Dose of Knowledge

Dani Ottoson, Pharm.D.
Dose of Knowledge
A Pharmacists Teach Program
Pharmacists Teach/ Dose of Knowledge helps educate youth and parents on the dangers associated with substance misuse

Our no-cost programs provide resources to educators and pharmacists across the US

Dose of Knowledge
A suite of standards-aligned digital resources that empower educators and pharmacists to discuss the facts about medication safety and substance misuse with K-12th grade students, in either a classroom or virtual learning setting.

Visit DoseOfKnowledge.com to learn more!

Prescription for Parents
A prevention education program for adults that arms parents, caregivers, friends, and family members with knowledge about substance misuse and how to discuss risks with their children.

CVS Pharmacists Teach programs have reached an estimated 1.7M lives nationwide!

Questions or to schedule a presentation?
Email PharmacistsTeach@CVSHealth.com
Website Overview

https://www.doseofknowledge.com

- **Homepage**
- **Educator Page**
  (Presentations, Educator Guides, Ability to Connect with a Pharmacist)
- **Student Page**
  (Interactive Module, Coming in the Fall: Spanish)
Our nine standards-aligned lessons are geared for students from elementary to high school

<table>
<thead>
<tr>
<th>Lesson Title</th>
<th>Grade Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Safety (K-2)</td>
<td></td>
<td>Students will be introduced to the power of medicine and the importance of medication safety. They will learn about prescription medicine, over-the-counter medicine, and vitamins, and they will understand what to do in case of an emergency.</td>
</tr>
<tr>
<td>Medication Safety (3-5)</td>
<td></td>
<td>Students will learn about the power of medicine and the importance of medication safety. They will compare and contrast prescription medicines and over-the-counter medicines, and they will understand what to do in case of an emergency.</td>
</tr>
<tr>
<td>All About Medicine (3-5)</td>
<td></td>
<td>Students will explore how medicine is created, how it can be administered, how it travels through the body and the reasons behind its many forms.</td>
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<tr>
<td>Peer Pressure (6-12)</td>
<td></td>
<td>Students will work together to develop and practice refusal skills and exit strategies to use when offered opioids or other drugs.</td>
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<tr>
<td>Mental Health (6-12)</td>
<td></td>
<td>Students will learn about mental health and the important role that each part of their health plays in their overall wellbeing. They will examine the causes and effects of stress, anxiety, and depression and explore options and strategies for supporting their own mental health. They will learn about treatment and some types of medication that may be used for anxiety and depression.</td>
</tr>
<tr>
<td>Managing Stress (3-5)</td>
<td></td>
<td>After students learn about the key components of health, they will focus on mental health as they consider the causes and effects of stress. They will explore tips and strategies for supporting their own mental health, and they will apply these strategies to stressful scenarios they may experience throughout their lives.</td>
</tr>
<tr>
<td>Opioid Use and Misuse (6-8)</td>
<td></td>
<td>Students will learn about opioids, the effects of these drugs on the human brain, and the endorphin-like effects on the human body. Students will compare the differences between prescription medications and illicit drugs.</td>
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<tr>
<td>Prescription Stimulants (6-12)</td>
<td></td>
<td>Students will learn about prescription stimulants and how they can be used to treat someone diagnosed with ADHD. They will learn about the effect's prescription stimulants can have on the brain and body if they are misused. They will identify where they can turn for help if needed.</td>
</tr>
<tr>
<td>Opioids and the brain (9-12)</td>
<td></td>
<td>Students will receive an overview of what opioids are and examine the short-term and long-term effects they have on the brain and body. Students will learn about substance misuse and substance use disorder.</td>
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Opioids and the Brain
Nervous System

What does your hand do when you accidently touch something hot?

Nervous System

- Allows body to react to outside world
- Controls processes inside our body
- Made of over 100 billion nerve cells called neurons
Nervous System

Central Nervous System
- Includes brain and spinal cord
- Responds to sensory information

Peripheral Nervous System
- Includes all the nerves that branch out from the brain and spinal cord
- Connects CNS to other parts of the body, including muscles and organs
The Effect of Stimulants and Depressants on the CNS

**Stimulants**
- Increase energy and stimulate the body
- Work by increasing alertness and attention
- Can increase blood pressure and heart rate
- Examples include: Adderall®, Ritalin®, Concerta®, and the illegal drug methamphetamine

**Depressants**
- Slow brain activity
- Work by creating feelings of calmness and drowsiness
- Can lower heart rate and blood pressure
- Examples include: Xanax®, Klonopin®, and Ambien®
What is an Opioid?

An opioid is a substance that acts on receptors in your brain for pain relief.

<table>
<thead>
<tr>
<th>Illegal/Illlicit</th>
<th>Legal with Prescription</th>
</tr>
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<tbody>
<tr>
<td>Heroin</td>
<td>Hydrocodone, Oxycodone, Morphine, Codeine, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Synthetic Opioid Fentanyl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be legal (prescription pain medication) or illegal (misused or used to lace other illicit drugs)</td>
</tr>
</tbody>
</table>
What You Need to Know About Opioids and Their Effects
How do Opioids Work?

- Opioids target nerve cells in the brain, spinal cord, and other organs.

- Opioid drugs bind or attach to opioid receptors and can have three main effects:
  - Decrease feelings of pain by blocking pain messages to the brain
  - Increase feelings of pleasure
  - Slow the automatic processes in the body, like breathing
Endorphins & Dopamine

- Endorphins naturally block pain by binding to opioid receptors in the spinal cord and other parts of the nervous system.

- Opioids mimic endorphins, but cause a much stronger pain-blocking signal.

Endorphins > Release of Dopamine

- Endorphins prompt the release of dopamine, which causes pleasure.

- Opioid drugs cause a larger flood of dopamine to be released.
  - These effects are often referred to as euphoria, which is defined as feelings of intense excitement or happiness.
  - The brain can remember this “high” and can start to crave the intensity produced by the opioid drug.
# Tolerance and Dependence on Opioids

- **Dopamine > Tolerance & Dependence**

<table>
<thead>
<tr>
<th>Tolerance</th>
<th>Dependence</th>
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<tbody>
<tr>
<td>When someone has taken enough opioid medication over time that he/she now requires a higher or more frequent dose to feel the same effects</td>
<td>When after repeated use, the parts of the brain responsible for releasing dopamine only function normally when the drug is around</td>
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</table>
Substance Misuse

Misuse is when people start to use a substance, like drugs or alcohol, for non-medical purposes in a manner that’s harmful to themselves or others.

Examples of prescription drug misuse include:

• Not following the instructions from your doctor

• Taking more of a medication than is prescribed

• Taking medication that belongs to someone else

• Taking a medication to feel euphoric (i.e., to “get high”)
### Signs and Symptoms of Substance Misuse

These common signs and symptoms can be physical or behavioral in nature

<table>
<thead>
<tr>
<th><strong>Physical</strong></th>
<th><strong>Behavioral</strong></th>
<th><strong>Other Signs &amp; Symptoms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Excessive fatigue</td>
<td>• Chronic dishonesty</td>
<td>• New or changing group of friends</td>
</tr>
<tr>
<td>• Repeated health complaints</td>
<td>• Sudden mood or personality changes</td>
<td>• Missing medications from your medicine cabinet</td>
</tr>
<tr>
<td>• Red or glazed eyes</td>
<td>• Increased negativity and irritability</td>
<td>• Concern with obtaining funds or selling personal items</td>
</tr>
<tr>
<td>• Significant weight changes</td>
<td>• Secretiveness or withdrawal from family and friends</td>
<td>• Drug paraphernalia</td>
</tr>
</tbody>
</table>
The Cycle of Addiction

Substance Use Disorder

a disease that affects a person’s brain and behavior and leads to an inability to control the use of legal or illegal drugs
Teenage Brain

The part of the brain the controls decision-making is the Prefrontal Cortex. It is not fully developed until age 25.

The decision-making part of the brain (Prefrontal Cortex) does not develop at the same rate as the emotional part of the brain (Amygdala), which is already fully developed.

<table>
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<th>Prefrontal Cortex</th>
<th>Amygdala</th>
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<tbody>
<tr>
<td>Controls thinking, decision-making, and the ability to control behavior</td>
<td>Controls emotions like anger and fear and the ability to control aggression</td>
</tr>
</tbody>
</table>

The teenage brain is largely controlled by the amygdala, because the amygdala is fully developed. That means teens may be more likely to act impulsively and make risky choices.
Effects of Substance Misuse on the Teenage Brain

The combination of impulsive decisions and a susceptible brain makes teens prime targets for addictive behaviors.

Introducing substances that change the chemistry in your brain at this stage of your development may have a lifelong impact.

90% of people battling substance use disorders reported started using in their teens*

*https://www.centeronaddiction.org/addiction-research/reports/adolescent-substance-use-americas-1-public-health-problem
Find Human Resources to Help You Make Star Choices!

70,000 screaming fans cheer on their hometown team.
What is Naloxone and How Does it Work?

- A potentially life-saving medication that can rapidly stop or reverse the effects of an opioid overdose
- Knocks opioids off the receptors in the brain, allowing for normal breathing to be restored
Learning Summary

✓ The nervous system is made up of two parts—the central nervous system and the peripheral nervous system.

✓ Stimulants and depressants have different effects on the brain and nervous system.

✓ Misusing prescription stimulants can cause psychosis, paranoia, heart attack, or stroke.

✓ Misusing depressants can cause slurred speech, confusion, dizziness, drowsiness, and slowed breathing. Combining these types of medications with other drugs, like opioids, or with alcohol dramatically increases the risk for serious and deadly consequences.

✓ Endorphins are natural pain blockers produced by the central nervous system.

✓ Opioids mimic endorphins and can provide a feeling of euphoria.

✓ Opioids bind to receptors in the brain to block pain messages from the nervous system.
Learning Summary

✓ It is important to use prescription medication as prescribed. Misusing prescription medications is illegal and dangerous.

✓ Common symptoms of substance misuse can be physical, behavioral, or be displayed in new habits or preoccupations.

✓ Substance misuse can alter brain function. Teen brains are even more at risk since they’re still developing.

✓ Misusing substances, like prescription opioids, can lead to addiction or a substance use disorder.

✓ Naloxone is a potentially life-saving medication that can stop or reverse the effects of an opioid overdose.

✓ Good Samaritan Laws protect people who call 911 to get help for a friend, even if they have also been misusing substances.

✓ The words we use matter! Avoid using stigmatizing language.

✓ Seek guidance from a trusted adult if you have questions or need help. “Human Resources” can include parents, teachers, doctors, coaches, etc.
Making healthy choices starts with YOU!
SKY RECOVERY PROGRAM

A HIGH IMPACT BREATH BASED MEDITATION PROGRAM FOR RECOVERY

Priya Narayanan, MD
September 12th, 2022
National Drug-Involved Overdose Deaths*
Number among All Ages, By Gender, 1999-2000
National Drug-Involved Overdose Deaths*

Number among All Ages, 1999-2000
Is test factory showcasing value?

Is there rigor in governance and standard reporting?

Is Test Factory able to show leadership and maturity to drive testing discussions across large programs?

Is Test Factory aligned to Philips way of working (DC/Platform / Program)?

Is PTF a good investment?

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**TREATMENTS**

**MEDICATION ASSISTED PROGRAM**

**COGNITIVE BEHAVIORAL THERAPY**

**EXERCISE THERAPY**

**GROUP SUPPORT ACTIVITIES**

**PAIN EDUCATION OR TNE**

**SPINAL MANIPULATION, ACUPUNCTURE OR YOGA**

**MINDFULNESS BASED PROGRAMS**

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**Treatment of OPIOID use disorder**

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Neuroscience of Addiction

- **Restore Executive Control Over Drug Use**
  - NK1 antagonist
  - Lorcanerin
  - Oxotocin
  - Pregnenolone
  - Gabapentin
  - Topiramate
  - Vaccines

- **Manage Withdrawal and Restore Balance to Stress Response**
  - KOR antagonists
  - Lofexidine
  - Gabapentin
  - N-acetylcysteine
  - Peripheral nerve stimulation

- **Preoccupation Anticipation**

- **Negative Affect Withdrawal**

- **Binge Intoxication**

- **Prefrontal Cortex**

- **Basal Ganglia**

- **Extended Amygdala**
• Respiration entrains the electrical activity of the brain
• Respiratory rhythms modulate neural oscillatory patterns throughout the brain/organize neuronal activity
• This has been found in animal and human studies and can be measured by EEG
It’s a Two-Way Street..
100+ Independent Studies on SKY - Key Findings

- **DEEP SLEEP**: 218% Increase
- **WELL-BEING**: Hormone Increases 50% Increase Serum Prolactin
- **DEPRESSION**: Decreases 70% Remission Rate In 1 Month
- **STRESS**: Hormone Decreases 56% REDUCTION Serum Cortisol

“SKY is the most powerful technique I’ve learnt”
Underlying Mechanism

- Before/after study design
- 40 healthy volunteers (avg age 25)
- Regular practitioners of SKY
- Excluded epilepsy, psych d/o, prolonged med exp
- 24 channel EEG 5 min before/after SKY: frontal, centrotemporal, parietal, and occipital regions

State changes in neuronal oscillations in multiple frequency bands immediately after SKY practice.
Underlying Mechanism Cont.

- **Figure**: % change in spectral power after SKY in 5 frequency bands across 7 regions
- Spectral power increased significantly in all frequency bands bilaterally in frontal, central, parietal, temporal, and occipital regions
- **Highest % change increase in gamma and beta** after SKY
- Asymmetry index values tended toward 0 following SKY (suggesting interhemispheric synchronization)
Effectiveness of SKY
As An Adjunctive intervention in Opioid Dependent Users

Sample Size: 84, Randomized Control Study

01 Control Group - standard therapy
02 (BUPRENORPHINE)
03 Study Group - standard therapy + SKY

SKY program conducted over 12 hours plus Daily 30 min practice

WHO Quality of Life Scale Domains
Impact by SKY - RESULTS

Physical health - P <0.05
Social Relationships NS
Psychological Health P <0.001
Environment P <0.001
WHO Quality of Life Psychological Health Domain

Effects on Psychological Quality of Life

Control

SKY

Change in Baseline: 6 months
Change in Baseline: 3 Months
Pilot study – Efficacy of SKY as an Adjunctive treatment for OUD

01 Ashtabula, one of Ohio’s poorest counties, had a 128% increase in overdose deaths between 2010 and 2020

02 FEASIBILITY AND ACCEPTABILITY STUDY, SKY in addition to treatment as usual

03 Instruments: Behavior and Symptom Identification Scale-24 (BASIS-24), Short Form-36 (SF-36), Perceived Stress Scale (PSS) surveys
Efficacy of SKY Breath Meditation on Opioid use Disorder
Qualitative Results

• High retention and completion rates observed (87.5%)
• All participants noted “mood was more positive”
• “I did my breathing. I feel alive afterwards”
• “Stressful situations are not as stressful”
• “I feel centered and calmer”
• ”I am starting to feel a difference in my body”
OUD and Comorbid Psychiatric Disorders

OUD and early life adversity (ELA)

OUD derives in part from abnormal reward circuit function, implicated in comorbid mental illnesses such as depression, bipolar disorder, and schizophrenia.

Addressing co-morbidities is essential to addressing OUD

In a large, representative study of over 20,000 subjects in the US, as many as 50% of people living with OUD also suffered from mental illness comorbidities (Ross & Peselow, 2012)
SKY Study for Depression.

**Study Framework**

- 25 pts with MDD with inadequate response to ≥ 8 wks SSRI tx
- Feasibility & efficacy of SKY as adjunctive tx
- Pts randomized to SKY (n=13) or waitlist control group (n=12); rater blind
- Primary efficacy endpoint was change in HDRS-17 score from baseline to 2 mo

**SKY Significantly Improves Outcomes for Depressed Patients Not Responding Well to Anti-Depressants**

- After 30 and 60 days, SKY group showed a sig decrease in dep compared to control
- SKY may be a useful adjunct for nonresponders to SSRI tx
SKY Study for PTSD...

Study Framework

- Randomized, wait-list controlled study
- 21 male Iraqi/Afghanistan veterans
- Active and waitlist control groups
- PCL self-report measures obtained 1 wk, 3 months, 1 yr after SKY
- Significant reduction in PTSD sx after just 1 week; results persisted for 1 yr with no follow-up sessions

SKY Significantly reduces PTSD sx

- PCL-M (Posttraumatic Stress Disorder Checklist Military Version)
- * p value < 0.0001
- $ p value < 0.005
SKY Study Sleep Quality..

**Study Framework**

- Assessed sleep architecture differences in those who practice SKY (n=13) vs controls (n=13)
- Whole night polysomnographic recordings were carried out in middle-aged subjects

**The SKY Significantly Enhances Restful Sleep**

SKY group spent 3x their total sleep time in restful sleep (slow wave sleep and REM), compared to controls.
Underlying Mechanism – Cortisol Reduction

Study Framework

- 60 pts who met criteria for etoh dependence
- Underwent 1 wk detox
- Randomized to SKY or control group (residential tx as usual)
- Measured ACTH and cortisol in AM at time 0 (before learning SKY) and 2 weeks after SKY

SKY significantly decreases stress hormone levels (cortisol)

Adding SKY to conventional tx for individuals in recovery for substance use was twice as effective in reducing cortisol levels as conventional tx alone.
SKY significantly increases prolactin hormone

**Study Framework**

- 19 **male** patients diagnosed with MDD mild or moderate
- [prolactin] measured before and after first SKY session
- SKY groups N=12; control group N=7

Prolactin, a well-being hormone is abnormally low in depressed individuals.

Depressed patients experienced 33.3% increase in their Prolactin levels after their very first SKY session.
TESTIMONIAL VIDEO
CALL TO ACTION

OCT 15 – OCT 17 2022
SAT 10AM – 1PM
SUN 10AM – 1PM
MONDAY 6 – 9PM

WHERE: DENVER, LOCATION TBA