMPLEMENTATION STRATEGIES: NAME IT, DEFINE IT, SPECIFY IT

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TASK #1 NAME IT: ERIC TAXONOMY

Engage consumers	**Remind clinicians**	**Utilize financial strategies**
Adapt and tailor to the context	**Develop stakeholder interrelationships**	**Change infrastructure**
Use evaluative and interactive strategies	**Provide interactive assistance**	**Train and educate stakeholders**

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Implementation Logic Model: Comprehensive HIV Prevention Services in Adolescents With STIs

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Clinical Evidence Based Practices

HIV testing + PrEP

Implementation Strategies

Engage consumers

Remind clinicians

Use iterative strategies: FAIL FAST!

Strategy Mechanisms

Outcomes

Implementation
- Acceptability
- Feasibility
- Usability
- **Equitable reach**

Service
- Guideline adherence
- Equitable delivery of services

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Strategy 1: Engage Consumers: The Adolescent Health Questionnaire

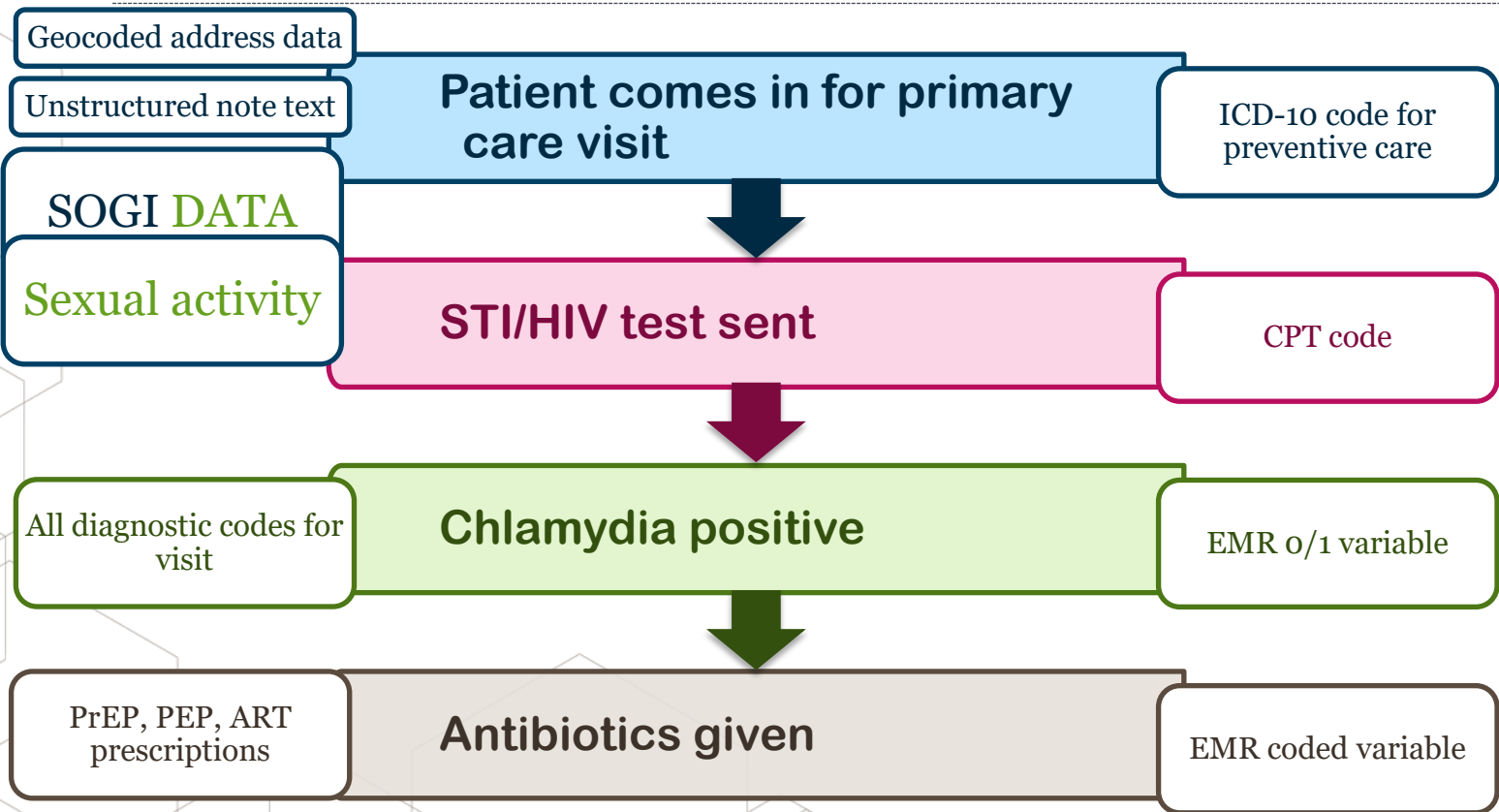**Children's Hospital of Philadelphia®**
Possibilities Project

Electronic self-screener filled out by teen before visit
- **Sexual orientation**
- **Gender identity**
- **Sexual history**
- **PrEP interest**
- **STI/HIV screening interest**
- **Drugs/EtOH/Tobacco**
- **Guns in home**

BUILDING A COMP SCIENCE SYSTEM: STILAB

Geocoded address data

Unstructured note text

SOGI DATA

Sexual activity

All diagnostic codes for visit

PrEP, PEP, ART prescriptions

Patient comes in for primary care visit

STI/HIV test sent

Chlamydia positive

Antibiotics given

ICD-10 code for preventive care

CPT code

EMR 0/1 variable

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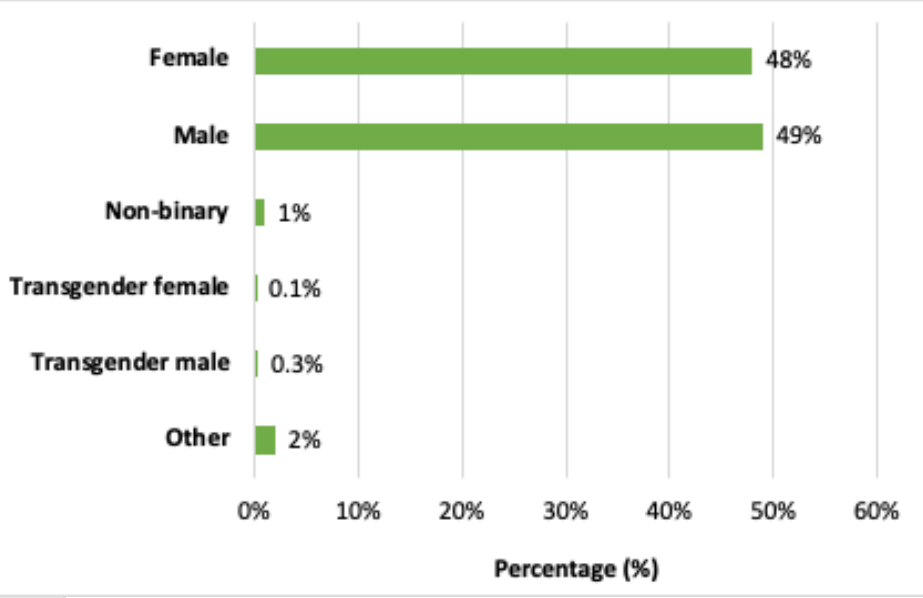PolicyLab

TRACKING SGM DATA TO IMPROVE QUALITY SERVICE DELIVERY

Sexual Orientation
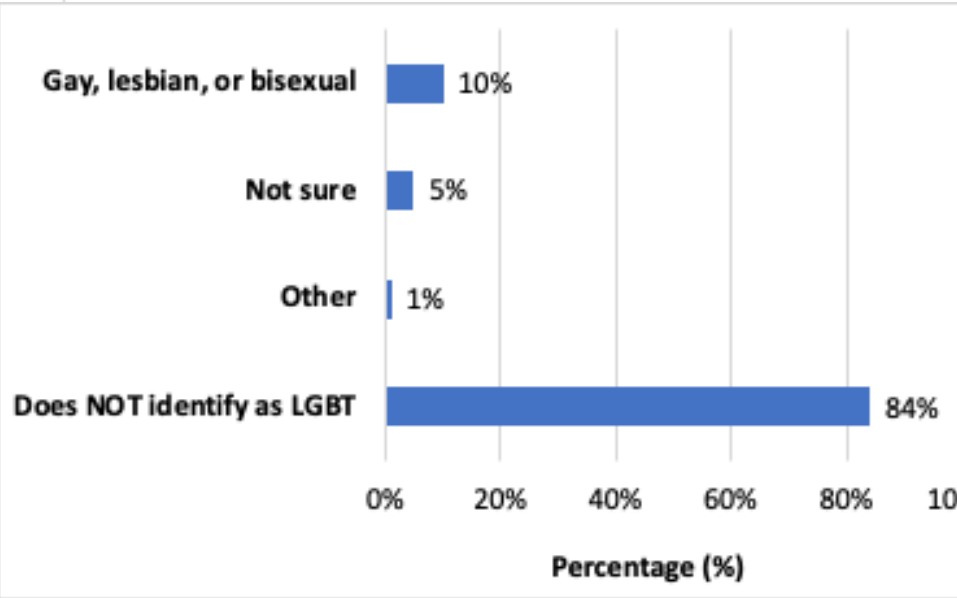
>12,000 LGBQ youth

Gender Identity

>1200 Trans/nonbinary youth

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STRATEGY 2: REMIND CLINICIANS

Advisory (1)

⚠️

Additional testing is recommended per AAP and CDC guidelines.

CT/GC: Yearly testing for all teens.

HIV and Syphilis: At least once for all teens. Repeat testing with new partners or in presence of STIs.

If not ordering labs, Acknowledgement Reason is required.

Order	Do Not Order	🏠 C.Trachomatis/N.Gonorrhoeae
Order	Do Not Order	🏠 HIV Antigen/Antibody
Order	Do Not Order	🏠 RPR Qualitative w/Rflx Titer

↗ Previous Lab Results

↗ Adolescent Health Questionnaire responses

↗ CDC Guidelines

Acknowledge Reason

Confidentiality concerns	Patient declines testing	Parent/Guardian declines testing	Test supplies not available
Test recently completed	Other: see comments		

Click Accept to order/not order tests toggled above

✔ Accept

Actor: The EHR

Action: Reminder to test for HIV/STIs

Temporality: When chart opened at well visit

Dose: Once annually

Target: Clinicians

Implementation Outcomes: Penetration, fidelity, feasibility, usability, EQUITY

Justification:

Need to simplify workflows, reduce cognitive burden, override bias.

Usability testing

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Implementation Logic Model: Comprehensive HIV Prevention Services in Adolescents With STIs

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- Prompt result delivery
- Partner services

Clinical Evidence Based Practices

HIV testing + PrEP

CDS Implementation Strategies

Engage consumers

Remind clinicians

Use iterative strategies: FAIL FAST!

Strategy Mechanisms

Clinician
- Decrease mental workload
- Increase situational awareness
- Reduce information overload
- Decrease bias

Health system
- Standardize prevention care
- Streamline workflows
- Youth-friendly design

Patient
- Improve HIV testing & PrEP awareness
- Increase access to care

Outcomes

Implementation
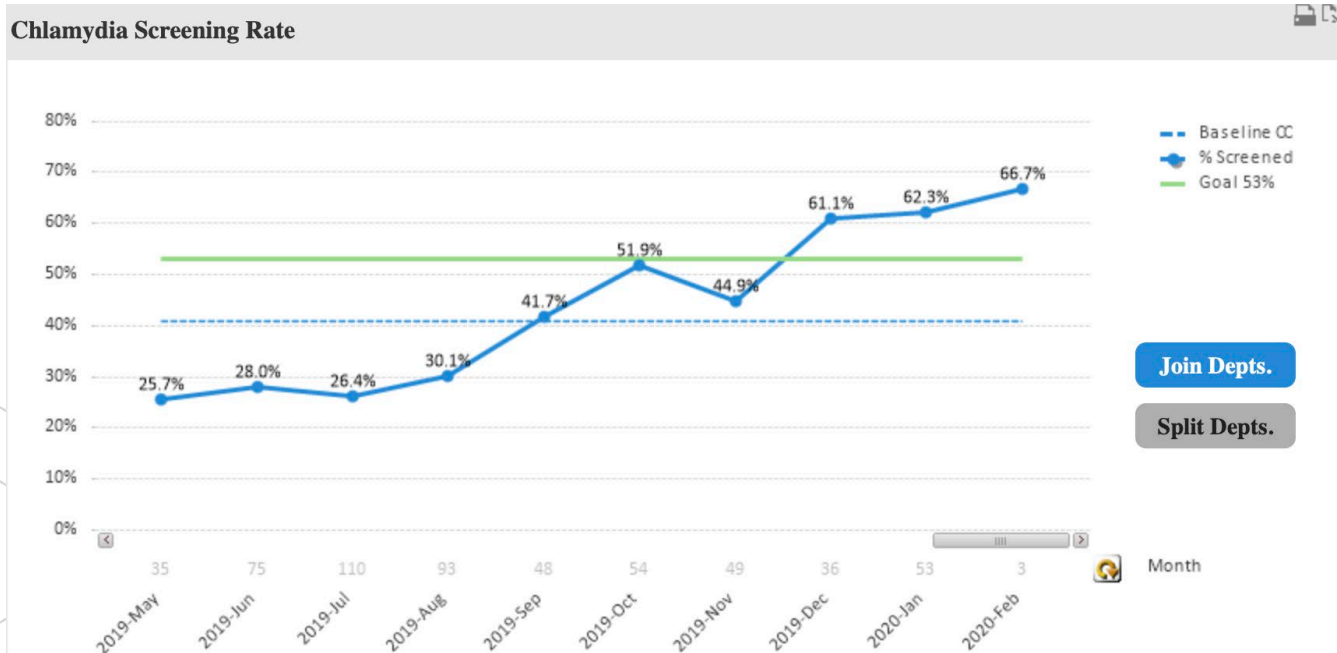- Acceptability
- Feasibility
- Appropriateness
- Usability
- Equitable reach

Service
- Guideline adherence
- Equitable delivery of services

Patient
- HIV testing
- PrEP counseling
- PrEP prescription

CFIR   ERIC   Proctor

SUCCEED FAST!!!!

BUT FAIL FASTER!!!!

Chlamydia Screening Rate

WILL IT WORK? TYPE I HYBRID PILOT???

Patient outcomes:
- **HIV testing**
- **PrEP counseling**
- **PrEP prescription**

Service outcomes:
- **Equity**
- **Patient-centeredness**

Well visit

Baseline AHQ

Randomize at practice level

Usual Care

CDS
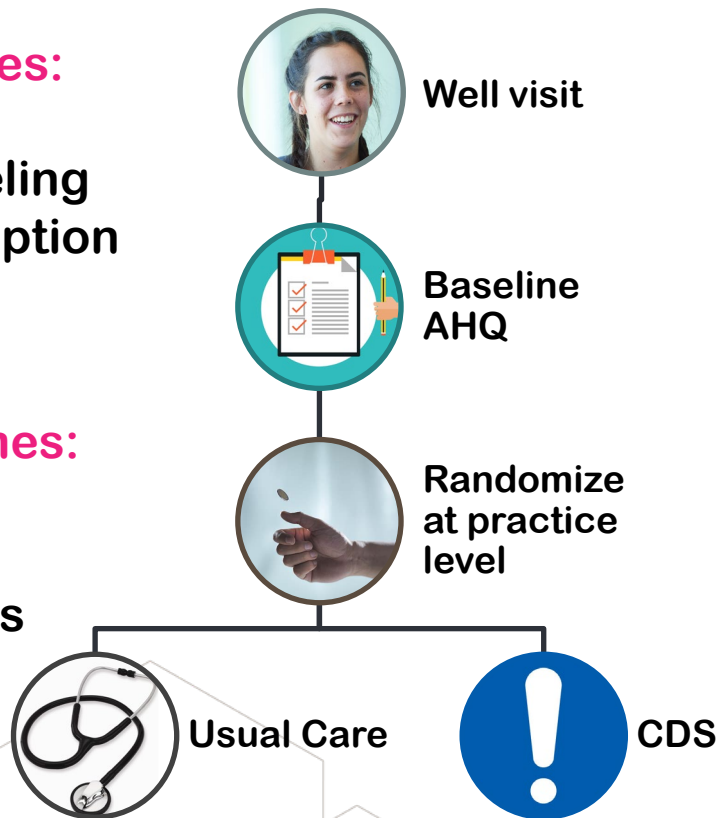
Implementation outcomes:
- **Penetration**
- **Acceptability**
- **Fidelity**
- **Reach**
- **Usability**

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WRAPPING UP: SOME KEY CONSIDERATIONS…

🖉 Editing existing Project Title **K23 Health Coaching to Improve Comprehensive HIV and Sexually Transmitted Infection Prevention.** (Instance #1)

Project Title	K23 Health Coaching to Improve Comprehensive HIV and Sexually Transmitted Infection Prevention
Implementation Strategy * must provide value	⊙ Use evaluative and iterative strategies ○ Provide interactive assistance ○ Adapt and tailor to context ○ Develop stakeholder interrelationships ○ Train and educate stakeholders 🔘 Support clinicians ○ Engage consumers ○ Utilize financial strategies ○ Change infrastructure reset
Type of Strategy (check all that apply)	☐ Create new clinical teams ☐ Develop resource sharing agreements ☑ Facilitate relay of clinical data to providers ☑ Remind clinicians ☐ Revise professional roles
Action Use verb statements to specify the discrete observable behaviors enacted that encompass the implementation strategy.	Send reminders to clinical teams for 1) STI screening, 2) need for repeat testing, 3) positivity rates Expand
Actor The individual(s) who perform(s)/enact(s) the Action(s).	PI/REsearch coordinator Expand
Context The physical location, emotional context, or social setting in which an action is performed.	Research to clinic interface

STEP 4: Document it!!!

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THINK ABOUT ANALYSIS IN THE DESIGN PHASE!

Hybrid designs: How early is too early?

Quasi experimental designs

- **Difference in differences**

- **Interrupted time series**

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KEY TAKEAWAYS

- **Don't accept the data you have, build the data you need**

- **You may need more than one IRLM—does each strategy need its own?**

- **Think about analysis early and often**

- **Innovations to remediate bias and reduce inequities should focus on the provider, clinic, health system levels and not focus only on individual youth behavior.**

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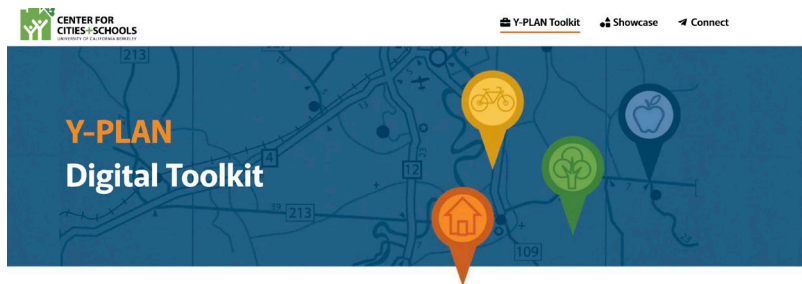PolicyLab

TOOLS

https://dissemination-implementation.org/

MOOC WHO TDR:
https://tdr.who.int/home/our-work/strengthening-research-capacity/implementation-research-training-materials

https://www.fic.nih.gov/About/center-global-health-studies/neuroscience-implementation-toolkit/Pages/default.aspx

Berkeley YPAR Hub

Home   Why YPAR?   Getting Started   Investigating a Problem   Strategizing for Action   Spotlights   About ▾

Youth Participatory Action Research (YPAR) Hub

YPAR is an innovative approach to positive youth and community development based in social justice principles. This hub features expansive curriculum and resources to enrich YPAR projects.

CENTER FOR CITIES+SCHOOLS
UNIVERSITY OF CALIFORNIA BERKELEY

💼 Y-PLAN Toolkit   👥 Showcase   ✈ Connect

Y-PLAN
Digital Toolkit

Y-PLAN (Youth – Plan, Learn, Act Now) is an award-winning, K-12 civic youth engagement strategy developed by UC Berkeley's Center for Cities + Schools (CC+S). It brings young people into the heart of city planning processes, enabling them to tackle real-world challenges in their communities! Learn more about Y-PLAN's history, methodology, and theory of change.

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ACKNOWLEDGEMENTS

CHOP/Penn:

- **The Possibilities Project**
- **The CHOP primary care network**
- **CHOP Youth Advisory Board**
- **PolicyLab**
- **Clinical Futures**
- **PISCE@ LDI**
- **Robert Gross, Alex Fiks, Rinad Beidas, Danielle Petsis, Dovie Watson, Nadia Dowshen**
- **Haley Richardson**
- **Arcus Initiative**

Funders:

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- **Gilead Sciences**
- **Penn CFAR: NIAID (P30 AI045008)**
- **Optum/Leonard Davis Institute of Health Economics (PI: Jenssen)**

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QUESTIONS AND COMMENTS?

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