

# YOUR PRESCRIPTION WILL BE READY AT “4:20”: WHEN TEENS WANT TO GET HIGH

Kara Lee Shirley,  
Pharm.D., CGP, BCPS, BCPP  
Associate Professor,  
Husson University School of Pharmacy

# Learning Objectives

- **Upon completion of this program participants will be able to:**
  - **Identify risk factors for addictive behavior and mental illness in adolescents**
    - *Identify inherited and acquired risk factors for addictive behavior and neuropsychiatric illness in adolescents*
    - *Discuss how suboptimal care of neuropsychiatric illness may predispose adolescents to addictive behaviors*

# Learning Objectives

- **Upon completion of this program participants will be able to:**
  - **Educate parents and caregivers of adolescents about the warning signs and treatment options for addiction and mental illness**
  - *Educate parents and caregivers of adolescents about warning signs and triage of addictive behaviors*
  - *Educate parents and caregivers of adolescents about recent trends in medication diversion and prevention strategies*

# Self Assessment Questions

1. **Which of the following temperamental traits increases the risk of developing a substance use disorder among adolescents?**
  - a. Reduced attention span
  - b. High impulsivity
  - c. Irritability
  - d. Emotional instability
  - e. All of the above

# Self Assessment Questions

**2. Which of the following is NOT associated with the initiation of drug use in adolescents?**

- a. Low religiosity
- b. Sensation seeking
- c. Inability to delay gratification
- d. Perfectionistic traits
- e. None of the above

# Self Assessment Questions

**3. Which neuropsychiatric disorder is least likely to co-occur with drug dependence syndromes in children?**

- a. Schizophrenia
- b. Major depression
- c. Bipolar disorder
- d. Posttraumatic stress disorder
- e. Attention-deficit/hyperactivity disorder

# Self Assessment Questions

**4. Which route of administration used to ingest a prescription stimulant will cause the most euphoric effect?**

- a. oral
- b. topical
- c. intranasal
- d. inhalation

# Clinical Case #1

- KM is a 16 y/o with Major Depressive Disorder (MDD)
  - ▣ History of outpatient treatment by her pediatrician
  - ▣ Recently ran away from home after she reported being sexually assaulted by her stepbrother
  - ▣ Admitted to an inpatient facility after accidental dextromethorphan (DMX) “skittles” overdose

# Why do people misuse medications?

- **“To feel good”**
  - ▣ Most abused drugs produce intense feelings of pleasure. This initial sensation of euphoria is followed by other effects, which differ with the type of drug used.
  - ▣ For example, with stimulants such as cocaine, the "high" is followed by feelings of power, self-confidence, and increased energy.
  - ▣ In contrast, the euphoria caused by opiates such as heroin is followed by feelings of relaxation and satisfaction.

# Why do people misuse medications?

- **“To feel better”**
  - ▣ Some people who suffer from social anxiety, stress-related disorders, and depression begin abusing drugs in an attempt to lessen feelings of distress.
  - ▣ Stress can play a major role in beginning drug use, continuing drug abuse, or relapse in patients recovering from addiction.

# Why do people misuse medications?

- **“To do better”**
  - ▣ The increasing pressure that some individuals feel to chemically enhance or improve their athletic or cognitive performance can similarly play a role in initial experimentation and continued drug abuse.
- **“Curiosity & because others are doing it.”**
  - ▣ In this respect adolescents are particularly vulnerable because of the strong influence of peer pressure; they are more likely, for example, to engage in "thrilling" and "daring" behaviors.....

# Rx Abuse

- **Partnership for a Drug-Free America**
  - **1 in 11 teens has admitted to getting high on cough medicine**
  - **1 in 5 teens has tried Vicodin®**
  - **1 in 10 teens has tried Oxycontin®**
  - **1 in 10 teens has tried the stimulants Ritalin® or Adderall® for nonmedical purposes**

# Prescription Rx Abuse

- **Why the dramatic increase?**
  - **Awareness**
    - Internet information explosion
    - Direct-to-Consumer Advertising
  - **Access**
    - Internet Sales
    - Friends & “Pharming”
      - Text messaging, chat rooms, unsupervised internet access
    - Parents
      - Medicine Cabinet
      - Opioids, stimulants, depressants such as benzodiazepines

# Addiction is.....

- **Addiction is a developmental disease**
  - ▣ **Adolescents and young adults generally exhibit higher rates of experimentation**
  - ▣ **It typically begins in childhood or adolescence**
    - **Most adult US smokers begin smoking before the age of 18**
    - **Onset of daily smoking is uncommon after the age of 25**
    - **Over 40% of adult alcoholics experience alcoholism-related symptoms between ages 15 and 19**
  - ▣ **Earlier onset of substance use predicts greater addiction severity**

# What factors increase the risk of addiction?

- **Home and family**
- **Peer and school**
  - ▣ **Sociocultural aspects do not fully account for greater drug intake**
- **Early substance use**
- **Method of administration**
  - ▣ **Smoking**
  - ▣ **Intranasal**
  - ▣ **Intravenous**
  - ▣ **Oral**
- **Genetic and neurobiological factors**

# Impulsivity & Substance Use Disorders (SUD)

- **Disturbances in reward motivation and SUD comorbidity are associated with “impulsivity”**
  - ▣ **Neuropsychiatric Disorders**
    - **MDD**
    - **ADHD**
    - **Eating Disorders**
    - **PTSD**
    - **Impulse-control disorders**
    - **Conduct disorder**

# “Impulsivity” and Decision Making

- **Definition of “impulsivity”**
  - ▣ **Goal-directed behavior characterized by poor judgment in the attainment of rewards**
    - **Drugs**
    - **Sex**
    - **Money (Gambling, shoplifting)**
    - **Food**
    - **Social Power (by means of violence)**

# Neurocircuitry of Motivation

- Motivation is *brain activity* which processes
  - ▣ Internal state of the individual in the external environment
  - ▣ Determines behavioral output
- Higher-order processing designed to organize behavior to maximize survival

# Neurocircuitry of Motivation

- **Substantial portions of the brain are involved**
  - ***Primary circuit***
    - Prefrontal cortex and ventral striatum
      - Motor output
  - ***Secondary circuit***
    - Sensory Input
      - Emotion and contextual memory:
        - Amygdala & Hippocampus
      - Instinctive behaviors (eating, sex, aggression):
        - Hypothalamic and septal nuclei

# Cortical development & Adolescence

- Maturation of the prefrontal cortex is facilitated by motivational drives to participate in novel adult-like behaviors
- Experience-based motivation to guide more appropriate decision making
- Developmental events that facilitate motivational drives to promote learning
  - ▣ May simultaneously increase vulnerability to the neurobehavioral effects of addictive drugs

# Cortical development & Adolescence

- **Increases in cortical interconnectivity in childhood**
- **Decreases to adult levels over adolescence**
- **Process reflects optimized learning potential corresponding to decreased rate of neuroplastic change**
- **Development determines the ability to learn new information versus that to use and elaborate on previously learned information**
- **System develops which prevents the loss of previously learned information**

# Motivation & Addiction Learning

- **Adolescent synaptic remodeling or “re-wiring” via behavior may create entrenchment of connections which promote impulsive behaviors and addiction**
  - ▣ **CREB; Synaptic remodeling and maturation**
  - ▣ **BDNF Induction : Vitality, Learning & memory**
- **Ages 10-25**
  - ▣ **Synaptic receptor density and myelination of frontal cortical areas**
    - **Interpersonal interactions**
    - **Impulse control**
    - **Goal setting**
    - **Assessment of risk versus benefit (reward)**
    - **Motivation**

# Adolescents & SUD

- **Are all adolescents predisposed to SUD?**
  - **Synaptic strength and remodeling**
    - **Glutamate and NMDA receptor systems**
    - **GABAergic systems**
  - **Rewards, social actions, attention**
    - **Dopaminergic systems**
  - **Serotonergic systems**
    - **Mood, anxiety and sleep**

# Neuropsychiatric Illness in Adolescents & SUD

- **Does SUD vulnerability reflect early presentation of neuropsychiatric illnesses that confer greater risk of SUD?**
  - ▣ **Major Depressive Disorder (MDD)**
  - ▣ **Posttraumatic Stress Disorder (PTSD)**
  - ▣ **Eating Disorders**
    - *Bulimia Nervosa (BN)*
    - *Anorexia Nervosa (AN)*
  - ▣ **Attention Deficit Hyperactivity Disorder (ADHD)**
    - *Conduct Disorder (CD) Comorbidity*

# Practice Parameter for “SUD” in Children & Adolescents

- **DSM-IV-TR criteria have not been officially established as applicable to adolescents**
  - ***Substance abuse***
    - **Maladaptive pattern with significant impairment or distress**
      - Inability to meet role functioning in 1 or more major areas
      - Risk-taking behavior
      - Exposure to hazardous situations
      - Increase in legal problems related to possession
  - ***Substance dependence***
    - **Meeting 3 of 7 criteria**
      - Withdrawal
      - Tolerance
      - Loss of control over use
        - “Addiction”

# SUD Presentation: Children & Adolescents

- **Presentation differs from that of adults**
- **Hallmark is impairment in academic as well as psychosocial functioning**
- **Acute change in mood, cognition and behavior**
  - ▣ **Behavioral changes: disinhibition, lethargy, hyperactivity or agitation, somnolence, hypervigilance**
  - ▣ **Mood changes: Depression to euphoria**
  - ▣ **Cognitive changes: impaired concentration, attention span, perceptual and overt disturbances in thinking e.g., delusions**

# SUD Presentation: Children & Adolescents

- **Manifestations may vary with:**
  - **Substances used**
  - **Amount used during a given timeframe**
  - **Setting and context of use**
  - **Individual characteristics**
    - **Experience with substance**
    - **Expectations of drug effect**
    - **Presence or absence of other neuropsychiatric pathology**

# SUD Practice Parameter: Children & Adolescents

- **Prevention**
- **Confidentiality of Disclosure**
- **SUD Assessment with Rating Scales**
- **Comprehensive neuropsychiatric evaluation**
- **Treatment of Comorbidities**
- **Specific SUD Treatment**
  - ▣ **Diagnostic Testing & Limitations**
  - ▣ **Motivation Interviewing**
  - ▣ **Cognitive Behavioral therapy**
  - ▣ **Family Therapy**
  - ▣ **Peer Support**
  - ▣ **12 Step Programs**
  - ▣ **Adjunctive Pharmacotherapy**
- **Continuity of Care**

# Pharmacotherapy of SUD in Children & Adolescents

- **“Option” rated by AACAP SUD guidelines**
  - **ETOH Cravings**
    - Naltrexone (ReVia®)
    - Topiramate (Topamax®)
    - Acamprosate (Campral®)
    - Ondansetron (Zofran®)
  - **ETOH Withdrawal**
    - Benzodiazepines (Oxazepam, Serax®)
  - **ETOH Aversion Therapy**
    - Disulfiram (Antabuse®)
  - **Opioid Withdrawal & Maintenance**
    - Clonidine (Catapres®)
    - Buprenorphine (Suboxone®, Subutex®)\*
    - Methadone
  - **Nicotine Replacement Therapy**
  - **Bupropion (Wellbutrin®, Zyban®)**

# Clinical Case #1

- **KM is a 16 y/o female with Major Depressive Disorder (MDD)**
  - ▣ History of outpatient treatment by her pediatrician
  - ▣ Recently ran away from home after she reported being sexually assaulted by her stepbrother 3 weeks ago
  - ▣ Admitted after accidental dextromethorphan (DMX) “skittles” overdose

# Case #1 Treatment Plan

- Evaluate safety and stability in current home environment
  - ▣ What may need to be changed?
- Would the process of telling anyone about the sexual assault be re-traumatizing for the patient?
  - ▣ Traumatizing for the family
  - ▣ Patient may chose not to tell, in order to protect their abuser and stay with their family
- Reassess MDD pharmacotherapy
  - ▣ Initiate a SSRI and monitor closely for suicidality during first month of treatment
  - ▣ Assess & Monitor potential Posttraumatic stress disorder (PTSD)
- Assess patient motivation for dextromethorphan abuse and potential polysubstance abuse
  - ▣ Appropriate level of confidentiality for patient disclosure

# Fluoxetine (Prozac®) & CBT for MDD with comorbid SUD

- **1<sup>st</sup> randomized trial conducted for adolescents with MDD & SUD**
- **Double-blind**
  - CBT with placebo
  - CBT with fluoxetine
- **In the context of cognitive behavioral therapy (CBT) MDD comorbid to SUD may remit with or without pharmacotherapy**
- **Depression does not appear to be improving early in the course of SUD treatment**
  - **SSRI such as fluoxetine should be considered even when patients are not yet abstinent**
  - **Weekly monitoring**
    - Adherence
    - Substance use
    - Target symptom response
  - **Reassess response to both MDD and SUD at 2 months**

# Patient & Caregiver Education

- **Prevention**
  - ▣ **Education & Communication**
- **DMX Abuse**
  - ▣ **Confusion, dizziness, nausea/vomiting, slurred speech, rapid heart beat, paresthesias, dissociative “out-of-body” reactions, double or blurred vision, visual hallucinations**
  - ▣ **Over 100+ OTC medications that contain DXM**
  - ▣ **MDD & SUD**
    - **Increased suicidality**
    - **2x as many girls reported an episode of depression in 2004**
  - ▣ **PTSD & SUD**
    - **SUD associated with self-medication of painful hyperarousal, trauma-associated memories and/or nightmares**
- **Outcomes**

# Clinical Case #2

- A high school principal has just been informed that a 11<sup>th</sup> grade student “AY” was seen gathering about 20 white tablets off of the classroom floor in the Language Arts class. When the student was asked, she nervously replied that the pills were just her ADHD medication. A peer grabbed her purse and the medication fell out. The teacher has never been informed that the girl has this diagnosis.

# Clinical Case #2

- **Upon further investigation by the school nurse it is discovered that AY has been recently diagnosed with Bulimia Nervosa (BN).**
  - **Binging & Purging for past 12 months**
  - **BMI is approximately normal**
  - **Received stimulants from a “friend” online**

# Medication Diversion

## □ **Adult** methods

- Doctor shopping
- Illegal Internet pharmacies
- Drug theft
- Rx forgery
- Illicit Rx by MDs

## □ **Youth** methods

- Stealing from relatives
- Purchasing from classmates
- Illegal internet pharmacies

# Gender & Medication Diversion

- **Girls outnumber boys in their misuse of prescription medications**
  - ▣ **Depression, anxiety, excessive concerns about weight and appearance, sexual abuse**
  - ▣ **Girls are perhaps more likely to abuse opioids and depressants**
  - ▣ **Boys are perhaps more likely to abuse stimulants**
- **Girls are more susceptible to peer pressure to “fit in” with their current friends**

# Treatment Plan Case #2

- **Assessment & Treatment of Bulimia Nervosa**
  - Individual CBT
  - Family Therapy
  - Adjunctive pharmacotherapy
    - Fluoxetine (Prozac®)
    - Topiramate (Topamax®)
  - Nutrition Support
- **Assessment of SUD**
- **Caregiver Education & Prevention of Diversion**

# Methods of abusing stimulants

---

- Crush tablet
- Snort
- IV
  - ▣ New Liquid preparation

# Methods to combat prescription misuse

- Develop tamper-resistant capsule
- Alter the synthesis and therapeutics of the product

# Clinical Case #3

- **TM is a 16 y/o male who has been diagnosed with ADHD since he was 8 y/o**
  - ▣ **Until 3 months ago TM's Connor's Rating Scale scores remained stable due to excellent outpatient care and follow-up**
  - ▣ **TM has withdrawn socially and only talks with his friends online; appears sluggish when arriving home from school in the afternoons**
  - ▣ **Mother finds receipt for an online order for Vicodin® on her son's laptop computer**

# Patient & Caregiver Education

- **Family Talk Agreement**
- **Assessment of SUD**
  - **CRAFFT: “Questions to Identify Adolescents with Substance Abuse Problems”**
- **Assessment of Neuropsychiatric Illness**
  - **Conduct disorder**
  - **Stimulant Pharmacotherapy of ADHD**
- **CBT**
- **Family therapy**
- **Peer support**
  - **12 Step Program**
- **Parental monitoring of computer & cell phone use**

# Addiction & Medical Outcomes

- **Subjective well-being**
- **Neuropsychiatric comorbidity**
- **Medical comorbidity**
  - ▣ **Periodontal disease**
  - ▣ **Sexual and physical abuse**
  - ▣ **STD's**
  - ▣ **HIV**
- **Homelessness**
- **Juvenile Delinquency**

# Summary

- **Prevention**
- **Education**
- **Confidentiality**
- **Assessment**
- **Screening**
- **Motivational Interviewing**
- **Treatment of SUD in addition to treatment of any neuropsychiatric comorbidity**
- **Nonpharmacologic therapy**
  - ▣ **Pharmacotherapy us adjunctive for SUD**
- **Continuity of Care**
- **Family support**
- **Peer support**

# Future Research

- **Cognitive Behavioral Therapy**
  - **Dual Diagnosis & Suicidality**
  - **Anxiety Disorders**
- **Translational Family Therapy**
- **Adolescent Group Therapy**
- **Motivational Enhancement Therapy**
- **Family Based Contingency Management**
- **Personality-Targeted Interventions**

# Future Research in SUD

## Pharmacotherapy

- **Stimulants in ADHD Adolescents at Risk for SUD**
  - **Extended-release dosage formulations**
- **Bupropion (Wellbutrin, Zyban®) in ADHD with comorbid SUD**
- **Atomoxetine (Strattera®) in ADHD with comorbid SUD**
- **Buprenorphine/Naloxone (Suboxone®) for opioid dependence in adolescents**
- **Topiramate (Topamax®) for Binge Eating Disorder**
- **Topiramate (Topamax®) for Compulsive Gambling**

# Questions ?

---

- [rhodyrx99@att.blackberry.net](mailto:rhodyrx99@att.blackberry.net)
- [shirleyk@husson.edu](mailto:shirleyk@husson.edu)

# References & Resources

- <http://www.nida.gov>
- <http://www.drugfree.org>
- <http://www.niaaa.nih.gov>
- <http://www.nimh.nih.gov>
- <http://www.theantidrug.com>

# Self Assessment Questions

1. **Which of the following temperamental traits increases the risk of developing a substance use disorder (SUD) among adolescents?**
  - a. Reduced attention span
  - b. High impulsivity
  - c. Irritability
  - d. Emotional instability
  - e. All of the above

# Self Assessment Questions

**2. Which of the following is NOT associated with the initiation of drug use in adolescents?**

- a. Low religiosity
- b. Sensation seeking
- c. Inability to delay gratification
- d. Perfectionistic traits
- e. None of the above

# Self Assessment Questions

**3. Which neuropsychiatric disorder is least likely to co-occur with drug dependence syndromes in children?**

- a. Schizophrenia
- b. Major depression
- c. Bipolar disorder
- d. Posttraumatic stress disorder
- e. Attention-deficit/hyperactivity disorder

# Self Assessment Questions

**4. Which route of administration used to ingest a prescription stimulant will cause the most euphoric effect?**

- a. oral
- b. topical
- c. intranasal
- d. inhalation

# References

- Breslau N, Davis GC, LR Schultz. Posttraumatic Stress Disorder and the Incidence of Nicotine, Alcohol and Other Drug Disorders in Persons Who Have Experienced Trauma. *Arch Gen Psychiatry* 2003;60:289-294.
- Bukstein OG, Work Group on Quality Issues American Academy of Child and Adolescent Psychiatry. Practice Parameter for the Assessment and Treatment of Children and Adolescents with Substance Use Disorders. *J Am Acad Child Adolescent Psychiatry* 2005;44 (6):609-621.
- Chambers RA, Taylor JR, Potenza MN. Developmental Neurocircuitry of Motivation in Adolescence: A Critical Period of Addiction Vulnerability. *Am J Psych* 2003;160:1041-1052.
- Crews F, He J, Hodge C. Adolescent cortical development: a critical period for vulnerability for addiction. *Pharm Biochem and Behavior* 2007;86:189-199.
- Marsch LA, Bickel WK, Badger GJ, et al. Comparison of Pharmacologic Treatments for Opioid Dependent Adolescents. *Arch Gen Psychiatry*. 2005;62:1157-1164
- Reed PL, Anthony JL, Breslau N. Incidence of Drug Problems in Young Adults Exposed to Trauma and Posttraumatic Stress Disorder. *Arch Gen Psychiatry* 2007;64(12):1435-1442.
- Riggs PD, Mikulich-Gilbertson SK, Davies RD et al. A Randomized-Controlled Trial of Fluoxetine and Cognitive Behavioral Therapy in Adolescents with Major Depression, Behavior Problems and Substance Use Disorders. *Arch Pediatr Adolescent Med* 2007;161(11):1026-1034.
- Seng JS, Graham-Bermann SA, Clark MK et al. Posttraumatic Stress Disorder and Physical Comorbidity Among Female Child & Adolescents. *Pediatrics* 2005;116(6):767-776.
- Swahn MH, Bossarte RM, Sullivent EE. Age of Alcohol Use Initiation, Suicidal Behavior, and Peer and Dating Violence Victimization and Perpetration Among high-Risk, Seventh-Grade Adolescents. *Pediatrics* 2008;121;297-305.
- Waxmonsky JG, Wilens TE. Pharmacotherapy of Adolescent Substance Use Disorders: A Review of the Literature. *J Child Adolescent Psychopharmacology* 2005; 15(5):810-825.
- Wilens TE, Adler LA, Adams J. et al. Misuse and diversion of Stimulants prescribed for ADHD: A systemic review of the literature. *J Am Acad Child Adolesec Psychiatry* 2008;47(1):21-31.