Smoking cessation treatment: A critical component of HIV/AIDS management

The 8th Annual Texas Conference on Health Disparities: The Intersection of Smoking, HIV/AIDS and Cancer

May 30-31

Damon J. Vidrine, Dr.P.H.
Overview

1. HIV/AIDS trends
2. Cigarette smoking and HIV/AIDS (prevalence, correlates, and health outcomes)
3. Smoking cessation efforts
4. Future directions
HIV/AIDS in the US

- Over 1.2 million people in the US are HIV positive
- 50,000 – 60,000 new cases each year
- Variables associated with HIV serostatus:
  - socioeconomic status
  - race/ethnicity
  - sexual orientation
  - depression
  - illicit drug use
  - heavy alcohol use

- Combination ART

Photo CDC, PHIL, 1989
CDC, 2012
Walensky et al. J Infect Dis 2006

Note. All displayed data have been statistically adjusted to account for reporting delays, but not for incomplete reporting. Death may be due to any cause.
Diagnoses of HIV Infection among Adults and Adolescents, by Race/Ethnicity, 2008–2011—United States and 6 Dependent Areas

- Black/African American
- White
- Hispanic/Latino
- Native Hawaiian/other Pacific Islander
- American Indian/Alaska Native
- Asian
- Multiple races


Note. Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. All displayed data have been statistically adjusted to account for reporting delays, but not for incomplete reporting.

*Hispanics/Latinos can be of any race.
Tobacco use among PLWHA

- **Prevalence of smoking:**
  - General US population, 19.0%
  - HIV-positive population, 45-65%
    - Drug and alcohol use
    - Sexual orientation
    - Depressive symptoms
    - Low socioeconomic status

- **Numerous health risks for HIV-positive smokers**

CDC MMWR, 2012
Vidrine AIDS Educ Prev, 2009
Effects of smoking among PLWHA

- Health outcomes associated with smoking
  - Oral lesions
  - Pulmonary diseases
  - Cardiovascular disease
  - Various malignancies (e.g., anal, cervical, head and neck, lung)

- Antiretroviral treatment response
  - Virologic (higher viral load among smokers)
  - Immunologic (lower CD4 cell counts among smokers)

- Poorer functional status/health-related quality of life

- Increased risk of mortality

Oral photos, CDC PHIL, 1999, 1987
Bacterial pneumonia Images courtesy of: AIDS Images Library www.aidsimages.ch
FIGURE 1—Cumulative probability of death (all-cause mortality) by months of follow-up, among current, former, and never smokers: Strategies for Management of Antiretroviral Therapy clinical trial, 2002–2006.
HIV/AIDS, smoking and survival (cont.)

Figure 1. Kaplan-Meier curve showing survival by age, stratified by human immunodeficiency virus and smoking status for all study subjects (A), only males (B), only study subjects of Danish origin (C), and only study subjects from Copenhagen (D). Abbreviation: HIV, human immunodeficiency virus.

Hellenberg et al., Clinical Infectious Diseases, December 2012
### Table 3. Number of Life-Years Lost and Population-Attributable Risk of Death Associated With Smoking and With HIV Among Individuals in the Danish HIV Cohort and the Copenhagen General Population Study (Controls)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Lost Life-Years (Age 35–80 y)</th>
<th>PAR, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIV among never smokers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(never smoking HIV patients vs never smoking controls)</td>
<td>5.1 (4.4–5.8)</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Smoking among controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(smoking controls vs never smoking controls)</td>
<td>3.6 (3.1–4.0)</td>
<td>34.4</td>
</tr>
<tr>
<td><strong>Smoking among HIV patients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(smoking HIV patients vs never smoking HIV patients)</td>
<td>12.3 (11.5–13.0)</td>
<td>61.5</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; HIV, human immunodeficiency virus; PAR, population-attributable risk.

Hellenberg et al., Clinical Infectious Diseases, December 2012
Summary of smoking cessation efforts with PLWHA

- Cessation programs can be successfully implemented in HIV clinic settings (e.g., Cummins et al. *Nurs Stand* 2005)
- Feasibility of using NRT + supportive counseling (Elzi et al., *Antivir Ther*, 2006)
- MI + NRT vs. self-help + NRT (Ingersoll et al. *AIDS Behav* 2009)
- Safety and tolerability of varenicline (Cui et al. *AIDS Patient Care STDS* 2012)
- Motivational enhancement + NRT vs. health education + NRT (Lloyd-Richardson et al. *Addiction* 2009)
- Intensive group therapy + NRT vs. standard care (Moadel et al. *JAIDS*, 2012)
- Individual counseling + NRT vs. computer-based treatment + NRT vs. self-help + NRT (Humphlet et al. *NTR*, 2013)
An innovative telephone intervention for HIV-positive smokers (R01CA97893)

Project Reach Out

1. To develop an innovative smoking cessation intervention for individuals living with HIV/AIDS and compare it to standard cessation treatment in a randomized clinical trial

2. To evaluate the role of motivation, risk perception, self-efficacy, coping skills, social support, and negative affect as potential mediators of smoking abstinence
Study design

- Two group, randomized controlled trial
  - Cell phone intervention vs. Usual Care
- Adaptive randomization
  - Depression history
  - Nicotine dependence (FTND)

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>Time 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment &amp; baseline assessment</td>
<td>Randomization</td>
<td>3-month follow-up</td>
<td>6-month follow-up</td>
</tr>
</tbody>
</table>
Study site and participants

- Thomas Street Health Center
- Serves predominantly low income, ethnically diverse HIV-positive patients in the greater Houston area
- Provides HIV/AIDS-related medical and psychological services to over 4,000 patients

**Eligibility**

- Inclusion criteria
  - HIV+
  - \( \geq 18 \)
  - Current smoker
  - English or Spanish speaking
  - Willing to set a quit day within 1 week

- Exclusion criteria
  - Physician deemed ineligible based on medical
  - Participation in another smoking cessation program
Intervention groups

Usual Care (UC)
- Brief provider advice to quit
- Written materials
- Instructions on how to receive NRT

Cell Phone Intervention
- All UC components
- Cell phone-delivered proactive counseling
  - 11 phone calls delivered over 3-months
  - Content based on CBT and MI
  - Prepaid cell phones given to participants
### Cell phone intervention (CPI)
#### Session content and schedule

<table>
<thead>
<tr>
<th>Call</th>
<th>Time of Call</th>
<th>Content of Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 day prior to quit date</td>
<td>Preparing to quit - why quit when you’re HIV-positive? Making the commitment to quit</td>
</tr>
<tr>
<td>2</td>
<td>On Quit Date</td>
<td>Quitting smoking – getting through the first day</td>
</tr>
<tr>
<td>3</td>
<td>2 days post quit date</td>
<td>Surviving withdrawal - withdrawal facts and coping skills</td>
</tr>
<tr>
<td>4</td>
<td>4 days post quit date</td>
<td>Managing high risk situations</td>
</tr>
<tr>
<td>5</td>
<td>7 days post quit date</td>
<td>Stress, negative affect &amp; smoking</td>
</tr>
<tr>
<td>6</td>
<td>10 days post quit date</td>
<td>Improving support and asserting yourself</td>
</tr>
<tr>
<td>7</td>
<td>2 weeks post quit date</td>
<td>Reviewing problem solving &amp; dealing with lapses</td>
</tr>
<tr>
<td>8</td>
<td>4 weeks post quit date</td>
<td>Reinforcing benefits of being an HIV+ nonsmoker</td>
</tr>
<tr>
<td>9</td>
<td>6 weeks post quit date</td>
<td>Maintaining commitment – keeping motivated</td>
</tr>
<tr>
<td>10</td>
<td>9 weeks post quit date</td>
<td>Successes and challenges in smoking cessation</td>
</tr>
<tr>
<td>11</td>
<td>12 weeks post quit date</td>
<td>Long-term relapse prevention</td>
</tr>
</tbody>
</table>
CONSORT flow diagram

- Assessed for eligibility (n=1372)
- Excluded (n=898)
  - Not meeting inclusion criteria (n=553)
  - Declined to participate (n=331)
  - Other reasons (n=14)
- Randomized (n=474)
- Allocated to CPI (n=236)
  - Completed 3-month follow-up (n=178)
  - Completed 6-month follow-up (n=175)
  - Completed 12-month follow-up (n=179)
  - Analyzed, intent to treat (n=236)
  - Analyzed, complete case (provided data at \( \geq 1 \) follow-up time points) (n=208)
- Allocated to UC (n=238)
  - Completed 3-month follow-up (n=172)
  - Completed 6-month follow-up (n=187)
  - Completed 12-month follow-up (n=186)
  - Analyzed, intent to treat (n=238)
  - Analyzed, complete case (provided data at \( \geq 1 \) follow-up time points) (n=216)
## Project Reach Out: Socio-demographic characteristics

Baseline demographic characteristics, n=474

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>UC</th>
<th>CPI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age</strong> in years (SD)*</td>
<td>45.70 (7.79)</td>
<td>43.94 (8.26)</td>
<td>44.82 (8.07)</td>
</tr>
<tr>
<td><strong>Sex</strong> % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68.90 (164)</td>
<td>71.19 (168)</td>
<td>70.04 (332)</td>
</tr>
<tr>
<td>Female</td>
<td>31.09 (74)</td>
<td>28.81 (68)</td>
<td>29.96 (142)</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong> % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>12.18 (29)</td>
<td>12.71 (30)</td>
<td>12.45 (59)</td>
</tr>
<tr>
<td>African American/Black</td>
<td>78.57 (187)</td>
<td>74.58 (176)</td>
<td>76.58 (363)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>7.98 (19)</td>
<td>10.17 (24)</td>
<td>9.07 (43)</td>
</tr>
<tr>
<td>Other</td>
<td>1.26 (3)</td>
<td>2.54 (6)</td>
<td>1.90 (9)</td>
</tr>
<tr>
<td><strong>Mean years of formal education</strong> (SD)</td>
<td>10.82 (2.53)</td>
<td>10.88 (2.68)</td>
<td>10.85 (2.60)</td>
</tr>
<tr>
<td><strong>Education level</strong> % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>36.97 (88)</td>
<td>39.83 (94)</td>
<td>38.40 (182)</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>38.14 (91)</td>
<td>37.71 (89)</td>
<td>37.97 (180)</td>
</tr>
<tr>
<td>More than high school</td>
<td>24.79 (89)</td>
<td>22.46 (53)</td>
<td>23.63 (112)</td>
</tr>
</tbody>
</table>

*p<0.05
Baseline demographic characteristics, n=474

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>UC</th>
<th>CPI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current work status % (n)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working full or part time</td>
<td>19.75 (47)</td>
<td>22.46 (53)</td>
<td>21.10 (100)</td>
</tr>
<tr>
<td>Not working due to health</td>
<td>65.97 (157)</td>
<td>60.59 (143)</td>
<td>63.29 (300)</td>
</tr>
<tr>
<td>Cannot find work</td>
<td>6.72 (16)</td>
<td>8.47 (20)</td>
<td>7.59 (36)</td>
</tr>
<tr>
<td>Not working for other reasons</td>
<td>7.56 (18)</td>
<td>8.47 (20)</td>
<td>8.02 (38)</td>
</tr>
<tr>
<td><strong>HIV transmission % (n)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSM</td>
<td>24.05 (57)</td>
<td>26.38 (62)</td>
<td>25.21 (119)</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>45.15 (107)</td>
<td>45.96 (108)</td>
<td>45.55 (215)</td>
</tr>
<tr>
<td>Injection drug use</td>
<td>19.83 (47)</td>
<td>14.47 (34)</td>
<td>17.16 (81)</td>
</tr>
<tr>
<td>Other</td>
<td>10.97 (26)</td>
<td>13.19 (31)</td>
<td>12.08 (57)</td>
</tr>
<tr>
<td><strong>Married/ Living with significant other % (n)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.91 (45)</td>
<td>16.53 (39)</td>
<td>17.72 (84)</td>
</tr>
</tbody>
</table>
# Alcohol & Illicit Drug Use

Health risk behaviors at baseline assessment, n=474

<table>
<thead>
<tr>
<th>Variable</th>
<th>UC</th>
<th>CPI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alcohol Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous/harmful drinking %(n)</td>
<td>32.77 (78)</td>
<td>28.81 (68)</td>
<td>30.80 (146)</td>
</tr>
<tr>
<td>*AUDIT score of ≥8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Illicit drug use</strong> in the past month %(n)</td>
<td>38.24 (91)</td>
<td>41.95 (99)</td>
<td>40.08 (190)</td>
</tr>
</tbody>
</table>
Overall treatment effect
Results from generalized linear mixed model regression (GLMM)

<table>
<thead>
<tr>
<th>Smoking abstinence</th>
<th>Intention-to-treat</th>
<th>Complete case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>p value</td>
</tr>
<tr>
<td>Data through 12-month follow-up visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 hr</td>
<td>2.36 (1.28, 4.38)</td>
<td>0.006</td>
</tr>
<tr>
<td>7 day*</td>
<td>2.41 (1.01, 5.76)</td>
<td>0.049</td>
</tr>
<tr>
<td>30 day</td>
<td>2.20 (0.83, 5.83)</td>
<td>0.114</td>
</tr>
</tbody>
</table>

* primary outcome

All GLMM modeling adjusted for fixed effects of time and age and random effect of subject.
7-day abstinence by time point

Complete case analysis

Follow-up time

- Quit day
- 3 months
- 6 months
- 12 months

Proportion quit

CPI

UC

OR = 4.5; 95% CI (2.0, 10.3)
P<0.0001

OR = 1.2; 95% CI (0.5, 2.9)
p=0.6

OR = 0.8; 95% CI (0.3, 1.8)
p=0.5

OR = 0.8; 95% CI (0.3, 1.8)
p=0.5
Conclusions

Positive

• HIV+ population was receptive to smoking cessation treatment
• CPI (vs. UC) results in a significantly higher 7-day abstinence rate

Negative

• Absolute quit rates were low
• Much of the CPI treatment effect was driven by the 3-month outcome (magnitude of effect at 6- and 12-months was smaller), rather than a sustained effect over time
The influence of HIV disease events/stages on smoking attitudes and behaviors (R01CA132636)

**Project STATE**

1. Assess the relationship between HIV disease events/stages (i.e., HIV diagnosis, stable disease, and progressive disease) and smoking outcomes (i.e., intention to quit, number of quit attempts, and cessation outcomes).

2. Evaluate perceived impact of HIV as a potential mediator of the association between disease event/stage and smoking outcomes.

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**Timeline**

- **Time 1**: HIV DX/treatment entry
- **Time 2**: Weekly cell phone assessments & 3-mo follow-up
- **Time 3**: 6-mo follow-up
- **Time 4**: 9-mo follow-up
- **Time 5**: 12-mo follow-up
Conceptual framework
Project STATE

HIV Event/Stage (i.e., diagnosis, stable disease, progression)

Perceived Impact of HIV

Attitudes about Smoking (i.e., motivation, expectancies, risk perceptions)

Smoking Outcomes (intention, cessation, reduction)

Perceived Control

Subjective Norms
## Project STATE:
### Socio-demographic characteristics

Baseline demographic characteristics, n=361 (English speaking)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age</strong> in years (SD)**</td>
<td>39.4 (11.9)</td>
</tr>
<tr>
<td><strong>Sex %</strong>(n)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>71.7 (259)</td>
</tr>
<tr>
<td>Female</td>
<td>28.3 (102)</td>
</tr>
<tr>
<td><strong>Race/Ethnicity %</strong>(n)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>19.1 (69)</td>
</tr>
<tr>
<td>African American/Black</td>
<td>67.3 (243)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>10.0 (36)</td>
</tr>
<tr>
<td>Other</td>
<td>2.7 (13)</td>
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<tr>
<td><strong>Mean years of formal education</strong>(SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.9 (2.7)</td>
</tr>
<tr>
<td><strong>Education level %</strong>(n)</td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>35.5 (128)</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>40.2 (145)</td>
</tr>
<tr>
<td>More than high school</td>
<td>24.3 (88)</td>
</tr>
</tbody>
</table>
## Project STATE: Socio-demographic characteristics

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<table>
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<tr>
<th>Characteristic</th>
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<tbody>
<tr>
<td>Married/ Living with significant other % (n)</td>
<td>17.5 (63)</td>
</tr>
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<tr>
<td>Working full or part time</td>
<td>15.2 (55)</td>
</tr>
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<td>49.6 (179)</td>
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<td>36.3 (131)</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>42.4 (153)</td>
</tr>
<tr>
<td>Injection drug use</td>
<td>9.7 (35)</td>
</tr>
<tr>
<td>Other</td>
<td>11.6 (42)</td>
</tr>
<tr>
<td>Depression (CES-D score &gt;/=16), % (n)</td>
<td>67.9 (245)</td>
</tr>
<tr>
<td>Illicit drug use in past 30 days, % (n)</td>
<td>47.6 (172)</td>
</tr>
<tr>
<td>Harmful drinking (AUDIT score &lt;/=8), % (n)</td>
<td>24.6 (89)</td>
</tr>
</tbody>
</table>
7-day smoking abstinence
Assessed weekly through month 12
Soon to Start DSRIP

- Legacy Community Health Services (a large Houston-based FQHC)
- N=1000
- 2 group RCT (SMS/MMS vs. counseling)
- Major outcomes:
  - quit attempts
  - abstinence at 6-months post enrollment
Future directions

- Exploration of potential mediators
- Addressing co-morbidities
- Involving other HIV-care providers
- More advanced mHealth approaches
  - Intervention delivery and assessment
- Reaching a larger population of PLWHA who smoke
Funding Sources

- R01CA097893, Project Reach Out (PI: E. Gritz)
- R01CA132636, Project STATE (PI: D. Vidrine)
- P30 CA016672, Cancer Center Support Grant (PI: R. DePinho)

- No industry funding
- No off-label medication uses
Acknowledgments

MD Anderson
• Ellen R. Gritz, Ph.D.
• Yisheng Li, Ph.D.
• Rachel Marks, M.P.H.
• Jessica Aynapudi, B.S.
• Evan Colmenero, B.S.
• Heather Danysh, M.H.S.
• Vanessa Bernal, B.S.
• Chiemenam Amaechi, B.A.
• Michelle Fingeret, Ph.D.
• Netri Mehta, M.P.H.
• Jose Moreno, M.S.
• Lokesh Shahani, M.D., M.P.H.
• Mary Mojica, B.A.
• Eric Crowder, B.G.S.
• Meredith Buchberg, B.A.

UTHSC at Houston Medical School
• Roberto C. Arduino, M.D.
• Ben Barnett, M.D.
• Tanvir Bell, M.D.

Fox Chase Cancer Center
• Amy Lazev, Ph.D.

Thomas Street Health Center
• Patients, volunteers, and staff