Advances in Prevention

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Treatment is not nearly enough

OUD Cascade of Care in USA

Williams AR, Nunes E, Olfson M. Health Affairs Blog, 2017
Cumulative Probability of treatment for SUD

Blanco et al., Drug Alcohol Depend, 2015
PREVENTION is based on an Understanding of Epidemiology

• Risk and Protective Factors…
  ➢ predict substance use;
  ➢ are nested within the individual and the contexts surrounding the individual;
  ➢ provide potential sites for intervention.
Addiction Is A Disease Of The Brain

Decreased Brain Metabolism in Drug Abuse Patient

Source: From the laboratories of Dr. N. Volkow
ADDICTION INVOLVES MULTIPLE FACTORS

Biology/Gene Environment

Brain Mechanisms

Addiction
There are Multiple Risk Factors

Laws/Culture

Neighborhood/Community

Family/Peers

Biology

Individual/Genes

Time/Age
RISK FACTORS FOR SUBSTANCE USE DISORDER

- Family History of SUD
- Childhood Sexual Abuse
- Disturbed Family Environment
- Parental Loss
- Low Self-Esteem
- Early-Onset Anxiety
- Social Deviance
- Impulsivity
- Low Education
- History of Trauma
- Psychiatric Comorbidity
- Ever Divorced
- History of SUD
- Social Deviance
- Low Social Support
- Marital Problems in
- Low Religious Services
- Stressful Life Events
- Social Deviance

DRUG AVAILABILITY

SUD LAST YEAR
SUDs are part of a broader structure

Krueger, 1999
Probability And Age of First Substance Use

Probability of Use

<table>
<thead>
<tr>
<th>Substance</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>46%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>82%</td>
</tr>
<tr>
<td>Cannabis</td>
<td>20%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>6%</td>
</tr>
</tbody>
</table>

Median Age at First Use (in years)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>15</td>
</tr>
<tr>
<td>Alcohol</td>
<td>18</td>
</tr>
<tr>
<td>Cannabis</td>
<td>17</td>
</tr>
<tr>
<td>Cocaine</td>
<td>20</td>
</tr>
</tbody>
</table>

Blanco et al., Am J Addictions, 2018
By the Time they are in 12th Grade, More than Half of Teens Report Having Tried Alcohol, Nearly Half Have Tried Vaping

Percentage of Seniors Who Have Ever Used

Source: University of Michigan, 2020 Monitoring the Future Study
Adolescence is the *period of greater Vulnerability* for Drug Abuse & Addiction.

*Degenhardt, JAMA Psychiatry 2016.*
Probability of transition

Lopez-Quintero et al., Drug Alcohol Depend, 2011
Common and Specific Consequences of SUD

Franco et al., Drug Alcohol Depend, 2019
We Also Need to View and Treat Addiction As A Chronic, Relapsing Illness
Natural course of remission for four substances

Lopez-Quintero et al., Addiction, 2011
Course of relapse of smoking

Garcia-Rodriguez et al., Drug Alcohol Depend, 2013
Switching Addictions?

![Graph showing percentage of new onset SUD with and without SUD remission. The graph indicates a significant difference (P<.001) between those who did and did not remit.

Data are from NESARC Waves 1 and 2
Blanco et al., JAMA Psychiatry 2014]
So…what Have We Done To Change The Drug Abuse Trajectory?

Drug abuse Prevention can be seen as experimental epidemiology.
There are Multiple Risk Factors

- Laws/Culture
- Neighborhood/Community
- Family/Peers
- Biology
- Individual/Genes

Time/Age
Example from PROSPER Community Prevention Delivery System—Young Adult Outcomes of Middle School Programs

PROSPER vs. control differences are practically significant: For every 100 misusers in non-PROSPER communities, there would be about 20-26 fewer in PROSPER communities.

Note: *p<.05, RRRs=20-26%
PROSPER (Community/University Partnership) Reduces Illicit Substance Use

Sum of six lifetime illicit use measures (methamphetamines, Ecstasy, inhalants, Vicodin, prescription drug misuse overall, other illicit drug use); Intervention vs. Control difference in slope is statistically significant, as are differences at multiple time points, including 11th and 12th grades.

Parents who were in the SSDP intervention in childhood grow up to have children with lower youth self-reported alcohol and drug onset (ages 6 - 18 years).

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Control</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early sex</td>
<td>12%</td>
<td>6%</td>
</tr>
<tr>
<td>Ever alcohol</td>
<td>30%</td>
<td>16% +</td>
</tr>
<tr>
<td>Ever cig</td>
<td>21%</td>
<td>12%</td>
</tr>
<tr>
<td>Ever marijuana</td>
<td>24%</td>
<td>17%</td>
</tr>
<tr>
<td>Ever any drug</td>
<td>37%</td>
<td>16%</td>
</tr>
<tr>
<td>Ever violent crime</td>
<td>53%</td>
<td>40%</td>
</tr>
<tr>
<td>Ever non-violent crime</td>
<td>40%</td>
<td>28%</td>
</tr>
</tbody>
</table>

False Discovery Rate corrected significance level to address multiple testing. + p < .10  * p < .05
Children (1-18 years old) from Parents who were in *Raising Healthy Children Intervention* in Grades 1-6 (n=72) Compared to Controls (n=110)

Hill KG et al., JAMA Pediatr. 2020
Public Health Benefits 16 Years After State Policy Change: Communities That Care in Pennsylvania

School districts (388) that implemented CTC (52%) had significantly lower levels of adolescent substance use, delinquency, and depression (odds ratios).

Opioid Prescribing Guidelines

March 2016

• Intended for primary care providers
• Applies to patients >18 years old in chronic pain outside of end-of-life care
• Focuses on:
  ➢ Determining when to initiate or continue opioids for chronic pain
  ➢ Opioid selection, dosage, duration, follow-up and discontinuation
  ➢ Assessing risk and addressing harms of opioid use

Patient-Centered Reduction or Discontinuation of Long-term Opioid Analgesics:

The HHS Guide for Clinicians

Focuses on:
(1) Criteria for reducing or discontinuing opioid therapy
(2) Considerations prior to deciding to taper opioids
(3) Ensuring patient safety prior to initiating taper
(4) Shared decision-making with patients
(5) Rate of opioid taper
(6) Opioid withdrawal management
(7) Behavioral health support
(8) Challenges to tapering

Dosage changes, particularly rapid reductions in dose, can harm patients or put them at risk if not made in a thoughtful, deliberative, collaborative, and measured manner.
So...what Should We Do To Change The Drug Abuse Trajectory?

Drug abuse Prevention can be seen as experimental epidemiology.
Traditional View of Innovation: Top Down

Rogers, 1962
Develop a Learning Health Care System

- Using *Public Health Needs* to *Generate Meaningful Research Questions*

- Ensuring that *Research Findings are Applied to Practice*
LHS : Dialogue and Iteration

In a learning health care system, research influences practice and practice influences research.

EVALUATE
Collect data and analyze results to show what works and what doesn’t.

ADJUST
Use evidence to influence continual improvement.

IMPLEMENT
Apply plan in pilot and control settings.

DESIGN
Design care and evaluation based on evidence generated here and elsewhere.

DISSEMINATE
Share results to improve care for everyone.

INTERNAL AND EXTERNAL SCAN
Identify problems and potentially innovative solutions.

Greene et al., Ann Int Med, 2012
There are Multiple Risk Factors

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- Impulsivity
- SUD LAST YEAR

DRUG AVAILABILITY
How Prevention Interventions Work

**Background Factors**
- Age
- Gender
- Race/ethnicity
- Poverty level
- Genotype

**Modifiable Risk & Protective Factors**
- Early aggression
- Social skills deficits
- Academic problem
- Misperceived drug use norms
- Association with deviant peers
- Neighborhood availability
- Media glamorization
- Parental monitoring and support

**Interventions**
- Parent skills training
- Social skills training
- Self-regulation
- Impulse control
- Tutoring
- Norms training
- Refusal skills
- Community policing
- Health literacy
Interventions Can Influence the Behaviors of Nonparticipants Through **Friendship Networks**

Adolescents with 3+ friends participating in the Strengthening Family Program were less likely to use cigarettes or get drunk than those who had no friends in the program (3 yrs post intervention).

*Kelly et al., J Adolesc Health 2015*
Emerging Research Issues on E-cigarettes

- Potential benefits and harm at the individual and public health level
- E-cigarette use as cigarette-smoking cessation
- E-cigarette as a gateway to combustible cigarette use (especially among youth)
- E-cigarette use leading to re-normalization of cigarette smoking (especially among youth)
- Exposure of nicotine to the developing brain and how changes in e-cigarette devices may impact this exposure
- Concurrent use of e-cigarettes with marijuana and/or other substances
Public Health Benefits 16 Years After State Policy Change: Communities That Care in Pennsylvania

School districts (388) that implemented CTC (52%) had significantly lower levels of adolescent substance use, delinquency, and depression (odds ratios).

- Alcohol 30 day
- Alcohol - lifetime
- Cigarettes - 30 day
- Cigarettes - lifetime
- Marijuana - 30 day
- Marijuana - lifetime
- Drunk or high at... (not fully visible)
- Binge drinking
- Any drug use -... (not fully visible)
- Any drug use -... (not fully visible)
- Arrested - 12 mo.
- Ever been arrested

HEAL Prevention Initiative

1. Risk Identification
2. Intervention Development
3. Social Determinants and Inequities
4. Dissemination, Implementation, Scale-up, & Sustainment
Cooperative Research Projects

<table>
<thead>
<tr>
<th>Community and Social Services</th>
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<tbody>
<tr>
<td>• Tribal communities (urban, rural, reservation)</td>
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<tr>
<td>• Young adult parents with history of SU in rural community</td>
</tr>
<tr>
<td>• Homeless youth</td>
</tr>
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<td>• Child welfare involved families</td>
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<table>
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<tr>
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<tr>
<td>• Brief intervention in the Emergency Department</td>
</tr>
<tr>
<td>• School based health centers – video game intervention</td>
</tr>
<tr>
<td>• Behavioral health treatment settings</td>
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<th>Juvenile Justice</th>
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<tbody>
<tr>
<td>• Adolescents and young adults with and without substance use disorder in justice settings</td>
</tr>
<tr>
<td>• Youth transitioning out of detainment</td>
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</table>
Structural and Social Challenges for SUD During SARS-CoV-2

- Stress and Stigma
  - Limited medication access and limited peer-support groups/social connection
  - Social distancing increases likelihood of opioid overdoses happening with no observers who can administer naloxone
- Job losses
- Housing instability/homelessness
- Incarceration (>50% of U.S prisoners have SUD) and prison populations are at greatest risk SARS-CoV-2 transmission
A longitudinal study of about 10,000 children from ages 9-10 through early adulthood to assess factors that influence individual brain development trajectories and functional outcomes.
Research Objectives

- Describe individual developmental trajectories (e.g., brain, cognitive, emotional, academic), and the factors that can affect them.
- Develop national standards of healthy brain development.
- Investigate the roles and interaction of genes and the environment on development.
- Study how physical activity, sleep, screen time, sports injuries, and other experiences affect brain development.
- Examine the factors that influence the onset, course, and severity of mental illnesses.
- Understand the relationship between mental health and substance use.
- Study how use of different substances (caffeine, nicotine, alcohol, marijuana) affects developmental outcomes, and vice versa.
Adolescent Brain Cognitive Development (ABCD) Study

Full Baseline Curated Data Released April 2019
ABCD Data Release 2.0.1 available now

Unique Users - 2019

Clinical files
Tabulated imaging files
Minimally processed image files
Fasttrack image files

January | February | March | April | May | June | July
Treatment is not nearly enough

OUD Cascade of Care in USA

Current estimates
Treatment gap
90% goal

Williams AR, Nunes E, Olfson M. Health Affairs Blog, 2017