

**Unveiling the Opioid Crisis:  
The Impact of Opioids on Body Systems and  
Alternative Treatment Options to Reduce the Nationwide Opioid Epidemic**

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## UNVEILING THE OPIOID CRISIS

### Abstract

This case study is meant to unveil the opioid crisis from two distinct angles: the first, to explore the effects of the crisis on different age groups, the economy, and illegal actions of pharmaceutical companies; and the second, to present alternative non-opioid treatment options to mitigate the nationwide epidemic. It revolves around Billy, a 55-year-old mail carrier diagnosed with osteoarthritis after years of walking up and down staircases in freezing temperatures delivering mail. After undergoing knee replacement surgery and due to her lifestyle, peers, and low socioeconomic status, she becomes addicted to the oxycodone her doctor prescribes. She now purchases synthetic opioids illegally as her doctor will not prescribe more. This case study is designed for high school and introductory-level college students to introduce them to the prevalence of this opioid crisis. Through critical thinking questions and dependent and independent learning, instructors can build student engagement and curiosity which will prepare them for class discussions over the course of two days. The study can aid in further analysis by examining the effects of polysubstance abuse on various body systems, researching nationwide laws or policies associated with the epidemic, and promoting the possibility of enforcing a student training program or more community-based interventions to control the escalating crisis.

*Keywords:* opioids, oxycodone, addiction, synthetic opioids, pain management, non-opioid treatment, polysubstance abuse, health policy

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### INTRODUCTION

It is no secret that the world is currently experiencing one of the most significant and consequential pandemics in history—COVID 19. However, as we watch the news and stay updated on the most current information about the pandemic, we are simultaneously overlooking an enormous epidemic that is presently unfolding across our nation—the opioid crisis. Research and treatment trials are constantly running for new bacterial and viral outbreaks that hit the world, but they are not as prevalent for this opioid crisis in the United States and many other countries. According to the Centers for Disease Control and Prevention, an average of 128 people die from prescription and illicit drug overdose every day in the United States (CDC, 2020); that totals to about 47,000 deaths per year on something that can be controlled. There are many legitimate uses for opioids in regard to chronic pain relief that are generally safe when prescribed a specific dose by a medical professional. However, opioids are highly addictive to the human body and thus have caused a major crisis that not only impacts the addicted individual, but also the welfare of the economy, infants when taken by a pregnant mother, ethical issues raised from the payment of doctors by pharmaceutical companies, illicit manufacturing of synthetic opioids, and many other factors (Bonnie, Ford, & Phillips, 2017).

The economy suffers a burden of about \$78.5 billion annually, “including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement” (NIH, 2020). Infants are affected via neonatal abstinence syndrome (NAS) which is a very serious withdrawal condition that inhibits the functions of the nervous system. Neonates who have been exposed to

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opioids as they are growing in utero must be treated with more opioids after birth to slowly wean off and thereby prevent worse withdrawal symptoms (Stover & Davis, 2015). The ethical issues with pharmaceutical companies paying physicians to prescribe opioids are widespread as researchers Nguyen, Bradford, and Simon found that physicians who “received opioid-specific payments prescribed 8,784 more opioid daily doses per year” compared to their unpaid counterparts (2019). There are various direct and indirect overlying issues associated with the use of opioids.

One positive is that the United States is gradually advancing and has shown a 4% decrease in deaths from 2017 to 2018 (CDC, 2018). Many believe opioids to be the first line of therapy for chronic pain, physicians and laymen included. However, there are many alternative treatment options that are holistic and non-pharmacological, which provide a safer pain management route. These options include acupuncture, laser therapy, cognitive behavioral therapy, physical therapy, non-addictive medication, medical marijuana, herbal remedies, chiropractic treatment, dietary changes, supplements, and physical activity. The anesthesiologist may also play a large role in reducing opioid use and misuse, as Soffin, Lee, Kumar, and Wu have found (2019). Anesthesiologists are able to manage pain before, during, and after operative treatment via non-addictive drugs. Physical activity and aerobic exercise can not only improve general health conditions, but also pain management over time. This health emergency is one that requires strong individual and community-based interventions as it is a controllable epidemic unlike the widespread coronavirus or influenza.

This case study will revolve around a main character named Billie, who lives in a financially low-class neighborhood in Cape Cod, Massachusetts. She was prescribed opioids

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post-surgery for a knee replacement as she spent her entire life walking up and down staircases to deliver mail as a United States Post Office mail carrier and was diagnosed with osteoarthritis.

Due to her lifestyle and peers, she becomes addicted to the pain medication and now purchases synthetic opioids illegally as her doctor cannot and will not prescribe more. This case is designed for high school students to introduce them to the opioid crisis and to hone in on the conflicts as well as alternative treatment options for pain management. It can be used in a lower-level college class as well, but the group formation and the number of days allocated to teach this case study may vary accordingly. Students will explore the side effects of opioids on every age group from neonates to the geriatric population, on the economy, and on the ethical implications behind the payment of doctors for prescribing opioids. They will gather in groups and discuss their findings via their choice of presentation the following day. Thereafter, students will look into alternative treatment options aside from addictive opioids. These teaching objectives are taught via dependent and independent learning. Dependent learning will include a short lecture on the first day, followed by an independent homework assignment researching an assigned conflict. Day 2 will include small group discussions, as each group will be assigned one treatment option to discuss first within the group, then with the rest of the class.

## CASE STUDY

### PART I—THE CONFLICT

#### **Introduction**

Billie, a 55-year-old mother of two, is a United States Post Office employee who has been working as a mail-carrier for the last 16 years of her life. She decided she was finally done with the job, as she now dealt with constant joint pain from overexertion and repetitive motion. For 16 years, all she did was walk up and down staircases and in and out of her car. The arrival of winter and the holiday season was only going to make the situation worse. In the winter, pain receptors become more sensitive due to cold temperatures and low atmospheric pressure (Repinski, 2019). During the holiday season, the number of mail and packages always skyrockets. Billie could not stand to work this job for yet another day. She decided it was finally time to go see a doctor about her intolerable knee pain. Her doctor, Dr. Leu, diagnosed her with osteoarthritis and sent her in for knee replacement surgery. Her symptoms matched the diagnosis perfectly: joint pain, stiffness, swelling, and a crackling sound from overusing her knee joints.

#### **November 15<sup>th</sup>, 2019**

Billie woke up, freezing cold, in the hospital post-operative unit after undergoing knee-replacement surgery. She was still fully recovering from being under anesthesia. Once she

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did, the nurses insisted she stand up and perform a few exercises with assistance. She thought they were utterly insane as she just underwent surgery, but they explained the necessity of moving to get back her range of motion and to prevent the formation of blood clots. She spent the night at the hospital and was given the okay to go home. With the help of her daughter, Billie stopped by the pharmacy to pick up her prescription opioid, Roxicodone, to help with knee pain and a nonsteroidal anti-inflammatory drug, Advil, to decrease swelling at the surgery site.

### **November 18<sup>th</sup>, 2019**

It has been three days post-surgery and Billie could not tolerate the knee pain. She claimed to her children that the pain spread throughout her right hip and lower extremities. Unbeknownst to them, Billie swallowed two extra pills each night for the next week to cope with the pain and let her sleep through the night. Little did she know, the Roxicodone was binding to the brain's opioid receptors and has slowly adapted to the drug. All she cared about was the instant gratification from the relief of her pain.

### **January 3<sup>rd</sup>, 2020**

A few months passed, and Billie had officially become a victim of addiction and a victim of the national opioid crisis. How? Dr. Leu called Billie for a quick follow-up in late November. Billie requested more opioids as she ran out of her original supply, at which point Dr. Leu began to ask many questions regarding the situation. He knew what had happened. Dr. Leu referred Billie to a specialist, but Billie did not show up to any of her appointments. She knew they were going to place her in a rehabilitation center, but she could not forego the peace and happiness she knew she was recently feeling. Living alone and retired in the low socioeconomic city of Cape Cod, Massachusetts away from her older children, Billie spent a lot of her newly found spare

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time with her friends. She was living an unhealthy lifestyle in an unhealthy environment filled with people who were already addicted to drugs and alcohol. She had many indirect connections to drug dealers and knew that if Dr. Leu could not prescribe more opioids, she could get synthetic fentanyl from the city. After all, she gained a lump sum from her recent retirement bonus at USPS. Where else was she going to spend her money? She was a divorced, single mom whose kids were married and off on their own.

**February 18<sup>th</sup>, 2020**

Billie's daughter, Eileen, called on her mom's birthday and she automatically knew something was wrong; Billie did not sound like her normal, giddy self.

### PART I QUESTIONS

**Individual Task:** Answer the following questions with as much detail as possible. You may reference Billie's story in your response. This will be a written assignment separate from the group task below.

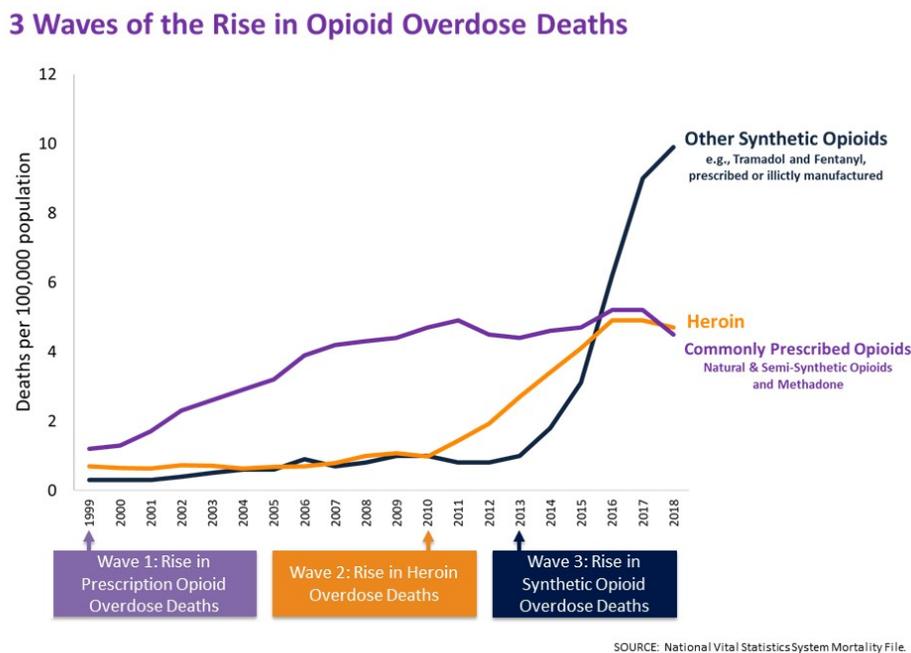


Figure 1: Opioid overdose deaths (CDC, 2020)

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1. Refer to the figure above. Addicted opioid users often open the door to alcohol and illegal/synthetic drugs such as heroin, cocaine, fentanyl, and psychostimulants. What are the effects of polysubstance drug use?
2. How do these drugs become addictive to the human body?
3. What precautions should a person take when prescribed an opioid? Do you think a patient's background should be checked beforehand?
4. Why do patients overdose on prescription opioids? Why has the rate of overdose increased in the United States?

Group Task: In your groups, you are tasked with researching the assigned conflict and its association with the opioid epidemic. You have the freedom to present your findings to the class in any form (e.g., a PowerPoint presentation, speech, role play, debate, a live mini lecture, an interactive/hands-on presentation, visuals, etc.). You also have the freedom to look into other countries other than the United States. You will be given a five-minute time slot for the presentation tomorrow and each member must participate in answering the following two questions along with interesting information/facts you may have found.

1. What are the effects of the opioid epidemic on your assigned conflict?
2. What can the local, state, or federal government do to mitigate the epidemic's effects on the conflict?

## PART II—THE RESOLUTION

Eileen had been following up with her mother post-surgery but could not tend to her needs due to her newborn son. She had hired a caretaker to visit her mother and help her with her exercises, but unbeknownst to Eileen, Billie had sent her off months ago. She had been lying to her daughter about her recovery process and addiction because she did not know she was addicted. Eileen forcefully took her mom to the specialist Dr. Leu told her about. The specialist analyzed Billie's lifestyle and provided rehabilitation information in addition to multiple non-pharmacological treatment options. Eileen forced Billie to attend the first few sessions, after which Billie realized she needed to finish the rest of it at her own will as she wanted to live to see her newborn nephew grow to be like her own children.

## PART II QUESTIONS

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**Group Task:** Take about seven minutes to conduct research and discuss the answers to the following questions with as much detail as possible. You may reference Billie's story in your response. The class will reconvene and partake in an open discussion for about ten minutes.

1. Many believe opioids to be the first line of therapy for chronic pain, physicians and laymen included. Within your group, come up with alternative treatment options and the benefits and risks associated with each option. You can look into various types of therapy, herbal treatment, non-pharmacological treatment, and/or non-addictive drugs.
2. What additional training can doctors receive during or after medical school to mitigate the crisis?
3. What can the United States learn from other countries?

## TEACHING NOTES

**Overview**

This case is designed for high school students to introduce them to the opioid crisis and to hone into the conflicts as well as alternative treatment options for pain management. It can be used in a low-level college class as well, but the group formation and the number of days allocated to teach this case study may change accordingly. A typical high school class period is 45 minutes; therefore, the case will be taught over a period of two class periods, or two days. The teaching objectives are taught via dependent and independent learning on both days. Day 1 will include an overview of the topic taught by the teacher along with a small activity that can be used for group formation. After assigning groups a homework assignment regarding the various conflicts caused by the opioid crisis, students will regroup as a class to discuss their findings on Day 2. Once the conflicts are discussed, the teacher will provide more insight from the case study and will transition to alternative treatment options. For this part, students will rejoin their groups

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and will conduct research on their own to offer non pharmacological treatment options. The difference between the group tasks on both days is that they are assigned a topic on Day 1 but have the freedom to choose their own topic(s) on Day 2 via research. Again, the class will reconvene to explain their findings. More details and alternative classroom management options are provided in the sections to follow.

### CLASSROOM MANAGEMENT

#### **Group Formation**

Groups can be formed in three ways: random assortment, having students choose their own groups, or the teacher grouping in advance. The last option is methodically best if it is necessary to mix high-level and low-level students in each group; however, this case study topic is such that the level of intelligence will not matter as much as it does in complex group projects. Thus, this case study will have random assortment via an activity. I like to include content in my group formation activity to my advantage because it helps students activate prior knowledge before the case study begins. I have chosen 5 groups of 4 students and each group will be assigned one conflict to research for homework in its relationship with the opioid crisis (Table 1). Each of the 20 students will be given a random part of the word (yellow columns). I will say the definition out loud to the class as they will come up with the related word. They will then move themselves around to form the word (ex. I would say the definition of “withdrawal” and when the class can identify the word, the students with the papers labeled “wi”, “th”, “draw”, and “wal” will find each other and come together to form the word). This interactive activity serves as a great, fun start to the two-day lesson, while also activating their prior knowledge.

Table 1: Group Formation  
Source of some definitions: (Scholastic, 2017)

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<b>Group Conflict: Effects of Opioids on....</b>	<b>Word</b>	<b>Definition</b>	<b>4 Member Split</b>			
<b>economy</b>	opioid	one of a group of drugs that produce relaxation, pleasure, and pain relief. Opioids can be addictive and potentially deadly due to overdoses.	o	pi	oi	d
<b>infants/ neonates</b>	withdrawal	a syndrome associated with the discontinuance of an addictive drug resulting in painful physical and psychological symptoms	wi	th	dra	wal
<b>teenagers</b>	fentanyl	an opioid drug made in laboratories that is much stronger (50 to 100 times) than other legal opioids. It is prescribed only to treat very severe pain.	fe	nt	an	yl
<b>elderly</b>	oxycodone	an opioid drug that is used as a painkiller and prescribed by doctors for severe pain. It is most commonly prescribed for patients recovering from surgery.	ox	yco	do	ne
<b>ethics behind the payment of doctors</b>	epidemic	an increase in the number of people affected by a disease or condition far above what is normally expected in a population	ep	id	em	ic

**Day 1**

The teacher will spend most of the period introducing the class to the opioid crisis and case study with the aid of various critical thinking questions. The case study will be given out in parts as the teacher uncovers the story piece-by-piece while asking questions related to the part. Doing so will build student engagement and curiosity and prepare them for the discussions to follow on Day 2. The class will form into groups via the activity aforementioned and the homework assignment will be explained.

**Homework Assignment**

Students will be assigned homework to serve as independent learning after the teacher introduces the opioid crisis to the class. Each group will be assigned one of the five conflicts and

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tasked with finding the relationship/impact of the conflict with the opioid crisis. For example, group 1 is assigned the economy, so students will conduct research to discuss how opioids have impacted the United States economy. They are given the freedom to go in depth by discussing the impact on other countries in addition to the U.S. Students are also given the freedom to present their findings to the class in any form: a PowerPoint presentation, a speech, a live mini lecture, a visual, etc. Each group will be given 5 minutes to present on Day 2, totaling 25 minutes of student-driven presentations.

### **Day 2**

Once the presentations are done, the teacher will guide the class into the second major topic of the case study: alternative treatment options. This time, the groups will be given the freedom to perform research and choose their own set of options. The teacher may provide general categories such as “types of therapy”, “herbal”, “non-addictive drugs”, etc. if he or she wants the students to come up with specific treatment options. The groups will have about seven minutes to meet, then will reconvene again as a class for an open discussion lasting about ten minutes. The teacher will provide closure of the entire topic in the remaining three minutes of class time (more time can be allocated, if needed, by altering discussion/presentation times).

### **Extension**

If an extension/follow-up activity is wanted or needed, the teacher can lead the class into a few different directions. He or she can have students complete another homework assignment, a research project, a bulletin board visual, a debate, or any other form of formative or summative assessment on any of the following topics:

- Delve into specific opioids and their uses/effects

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- Find organizations/centers/support groups that aid with addiction
- Research laws or policies associated with opioids
- Discuss ways to control or eliminate the existing epidemic
- Explain the impact of opioids when taken with other prescribed medications
- Justify the process of how drugs become addictive to the brain/body

## BLOCKS OF ANALYSIS

The overlying issues associated with the national opioid crisis are vast but the five overarching conflicts that will be discussed in the case study are discussed in detail below. Other information is acceptable, as long as students are able to provide proper evidence and reasoning.

<b>Group Conflict: Effects of Opioids on....</b>	<b>Research</b>
<b>economy</b>	Although the original intent of manufacturing and prescribing opioids was righteous, the result influenced by society has burdened not only addicted

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	<p>individuals, but also the economy. The United States economy suffers a burden of about \$78.5 billion annually “including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement” (NIH, 2020). Many of these costs come from the direct impact of overdose death, while other causes include the loss of jobs and decrease in gross domestic product. The number also takes into account the criminal justice budget used by police departments and correctional facilities (Birnbaum et al., 2011). Reform policies are becoming more prevalent for restrictions within medical use; yet illicit manufacturing of drugs has increased with more public demand (Hagemeier, 2018).</p>
<b>infants/ neonates</b>	<p>Traumatic effects of opioids are most commonly and directly associated with just the addicted individual, yet these drugs can also have indirect effects on fetuses. Infants are affected via neonatal abstinence syndrome (NAS) which is a very serious withdrawal condition that inhibits the functions of the nervous system. Neonates who have been exposed to opioids in utero must be treated with more opioids after birth to gradually wean off and thereby prevent worse withdrawal symptoms. NAS involves many obstetrical complications other than death such as underdevelopment, premature birth, neurological defects, diseases, placental abruption—most of which prevail throughout adulthood (Stover &amp; Davis, 2015).</p>
<b>teenagers</b>	<p>Adolescents are a highly vulnerable group due to peer pressure and wanting to conform to societal norms as they are still developing an individual personality. This section of the case study is open to interpretation. The group can discuss the direct effects of opioids on teenage health such as drowsiness, nausea, vomiting, muscle pain, insomnia, infections, diseases, addiction, etc. or expand their search and look into how opioid addiction can impact the future of adolescents. The latter option can include long-term effects such as attaining low levels of education and subsequently having no career path, breaking family ties, spending money on other drugs at the risk of losing personal assets, etc.</p>
<b>elderly</b>	<p>The geriatric population, most of whom are already immunocompromised, can experience side effects with constant opioid use. A group of researchers completed a study with patients greater than 60 years of age who were prescribed more than three opioid prescriptions within a span of three months. Data revealed that geriatric patients on opioids were at higher risk of fractures compared to those not on opioids (Saunders et al., 2010). The disparity further increases with higher doses of painkillers, up to double the risk of hip and pelvis fractures. Neurological effects such as dizziness and sedation can cause an increase in the number and severity of falls as well.</p>
<b>ethics behind the payment of doctors</b>	<p>Ethical issues associated with pharmaceutical companies paying physicians to prescribe opioids are widespread. Researchers Nguyen, Bradford, and Simon found that physicians who “received opioid-specific payments prescribed 8,784 more opioid daily doses per year” compared to their unpaid counterparts (2019). As with any company, business owners do everything in their power to be the most successful and wealthiest in their field. Pharmaceutical companies have very strategically found ways to promote their opioids by paying physicians more for</p>

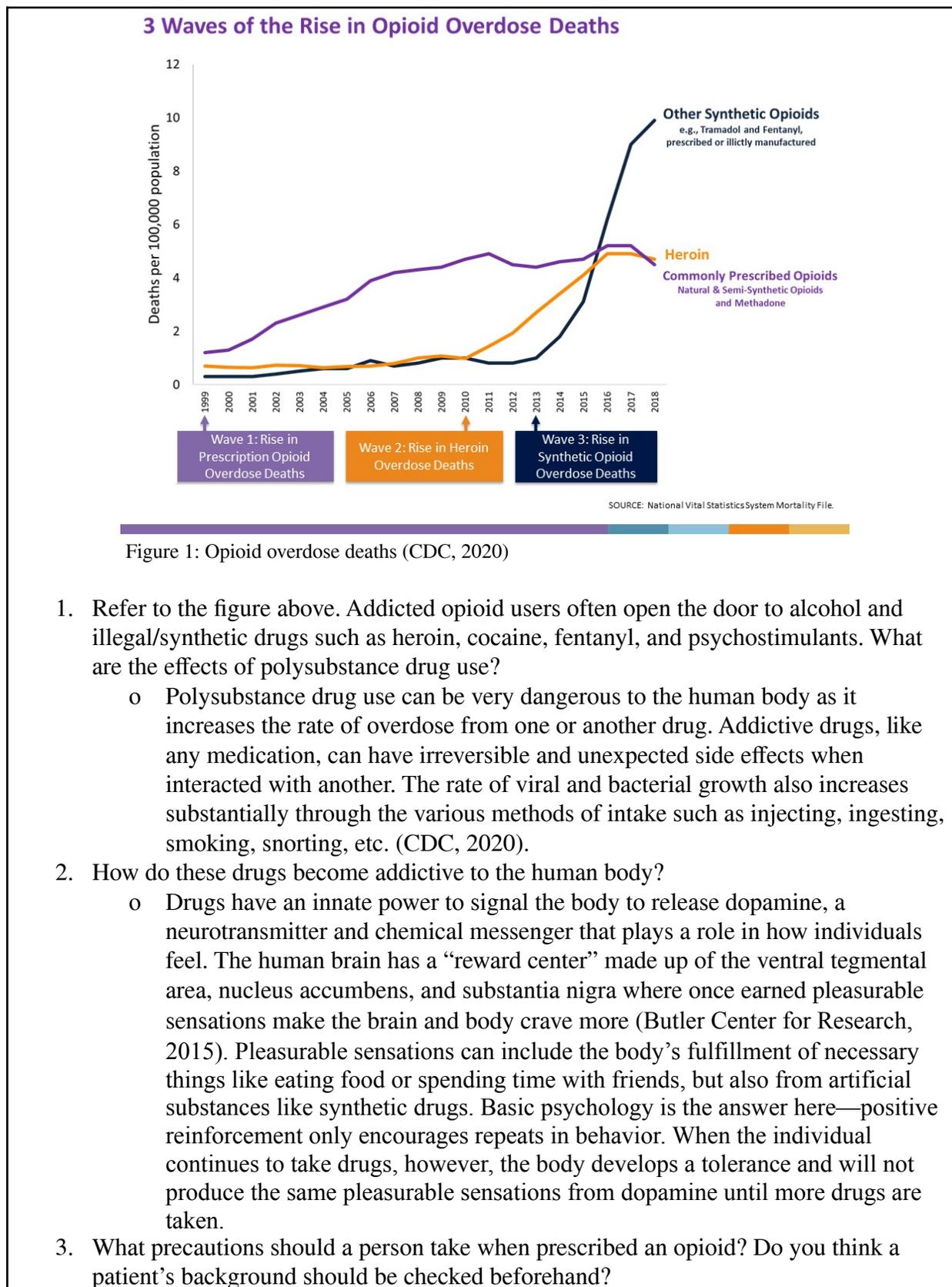
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	every prescription written. Although the action is legal, it is not ethical especially today knowing that there is a national opioid crisis largely caused by physicians.
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## ANSWER KEY

**PART I QUESTIONS**Individual Task

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- o Patients should precisely follow the intake directions of any medication. They should be aware of any potential side effects and try as quickly as possible to eliminate the need for opioids by searching for non-addictive treatments. One should never use another patient's prescription, as dosage varies per person.
  - o The answer to the second question varies.
4. Why do patients overdose on prescription opioids? Why has the rate of overdose increased in the United States?
- o Patients can be highly influenced by their social environment, as Billie was in the case study. Genes, ethnicity, age, gender, and neurological disorders may account for the rate of addiction as well (NIH, 2020).
  - o The rate of overdose has increased greatly in the United States due to the rapid increase of synthetic drug manufacturing and peer pressure. Many other answers are valid here.

Group Task

3. What are the effects of the opioid epidemic on your assigned conflict?
- o Answers vary. Refer to the "Blocks of Analysis" section for details on each of the five conflicts.
4. What can the local, state, or federal government do to mitigate the epidemic's effects on the conflict?
- o Answers are multifarious and depend on the group's assigned conflict. Groups can research existing drug-related policies in addition to coming up with their own ideas. Pharmacists can be on the lookout for prescription frauds, scientists can develop safer medicines, physicians can follow up with patients constantly, the national government can create specific hotlines, etc.

**PART II QUESTIONS**

Group Task: Take about seven minutes to conduct research and discuss the answers to the following questions with as much detail as possible. You may reference Billie's story in your response. The class will then reconvene and partake in an open discussion of the three questions for about ten minutes.

1. Many believe opioids to be the first line of therapy for chronic pain, physicians and laymen included. Within your group, come up with alternative treatment options and the benefits and risks associated with each option. You can look into various types of therapy, herbal treatment, non-pharmacological treatment, and/or non-addictive drugs.
- o Answers vary, as long as each group is able to back up their response with evidence. Possible responses are physical therapy for pain, laser therapy, cognitive behavioral therapy, acupuncture, chiropractic treatment, herbal

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- remedies, dietary changes, supplements, exercise, non-addictive medication, medical marijuana (Hill, 2015), holistic treatments such as reiki healing, etc.
2. What additional training can doctors receive during or after medical school to mitigate the crisis?
    - o Doctors can be trained to always be on the lookout for potential threats related to the patient's background. If so, he or she should consider another form of pain-relieving treatment. Anesthesiologists can strategically reduce the quantity of addictive medication used in the perioperative period (Soffin et al., 2019).
  3. What can the United States learn from other countries?
    - o Many countries can be used as an example, as long as sufficient evidence is provided. Example: European countries such as France and Switzerland developed drug consumption/heroin-assisted treatment facilities. Although unorthodox, it has helped the population take drugs safely, yet without the added risks of overdose, death, and infection/disease transmission (North Carolina Health News, 2019).

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