SWK 3805: Module 9- Sedative/Hypnotics and CNS Depressants

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Contents

Module 9: Preface

Welcome to the online coursebook for Module 9 of our Theories and Biological Basis of Addiction course. The material is designed to be read interactively or after downloading; while the embedded interactive exercises require internet connectivity, each can also be downloaded for offline work. These exercises are presented to help you test and apply what you are reading, challenge yourself, prepare for quizzes, and have a little fun along the way. The list of key terms at the end explains text ***highlighted in bold italics*** throughout the book—in the interactive mode you can click on a highlighted word to jump to its explanation in the key terms section. Use the back arrow to return to where you were reading.

Module 9: Introduction

The reading for Module 9 introduces concepts essential for understanding the nature of sedative-hypnotic and central nervous system depressant substances, their use and misuse, and their effects. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 9 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the nature and actions/effects of sedative/hypnotic and CNS depressant substances
- Identify patterns in the United States of use and misuse of these substances
- Describe the relevance of key pharmacokinetic and addiction principles;
- Define several key terms related to substance use disorders.

Ch. 1: Introducing Sedative/Hypnotics and CNS Depressants

The first reading for Module 9 is valuable in that it addresses a range of important issues and concepts related to the class of drugs we call sedatives/hypnotics and ***central nervous system (CNS) depressants***. This topic follows Module 8 about alcohol, which you should recall, is also a central nervous system depressant. So, much of the Module 9 content is relevant to Module 8, and vice versa. This first chapter reading is Dupont, R.L., & Dupont, C.M. (2005). Sedatives/hypnotics and benzodiazepines. In R.J. Frances, S.I. Miller, & A.H. Mack, (Eds.), *Clinical textbook of addictive disorders, third edition,* (pp. 219-242). NY: Guilford Press.

In this first chapter will read about:

- the nature of the sedative/hypnotic and ***benzodiazepine*** substances;
- distinguishing between medical and nonmedical use (***prescription abuse***);
- the relevance of two ***pharmacokinetic*** principles (speed of onset & persistence) which are relevant to many types of substances, not only to the sedative/hypnotic and CNS depressants;
- principles of abuse and addiction (reinforcement, ***withdrawal***, ***tolerance***) with relevance to many types of substances, not only to the sedative/hypnotic and CNS depressants;
- effects of long-term use
- key terms used in the field of substance use disorders and addiction.

Click here for a link to our Carmen course where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 9, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

Ch. 2: Club Drugs

This chapter is specific to those “club” drugs that have sedative/hypnotic effects: GHB, Ketamine, and Rohypnol. The assigned piece is presented in the NIDA DrugFacts series (2014). In this piece you will read about:

- Effects of GHB, Ketamine, and Rohypnol and how they are abused
- addiction and withdrawal concerns
- Monitoring the Future (2014) trends in their use

Click here for a link to our Carmen course where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 9, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don’t forget to return here in your coursebook to complete the remaining chapters and interactive activities.

Ch. 3: More About Sedative/Hypnotic and CNS Depressant Drugs

This chapter updates some of the information presented in earlier chapters and introduces a few more topics. In this chapter you will read about:

- more effects of these substances (including problems with driving under the influence)
- additional substances (non-benzodiazepine sleep medications, Quaaludes)
- polydrug use
- suicide risk
- key terms used in the field of substance use disorders and addiction.

More on Effects of These Substances

The topics of prescription drug abuse and the drugs known as sedative/hypnotics and CNS depressants overlap considerably. Whether prescribed or used (illegally) without a prescription, a drug still has the same actions on the brain, body, and behavior. The description below comes from a presentation to Congress by the director of the National Institute on Drug Abuse (NIDA), Dr. Nora Volkow, on September 22, 2010:

> *CNS depressants, typically prescribed for the treatment of anxiety, panic, sleep disorders, acute stress reactions, and muscle spasms, include drugs such as benzodiazepines (e.g, Valium, Xanax) and barbiturates (e.g., phenobarbitol)—which are sometimes prescribed for seizure disorders. Most CNS depressants act on the brain by affecting the neurotransmitter gamma-Aminobutyric acid (GABA), which works by decreasing brain activity. CNS depressants enhance GABA's effects and thereby produce a drowsy or calming effect to help those suffering from anxiety or sleep disorders. These drugs are also particularly dangerous when mixed with other medications or alcohol; overdose can suppress respiration and lead to death. The newer non-benzodiazepine sleep medications, such as zolpidem (Ambien), eszopiclone (Lunesta), and zalepon (Sonata), have a different chemical structure, but act on some of the same brain receptors as benzodiazepines and so may share some of the risks—they are thought, however, to have fewer side effects and less dependence potential.*

Driving Under the Influence of Medications

News reports in recent years have identified potential problems with ***non-benzodiazepine sleep medications***. Sleeping medications like Ambien were reportedly involved in car crashes where Tiger Woods and Kerry Kennedy were reportedly ***driving under the influence*** of these legal substances. While it is clear to most of us that driving under the influence of alcohol is a bad idea (and illegal), too often people overlook the potential dangers associated with driving under the influence of other legal substances and prescription medications. The Automobile Association of America (AAA, 2014) reported that, while 66% of people consider driving under the influence of alcohol to be a very serious threat and 56% considered driving under the influence of illegal drugs to be so, only 28% consider driving under the influence of prescription drugs to be a very serious threat. They report that the crash risk increases by up to 41% for driving under the influence of certain antidepressants, and even over-the-counter cold and allergy medications can impair driving. The dangers also apply to operating any dangerous equipment or machinery, not only motor vehicles.

While their addictive potential may be less than for some of the other substances in this category, non-benzodiazepine sleep medications are not necessarily "safe" drugs across all types of risk. The increased risks are present even for people who take fewer than two pills monthly—they are still three times more likely to die than people who do not use these substances at all (Kripke, Langer, & Kline, 2012).

Quaaludes

One substance that we have not discussed so far is the sedative-hypnotic called methaqualone (known by the brand name Quaaludes, or by the street name "ludes" or "sopers"). Like the other drugs you are learning about in this module, overdose is possible with this substance, causing symptoms on a continuum of delirium, convulsions, kidney failure, coma, and death. This drug has been in the news recently because it is the substance that Bill Cosby admitted to administering to a number of women either without their knowledge or without their knowledge of the expected effects.

Polydrug Use

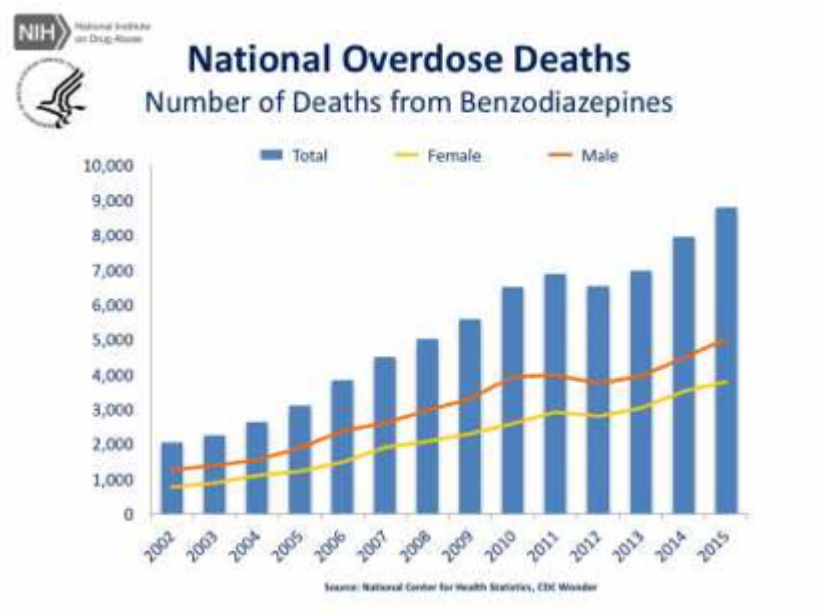
What is particularly important to know, especially given the "club" drug culture surrounding use, is that it takes only ¼ as much of certain drugs when combined with alcohol to induce coma. A large percentage of drug-related deaths and fatal overdose situations involved the combination of opioids or heroin with benzodiazepines. This point is important across our course:***polydrug use*** is potentially very risky. Combining alcohol with the use of any of the substances we are studying is a form of polydrug use.

Risk of Suicide

Non-medical use (prescription abuse) of sedative-hypnotic medications is a significant risk factor for suicide, as is the abuse of alcohol (Dodds, 2017): sleeping pills and other sedative drugs is associated with a three-fold higher risk of suicide attempt. According to a recent review of literature (Dodds, 2017), the increased risk of attempted or completed suicide seems to be present with prescribed use, as well. It is not clear whether different specific medications have different associated risk, only that the class of substances (particularly benzodiazepines) has this increased risk. The picture is further complicated by the difficulty in many instances of separating accidental

overdose deaths from suicide attempts resulting in death. We do know that the rate of death from benzodiazepine overdose has climbed in recent years (see Figure 1).

Figure 1. Trend in U.S. overdose deaths from benzodiazepines (NIDA, 2017)



Ch. 4: Summary

In this Module 9 coursebook, you learned some basic principles about the class of substances called sedative/hypnotic and central nervous system depressants. We explored which drugs fall into this category, including some of the “club” drugs. Topics discussed included the nature and effects of these substances. Our discussions also introduced concepts that are relevant across many types of substances, not just this particular class of substances. This included some basic pharmacokinetic principles, issues of polydrug use, prescription versus non-prescription use of medications, driving under the influence, accidental overdose, and suicide risks.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Module 9: Key Terms

benzodiazepines: a type of central nervous system depressant psychotropic drugs that produce sedative/hypnotic effects, sometimes used to treat anxiety; for example, Xanax, Valium, Librium, Ativan, Klonopin.

central nervous system (CNS) depressants: psychotropic drugs that slow down or reduce activity in the brain; for example, alcohol, benzodiazepines, barbiturates.

driving under the influence (DUI): a criminal offense associated with operating a motor vehicle while a person's ability to safely operate the motor vehicle is impaired by alcohol or other substances; also may be identified as driving while impaired (DWI).

non-benzodiazepine medications: a class of sedative/hypnotic drugs usually used to promote sleep which have many of the same effects as benzodiazepines but may have fewer associated risks; for example, Ambien, Sonata, Lunesta.

persistence: how long a substance remains active in the body; related to the pharmacokinetic principle of drug half-life.

pharmacokinetics: science and principles of pharmacology addressing how drugs are acted upon by the human body, including rates of drug absorption, distribution, metabolism, breakdown, and excretion/elimination.

polydrug use: using two or more psychotropic substances in combination, usually with the intent of achieving a particular effect; alcohol is commonly involved in polydrug use scenarios.

prescription abuse: the use of a controlled substance (medication) without a prescription, in a manner other than was prescribed, or for the purpose of altering feelings/experience.

speed of onset: a pharmacokinetic principle related to how quickly a drug's effects are first experienced by the user; this varies by type of substance, but is also powerfully influenced by mechanism of administration (e.g., orally, intravenously, inhaled)

tolerance: when repeated use of a substance leads to a person having diminished response such that less effect is experienced by the same dose and/or higher doses are needed to achieve the same effect; one of the diagnostic criteria for substance use disorders.

withdrawal: the cluster of symptoms experienced when a substance dose is decreased or when its use is stopped completely; not experienced with all substances; one of the diagnostic criteria for substance use disorders.

Module 9: References

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