



Attitudes towards participating in digital pill-based adherence research for oral PrEP among men who have sex with men with substance use

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Authors & Disclosures

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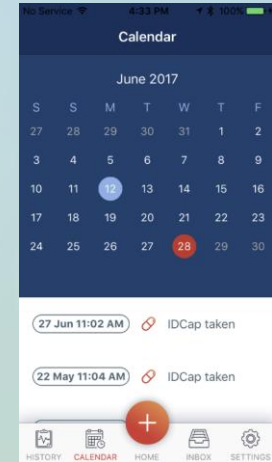


BACKGROUND



Digital Pill Systems (DPS)

- **Digital pill systems (DPS) directly measure and verify medication ingestion events in real-time.**
- DPS components:
 - Gelatin capsule with an integrated radiofrequency identification tag, which overencapsulates PrEP
 - Wearable Reader device
 - Cloud-based server driving a collaborative interface



Components of ID-Cap System™.
Images courtesy of etectRx (Gainesville, FL).

How the ID-Cap™ System Works

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1 ID-Capsule

The ID-Capsule contains an ingestible sensor that creates a low power radio frequency (RF) signal when activated by the patient's gastrointestinal fluid.



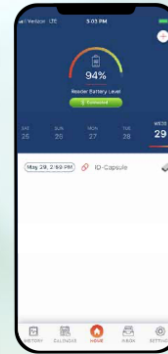
2 Reader

The Reader processes the signal from the ingested sensor and forwards a message via Bluetooth to the Patient App.



3 Patient App

The Patient App displays the information and sends data to the etectRx secure server.



Wi-Fi/Cellular

Internet



4 Clinician Dashboard

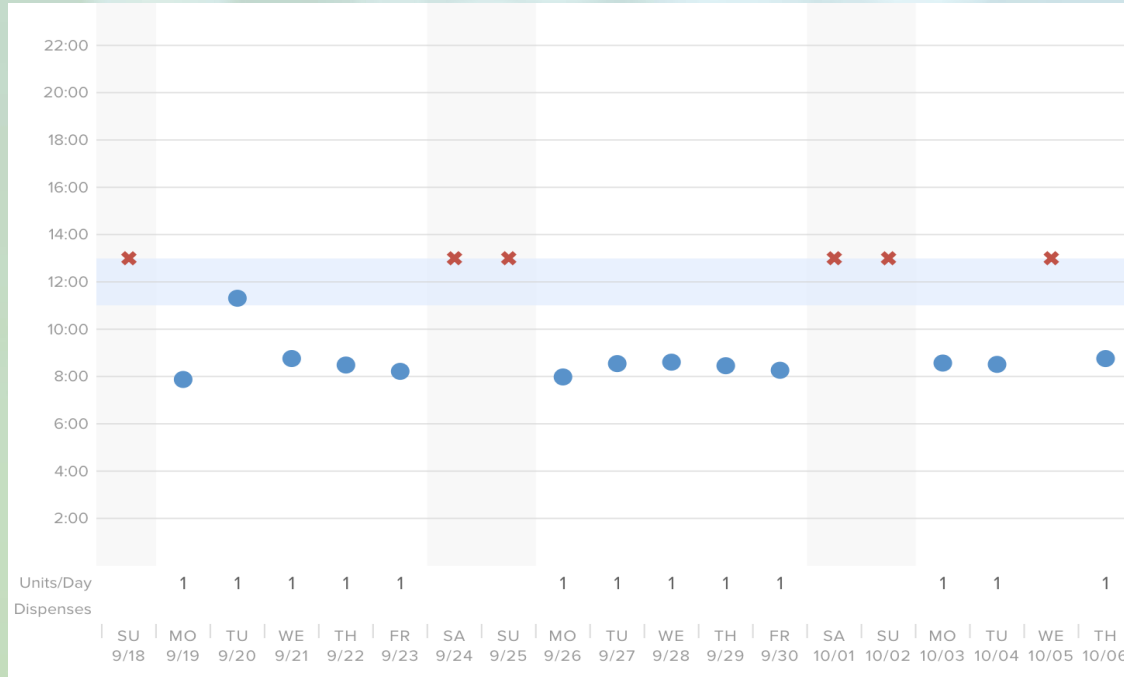
The etectRx server sends patient ingestion information to the Clinician Dashboard.

Image courtesy of etectRx (Gainesville, FL).



Sample DPS Adherence Data

Time of day



- ← Participant-identified ingestion window
- PrEP ingestion event
- ✘ Missed PrEP ingestion

Days of week



PrEP, Substance Use & DPS

- Once-daily oral PrEP (TDF/FTC) is nearly 99% effective for preventing HIV, but its efficacy is closely linked to adherence.
- Among men who have sex with men (MSM), non-alcohol **substance use can increase HIV risk and PrEP nonadherence.**
- DPS technology can provide real-time insights into suboptimal PrEP adherence that can be used to inform interventions.
- Prior work has shown that DPS can **accurately measure PrEP adherence among MSM who use substances.**

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Chai PR, et al.. DigiPrEP: a pilot trial to evaluate the feasibility, acceptability, and accuracy of a digital pill system to measure PrEP adherence in men who have sex with men who use substances. *JAIDS.* 2022 Feb 1;89(2):e5-e15.



Study Aims

Among sexually active MSM on PrEP with substance use:

1. To explore attitudes toward DPS technology and overall willingness to participate in future DPS-based research studies in the context of HIV prevention; and
2. To measure the association between worry about daily PrEP adherence and willingness to participate in future DPS-based research.



METHODS



Methods

- **Participants:** Age 18+, cisgender or transgender MSM, HIV-negative, currently on PrEP, sexually active in past 3 months, score of ≥ 2 on CAGE Drug Use Questions (CAGE-AID), and current user of Grindr social networking app.
- **Procedures:** One-time, cross-sectional quantitative survey via Grindr covering: sociodemographics, PrEP use, sexual history, substance-related risk, willingness to participate in DPS-based research, attitudes toward DPS technology (usability, usefulness, data preferences), and worry about PrEP adherence.
- **Analyses:** Descriptive statistics & ordinal logistic regressions (SAS).

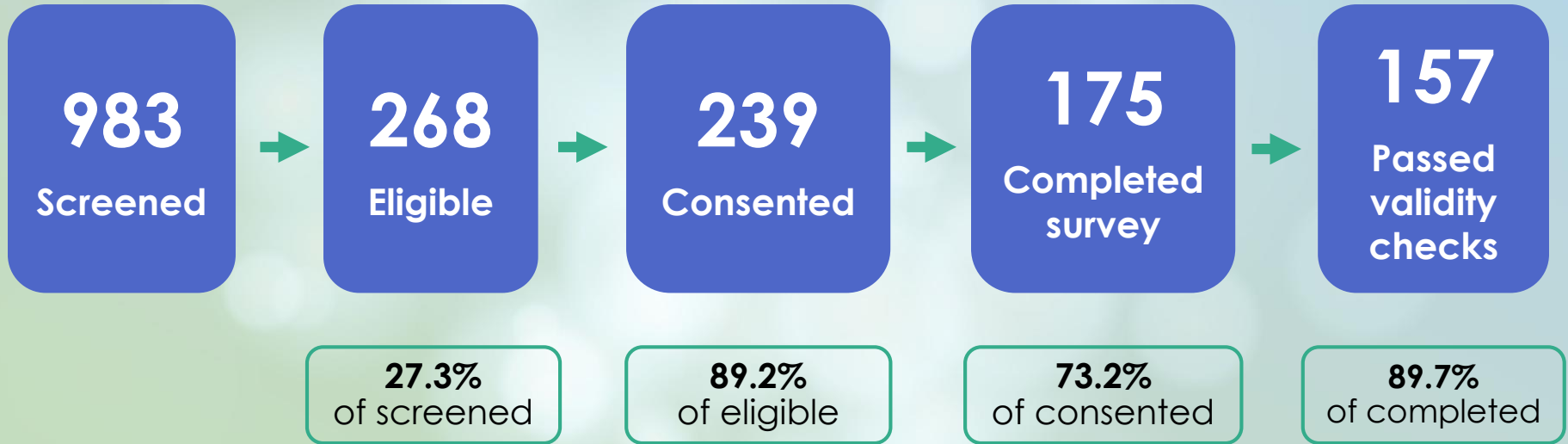
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RESULTS



Enrollment





Sociodemographics (N=157)

Age	Median (IQR)	Range
Age (years)	33 (14)	18-70

Race	N (%)
White	119 (75.8)
Black or African American	7 (4.5)
Asian	6 (3.8)
American Indian or Alaska Native	2 (1.3)
More than one race	19 (12.1)
Other	4 (2.5)

Ethnicity	N (%)
Not Hispanic or Latinx	123 (78.3)

Gender Identity	N (%)
Cisgender	150 (95.5)
Transgender	7 (4.5)

Sexual Orientation	N (%)
Homosexual or gay	124 (79.0)
Bisexual	29 (18.5)
Other	4 (2.5)

Education	N (%)
High school graduate or less	13 (8.3)
Some college	39 (24.8)
College degree or higher	105 (66.9)



PrEP Use & Sexual History

Duration of PrEP Use	N (%)
> 1 year	93 (59.2)

Self-Reported PrEP Adherence*	N (%)
≥ 4 of 7 doses per week	149 (94.9)

Relationship Status	N (%)
Single	100 (63.7)
In a relationship or Married	48 (30.6)
Divorced or Separated	9 (5.7)

Sexual Partners	Median (IQR)	Range
In last 3 months	6 (7)	1-75

Condom Use*	N (%)
Never or Almost never	98 (62.4)
Sometimes	35 (22.3)
Almost every time or Every time	24 (15.3)

STI Diagnosis*	N (%)
Yes	44 (28.0)

Substance Use Before / During Sex*	N (%)
Never or Almost never	44 (28.0)
Sometimes	56 (35.7)
Almost every time or Every time	57 (36.3)

* During last 3 months.



Substance-Related Risk

- Substance-related risk was common in this sample, with:
 - More than half at **moderate or high risk for alcohol (51.6%)** and **marijuana (61.8%)**.
 - More than one-quarter at **moderate or high risk for inhalants (28.7%)**.
 - One-third at **moderate or high risk for amphetamine (34.4%)**.

ASSIST Substance Risk Score N (%)			
Substance	Low	Moderate	High
Alcohol	76 (48.4)	62 (39.5)	19 (12.1)
Tobacco	86 (54.8)	67 (42.7)	4 (2.5)
Marijuana	60 (38.2)	81 (51.6)	16 (10.2)
Inhalants	112 (71.3)	43 (27.4)	2 (1.3)
Amphetamine	103 (65.6)	36 (22.9)	18 (11.5)
Cocaine	126 (80.3)	27 (17.2)	4 (2.5)
Sedatives	126 (80.3)	27 (17.2)	4 (2.5)
Hallucinogens	128 (81.5)	25 (15.9)	4 (2.5)
Opioids	132 (84.1)	20 (12.7)	5 (3.2)



Willingness to Participate in DPS Research

- Most were **at least moderately willing to participate in DPS research** for PrEP adherence measurement (72.6%).
- Primary motivations included:
 - **Contribution to PrEP research** (66.9% very or extremely important).
 - **Compensation** (68.8% very or extremely important).

Willingness to Participate in DPS Research	N (%)
Not at all or Slightly willing	43 (27.4)
Moderately willing	32 (20.4)
Very or Extremely willing	82 (52.2)
Motivations for Willingness to Participate	N (%)
Contribution to PrEP Research	
Not at all or Slightly important	18 (11.5)
Moderately important	34 (21.7)
Very or Extremely important	105 (66.9)
Monetary Compensation	
Not at all or Slightly important	18 (11.5)
Moderately important	31 (19.7)
Very or Extremely important	108 (68.8)



DPS Attitudes: *Usability & Usefulness*

- Median DPS usability score was 70, indicating **above-average perceived usability**.
- Many participants reported that DPS would be very or extremely useful for:
 - **Increasing accountability** for PrEP adherence (58.0%).
 - **Adherence monitoring** by researchers (87.3%).

Usability of DPS	Median (IQR)	Range
System Usability Scale	70 (27.5)	0-100

Usefulness of DPS	N (%)
Accountability for PrEP Adherence	
Not at all or Slightly useful	30 (19.1)
Moderately useful	36 (22.9)
Very or Extremely useful	91 (58.0)
Adherence Monitoring by Researchers	
Not at all or Slightly useful	8 (5.1)
Moderately useful	12 (7.6)
Very or Extremely useful	137 (87.3)



DPS Attitudes: *Data Preferences*

- Most were **not at all or slightly concerned about real-time monitoring** by researchers (80.3%).
- Many were interested in viewing PrEP adherence data **daily** (42.0%) **or weekly** (33.1%).
- Over half were **very or extremely willing to interact with ancillary wearable devices** to collect biometric data to contextualize PrEP adherence (59.9%).

Concern about Adherence Monitoring	N (%)
Not at all or Slightly concerned	126 (80.3)
Moderately concerned	16 (10.2)
Very or Extremely concerned	15 (9.6)

Preferred Frequency for Viewing Data	N (%)
Daily or on-demand	66 (42.0)
Weekly	52 (33.1)
Monthly	16 (10.2)
Only after missed doses	18 (11.5)
No desire to access adherence data	5 (3.2)



PrEP Adherence Worry

- Most participants reported **at least moderate worry about daily PrEP adherence** (59.2%), despite high self-reported adherence.

Worry about Daily PrEP Adherence	N (%)
Not at all or Slightly worried	64 (40.8)
Moderately worried	39 (24.8)
Very or Extremely worried	54 (34.4)



PrEP Adherence Worry (cont.)

- Compared to those not at all worried about their daily PrEP adherence, participants with **extreme worry** were:
 - **3.3x more likely** to be willing to participate in DPS research (95% CI [1.029,10.445]).*
 - **4.2x more likely** to be willing to contribute biometric data via ancillary wearable devices (95% CI [1.310,13.681]).**
- Those with extreme worry preferred to receive **notifications after all missed doses** (63.2%) and **weekly metrics of ingestions** (73.7%).

* After adjusting for past injection drug use.

** After adjusting for age and past injection drug use.

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CLOSING THOUGHTS



Conclusions

- MSM on PrEP with substance use reported **favorable attitudes toward DPS technology** for PrEP adherence measurement and **openness to participation in future research**.
- Those with extreme PrEP adherence worry were **more willing to participate in research, and wanted more interaction with the system**, than those who worried less about adherence.
- These data around user willingness and motivations to engage in research, and preferences for accessing DPS data, should directly inform future DPS trials in this population.



Thank You

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