High Levels of Latent TB Infection, Blood Borne Viruses and Unmet Need among homeless people in London: the TB Reach study

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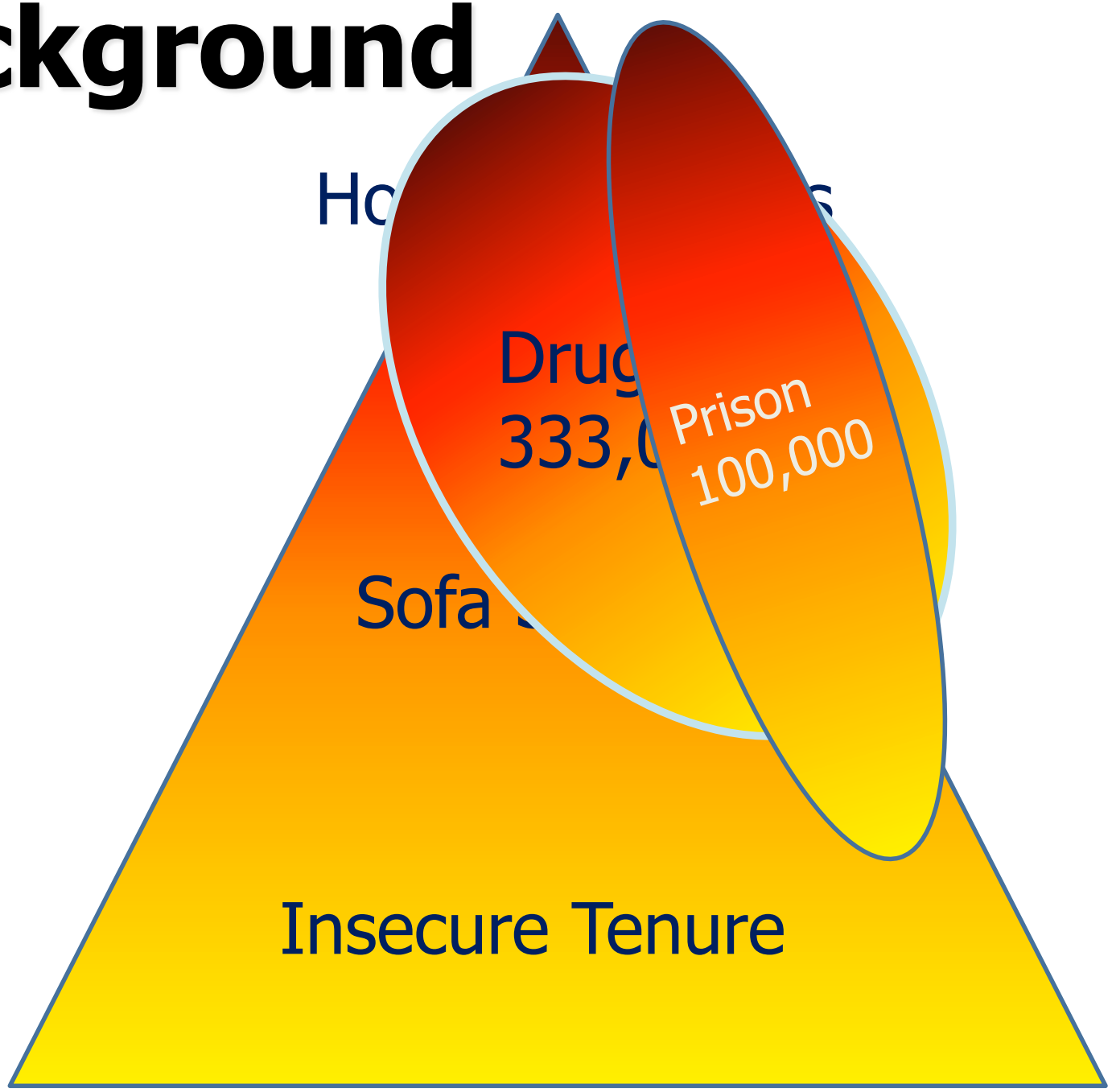
Background



Objectives

To assess among homeless population in London

- Prevalence:
  - Latent TB Infection (LTBI)
  - Infection with blood borne viruses (BBV) - HIV, Hepatitis B & C
  - Co-infection

- Risk factors for infection

Methods

- **Study Design:**
  - Cross-sectional survey
- **Eligible Criteria**:
  - Individuals ≥ 16 years of age screened on the Mobile X-ray Unit for pulmonary TB*
- **Setting:**
  - Homeless hostels, residential and walk-in substance misuse services in London
- **Study Period:**
  - May 2011 – May 2012

*Screening is offered to all regardless of symptoms

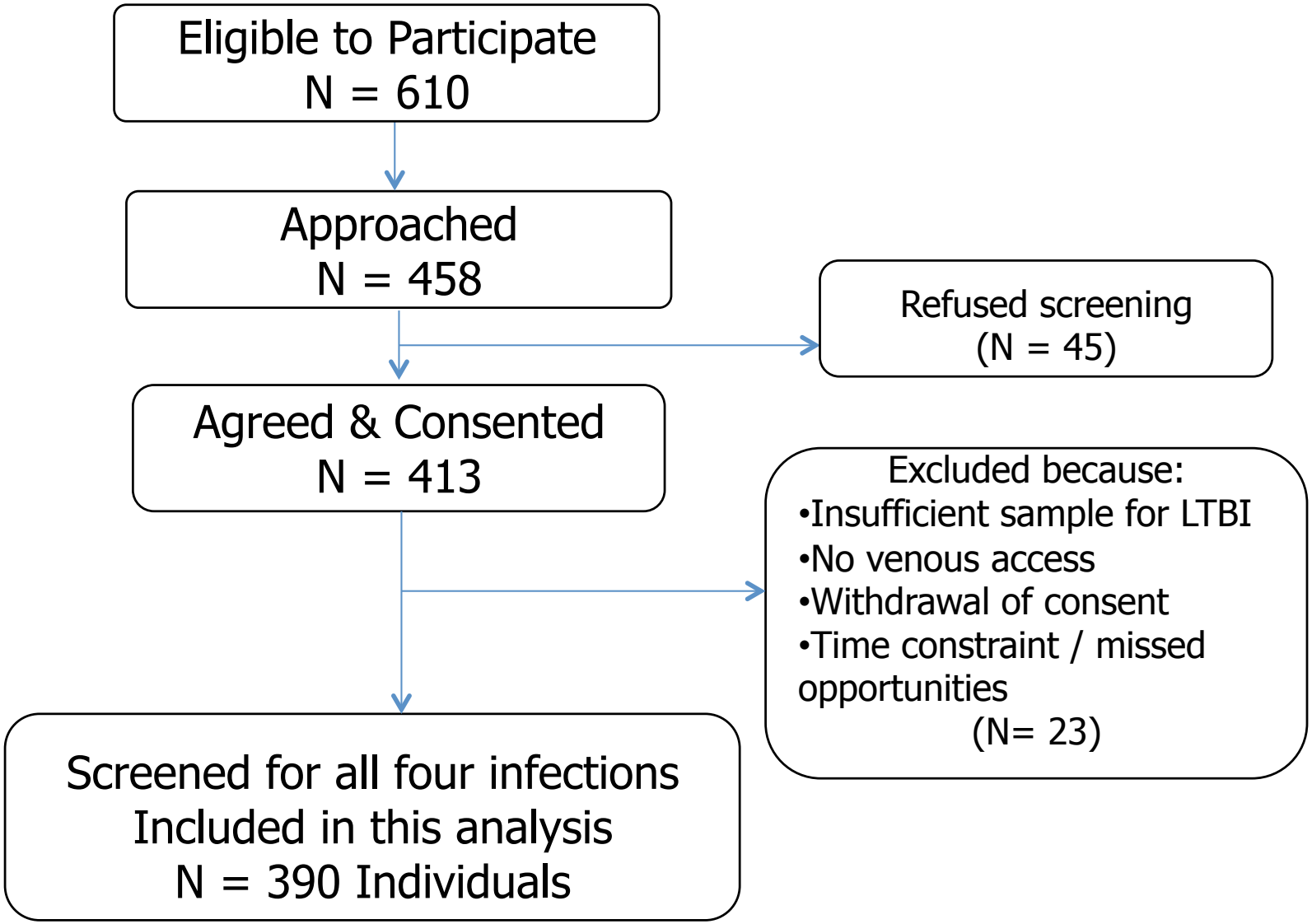
Methods (Contd)

- **Study Procedure**:
  - Written informed consent
  - Questionnaire
  - Blood samples

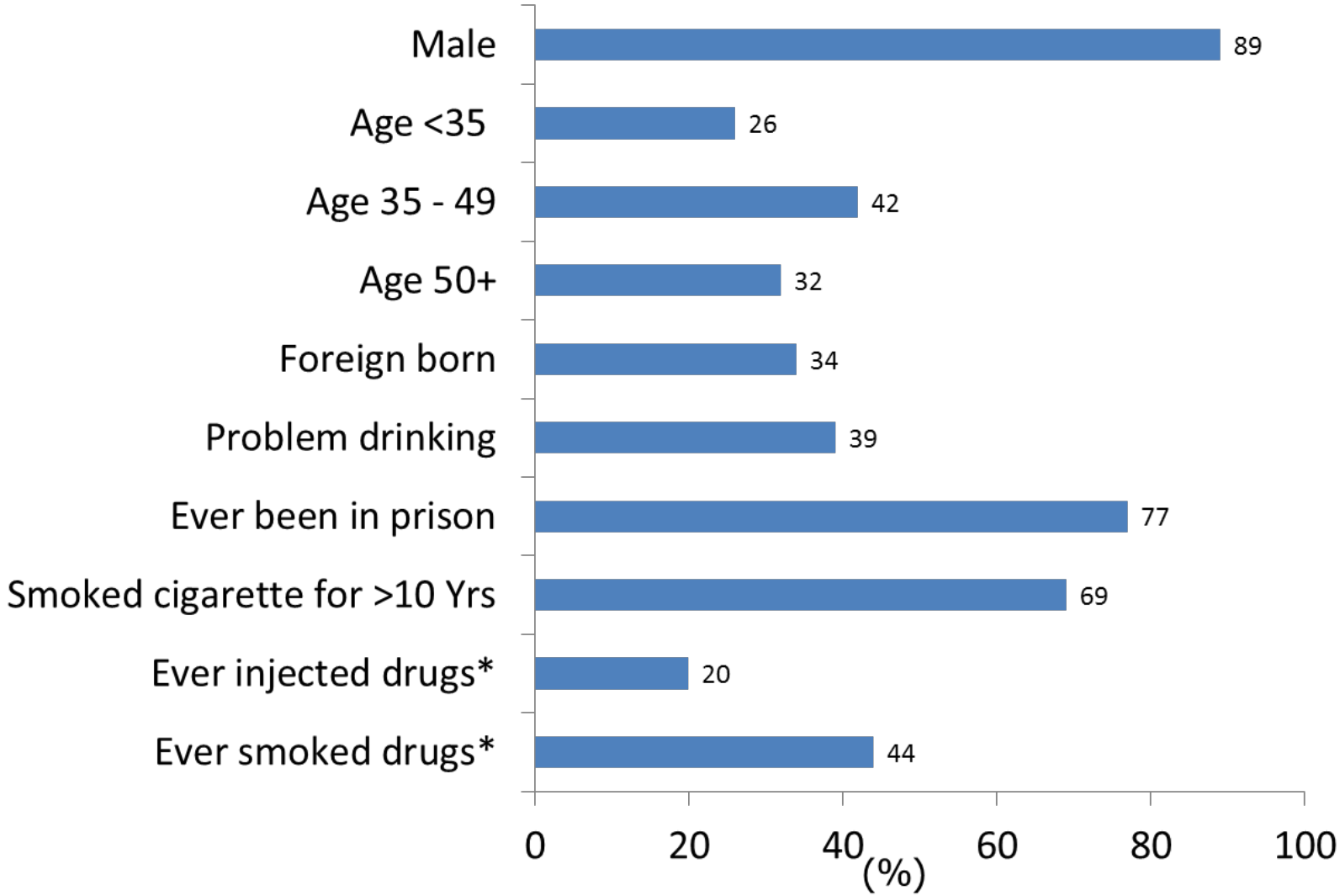
    - LTBI :QuantiFERON-TB Gold In-Tube
    - HIV :HIV 1 & 2 Antibody
    - Hepatitis B :HBsAg, anti-HBs, anti-HBc
    - Hepatitis C :HCV-IgG, HCV-RNA

  - Planned meeting to feedback results
  - Onward referral if needed using pathways consistent with national guidelines

Results

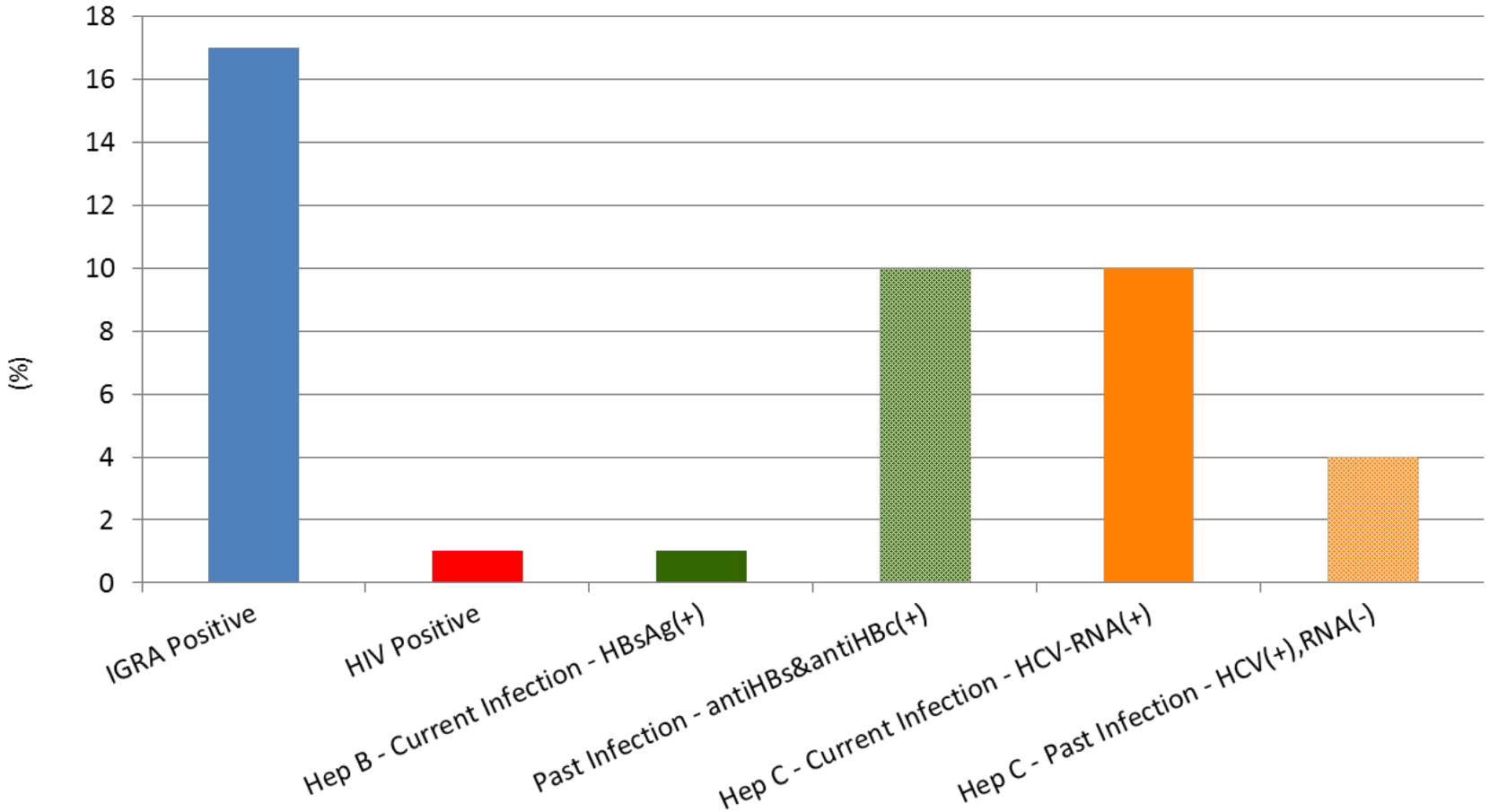

Eligible to Participate
N = 610
Approached
N = 458
Refused screening
(N = 45)
Agreed & Consented
N = 413
Excluded because:
•Insufficient sample for LTBI
•No venous access
•Withdrawal of consent
•Time constraint / missed opportunities
(N= 23)
Screened for all four infections
Included in this analysis
N = 390 Individuals

Characteristics of Homeless Population Surveyed

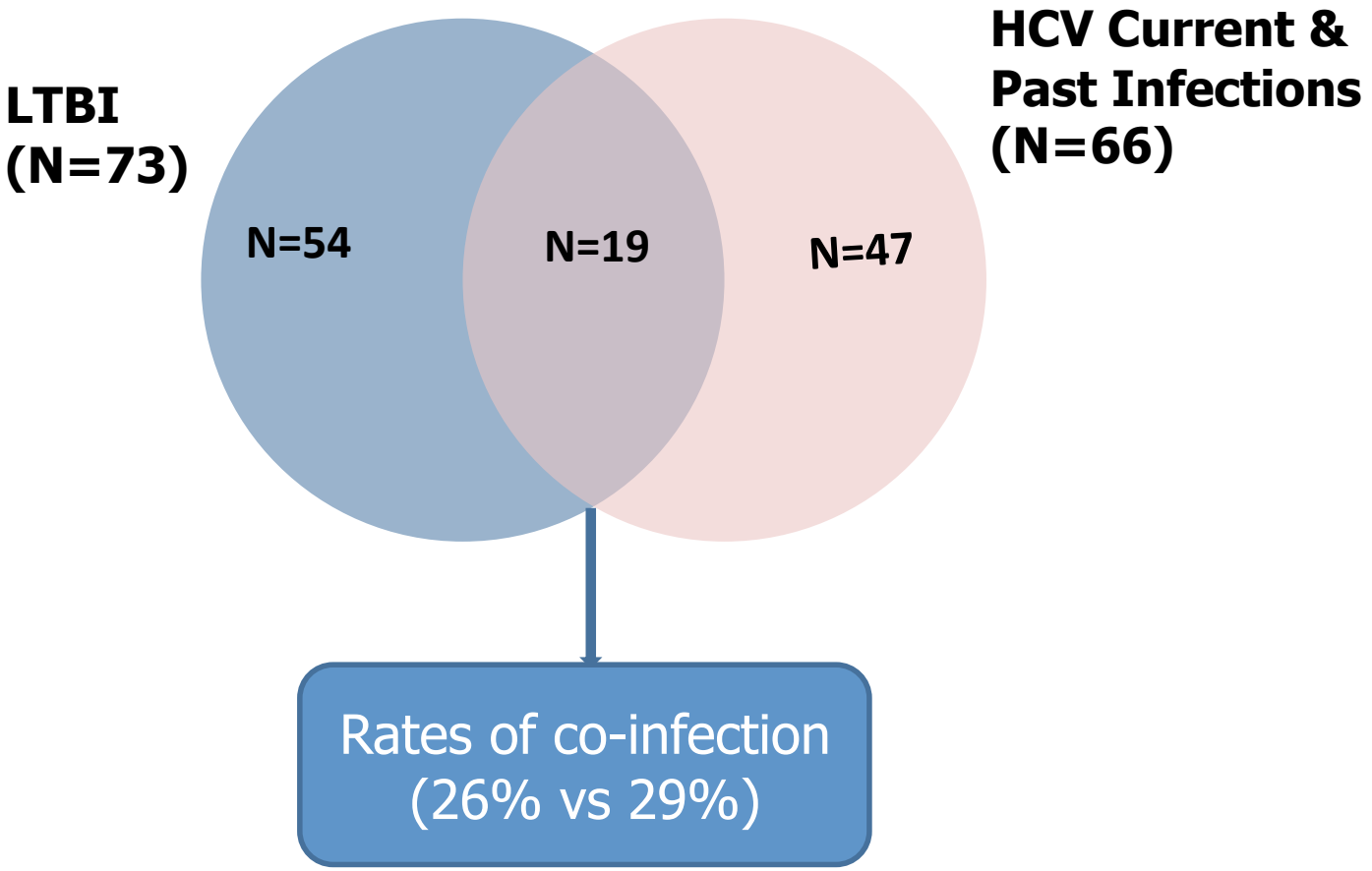


* heroin, crack or cocaine

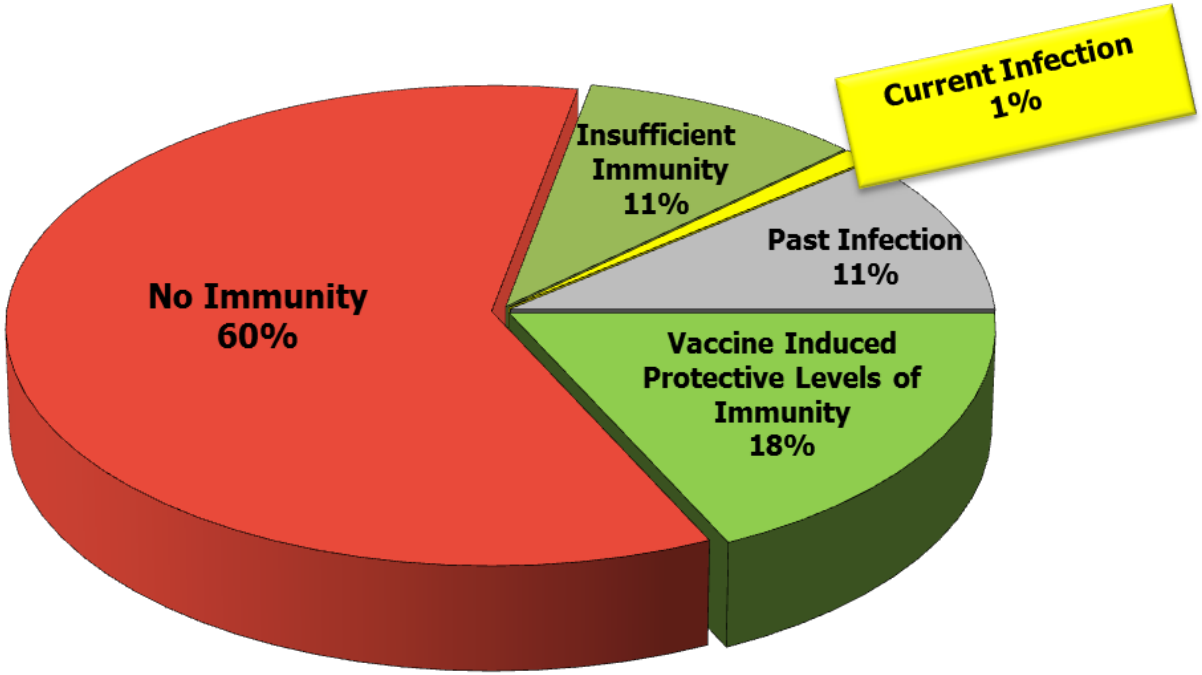
Prevalence of Infection



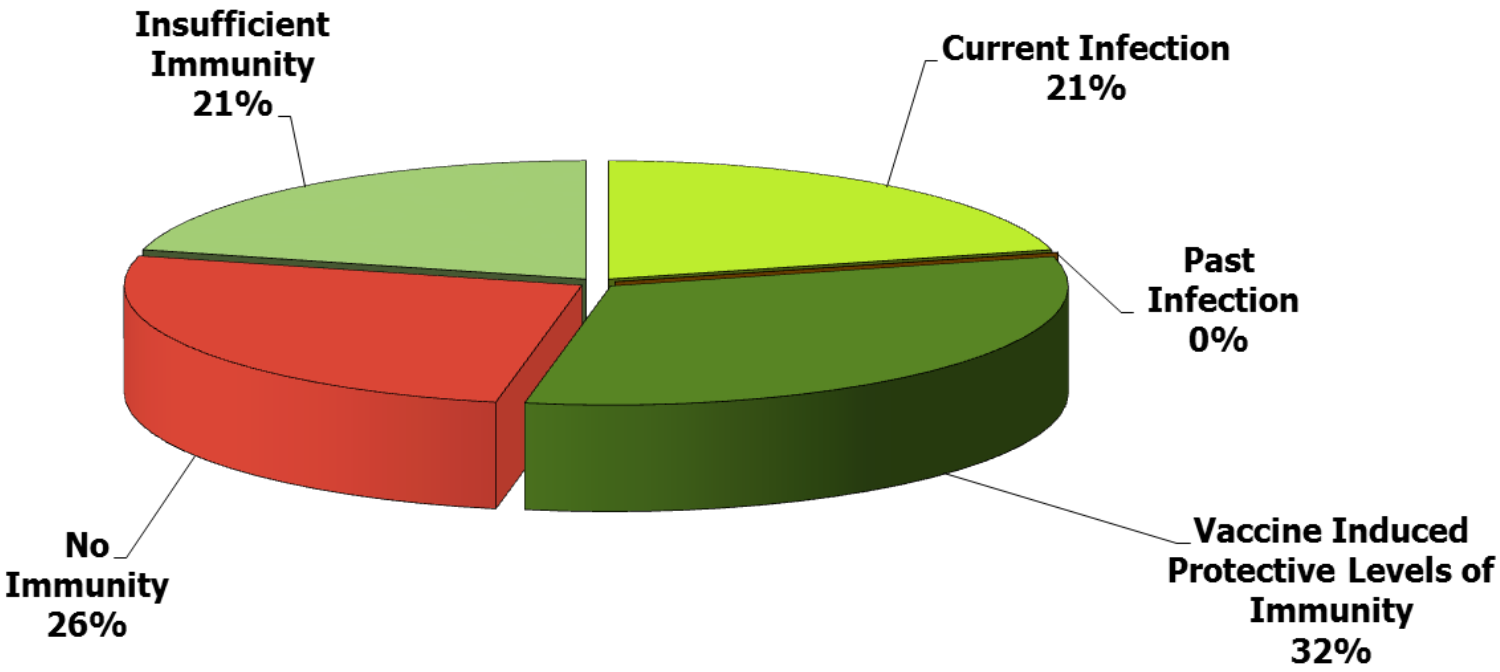
Co-Infections



Hepatitis B Immunity Overall



Hepatitis B Immunity
Injecting Drug Users



Multivariate Analysis of Risk Factors for Infection in Homeless Population

Risk Factor for LTBI	OR	CI_{95}			p-*value*
Increasing age >50 age group	3.49	1.28	-	9.48	0.014
Foreign birth	6.59	3.50	-	12.39	<0.001
Smoking drugs	2.19	1.02	-	4.64	0.042
Injecting drugs	2.36	1.08	-	5.16	0.031
Risk Factor for Hepatitis C	**OR**	**CI_{95}**			**p-*value***
Injecting drugs	19.62	8.23	-	46	<0.001

Summary and Conclusions

- High rates of LTBI & Hepatitis C
  - Overlap between the two infections
  - Both epidemics are driven by drug use
- Comparatively low levels of HIV and Hepatitis B
- Insufficient immunity to Hepatitis B
- Foreign birth is an important risk factor for LTBI, but:
  - 1 in 10 UK-born homeless had LTBI versus 1 in 3 among Non-UK born

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- **Chief Investigator:**
  - John Watson – Health Protection Agency
- **Lead Researcher:**
  - Andrew Hayward – UCL/RFH
- **Co-Investigators:**
  - Alistair Story - Find&Treat
  - Marc Lipman - UCL/RFH
  - Tim McHugh & Rob Shorten - UCL
  - Sue Dart - RFH
  - Ibrahim Abubakar - UCL
- **Core Research Team:**
  - Project Manager – Elizabeth Garber
  - Research Nurses – Sue Yates, Sara Hemming & Gloria Ferenando
  - Research Assistant – Lucia Possas
- **Others:**
  - Laboratory Staff – RFH – Virology & Immunology Lab
  - Find&Treat Staff

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Video Directly Observed Therapy: A novel method for supporting adherence in marginalized populations

Presentation for
Homelessness, Health and Inclusion:
Improving the Health of the Poorest Fastest
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by

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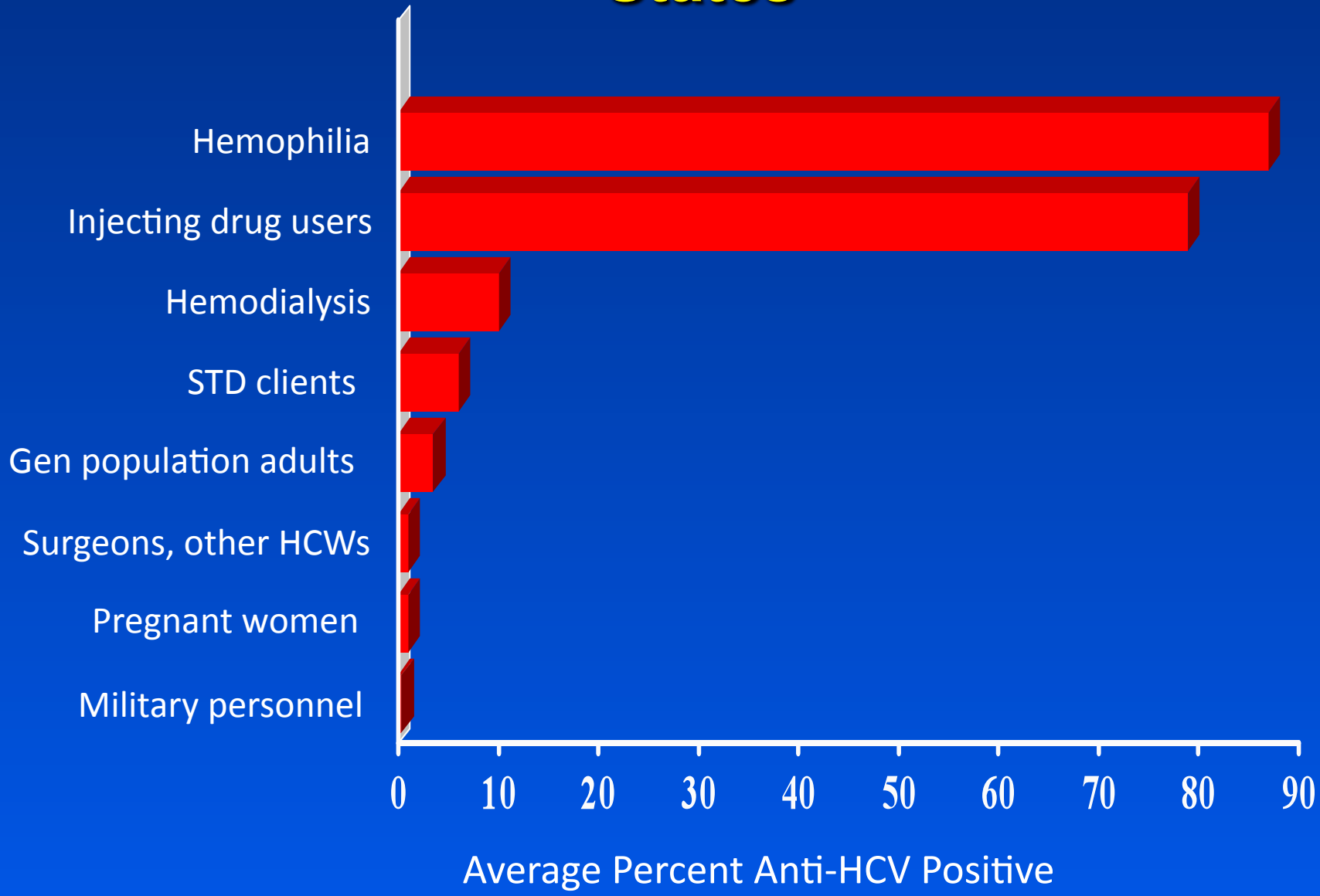
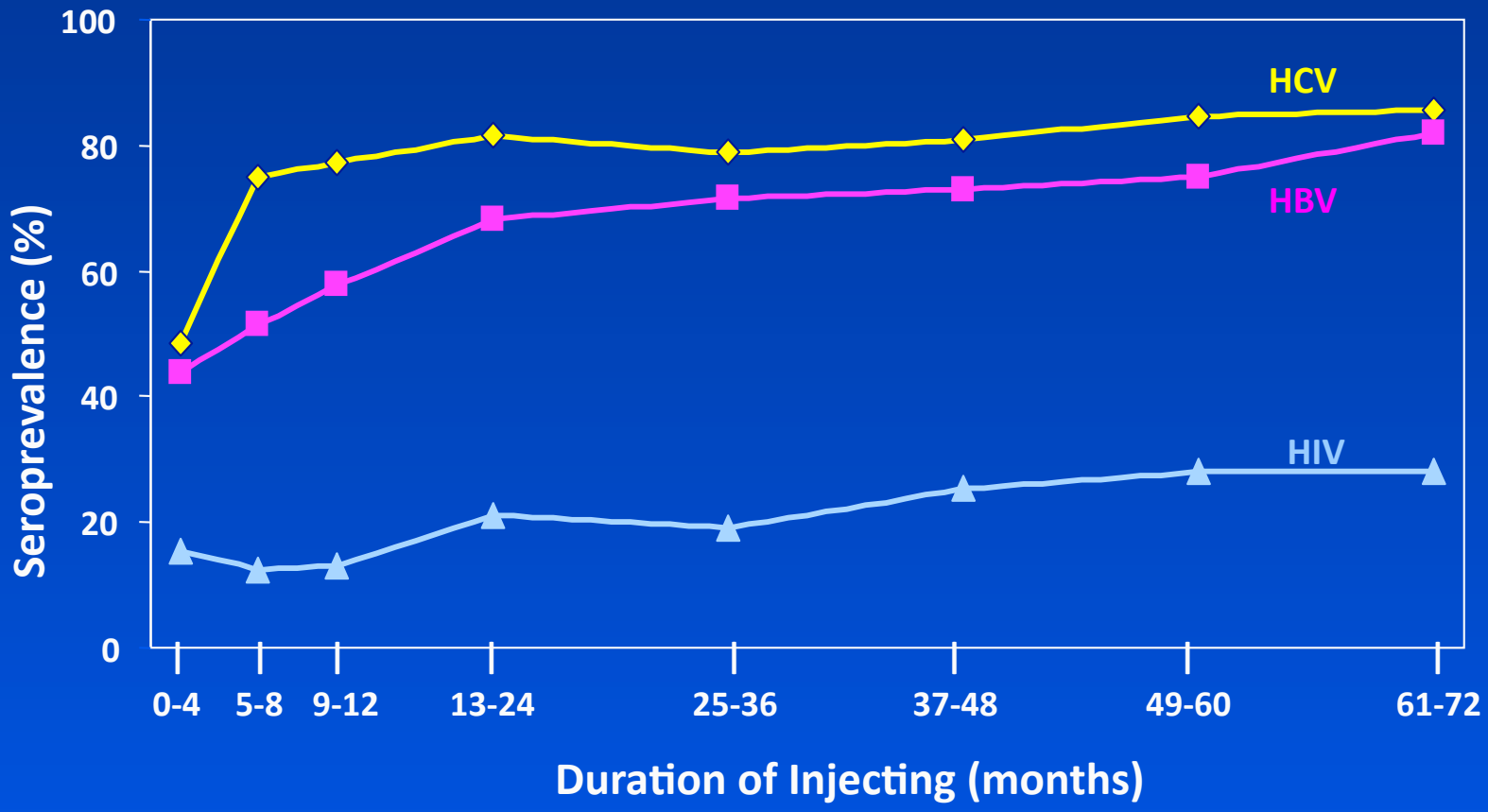
Outline

- Hepatitis C
- Other infections among persons who inject drugs
- Treatment adherence
- Video Directly Observed Therapy for improving adherence in hard-to-reach groups

HCV Prevalence by Selected Groups United States

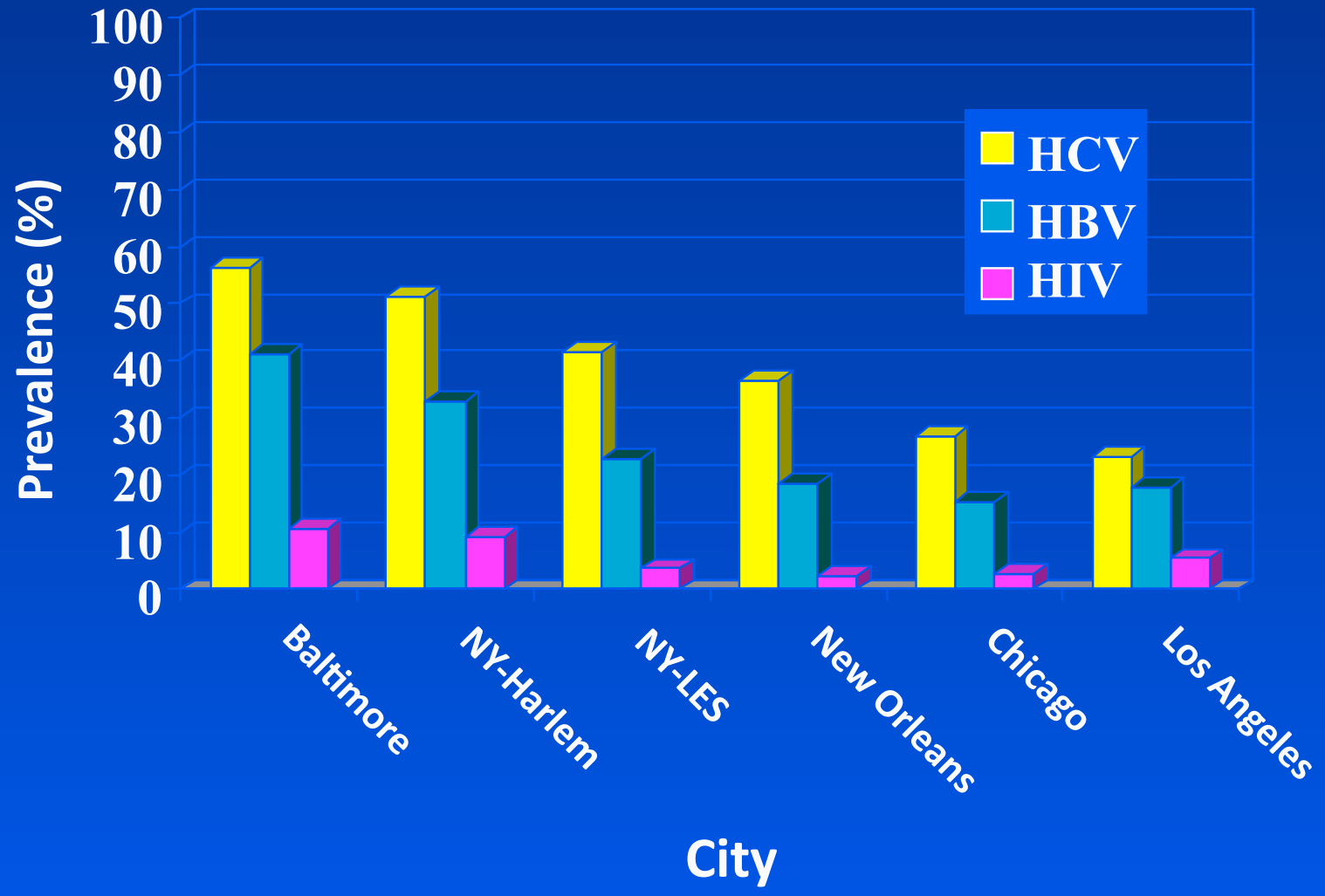


HCV, HBV, and HIV Infection by Duration of Injection Drug use: ALIVE Study, Baltimore, MD 1988-1989



Garfein RS *Am J Public Health* 1996; 86:655.

CIDUS II - HIV, HBV, and HCV Infection among Young Adult IDUs by Study Site, 1997-1999

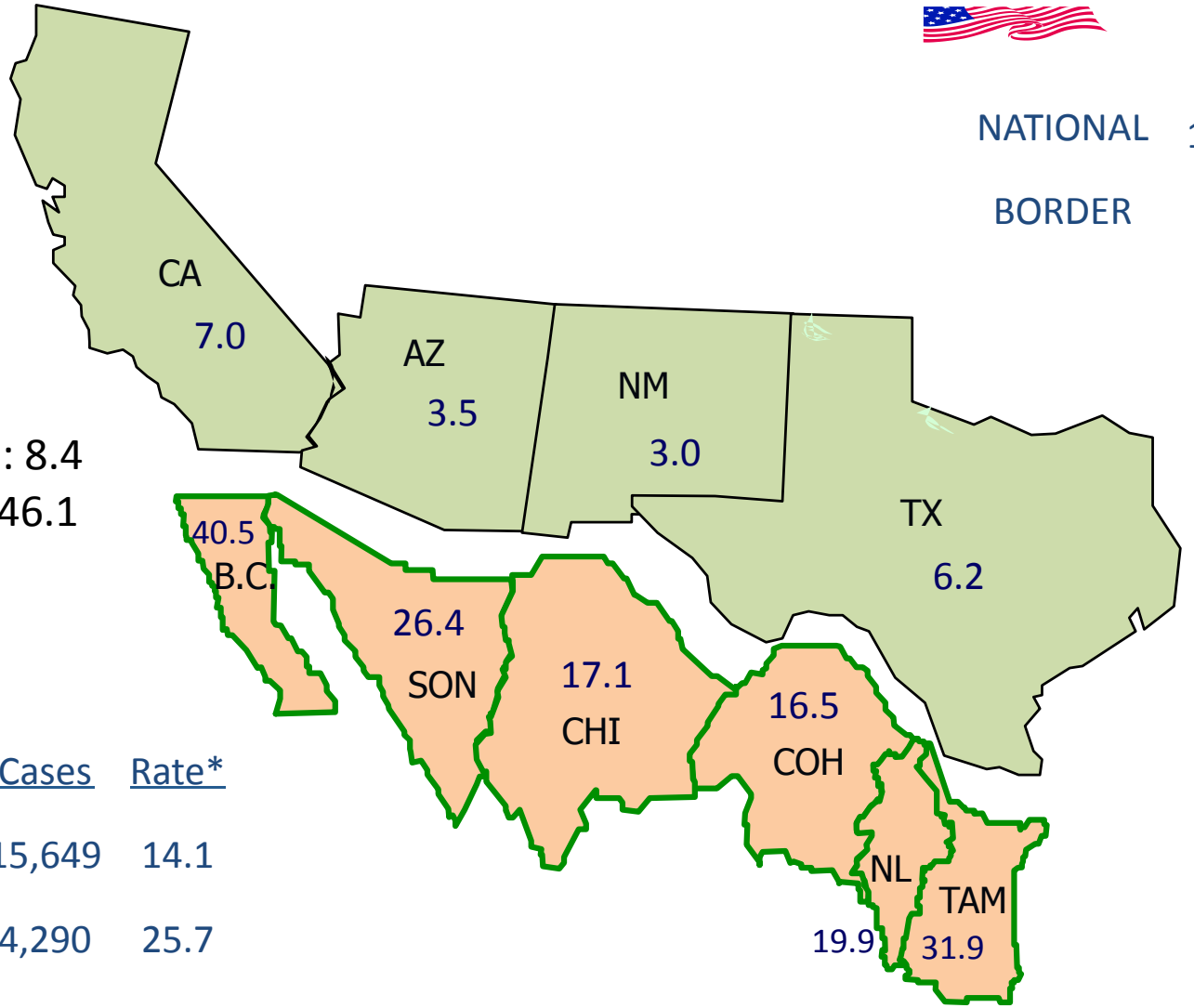


The Study To Assess Hepatitis C Risk, San Diego, CA: 2009-2010

- Cross-sectional design
- Eligibility
  - 18-40 years old
  - injected drugs in the last 6 months
  - current resident of San Diego County
- Behavioral risk assessment
- Serologic testing
  - **HCV+ = 25.4%**
  - **HIV+ = 4.3%**
- STAHR II in progress

Tuberculosis Rates in the US and Mexico

By State



San Diego: 8.4
Tijuana: 46.1

	Cases	Rate*
NATIONAL	13,142	4.2
BORDER	4,180	6.8

	Cases	Rate*
NATIONAL	15,649	14.1
BORDER	4,290	25.7

* Rate = cases per 100,000 population

CDC, 2008; CDPH, 2008; DGEPI Mexico, 2008; INEGI, 2005; SINAVE, 2007.
Adapted from: Schneider E, et al. *Rev Panam Salud Publica*. 2004;16(1):23–34.

TB among Injection Drug Users

- High prevalence of *M. tuberculosis* infection among IDUs (63%), non-IDUs (58%), sex workers (49%), and homeless (53%) in Tijuana, Mexico.
- *M. tuberculosis* infection strongly associated with duration of injection drug use in New York City.
- Injection drug use is a risk factor for TB among HIV+ persons in the U.S. and Canada.

Garfein et al., *Emerg Infect Dis*. 2010;16:757-63
Solomon et al., *Int J Tuberc Lung Dis*. 2000;4:47-54
Sterling et al., *J Infect Dis*. 2011;204:893-901

*Most TB can be cured in 6 months with antibiotics, but **adherence** is critical.*

- Contributors to poor adherence:
  - Long treatment regimens
  - Frequent side effects
  - Contraindicated with other medications and alcohol
- Poor adherence → drug resistance (MDR/XDR-TB)
  - Second line drugs more toxic and less effective
  - Drastically increases treatment time and costs
  - Transmission of resistant strains

MMWR, CDC, 2012; WHO, 2012 & 2010

Reasons for Low Medication Adherence in Marginalized Populations

- Often difficult to locate
- Afraid of incarceration or detainment
- IDU's cannot withstand hospitalization without OST
- Little to no support to help monitor care
- Low disease literacy
- Feeling stigmatized or poorly treated by care providers

Thus, incentives or novel interventions targeting these populations are needed to improve treatment success.

Curtis et al., *Public Health Reports. 1994;109:*319-27
Story et al., *Thorax*. 2007;*62:*667-71

Directly Observed Therapy (DOT)

- Patient observed swallowing each dose

- Preferred strategy (WHO & CDC)
  - Improves adherence
  - Reduces risk of acquired drug resistance, treatment failure, and relapse
  - Intermittent dosing allowed if given as DOT
  - Saved 6.8 million lives between 1995 and 2010

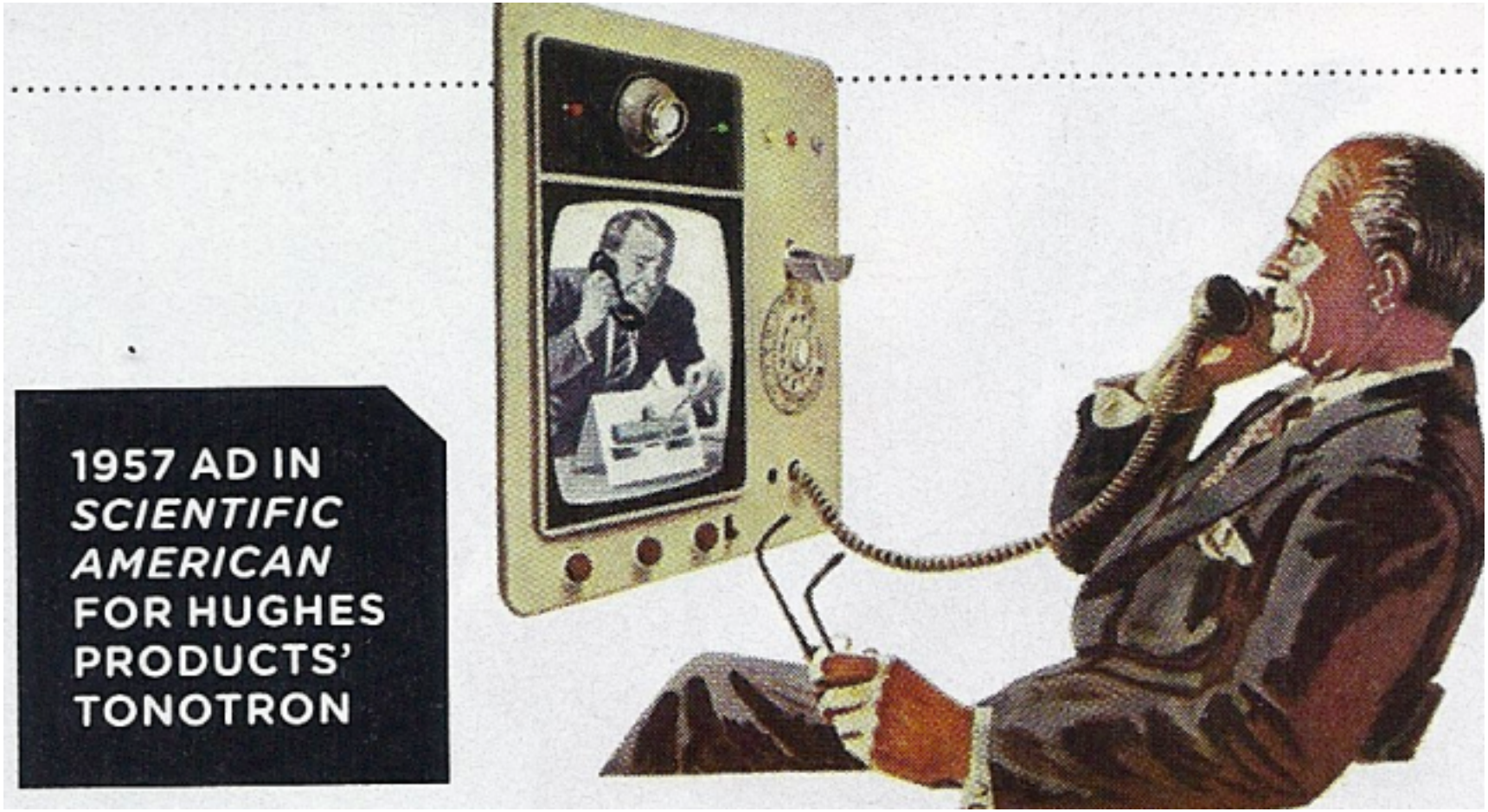
Provider visits the patient

Patient visits the clinic

Barriers to DOT

- Cost
- Manpower
- Transportation
- Impractical in some rural settings
- Coordination b/w patient and provider
- Restricts mobility
- Privacy and stigma concerns
- Feeling patronized

Video Phone DOT???



San Diego's Video Phone Experiment

- Landline-based system
- 33 patients over 9 months of treatment
- Benefits:
  - High patient acceptance
  - Saved $$$
    - 27,840 miles saved ($10,161)
    - 795 hours saved ($15,000)
- Disadvantages:
  - Limited to business hours
  - Must take meds while at home
  - Won't work for San Diego's binational patients

“Mobile Phone-Based Video Directly Observed Therapy (VDOT) for Tuberculosis”

Video DOT Flow Diagram

(Funded by NIH/NIAID grant R21-AI088326; PI: R. Garfein)

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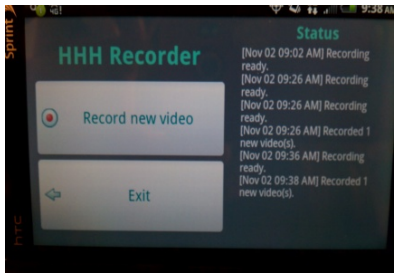
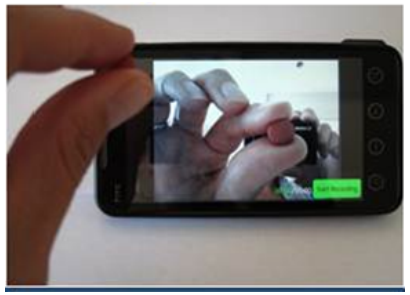
HHH API
Android Binding





HHH Recording Application

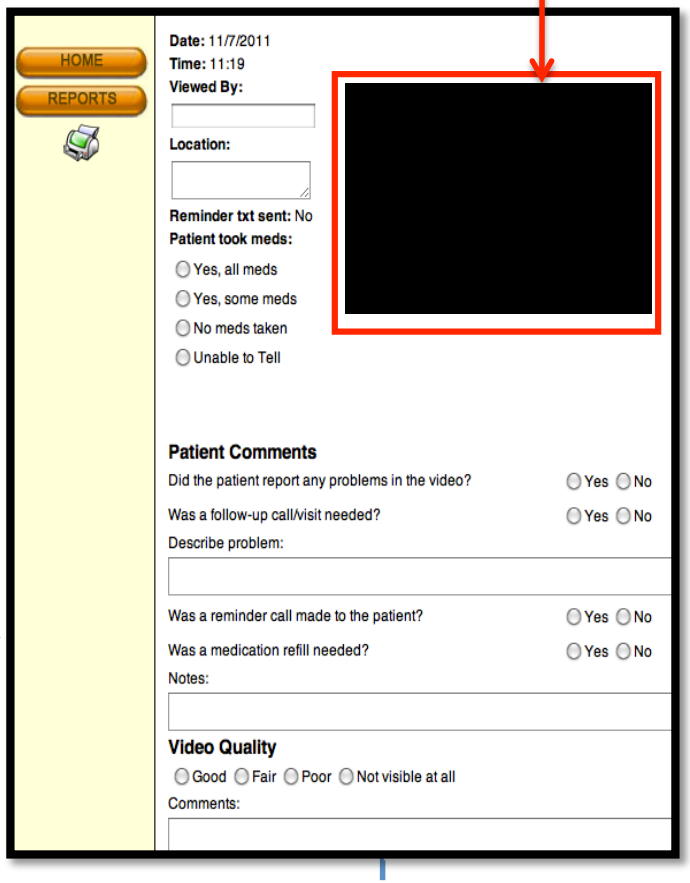
-Authenticate
-Encrypt
-Transmit/Retry

HHH Server

HHH API

- Authenticate
- Store
- Notify
- Retrieve
- Decrypt
- Archive

UCSD *Calit²*
Client Mgt. System



DOT Worker

View Video

Enter Data

START: Patient records video of self taking pills.

(SMS confirmations & reminders sent to patients)

(DOT Worker notified if video not sent by appointed time)

Patient Education

Participant Recording Procedures

Video Cell Phone Direct Observed Therapy (VCP-DOT)

Recording Procedures

1. **Gather needed medication, something to drink, and the cell phone at a table in a well-lit location.**
2. **Prepare the cell phone to record your video.**
   - **Turn Cell Phone on using the button on the top right edge of the phone and wait for the phone to 'boot-up'.**

   - **Unlock the phone by using your pointer finger to drag the "screen" bar down towards the bottom of the phone.**

Emergency Phone Numbers

If you are experiencing problems with you medication, you have any new or uncomfortable side effects, do not wait to send in you daily video. Call you Nurse Case Manager or health care provider immediately!

Nurse Case Manager

Name:_____

Phone Number:_____

Social Service Aid (SSA)

Name:_____

Phone Number:_____

County TB Control Department

Phone Number:_____

Private Doctor

Name:_____

Phone Number:_____

For Any other Emergencies

Dial 911

Pilot Study Design

- Recruited new, uncomplicated TB cases age ≥18 y.o.
- Obtained written informed consent
- TB case worker trained patient to use mobile phone
- Provided VDOT for 4-9 months
- Conducted brief pre- and post-treatment interviews
- $25 for each interview, but no $ for sending videos

Pilot Study Demographics

		San Diego	Tijuana
Number enrolled in VDOT		**43**	**9**
Number of participants who spent time in both cities		6	0
Age: mean(range)		38.9 (18-86)	28.1 (18-65)
Hispanic or Latino n(%)		18 (41.9)	9 (100)
Race: n(%)	Asian	13 (30.2)	0 (0)
	African American/Black	3 (6.9)	0 (0)
	Pacific Islander/Native Hawaiian	2 (4.7)	0 (0)
	Caucasian/White	9 (21.0)	3 (33.4)
	Other/Mixed Race	16 (37.2)	6 (66.6)
Gender: n(%)	Male	23 (53.5)	5 (55.5)
	Female	20 (46.5)	4 (45.5)
Switched back to in-person DOT: n(%)		6 (13.9)	1 (11.1)
Telephones stolen/replaced		1/2	2/1

Pilot Study Outcomes

		San Diego (n=41) n (%)	Tijuana (n=9) n (%)
Proportion of expected videos received	Mean	**93%**	**96%**
	IQR	**91-99%**	**91-99%**
	Range	**51-100%**	**88-100%**
How many days did patient practice with a DOT worker before recording a video on his/ her own?	1	**25 (61)**	1 (11)
	2	6 (15)	0 (0)
	3	2 (5)	3 (33)
	≥4	7 (17)	**5 (44)**
How often did you have problems recording a video?	≥1/2 the time	3 (7)	1 (11)
	Rarely	**22 (54)**	**5 (56)**
	Never	16 (39)	3 (33)
If you had to redo your TB treatment, would you choose VDOT or in-person DOT?	VDOT	**38 (93)**	**8 (89)**
	No Preference	2 (5)	1 (11)
	In-Person	1 (2)	0 (0)
Would you recommend VDOT to other TB patients?	Yes	**41 (100)**	**9 (100)**

Pilot Study Summary

- **Patients reported:**
  - \+ Appreciated mobility that VDOT allowed
  - \+ Convenience of taking medications on own schedule
  - – 1 hectic mom preferred in-person DOT
- **Providers and health officials reported:**
  - \+ High adherence and patient satisfaction
  - \+ Significant savings in staff time and transportation
  - \+ 87% of patients who started on VDOT finished with VDOT
  - – Some video uploads delayed by lack of cell/WiFi signal

Overall, this study found VDOT to be highly feasible and acceptable to patients, providers and health officials in both countries.

Next Steps

- Update Video Recorder App to run on multiple devices
- Update Client Management System
- Virtualize to run in the Cloud
- Evaluate adherence and cost
- Evaluate in other populations (i.e., homeless, IDU)

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verizon foundation

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