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Continuing Education for Nursing Home Administrators

Effects of E-Cigarette on the Mental Status of a Person



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Section 1: Introduction

There is a very long history of tobacco use in the United States. Originally smoked in pipes, tobacco use is estimated to have existed in North America for more than 12,000 years. In the late 19th century, the tobacco industry was revolutionized by the invention of the cigarette-rolling machine, which led to mass production and rapid growth in nicotine consumption through the commercialization of cigarettes. While traditional cigarette use has declined in the United States in recent decades, the use of e-cigarettes is on the rise. Though e-cigarettes were first patented in 1930, they were not widely used until the early 21st century, gaining popularity in the United States after their introduction in 2006 (Picone, 2024). According to the National Health Interview Survey, the prevalence of e-cigarette use among adults in the United States grew from 4.5% in 2019 to 6.5% in 2023 (Vahratian et al., 2025). The use of e-cigarettes among middle and high school students is also increasing, with 5.9% of students reporting in 2024 that they currently use e-cigarettes, making it the most popular tobacco product used among youth and young adults (CDC, 2024c). E-cigarettes are also the most commonly used tobacco product overall (Purushothaman & Cuomo, 2026).

E-cigarettes, also known as vapes, are battery-operated and produce an aerosol, or vapor, by heating liquid. Users inhale this aerosol into their lungs. E-cigarettes typically contain nicotine, but can be used to smoke cannabis or other drugs. They are often made in bright colors and desirable flavors that appeal to youth and young adults (CDC, 2024a). Though e-cigarettes do not contain tobacco, they are considered tobacco products by the US Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) because they do typically contain nicotine, which is extracted from tobacco (Malani & Walter, 2024).

E-cigarettes are available in different forms. Disposable e-cigarettes are sold as pre-filled devices. Though they may be rechargeable, they are not refillable.

Refillable e-cigarettes can be charged and refilled with e-liquid. Some refillable e-cigarettes have user-adjustable settings that change the amount or strength of the aerosol produced. Some rechargeable e-cigarettes use a pre-filled cartridge or pod. E-cigarettes may look like USB flash drives, pens, smartphones, highlighters, toys, or other objects. They may have a digital screen and features that gamify use through incentivizing vaping with points and rankings (CDC, 2024a).

Different terms can be used for e-cigarettes. While they are also commonly known as vapes, they may also be called e-cigs, vape pens, electronic nicotine delivery systems (ENDS), or be referred to by their brand name. The e-liquid contained in these products may be called e-juice, vape juice, or vape liquid. Especially among youth, slang for these products can change quickly (CDC, 2024a). Nurses and other members of the healthcare team need to be familiar with the different names used for e-cigarettes to improve identification of use and communication with users.

Dual use occurs when an individual uses both traditional cigarettes and e-cigarettes. Dual use is more common in older adults, with 42.7% of smokers ages 45 and older reporting they both vape and smoke cigarettes. Dual use is associated with a higher risk of mental health problems than using either e-cigarettes or traditional cigarettes alone. Some adults smoke e-cigarettes in an effort to quit smoking traditional cigarettes; however, no e-cigarette is FDA-approved to aid in smoking cessation. Evidence suggests that e-cigarettes may only aid in cigarette smoking cessation when e-cigarette use replaces all tobacco use for the individual. Over 60% of adults who currently vape report having plans to quit the use of e-cigarettes (CDC, 2024b).

Among adults, more men than women report smoking e-cigarettes. The group with the highest rate of e-cigarette use is young adults, ages 18-24 years. The percentage of those who smoke e-cigarettes generally declines as age increases. E-

cigarette use is more common among those with lower incomes, less education, or who do not have health insurance. Use of e-cigarettes among those who identify as LGBTQ+ is higher than use among those who identify as heterosexual. E-cigarette use is also higher among individuals with serious psychological distress than those who do not experience these symptoms (CDC, 2024b).

E-cigarettes are commonly marketed as less harmful than traditional cigarette use; however, there is little evidence to support this claim. Though smokers of traditional cigarettes may reduce harmful exposure to smoke, those who are novel nicotine users experience a significant increase in health risks associated with nicotine use and vaping. There are also different additives found in e-cigarettes that can lead to adverse health effects (Civiletto et al., 2024).

The increase in use of e-cigarettes, especially among youth and young adults, is concerning for the healthcare community. It is widely perceived in the general public that vaping is safe; however, the truth is that no tobacco products, including e-cigarettes, are considered safe. The addictive properties and physical effects of nicotine, as well as the aerosol that is produced, can harm individuals who use e-cigarettes. E-cigarettes have been found to be particularly harmful to the mental health of those who use them. Nurses can make a meaningful impact on their patients' health by correcting misconceptions about e-cigarette use and providing effective patient education. Nurses must understand how nicotine affects the brain and leads to addiction, be able to recognize the early mental and behavioral effects of e-cigarette use, identify populations at risk, implement evidence-based interventions to support cessation and mental well-being, and educate patients regarding the cognitive and psychological risks associated with e-cigarette use.

Section 2: The Brain and Nicotine

To best understand how nicotine affects the brain, it is necessary first to review the basics of neuroanatomy and how neurotransmitters function. The nervous system is divided into functional categories. The central nervous system (CNS) includes the brain and spinal cord, while the peripheral nervous system (PNS) includes all neurological structures outside the CNS. The CNS plays a vital role in human life, as it receives, integrates, and responds to sensory information by generating motor output, including behaviors and mechanisms that maintain homeostasis. The brain is an organ composed of nervous tissue and is responsible for sensation, movement, emotional responses, communication, cognition, and memory. This tissue is incredibly fragile and susceptible to injury. Protection mechanisms include the skull, meninges, and cerebrospinal fluid, as well as the blood-brain barrier, which restricts the flow of harmful substances from the blood into the brain tissue. The spinal cord, also part of the CNS, transmits motor commands from the brain to the PNS and relays sensory input from peripheral receptors to the brain (Margetis et al., 2026).

The brain is divided into the right and left hemispheres. While some functions of the brain are specifically located in one hemisphere, such as language function primarily occurring in the left hemisphere and visuospatial functions primarily occurring in the right hemisphere, there is constant communication between the hemispheres. The cerebral cortex is composed of gray matter and contains billions of neurons. The cortex is divided into four lobes: frontal, parietal, occipital, and temporal. Specific neurological functions are located within each of these lobes. The frontal lobe is responsible for tasks such as voluntary motor function, problem-solving, attention, memory, and language. The primary motor cortex is also located in the frontal lobe. This area enables precise movement of the skeletal muscles. Broca's area is the portion of the frontal lobe that coordinates the motor function necessary for speech production. The parietal lobe processes

somatosensory information. Neurons in this lobe receive input from the sensory receptors and proprioceptors located throughout the body and translate these signals into perception. This perception enables the sense of touch and body position. The occipital lobe contains the visual cortex and is responsible for visual processing. This area of the brain receives information from the retina and interprets the visual experience. The temporal lobe contains the auditory cortex and processes input from the mechanoreceptors of the auditory system. The Wernicke area, located in the temporal lobe, is crucial for language comprehension (Margetis et al., 2026).

The basal nuclei, also called the basal ganglia, are located deep within the hemispheres. The structures of this area modulate voluntary movement, regulate muscle tone, and contribute to motor coordination. The thalamus is the major relay center for sensory information, receiving input from sensory pathways and then distributing it to the appropriate cortical regions for processing. This part of the brain also contributes to consciousness and regulation of the sleep-wake cycle. The hypothalamus is a small structure that is necessary for maintaining homeostasis. This structure links the CNS to the endocrine system via the pituitary gland and regulates autonomic functions, such as heart rate, blood pressure, appetite, thirst, temperature, and circadian rhythms. The hypothalamus also synthesizes critical hormones, including vasopressin (the antidiuretic hormone), oxytocin, dopamine, and other vital hormones (Margetis et al., 2026).

There are structures within the brain that are responsible for basic survival. The pons is a structure that contains nuclei and relays neural signals between the cerebrum, cerebellum, and spinal cord. The medulla oblongata is located at the base of the brainstem and regulates autonomic functions such as respiratory rate and heart rate. It also regulates protective reflexes. The cerebellum is responsibile for the smooth coordination of voluntary movement, interpreting sensory input, and coordinating the transmission of output. The limbic system contains several

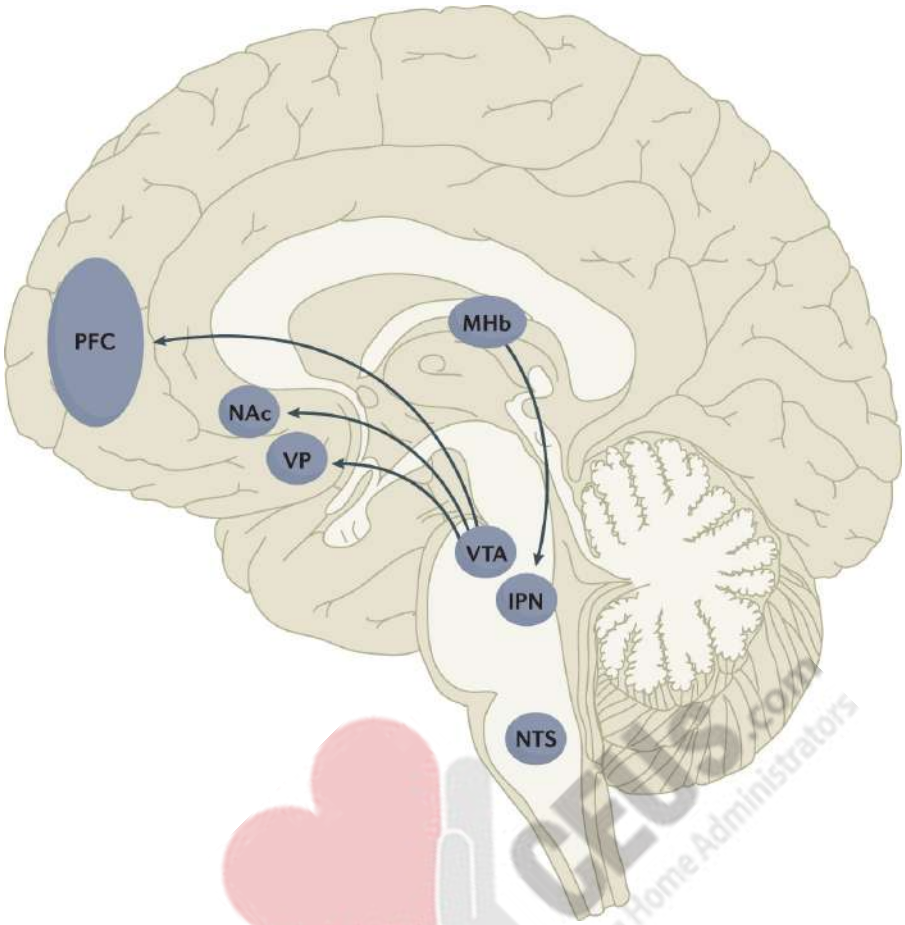
structures, including the hippocampus, amygdala, nucleus accumbens, and hypothalamus, among others. These structures contribute to emotion, memory, and motivation. The amygdala and nucleus accumbens are involved in pleasure sensation and addiction (Margetis et al., 2026).

The reticular formation is a network of neurons located in the brainstem and affects the cerebral cortex, cerebellum, thalamus, hypothalamus, and spinal cord. Through the reticular activating system (RAS), the reticular formation regulates the level of consciousness. Sensory input from different pathways activates RAS neurons in the brainstem, which then relay information to specific areas of the brain. This process is necessary to promote wakefulness and alertness, and to filter out repetitive, low-salience stimuli to prevent overwhelming the sensory processing systems. The spinal cord is a bidirectional pathway, with 31 pairs of spinal nerves. These spinal nerves contain neurons that process sensory information and transmit impulses. Sensory information travels from the body to the spinal cord before transmission to the brain. Descending tracts within the spinal cord transmit motor signals from the brain to lower motor neurons (Margetis et al., 2026).

There are neural structures specifically involved in the brain's response to nicotine. The nucleus accumbens receives input from the amygdala, hippocampus, thalamus, and prefrontal cortex. This part of the brain is primarily responsible for goal- and reward-based behavior. This area of the brain also contributes to conditions such as anxiety, depression, and addictive behaviors (Yan et al., 2023). The ventral tegmental area is in the midbrain and regulates reward consumption, aversion, stress modulation, learning, memory, and addictive behaviors by mediating dopamine release. . Neurons in this region connect directly with the prefrontal cortex and other brain areas that influence behavior (Cai & Tong, 2022).

The prefrontal cortex is located at the front of the brain and is responsible for executive functions, including attention, self-control, decision-making, and emotion regulation. This area is the last part of the brain to develop fully and does not reach full maturity until an individual is in their mid-20s (Cleveland Clinic, 2025). The ventral pallidum is located in the basal ganglia and is involved in regulating reward processes and motivation. It plays a primary role in the development and maintenance of addiction (Morais-Silva & Lobo, 2024). The medial habenula contains a wide variety of nicotinic acetylcholine receptor subunits and is essential for emotional and behavioral regulation, making it a key component in conditions such as depression and addiction (Ables et al., 2023). The interpeduncular nucleus is located in the midbrain and consists primarily of GABAergic neurons, which contributes to anxiety and withdrawal symptoms (Klenowski et al., 2022). The nucleus tractus solitarius is a bundle of nerve fibers in the brain stem that receives all sensory input from the body. It affects various systems and mediates the physical response to emotions (AbuAlrob & Tadi, 2023).

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This image shows the different areas of the brain affected by nicotine: Prefrontal Cortex (PFC), Nucleus Accumbens (NAc), Ventral Pallidum (VP), Ventral Tegmental Area (VTA), Medial Habenula (MHb), Interpeduncular Nucleus (IPN), Nucleus Tractus Solitarius (NTS) (Le Foll et al., 2022)

The human body contains billions of nerve cells, which are generally composed of a cell body, axon, and axon terminal. The cell body produces neurotransmitters and regulates cellular function. The axon carries electrical signals along the nerve cell to the axon terminal. At the axon terminal, the electrical impulse from the axon is converted to a chemical signal through activation of neurotransmitters (Cleveland Clinic, 2022c). Neurotransmitters are chemicals produced in the body that enable neurons to transmit messages via chemical synaptic transmission (Sheffler et al., 2023). Neurotransmitters are released by the nerve cell into a

fluid-filled space between the axon terminal and the next target nerve cell. This space is called the synaptic junction. There are at least 100 known neurotransmitters, including acetylcholine, glutamate, gamma-aminobutyric acid (GABA), glycine, dopamine, norepinephrine, and serotonin, though scientists suspect more remain yet to be discovered. Neurotransmitters carry messages across a space less than 40 nanometers wide. To help put this microscopic distance in perspective, a human hair is approximately 75,000 nanometers wide. The neurotransmitters bind to receptors on the target cell, much like a lock-and-key system. This process triggers an electrical signal in the target cell, which may result in another neural transmission, a muscle contraction, or the release of hormones from a gland, depending on the type of cell that is targeted (Cleveland Clinic,2022c).

Neurotransmitters can have one of three actions. They are either excitatory, inhibitory, or modulatory. Excitatory neurotransmitters stimulate the neuron and cause that cell to pass the chemical message along to the next cell. Inhibitory neurotransmitters can block or prevent the chemical message from being transmitted further. Modulatory neurotransmitters regulate the effects of other neurotransmitters. They can adjust how the cells communicate through the synapse. They can also affect many neurons simultaneously. Once a neurotransmitter has completed its function, the chemical must be removed from the synaptic junction. The neurotransmitter may fade away through diffusion, be reabsorbed and reused by the nerve cell through reuptake, or be broken down by enzymes in the synapse, preventing further binding to receptor cells (Cleveland Clinic,2022c).

The primary excitatory neurotransmitter in the brain is glutamate. Glutamate is especially involved in nervous system plasticity andmemory storage. GABA is an inhibitory neurotransmitter that is necessary to regulate neural activity and prevent excessive neuronal excitation, which can lead to seizures. GABA is

targeted for treatment in cases of anxiety disorder, insomnia, epilepsy, and other conditions. Dopamine is necessary for learning, motor control, reward, emotion, and executive functions. This neurotransmitter is often altered in those with psychiatric and neurological disorders, such as schizophrenia, psychosis, depression, Tourette syndrome, and attention deficit hyperactivity disorder (ADHD). Serotonin modulates neuropsychological processes and also affects bowel motility, bladder control, and cardiovascular function. Norepinephrine affects stress, sleep, attention, focus, and inflammation. It also modulates the responses of the autonomic nervous system. Alterations in norepinephrine transmission can lead to anxiety disorders, mood disorders, ADHD, Alzheimer's disease, and posttraumatic stress disorder. Histamine is primarily involved in homeostatic functions, including wakefulness cycles, feeding behavior, and motivational behavior. Alterations in histamine can have multiple effects on the body, including changes in blood-brain barrier permeability, which can lead to neuroinflammation (Sheffler et al., 2023). Acetylcholine is an excitatory neurotransmitter involved in several different physiological processes, including voluntary muscle movement, memory, thinking, and learning (Cleveland Clinic,2022a).

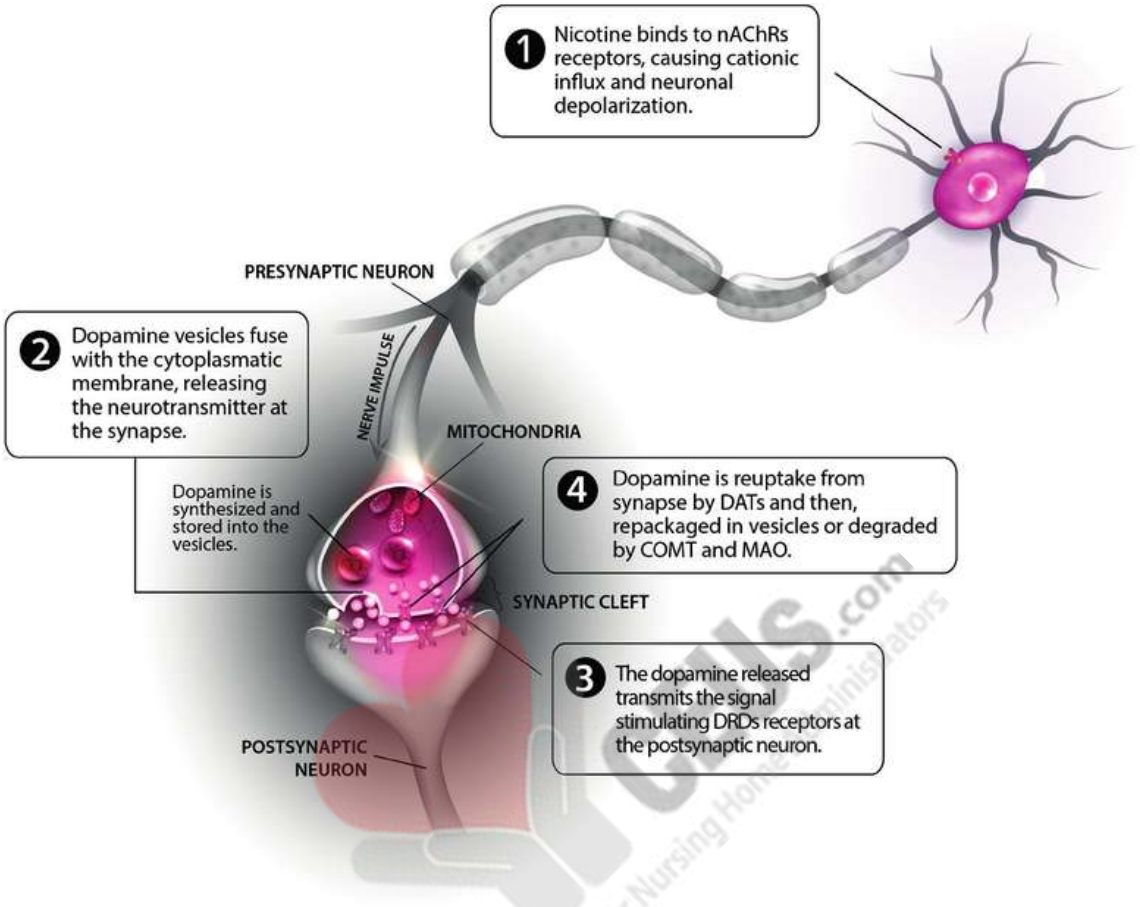
Nicotine, named after Jean Nicot, the French diplomat who introduced tobacco seeds from Portugal to France in the 16th century, is the psychoactive chemical found in tobacco leaves . Nicotine is synthesized in the leaves of the tobacco plant after active growth is completed. Nicotine is produced to aid the plant in defense against predatory insects (Sansone et al., 2023).

Nicotine directly impacts neurotransmitters. The nicotinic acetylcholine receptor (nAChR) facilitates communication from acetylcholine (Barrantes, 2023). Both acetylcholine and nicotine can bind to nAChRs. When these receptors are frequently engaged, they eventually become desensitized and no longer function. Whether a nAChR is activated by acetylcholine or nicotine, the nerve cell responds

the same way, with the release of neurotransmitters. NAChRs are found throughout the body and play different roles depending on their location. In neural tissue, they contribute to cognition, addiction, and cell growth. When nAChRs and their downstream signaling pathways become dysregulated, various diseases can develop (Sansone et al., 2023).

When neurotransmitters are released as a result of nAChR and nicotine interaction, the individual feels the effects of the signals initiated by those neurotransmitters, including feelings of pleasure, stimulation, and mood modulation. This process also leads to the development of new neural pathways and behavioral conditioning in response to environmental cues. Eventually, the desensitization of the nAcHR receptors leads to short-term nicotine tolerance and diminished psychological benefits of nicotine (Sansone et al., 2023). As a result, increased amounts of nicotine are needed to produce the same effect initially experienced with nicotine use (Mayo Clinic, 2025). When levels of nicotine in the brain decline, individuals begin to experience withdrawal symptoms. In the meantime, the nAChRs again become sensitive to nicotine and are reactivated if more nicotine is introduced to the body (Sansone et al., 2023).

How Nicotine binding to nAChRs stimulates dopamine release (Mota et al., 2023)



Section 2 Personal Reflection

Why do you think certain areas of the brain play a role in nicotine response? How do nAChRs interact with acetylcholine and nicotine? How does dopamine affect an individual? How does this likely affect addiction?

Section 3: Pathophysiology of Nicotine Addiction

Nicotine addiction is considered a chronic relapsing disorder responsible for over 480,000 deaths in the United States each year. When nicotine is consumed through inhaled cigarette smoke, the brain receives an arterial bolus of nicotine

within 7-30 seconds (Selby & Zawertailo, 2022). Nicotine addiction has been identified as the leading cause of preventable death and disease worldwide (Mahajan et al., 2021). Some e-cigarette devices are more efficient at delivering nicotine to the user compared to traditional cigarettes. This increases dependence (Wahidy et al., 2026).

The interaction between nicotine and nAChRs is the basis of the physiological dependence of an individual upon nicotine. When nicotine binds to certain types of nAChRs, dopamine is activated (Jiang et al., 2025). Dopamine, known as the "feel good" hormone, elicits feelings of pleasure and motivation to act while in this "feel good" state (Cleveland Clinic, 2022b). This system is responsible for rewarding sensory stimulation and associative learning (Jiang et al., 2025). It is important for human survival because it motivates individuals to complete tasks necessary for survival, such as eating, drinking, and reproducing. The human brain is hardwired to complete tasks that release dopamine, and when a task elicits a large dopamine response, the individual seeks to repeat that experience (Cleveland Clinic,2022b). This is the same process that contributes to the early process of nicotine addiction (Jiang et al., 2025).

Nicotine can cause rewarding or aversive effects, depending on an individual's sensitivity and tolerance. These contrasting signals from multiple brain regions contribute to the addictive properties of nicotine use. During an individual's initial use of nicotine, contrasting effects determine the likelihood of the person continuing to use nicotine. Aversive effects limit nicotine use and mitigate withdrawal symptoms. As someone uses nicotine more frequently, they are less sensitive to the aversive effects of nicotine (Le Foll et al., 2022).

The rewarding effects of nicotine primarily occur in the mesolimbic pathway. When nicotine is used, dopamine levels increase in specific brain regions. This increase in dopamine creates the reward effect of nicotine use (Le Foll et al.,

2022). Glutamate and GABA signaling within the mesolimbic system contribute to reward-related behaviors. Nicotine also enhances the reinforcement effects of sweet flavors. This explains the popularity of flavored nicotine liquids used for vaping. The nAcHRs in the ventral tegmental area (VTA) are especially vital in reinforcing the use of nicotine due to specific types of nAChRs and the neurotransmitters that are affected. Research has found that the activation of both GABA neurons and glutamate neurons contributes to reward processing. GABA neurons have been found to accelerate the brain's ability to associate cues with rewards, while glutamate neurons form functional connections with the VTA and other reward-related brain areas and are involved in dopamine synthesis. Evidence suggests that other neurons are involved in signaling nicotine-based reward responses; however, more research is necessary to determine exactly how these neurons contribute (Kim & Picciotto, 2023).

When nicotine activates nAChRs, it has a complex effect that not only enhances dopamine release, but also reduces baseline dopamine levels. This makes the release of dopamine when nicotine is used more impactful for the brain. As a result, the connection between nicotine use and dopamine release is enhanced, and the pairing of environmental cues with the anticipation of the dopamine reward is strengthened. This process also enhances the addictiveness of nicotine (Jiang et al., 2025).

There are two primary brain pathways associated with the addictive properties of nicotine. These pathways lead to reward and aversive effects (Le Foll et al., 2022). This means nicotine not only creates positive reinforcement with feelings of pleasure through activation of the reward system of the brain, but it also involves negative regulation, which causes unpleasant consequences when nicotine is not used, such as nausea. When nicotine is used, reward and aversion signaling occurs across multiple brain regions (Jiang et al., 2025).

Positive reinforcement signals from nicotine use are created within the mesolimbic pathway. Research suggests that the rewarding effects of nicotine result from multiple integrated actions of the dopaminergic, GABAergic, and glutamatergic systems(Jiang et al., 2025). Aversive effects that may limit use are primarily mediated by communication between the medial habenula (MHb) and interpeduncular nucleus (IPN). Research has found that other regions of the brain, including the prefrontal cortex, are interconnected and reinforce addictive behaviors (Le Foll et al., 2022).

Negative states associated with nicotine use include aversion and withdrawal. Aversion occurs when nicotine causes physical effects that make an individual want to avoid nicotine use. While lower doses of nicotine only elicit the reward response in the brain, higher doses cancreate an aversion response. Those who use nicotine typically use an amount that elicits the maximum reward before aversive effects are felt. When nicotine is used, it binds to high-affinity nAChRs, which create the desired reward feelings. When nicotine is consumed in high quantities, it also binds to the low- affinity nAChRs, which are associated with negative symptoms. These negative symptoms cause the individual to avoid nicotine use. There is a genetic component to the volume of low- and high-affinity nAChRs. Hence, those who are genetically predisposed to having fewer low-affinity nAChRs are more likely to use larger amounts of nicotine because they do not feel aversive effects as easily (Wills et al., 2022).

Negative symptoms associated with nicotine intolerance commonly include nausea, vomiting, and skin paleness. Other potential symptoms include increased salivation, dizziness, abdominal pain, sweating, tachycardia, tachypnea, vestibular disturbances, muscle tremors, and headaches. Late symptoms of nicotine intolerance that contribute to aversion include diarrhea, hypotension, bradycardia, dysrhythmias, confusion, agitation, and muscle weakness. Adolescents and children are at increased risk for these symptoms due to their

small size. Liquid sources of nicotine, used in vaping, are more likely to lead to symptoms of nicotine poisoning (Cleveland Clinic,2026).

Unlike nicotine aversion, negative symptoms associated with less nicotine intake, called withdrawal symptoms, increase the likelihood of using nicotine again. Although aversion and withdrawal symptoms create different responses, they are actually similar in mechanisms. The nAChR subtypes that underlie aversion partially overlap with those that underlie withdrawal symptoms (Kim & Picciotto, 2023). Glutamate signaling is involved in the aversion symptoms experienced as a result of nicotine toxicity. When nicotine binds to nAChRs in the MHb, the individual may begin to experience aversion symptoms. Neural activity in the MHb, IPN, and VTA influences withdrawal symptoms (Jiang et al., 2025).

During withdrawal from nicotine, mental health effects can include anxiety and panic-spectrum symptoms. These include intensified anxiety, inner restlessness, and psychomotor agitation. Clinically, patients may appear to be having a panic attack, pronounced agitation, inability to remain still, and symptoms such as insomnia and autonomic hyperarousal. These symptoms are worsened for those with pre-existing mental health conditions (Wahidy et al., 2026). Typically, withdrawal symptoms begin within 4 to 24 hours after cessation, peak after 2-3 days, and then taper off slowly over the next 3-4 weeks (Cleveland Clinic, 2024). Due to greater variability in nicotine delivery and formulations in e-cigarettes, the onset and intensity of withdrawal symptoms for e-cigarette users are less predictable than the withdrawal symptoms for traditional cigarette smokers (Wahidy et al., 2026).

Cravings are a symptom of nicotine dependence. Individuals may describe this feeling differently, but many express restlessness and edginess or anxiety. Some individuals may report feeling tightness in their throat or stomach. They may

describe cravings as coming in waves of intensity, starting subtly and growing stronger over time (Mayo Clinic, 2025).

When withdrawal symptoms occur with heightened mental health symptoms, the healthcare team must rule out other conditions that could contribute to symptoms, such as a cardiopulmonary emergency. Individuals who are very irritable or agitated should be assessed for delirium or medical causes of their agitation. Patients experiencing dysphoria should be assessed for suicide risk. Patients experiencing insomnia with cognitive disruption should have their mental status reassessed after they have been able to sleep. Regardless of the etiology, patients in nicotine withdrawal who express suicidal ideation must be managed with full suicide prevention precautions. Individuals who use other substances in addition to nicotine can experience psychotic or perceptual symptoms when withdrawing from nicotine. Though this is rare, a full medical and toxicological evaluation is necessary to rule out other causes of psychosis (Wahidy et al., 2026).

Though e-cigarettes have been marketed as less addictive than traditional cigarettes, a large systematic review and meta-analysis found that the level and prevalence of dependence on e-cigarettes is similar to that of traditional cigarettes (Kundu et al., 2025). What makes e-cigarettes potentially more dangerous than traditional cigarettes is that e-cigarettes are often marketed to younger individuals whose brains are more susceptible to the addictive effects of nicotine (CDC, 2024e).

During adolescence, the brain is still developing and is more susceptible to the neuro-inflammatory effects of nicotine (Mahajan et al., 2021). Since acetylcholine and dopamine systems are not yet completely developed, the use of nicotine during this critical period can alter these systems. MRI-based research has found that during adolescence, significant changes occur in the brain. During this critical

period, the brain is vulnerable to outside stimuli that can alter the course of development (Reynolds et al., 2025).

Nicotine use during adolescence affects the brain and alters the function of dopamine. Evidence suggests that changes in these neurotransmitter systems can lead to long-term issues. Animal studies have found that those who are exposed to nicotine in adolescence experience fewer adverse effects that would discourage nicotine use. Since nicotine increases sensitivity for the rewarding effects of its use, it also increases the reward effect when other drugs are used. Increased reward sensitivity leads to the "gateway drug" effect that increases the risk of use of other substances for adolescents who have used nicotine (Reynolds et al., 2025).

These processes can result in long-term nicotine addiction. The adolescent brain also becomes addicted to nicotine more quickly. Since the adolescent brain is not considered fully developed until age 25, the detrimental effects of nicotine addiction can continue well beyond what is socially considered adulthood (CDC, 2025).

Nicotine use creates associations in the brain. Over time, the new neural connections formed cause the brain to associate smoking with specific situations in an individual's daily routine. This may include activities such as drinking coffee, talking on the phone, drinking alcohol, driving the car, or spending time with friends. These activities become triggers for the brain to desire nicotine use (Mayo Clinic, 2025).

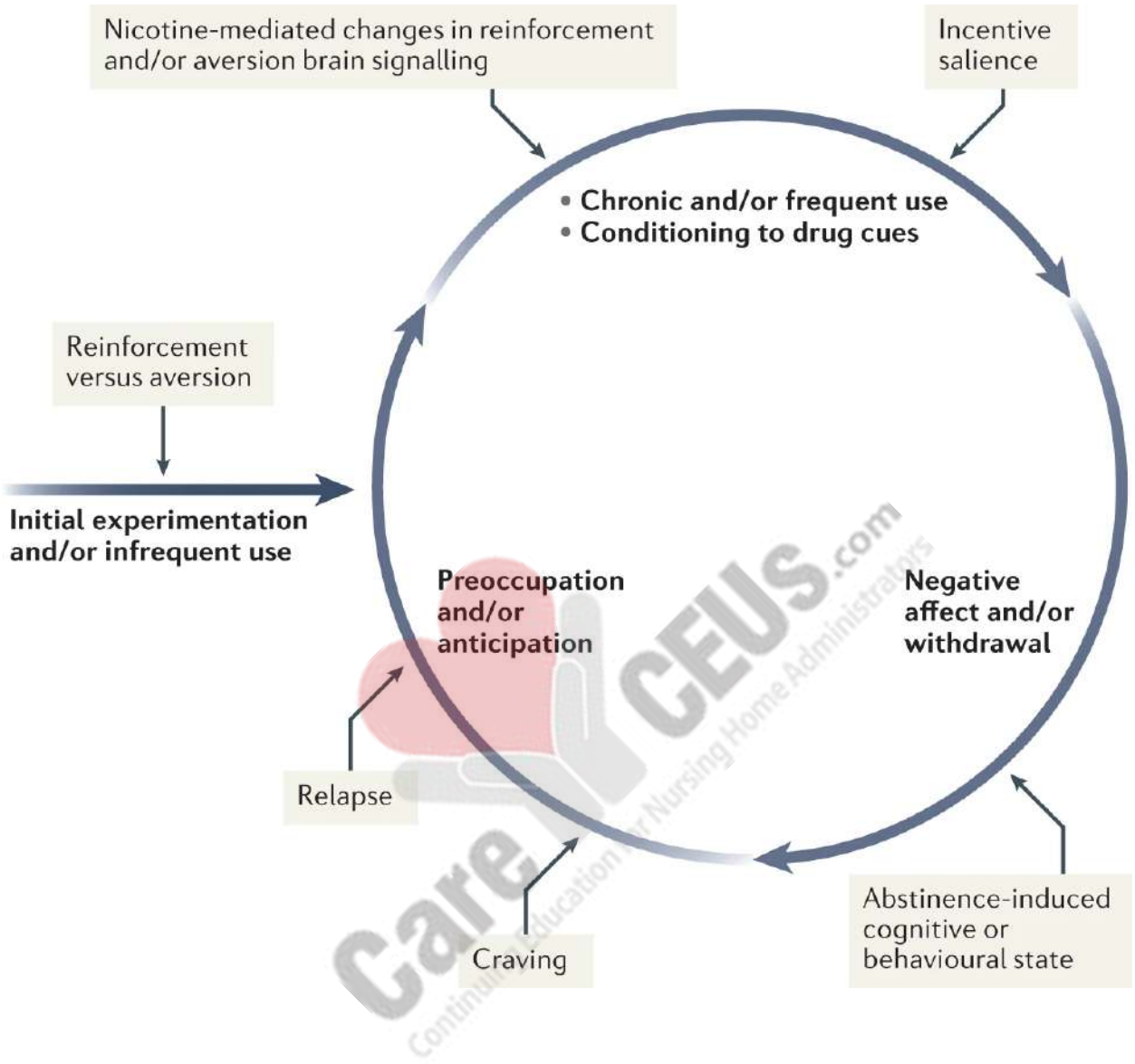
There is a difference between nicotine addiction and nicotine dependence. When an individual is addicted to nicotine, they crave the effects the use of nicotine has on their body. The urge to use nicotine-containing substances is hard to resist for those addicted to its effects. When an individual has a physical nicotine dependence, they experience physical symptoms of withdrawal when they do not

use nicotine. These can include trouble sleeping, increased anxiety, irritability, and hunger. When an individual who is experiencing withdrawal symptoms uses nicotine, the negative symptoms associated with withdrawal disappear; however, they return when nicotine is not used again for a period of time. The amount of nicotine in e-cigarettes varies widely among brands. There is no required standard method of labeling these products with their nicotine content, and sometimes products are not labeled accurately. Some brands of e-cigarettes may claim to be nicotine-free, but when tested are found to contain nicotine (Society, 2024).

Nicotine dependence affects mood and behavior. Individuals who are dependent upon nicotine may feel unable to quit, even when they have tried multiple times. It is common for individuals who are dependent upon nicotine to use within 30 minutes of waking. Research suggests that the sooner an individual must use nicotine after waking, the more physically dependent their body has become. Individuals who have developed nicotine dependence commonly experience symptoms of withdrawal when they attempt to stop using nicotine, making cessation difficult (Mayo Clinic, 2025).

When working with individuals who experience nicotine addiction, nurses can provide improved care when they understand that there are multiple neurochemical components to nicotine addiction. Nurses can remind patients and those in the community that addiction to nicotine and relapse with its use is not a moral failing, but rather a genetically predisposed and extremely complex neurochemical adaptation.

Cycle of Nicotine Addiction (Le Foll et al., 2022)



Section 3 Personal Reflection

How could you explain nicotine addiction in simplified terms? How do the rewarding and aversive effects work in contrast to promote addiction? Why would having fewer nAChRs that lead to aversive symptoms increase risk for heavy nicotine use?

Section 4: The Effects of Nicotine on Mental Health

The same pathways that lead to nicotine addiction also negatively affect the mental health of those who use e-cigarettes. The most common reason adolescents report using e-cigarettes is to relieve symptoms of anxiety, stress, or depression; however, nicotine has been linked to making these feelings worse when addiction or withdrawal occurs (CDC, 2025). Research has found that nicotine negatively affects mental health symptoms in both adolescents and adults. Research also suggests that the increase in mental health symptoms associated with withdrawal makes smoking cessation more difficult. Though many individuals begin to use nicotine as a means of self-medication, it ultimately leads to a cycle of addiction that is difficult to break (Alnashri et al., 2025). Research suggests a correlation between greater dependence on nicotine and worsened mental health symptoms (Alnashri et al., 2025).

The use of nicotine-containing products in the general population has declined since the physical harms of tobacco use have become undeniable and community education initiatives have worked to inform the public of risks associated with use. Research suggests that the mental health risks associated with traditional smoking are similar for those who use e-cigarettes. For those with mental illness, smoking is far more prevalent, with a rate 2-3 times higher than the general population. For those with severe mental illness, including schizophrenia, bipolar disorder, posttraumatic stress disorder (PTSD), and substance use disorder, the rate of nicotine use is five times higher than the general public. Individuals who use tobacco are twice as likely to experience depression, though this number climbs to four times the risk for those who are heavy consumers of nicotine (Prochaska Judith, 2025).

Clinical psychological testing among those who do and do not use e-cigarettes supports the research findings that those who vape have higher rates of mental

health challenges. Evidence-based testing, including PHQ-9 for depression, GAD-7 for anxiety, PC-PTSD-5 scores, and ADHD scores, is significantly increased in those who use e-cigarettes when compared to those who do not. Research has found that increased vaping correlates with poorer mental health, especially for internalizing symptoms such as depression and anxiety. Individuals who have ADHD may be prone to self-medicate with e-cigarettes. Individuals with PTSD experience exacerbated symptoms due to e-cigarette use (Ibrahim et al., 2025).

In a literature review, depression was found to be a mental health result of e-cigarette use. Studies found that continued use worsened depressive symptoms and led to a general decline in mental health. A bidirectional association was identified, as those who used e-cigarettes were more likely to experience depression and those with depression were more likely to use e-cigarettes (Javed et al., 2022). Most research supports the idea that nicotine use predates mental illness in users. Mental illness has been associated with greater dependence on nicotine, increased withdrawal symptoms with cessation, and less success for long-term cessation. Those who use nicotine earlier in life are more likely to consume excessive amounts of alcohol and develop alcohol abuse and dependence (Prochaska Judith, 2025).

Due to the mood-altering effect of nicotine, use can make an individual feel their symptoms of a mental health condition are improved or absent. However, this can lead to nicotine dependence, which leads to withdrawal symptoms. Nicotine withdrawal has been found to be the cause of acute psychiatric symptoms, especially in cases of abrupt cessation. In the emergency healthcare setting, patients in acute withdrawal can present with symptoms consistent with panic-like anxiety, dysphoria, agitation, insomnia, irritability, and impaired concentration. These are also symptoms often consistent with primary mood and anxiety disorders, stimulant intoxication or withdrawal, akathisia, emerging psychosis, and delirium. Withdrawal symptoms can also amplify psychiatric vulnerabilities in

some individuals, including impulsive behavior and suicidal ideation. Those at highest risk for psychiatric symptoms associated with abrupt nicotine cessation include adolescents, those with a preexisting mental health disorder, and patients who are hospitalized (Wahidy et al., 2026).

Due to the continued development of the brain during adolescence, this population is at increased risk for long-term and long-lasting effects of nicotine use, including increased risk for nicotine addiction, mood disorders, and permanent lowering of impulse control. Nicotine use in this age group also makes the brain more prone to become addicted to other substances, such as cocaine (Prochaska Judith, 2025). One study that examined the mental health effects of individuals aged 10-21 years who use e-cigarettes found that e-cigarette use was associated with depression, suicidal ideation, and suicide attempts. The number of suicide attempts for e-cigarette users was significantly higher compared to non-users. The effects of nicotine use on brain development in adolescents can lead to both cognitive and psychiatric issues (Javed et al., 2022).

The impaired cholinergic signaling due to alterations in nAChR signaling that occurs with adolescent nicotine use increases vulnerability to psychiatric disorders later in life. These changes also affect dopamine signaling. Dopamine signaling is often found to be altered in those with psychiatric disorders. Alterations in dopaminergic receptor expression are seen in adults with schizophrenia, depression, and addiction. The dopamine system undergoes rapid development during adolescence. Nicotine use during this period particularly affects the dopamine neurons of the VTA, affecting their firing rate, as well as other direct and indirect effects on dopamine neurotransmission, neurons in dopaminoceptive regions, and VTA GABA neurons, which are responsible for dopamine regulation. All of these alterations are associated with psychiatric vulnerability. Some researchers suggest that dopamine pathways are not necessarily altered by

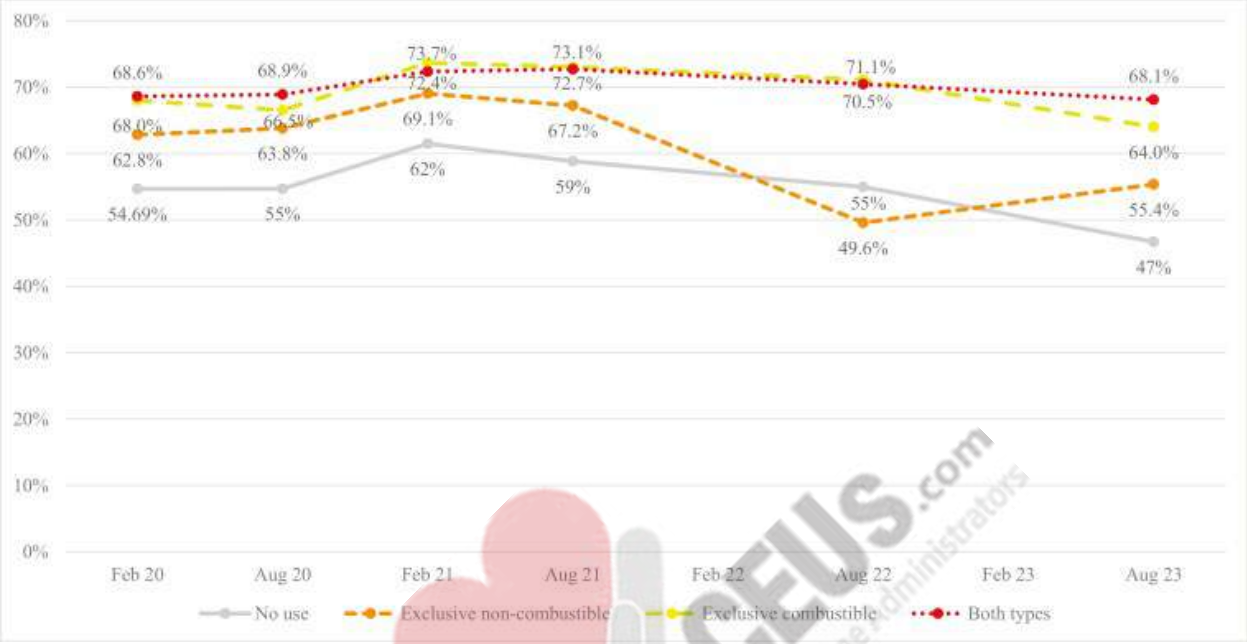
nicotine use during this period, but are rather “frozen” in an immature state (Reynolds et al., 2025).

Symptoms of depression are commonly found in adolescents who use e-cigarettes. In fact, younger adolescents who used e-cigarettes alone had a higher incidence of depressive symptoms than those who either engaged in binge drinking or marijuana use. However, depressive symptoms among these three groups leveled out in mid and late adolescence. Depressive symptoms include feeling hopeless, not enjoying activities previously enjoyed, and feeling as if life is meaningless (Gorfinkel et al., 2022).

Individuals with severe mental health conditions have a 15-20 year shorter life expectancy than the general population. One of the primary causes of death for this population is tobacco use. Tobacco use also interferes with many medications used to treat mental health conditions. When someone with a mental health disorder quits using nicotine, they can reduce psychiatric medication dosages by 25% on average (WHO, 2021).

As a result of clinical research that has shed light on the significant negative effects of vaping on mental health, the US Food and Drug Administration banned most flavored e-cigarette cartridges and pods in 2020 to reduce the appeal of these products to adolescents and young adults (Javed et al., 2022). The mental health effects of e-cigarettes can be improved with vaping cessation. Research suggests that individuals who previously used nicotine and then stopped using it reported lower levels of anxiety, depression, and stress, as well as improved mood and quality of life (CDC, 2025).

Internalizing Mental Health Symptoms Among Different Types of Nicotine Users Compared to Non-Users from 2020-2023



(Hackworth et al., 2025)

Section 4 Personal Reflection

How does nicotine use impact mental health? How do alterations in dopamine signaling contribute to mental health problems? Why is the adolescent brain more vulnerable to the mental health effects of nicotine? How does nicotine impact those with pre-existing mental health conditions?

Section 5: Risk Factors

Some individuals are at increased risk for initiating the use of e-cigarettes, others are at increased risk for developing addiction or dependence on nicotine, and

others are at increased risk for the adverse mental health effects that result from e-cigarette use. There are also risks associated with using e-cigarettes.

Multiple factors influence adolescents to use tobacco-containing products. Media, including social media, often show adolescents using these products, which can normalize use for those who may want to try tobacco products. Research has found that youth who observe other youth using tobacco-containing products are more likely to use them themselves. Adolescents are also at risk for use if they have a parent who uses a tobacco product. Lower socioeconomic status, including low income or education, increases risk. Some adolescents may not know how to say “no” to peers when offered nicotine. They may lack support or involvement from parents. Accessibility, availability, and cost are also factors. Poor school performance and low self-esteem have been identified as risk factors for nicotine use. Adolescents with mental health challenges are more likely to initiate use of e-cigarettes to self-medicate psychological symptoms. Adolescents may also believe that nicotine has positive benefits, such as stress relief and easier weight loss (CDC, 2024f).

Adolescents are at increased risk for developing long-term nicotine dependence. Approximately 90% of adults who use nicotine began using before age 18. Though there are physiological factors that increase the risk for nicotine dependence in adolescents, certain marketing strategies also increase risk. Flavorings in tobacco products, especially those used in e-cigarettes, are especially appealing to adolescents. In 2024, 88.2% of high school students and 85.7% of middle school students who had used e-cigarettes within the previous month reported having used a flavored nicotine product in the past 30 days. E-cigarettes have been the most commonly used tobacco product among adolescents since 2014. In 2024, 3.5% of middle schoolers had reported using e-cigarettes in the past 30 days, while 7.8% of high school students reported the same. The use of e-cigarettes in this population is significantly higher than that of those who use traditional

cigarettes, as only 1.1% of middle schoolers and 1.7% of high schoolers reported having smoked traditional cigarettes within the previous thirty days (CDC, 2024f).

Adolescents who use e-cigarettes are at increased risk for suicidality and depressive symptoms. Research found that adolescents who used e-cigarettes reported higher rates of hopelessness, sadness, suicidal plans, and suicide attempts within the previous 12 months. The incidence of depression was higher in adolescent users of e-cigarettes compared to non-users in the same age group. The highest rate of suicidality was found among those who used both e-cigarettes and traditional cigarettes (Javed et al., 2022).

Genetic factors influence an individual's physiological response to nicotine. It is estimated that genetic factors influence half of the variability in nicotine dependence. Variations in certain genes can determine which subunits are expressed on nAChRs, as well as the functional properties of these subunits. These variations contribute to vulnerability to nicotine dependence, as well as the volume of nicotine used per day. Some individuals have genetic variations that slow the metabolism of nicotine, causing them to use less and experience less severe withdrawal symptoms with cessation. Individuals who metabolize nicotine more quickly tend to use a larger amount of nicotine per day and have more difficulty quitting due to worsened withdrawal symptoms. Some genes can even influence the age at which an individual initiates nicotine use (Le Foll et al., 2022).

In addition to parental smoking and peer influence, impulsive or risk-taking personality and sensation-seeking behaviors also increase risk for initiating e-cigarette use. Individuals who have experienced adverse childhood events are at increased risk for nicotine use as an adult (Selby & Zawertailo, 2022). The use of e-cigarettes increases the risk of an individual smoking traditional cigarettes, which also have serious physical and psychological consequences (Le Foll et al., 2022).

Individuals who have a preexisting psychological condition are at risk for using nicotine products, becoming dependent on nicotine, and having adverse mental health effects as a result of e-cigarette use. Research has found that those with three or more persistent mental health issues have a 36.6% increased risk of experiencing anxiety immediately after using e-cigarettes when compared to those without persistent psychological conditions. Individuals who had five or more persistent psychiatric conditions had a 41.7% increased risk for anxiety after vaping (Purushothaman & Cuomo, 2026). Some of the psychological issues associated with nicotine are caused or exacerbated by the physical effects of nicotine use. Individuals with preexisting mental health challenges may experience further mental health deterioration from nicotine use. Individuals who use nicotine-containing products are at increased risk for developing a mood disorder (Abdelkader et al., 2024).

Female e-cigarette users are at increased risk for mental health issues such as depression and suicidal ideation. In addition to depression, anhedonia was also found to be higher in those who use electronic cigarettes. Anhedonia occurs when an individual is unable to experience pleasure or enjoy previously enjoyable activities (Javed et al., 2022).

The flavorings available for cannabis and nicotine-containing e-cigarette products increase both the likelihood of addiction to these products and the likelihood that an individual would engage in dual use. Dual use significantly increases risk for mental health complications. Dual use occurs when an individual uses both e-cigarettes and traditional nicotine or cannabis, or when they vape two different types of products (Purushothaman & Cuomo, 2026).

Certain populations are at increased risk for mental health problems associated with nicotine withdrawal. Adolescents, young adults, individuals who use high volumes of nicotine pods or disposables, and those with a preexisting psychiatric

condition are at increased risk for mental health problems during withdrawal (Wahidy et al., 2026). Hospitalized patients are at increased risk for agitation and delirium-like syndromes during nicotine withdrawal. Affective volatility during withdrawal can intensify psychiatric symptoms, including dysphoria, irritability, and impulsivity, which can increase the risk for suicidal ideation. Sometimes, the symptoms associated with nicotine withdrawal may be attributed to a primary psychiatric disorder. This assumption can lead to inappropriate prescription of medications or therapies that do not address the actual problem of nicotine dependence. A misdiagnosis is even more likely when a patient has a previously diagnosed mental health condition. Healthcare workers can help to aid in a correct diagnosis by being aware of the symptoms of nicotine withdrawal that mimic other psychiatric problems and understanding symptoms that are hallmarks of nicotine withdrawal.

Addiction and dependence create mental health challenges for those who use nicotine. In addition to biological factors, social and economic factors related to nicotine use can impact an individual's mental health. Those who use tobacco products often face stigma and social isolation. Stigma can lead to strained relationships with family and friends. Users may be embarrassed by their inability to quit using nicotine. The economic burden of nicotine use can be significant. In addition to the cost of nicotine products, healthcare-related costs are also increased for those who consume nicotine. The consequences of nicotine use can strain personal finances, lead to financial instability, and cause further stress. The psychological impact of nicotine can make users feel they need nicotine to cope with mental health symptoms. This makes cessation particularly difficult (Abdelkader et al., 2024).

Individuals who are exposed to secondhand e-cigarette emissions are at increased risk for mental health challenges. Evidence suggests that there is no significant difference in the psychological outcomes of those who are exposed to e-cigarette

emissions compared to those who are exposed to traditional secondhand smoke. E-cigarette emissions contain heavy metals, including lead, chromium, and nickel, ultrafine particles, and inorganic and volatile organic compounds. There is a public misconception about the safety of these emissions. While in some ways the emissions from e-cigarettes can be considered less harmful than cigarette smoke, in other ways they are just as, if not more, harmful. Research data suggests that those who are passively exposed to e-cigarette emissions, such as children, have the same increased risk for moderate to severe internalizing mental health problems as those exposed to secondhand smoke. Those who are not nicotine users, but are passively exposed to nicotine, are more likely to experience a sense of isolation, which can negatively impact mental health (Farrell et al., 2022).

Prenatal exposure to nicotine, including from e-cigarettes, increases the risk of alterations in brain development and later behavior. Nicotine crosses the placental barrier and can affect the fetal brain. NAChRs are active within the brain of the fetus and are upregulated by maternal nicotine use. In animal studies, maternal nicotine use has been found to affect fetal brain development of the prefrontal cortex, nucleus accumbens, dopamine, and elements of the nervous system. In human studies, infants who experienced prenatal nicotine exposure had lower birth weight and a greater incidence of preterm birth. Brain development was also found to be affected in human infants, with those exposed having smaller frontal lobes and cerebellar volumes. When children who were exposed to maternal nicotine use are compared to those who were not exposed at ten years old, those who were exposed continue to exhibit reduced brain volume, cerebral white and gray matter, and gyrification of the brain. In a study that assessed children at 6-8 years old who had been exposed to nicotine prenatally, the exposed children had increased behavioral and emotional difficulties related to reduced volumes of the caudate and nucleus accumbens, as well as thinning of the superior frontal cortex and parietal cortices. Research also found that prenatal exposure to nicotine in

the second trimester can lead to orbitofrontal cortex thinning, which increases risk for adolescent substance experimentation. Behavioral problems in children, especially attention deficit hyperactivity disorder (ADHD), are significantly increased in children exposed to nicotine during the prenatal period. Some genetic predispositions can also increase the risk for hyperactivity, impulsivity, oppositional behaviors, and language impairment in children who are exposed to nicotine prenatally. Nicotine has also been found to have long-term effects on serotonin and dopamine, impacting mental health later in life. E-cigarettes are often marketed as a safer alternative to traditional cigarettes during pregnancy; however, the developing brain is still exposed to nicotine, which can have adverse lifelong effects on mental health for the child (Castro et al., 2023).

Section 5 Personal Reflection

Who is at increased risk for initiating use of e-cigarettes? Who is at increased risk for nicotine dependence? How do genetics affect risk for mental health complications associated with e-cigarette use? How does secondhand e-cigarette vapor and maternal nicotine use affect the developing brain? What are the long-term consequences of this exposure?

Section 6: Screening and Assessment Strategies

Screening, Brief Intervention and Referral to Treatment (SBIRT) was developed by the Substance Abuse and Mental Health Services Administration as a comprehensive approach for addressing substance abuse. This evidence-based approach helps clinicians identify and improve outcomes for people who use all types of substances, including nicotine. The goals of SBIRT include harm prevention, identification, and early intervention. This approach can help clinicians identify at-risk patterns of substance use, provide evidence-based intervention,

provide resources and support, prevent disease and injury, improve health, and reduce healthcare costs. This approach can be used in any clinical setting. There are three core components to SBIRT. The first is screening with a validated screening tool, which helps providers quickly assess the severity of substance use and informs the level of treatment necessary. The next component, brief intervention, is aimed at improving insight and awareness of the problems that substance use creates with the hope of motivating behavioral change. The final component is referral to treatment, in which those identified as needing care can access appropriate and effective treatment options (SAMHSA, 2024).

The 5As (Ask, Advise, Assess, Assist, and Arrange) framework was developed by the United States Public Health Service to address the need for cigarette smoking cessation; however, it is also applicable to e-cigarette use. The Ask-Counsel-Treat framework was developed by the American Academy of Pediatrics and the Centers for Disease Control and Prevention to help pediatric healthcare workers address e-cigarette use (Kaliamurthy & Camenga, 2022).

Screening for nicotine use is recommended at every medical visit (Le Foll et al., 2022).

The American Lung Association (ALA) has made specific recommendations for screening for the use of e-cigarettes. The ALA recommends that healthcare organizations include wording specific to e-cigarette use in electronic medical record questionnaires (ALA, 2026). Research has found that among primary care clinics, e-cigarette use was screened for only 34.8% of the time, while screening for general tobacco use was 99.2%. In addition, screening for alcohol and illegal drug use was also greater than 90%, highlighting the disparity in substance screening in primary care. One recommendation to improve screening for e-cigarette use in the primary care setting is to include e-cigarette questions on the

same electronic form as those that screen for traditional tobacco use (Sanford et al., 2023).

Screening for nicotine use should be included during an assessment for psychological symptoms. A complete assessment should include the type of device used, nicotine concentration, frequency of use, time since last exposure, and the severity of withdrawal symptoms in the past. This information can help to inform the healthcare team regarding psychiatric symptom care when nicotine withdrawal is suspected (Wahidy et al., 2026).

The American Academy of Pediatrics recommends screening for tobacco and other substance use beginning at age 11. However, research has found that actual screening rates are low in the pediatric primary care setting. By screening everyone over age 11, regardless of risk factor identification, all patients are asked about substance use without bias. Screening is recommended at annual well visits or whenever an adolescent presents to the clinic with symptoms that could be the result of e-cigarette use, including respiratory symptoms and symptoms of nicotine withdrawal. Adolescents who seek care related to the use of alcohol, cannabis, or other tobacco products should also be automatically screened for e-cigarette use (Kaliamurthy & Camenga, 2022).

Screening for nicotine use can be completed through self-report. A self-categorization assessment occurs when the nurse or other member of the healthcare team asks the patient, “Which of these best describes your smoking history? Current daily smoker, current non-daily smoker, former smoker, or never smoker?” Another method for self-report screening is categorization based on behavioral assessment. This involves a series of yes-or-no questions asked of the patient, including “Have you ever smoked?” If the answer is yes, the assessment continues with “Have you smoked more than 100 times in your lifetime?”, “Have you smoked in the last 30 days?”, and “Do you smoke every day or almost every

day of the week?" Based on the answers to these questions, an individual can be categorized as a never-smoker or an ever-smoker. Ever smokers can be further categorized as a former or current smoker. Current smokers can be further categorized as daily or non-daily users, regardless of the frequency and volume of nicotine use. All current smokers should be offered treatment for smoking cessation (Le Foll et al., 2022).

The Tobacco, Alcohol, Prescription Medication, and other Substance use (TAPS) tool is a validated screening tool for substance use in adults that includes screening for nicotine use. This brief, 4-item tool can be used in a variety of healthcare settings. (Carter et al., 2022). For those who screen positive using the TAPS tool, the TAPS-2 tool can be used to guide a brief assessment of substance use. TAPS can be administered by a healthcare professional or can be self-administered to screen for substance use within the past 12 months. A score of 0 using this tool indicates no substance use in the previous 3 months, a score of 1 indicates problem use, and a score of 2 or greater identifies individuals at higher risk. The questions ask about the use of nicotine, drinking alcohol, misuse of prescription medications, and illegal drug use. The use of substances in each of these categories gives a score of one point. Though this screening tool is not specific to e-cigarettes, it is valuable in identifying those who use nicotine products, as well as those who may require more intensive support to quit (Carter et al., 2022).

The Screening to Brief Intervention (S2BI) tool and the Brief Screener for Alcohol, Tobacco, and other Drugs (BSTAD) are options for screening adolescents and young adults for e-cigarette use. The Car-Relax-Alone-Forget-Friends-Trouble (CRAFFT) version 2.1 + Nicotine is a tool that includes questions regarding e-cigarette use. All of these tools screen for substance use within the previous 12 months. A negative screen indicates no use of these substances in the previous year, while a positive screen indicates use of at least one of these substances

within the previous 12 months. It is necessary that screening for e-cigarette use be completed confidentially to encourage honest responses from the patient. This can be done on paper, electronically, as part of the electronic medical record, or as a pre-visit screener. Self-administered screeners typically provide a more accurate picture of e-cigarette use than clinician-administered screening tools (Kaliamurthy & Camenga, 2022).

The CRAFFT tool is intended for use with individuals under 21 years of age. The CRAFFT 2.1+ Nicotine tool uses four questions and can be administered verbally by the provider, though research suggests greater accuracy when self-administered (Gao et al., 2025). The first part asks how many days in the past month an individual has drunk more than a few sips of alcohol, used any marijuana in any form, used any other substance to get high, and used a vaping device or tobacco products of any kind. If the answer to all these questions is 0, the patient is then asked if they have ever ridden in a car driven by someone (including themselves) who was “high” or had been using alcohol or drugs. If 1 or more days of use is answered for the questions regarding alcohol, marijuana, or other psychoactive substances is 1 or greater, further questions are asked to assess the individual’s substance use. If they answer 1 or more days of use of vaping or tobacco products, a different questionnaire is used to assess use of vaping and tobacco products.

The CRAFFT 2.1+N Interview

To be verbally administered by the clinician

Begin: *"I'm going to ask you a few questions that I ask all my patients. Please be honest. I will keep your answers confidential."*

Part A

During the PAST 12 MONTHS, on how many days did you:

1. Drink more than a few sips of beer, wine, or any drink containing **alcohol**? Say "0" if none. ☐ # of days
2. Use any **marijuana** (cannabis, weed, oil, wax, or hash by smoking, vaping, dabbing, or in edibles) or "**synthetic marijuana**" (like "K2," "Spice")? Say "0" if none. ☐ # of days
3. Use **anything else to get high** (like other illegal drugs, pills, prescription or over-the-counter medications, and things that you sniff, huff, vape, or inject)? Say "0" if none. ☐ # of days
4. Use a **vaping device* containing nicotine and/or flavors,** or use any **tobacco products†?** Say "0" if none. ☐ # of days
   **Such as e-cigs, mods, pod devices like JUUL, disposable vapes like Puff Bar, vape pens, or e-hookahs. †Cigarettes, cigars, cigarillos, hookahs, chewing tobacco, snuff, snus, dissolvables, or nicotine pouches.*

If the patient answered…

"0" for all questions in Part A	"1" or more for Q. 1, 2, or 3	"1" or more for Q. 4
↓	↓	↓
Ask 1st question only in Part B below, then STOP	**Ask all 6 questions in Part B below**	**Ask all 10 questions in Part C on next page**

Part B

		Circle one	
C	Have you ever ridden in a **CAR** driven by someone (including yourself) who was "high" or had been using alcohol or drugs?	**No**	**Yes**
R	Do you ever use alcohol or drugs to **RELAX**, feel better about yourself, or fit in?	**No**	**Yes**
A	Do you ever use alcohol or drugs while you are by yourself, or **ALONE**?	**No**	**Yes**
F	Do you ever **FORGET** things you did while using alcohol or drugs?	**No**	**Yes**
F	Do your **FAMILY** or **FRIENDS** ever tell you that you should cut down on your drinking or drug use?	**No**	**Yes**
T	Have you ever gotten into **TROUBLE** while you were using alcohol or drugs?	**No**	**Yes**

Two or more YES answers in Part B suggests a serious problem that needs further assessment. See Page 3 for further instructions. →

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Part C

*"The following questions ask about your use of any **vaping devices containing nicotine and/or flavors**, or use of any **tobacco products.***"*

	Circle one	
1. Have you ever tried to QUIT using, but couldn't?	**Yes**	**No**
2. Do you vape or use tobacco NOW because it is really hard to quit?	**Yes**	**No**
3. Have you ever felt like you were ADDICTED to vaping or tobacco?	**Yes**	**No**
4. Do you ever have strong CRAVINGS to vape or use tobacco?	**Yes**	**No**
5. Have you ever felt like you really NEEDED to vape or use tobacco?	**Yes**	**No**
6. Is it hard to keep from vaping or using tobacco in PLACES where you are not supposed to, like school?	**Yes**	**No**
7. When you HAVEN'T vaped or used tobacco in a while (or when you tried to stop using)…		
a. did you find it hard to CONCENTRATE because you couldn't vape or use tobacco?	**Yes**	**No**
b. did you feel more IRRITABLE because you couldn't vape or use tobacco?	**Yes**	**No**
c. did you feel a strong NEED or urge to vape or use tobacco?	**Yes**	**No**
d. did you feel NERVOUS, restless, or anxious because you couldn't vape or use tobacco?	**Yes**	**No**

One or more YES answers in Part C suggests a serious problem with nicotine that needs further assessment. See Page 3 for further instructions. ⟶

References:

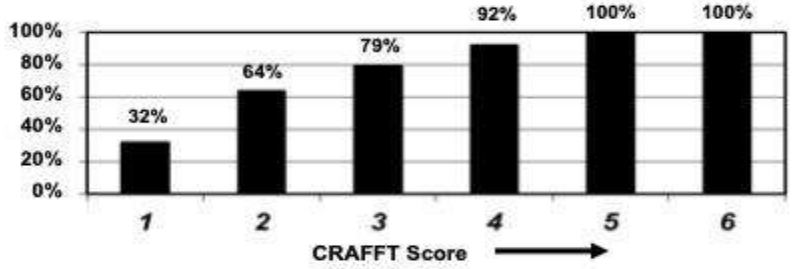
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CRAFFT Score Interpretation

Probability of a DSM-5 Substance Use Disorder by CRAFFT score*



*Data source: Mitchell SG, Kelly SM, Gryczynski J, Myers CP, O'Grady KE, Kirk AS, & Schwartz RP. (2014). The CRAFFT cut-points and DSM-5 criteria for alcohol and other drugs: a reevaluation and reexamination. Substance Abuse, 35(4), 376–80.

Use the 5 R's talking points for brief counseling.

1. **REVIEW** screening results
   For each "yes" response: *"Can you tell me more about that?"*
2. **RECOMMEND** not to use
   "As your doctor (nurse/health care provider), my recommendation is not to use any alcohol, nicotine, marijuana or other drug because they can: 1) Harm your developing brain; 2) Interfere with learning and memory, and 3) Put you in embarrassing or dangerous situations."
3. **RIDING/DRIVING** risk counseling
   "Motor vehicle crashes are the leading cause of death for young people. I give all my patients the Contract for Life. Please take it home and discuss it with your parents/guardians to create a plan for safe rides home."
4. **RESPONSE** elicit self-motivational statements
   Non-users: *"If someone asked you why you don't drink, vape, or use tobacco or drugs, what would you say?"* Users: *"What would be some of the benefits of not using?"*
5. **REINFORCE** self-efficacy
   "I believe you have what it takes to keep substance use from getting in the way of achieving your goals."

Give patient Contract for Life. Available at www.crafft.org/contract

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crafft@childrens.harvard.edu www.crafft.org

For more information and versions in other languages, see www.crafft.org.

(Knight, 2020)

Screening and brief intervention worksheet

Screen all patients over age 12	• Administer through a portal, on paper, or on a tablet • Ask parents to allow their children to fill out the screen confidentially
Use a validated screening tool, such as the S2BI*	**In the past year, how many times have you used:** 1. Nicotine/Tobacco (including cigarettes, electronic cigarettes, or vapes)? • Never • Once or twice • Monthly • Weekly or more 2. Alcohol? • Never • Once or twice • Monthly • Weekly or more 3. Marijuana (such as smoking, vaping or edibles)? • Never • Once or twice • Monthly • Weekly or more 4. Prescription drugs that were not prescribed for you (such as pain medication or Adderall)? • Never • Once or twice • Monthly • Weekly or more 5. Illegal drugs (such as cocaine, Ecstasy or Molly)? • Never • Once or twice • Monthly • Weekly or more 6. Inhalants (such as nitrous oxide)? • Never • Once or twice • Monthly • Weekly or more

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The S2BI is a validated instrument for use with adolescents aged 12-17 years and consists of 7 items. It can be used to screen for alcohol use and other substances, as well as e-cigarettes. Questions specifically focused on e-cigarette use can be included.

Screening and brief intervention worksheet

	7. Herbs or synthetic drugs (such as salvia, "K2", or bath salts)? • Never • Once or twice • Monthly • Weekly or more
Add a question about vaping	1. In the past year, how many times you vaped anything including, nicotine, marijuana, or just flavoring?: • Never • Once or twice • Monthly • Weekly or more 2. Which of the following have you vaped? (choose all that apply) • Nicotine, • Marijuana • Just flavoring? **If positive, ask about EVALI symptoms:** In the past three months have you had new or worsening cough, chest pain, shortness of breath, coughing up blood, abdominal pain, nausea, vomiting, diarrhea, fever, night sweats, or weight loss? Yes/No
Give brief advice to EVERY patient	• Discourage all substance use on the basis of health *"The best choice for health and development is NOT to use any substances"*
No Substance use	• Give positive reinforcement *"Choosing not to use substances is a really smart decision"*
Once or twice for one or more of alcohol, nicotine or marijuana	• Recommend cessation *I recommend that you don't use substances at all. People can get into trouble, get hurt or have something bad happen to them even if they only use a few times.* • Double check the bottom half of the screen • If another substance is positive, consider a referral to a behavioral health counselor • If non-prescription medication use is positive, take more history to determine the reason for use and source of the prescription

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Screening and brief intervention worksheet

Monthly use of any substance	• Recommend cessation
	• Consider medications for nicotine or marijuana withdrawal and cravings (see separate guidance)
	  • *"As your healthcare provider I recommend that you quit."*
	• Give personalized feedback and education.
	  • *"Marijuana can hurt your academic performance and make it harder to reach your goals"*
	  • *"Alcohol can make feelings of depression worse."*
	  • *"Nicotine can make it hard to concentrate and interfere with ADHD medications"*
	• Suggest an appointment with a behavioral health counselor
	  • *"I would recommend that you speak with a counselor to talk about stress and about vaping. Can I help you set that up?"*
	• If the patient does not agree to see a counselor, ask for a follow up.
	  • *"If you are not interested in speaking to a counselor right now I would like to follow up with you in three months to see how you are doing. Let's make a follow up appointment."*

Weekly or more use	• Follow guidance for weekly or more • Suggest an "abstinence challenge" • *"I recommend that you quit for a little while to see how that feels. Would you be willing to try quitting for 3 months?"* • Offer drug testing to help self-monitor (see separate guidance)

*The S2BI is a screening tool designed to detect SUBSTANCE USE DISORDERS. Questions are based on the substance being used (alcohol, nicotine, THC). The question about vaping is designed to identify adolescents who are vaping who may have lung injury due to the chemicals that are in the vaping liquid.

Disclaimer: The Screening and Brief Intervention Tip Sheet is offered for information purposes only and is not meant as a substitute for independent medical judgment or the advice of a qualified physician or healthcare professional. The Screening and Brief Intervention Tip Sheet is not intended to provide medical advice or clinical services to patients, to verify or approve medical information or credentials, or to make any medical referrals. The Screening and Brief Intervention Tip Sheet does not provide professional or medical advice or recommend any particular medical device or service, including recommendations or endorsements through the Screening and Brief Intervention Tip Sheet. Users who choose to use information or recommendations made available by the Screening and Brief Intervention Tip Sheet do so at their own risk, and should not rely on that information as professional medical advice or use it to replace any relationship with their physicians or other qualified healthcare professionals.

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The following chart lists questions to ask youth who vape and the rationale behind asking them.

Questions	Rationale
What type and brand of vape are you using?	
When (at what age) and at what age did you start vaping? Why did you try it? Why do you vape now? What are some downsides of vaping for you?	Early onset of substance use is associated with greater lifetime risk of substance use disorder. Motivations for initiating and continuing vaping can help inform cessation counseling
What's in your vape? Nicotine? Tetrahydrocannabinol (THC)? Flavoring? If nicotine and/or THC, what is the concentration (or milligram content) of the cartridges/liquids?	Vaping nicotine and THC place youth at risk for nicotine and cannabis use disorders; higher concentration cartridges may be associated with greater risk. Vaping THC may also be associated with EVALI.
How many times do you vape in a day/ week? How long after you wake up do you start vaping? Do you vape at school and/or work, and if so, how often?	Frequent use throughout the day places youth at risk for developing withdrawal symptoms.
How long does a cartridge/pod last you? How many cartridges do you go through in a typical week? If not using cartridges, how often do you refill your vaping device?	More frequent use places youth at risk for withdrawal.
Have you tried quitting on your own- how long were you able to not vape? Did you experience cravings (a strong feeling that you want to use again) or symptoms of withdrawal? If vaping THC: Have you had episodes of persistent vomiting? Paranoia? Psychotic symptoms like hearing voices or seeing things that are not really there?	Cessation attempts are likely to be hampered by cravings and withdrawal. For nicotine, these symptoms can be reduced with pharmacotherapy

(Adapted from Hadland SE, Chadi N. Through the Haze: what providers can do to address youth vaping. *J Adolesc Health*. 2020;66[1]:10–14. (Kaliamurthy & Camenga, 2022))

If an evidence-based screening tool is used and the result is negative, meaning the patient does not report e-cigarette use, the nurse should provide appropriate preventative education. If the screening is positive, a nicotine use history should be obtained. The minimum information to gather at this point is the frequency of e-cigarette use and the contents of the e-liquid they use. Frequency can be assessed by asking the user how many times per day, week, or month they vape, but if use is irregular, this could be a difficult question to answer. Another appropriate way to assess frequency is to ask how often they refill their e-cigarette or how many disposable e-cigarettes they use per day (Kaliamurthy & Camenga, 2022).

The content of the e-liquid is an important part of assessing e-cigarette use. While someone may be able to confirm that the liquid they use contains nicotine, they typically do not know its nicotine concentration. While the quantity of nicotine in an e-cigarette does not necessarily correlate with nicotine exposure levels for various reasons, a general estimate of the amount of nicotine someone is exposed to can help inform clinical decisions and determine whether pharmacological assistance with cessation may be necessary (Kaliamurthy & Camenga, 2022). The clinician should also inquire about the type of e-cigarette device the adolescent uses. They may use more than one type of device that exposes them to varying levels of nicotine (Kaliamurthy & Camenga, 2022).

When assessing cessation history, there are evidence-based tools that can be used to assess effort in quitting the use of e-cigarettes, as well as assess for symptoms of withdrawal the individual has experienced in the past. The Hooked on Nicotine Checklist, the Patient-Reported Outcomes Measurement Information System (PROMIS), the E-cigarette Dependence Scale (EDS), and the Fagerstrom Test for Nicotine Dependence (FTND) are all validated tools for assessing nicotine dependence. Generally speaking, higher scores on these tools indicate greater nicotine dependence (Kaliamurthy & Camenga, 2022).

In addition to screening for the use of e-cigarettes, those e-cigarette users should also be screened for symptoms of mental health issues. E-cigarettes can contribute to the development of or exacerbate symptoms of various mental health conditions. There are many evidence-based screening tools available to assess for the presence of mental health conditions. The Vanderbilt ADHD Rating Scale, Patient Health Questionnaire-9 (PHQ-9), and Screen for Child Anxiety Related Disorders (SCARED) are validated tools for assessing the mental health of e-cigarette users (Kaliamurthy & Camenga, 2022).

Nurses should be aware of the diagnostic criteria when assessing for nicotine dependence. Nicotine dependence can be diagnosed using ICD-10 or DSM-5 criteria. The DSM-5 uses standard substance use disorder criteria that are non-specific for nicotine. To meet DSM-5 criteria, an individual must experience 2 of the following 11 conditions within the past 12 months:

- Tobacco often used in larger amounts or over a longer period of time than intended
- A persistent desire or unsuccessful efforts to reduce or control tobacco use
- Craving, or a strong desire or urge to use tobacco
- Recurrent tobacco use resulting in failure to fulfill major role obligations at work, school, or home
- Continued tobacco use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of tobacco
- Important social, occupational, or recreational activities given up or reduced because of tobacco use
- Recurrent tobacco use in hazardous situations, such as smoking in bed

- Tobacco use continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by tobacco use
- Tolerance, defined as either a need for markedly increased amounts of tobacco to achieve the desired effect or a markedly diminished effect with continued use of the same amount of tobacco
- Withdrawal, including either withdrawal syndrome for nicotine or tobacco or nicotine taken to relieve or avoid withdrawal symptoms

(Le Foll et al., 2022)

Section 6 Personal Reflection

How does SBIRT guide clinical care for e-cigarette use? Why is it necessary to screen all individuals over age 11 for nicotine use? Why do you think self-reported screening tools are more accurate than those administered by a clinician? What information is necessary for a complete assessment of e-cigarette use?

Section 7: Nursing Interventions

The treatment plan for e-cigarette smoking cessation must be individualized for the best chance of success. Clear and effective communication is necessary to ensure an accurate assessment of nicotine use. Not all patients equate smoking traditional cigarettes with the use of e-cigarettes. They may not disclose use of e-cigarettes as use of nicotine. This is more common among adolescents (Wahidy et al., 2026). Nurses must be careful in selecting the wording they use when discussing e-cigarette use with patients to avoid miscommunication and omitted information. When counseling an individual about smoking cessation, the five R's can help nurses remember the points that should be included in a smoking

cessation conversation. These include the Relevance of quitting, the Risks of not quitting, the Rewards of quitting, the Roadblocks that may arise, and Repetition (Kaliamurthy & Camenga, 2022).

Motivational interviewing is a technique used to elicit behavior change. This technique emphasizes collaboration rather than lecturing or confrontation. The interviewer must communicate to the patient that they respect the patient's autonomy. It is often helpful to ask permission of the patient to discuss their e-cigarette use and then review the results of the screening tool. The discussion should include education regarding the concerns and health risks of e-cigarette use. Based on this conversation, the interviewer can assess the patient's desire and motivation to quit using e-cigarettes. It can be helpful to assess readiness by asking the patient to rate their desire to quit on a scale of 1 to 10, with 1 being not ready and 10 being very ready. Based on the response, the interviewer can ask follow-up questions, such as why they didn't assign a higher or lower number. At this time, it can also be helpful to assess barriers to cessation (Kaliamurthy & Camenga, 2022).

For adolescents, individual needs, challenges, and motivations will need to be assessed. Cognitive development must also be considered, as adolescents typically have emerging needs for independence and autonomy. A personalized strengths-based approach can help an adolescent feel empowered and motivated to make healthy choices. While counseling for e-cigarette cessation can occur without a parent present, especially for the first conversation, clinicians should encourage the adolescent to include their parents and caregivers in the conversation for support (Kaliamurthy & Camenga, 2022).

Healthcare workers can help individuals set goals regarding smoking cessation, even if they are not yet ready to quit. If they are not yet ready, nurses and other members of the healthcare team should maintain a positive therapeutic rapport

with the patient. It can be helpful to see the patient more frequently, provide support, and discuss cessation (Kaliamurthy & Camenga, 2022). Patients who are not yet ready to quit using nicotine and who have comorbid mental health conditions may be more open to addressing their mental health. Improvements in their mental health status can lead to motivation for smoking cessation (Prochaska, 2025). When individuals are ready to quit, nurses can help guide them toward the best chance of success by collaborating with the patient to create a quit plan. When appropriate, the healthcare team can support the individual's chosen quit date through behavioral and/or pharmacological interventions (Kaliamurthy & Camenga, 2022).

A quit plan is an intentional, evidence-based method that increases the likelihood of success with e-cigarette cessation. smokefree.gov walks users through the steps to create a quit plan, but nurses and other health care professionals can also help patients develop one. The first step of making a quit plan is to choose a date. Individuals should choose a date within the next two weeks. It is helpful to choose a date that will not already be stressful. Next, the individual should estimate how much they spend on vaping each week. This estimate should include the cost of vapes, pods, e-liquid, and any other spending related to e-cigarette use. Calculating this number motivates individuals by showing them how much money they can save by quitting. The next step in creating a quit plan is to identify the reasons why they are choosing to quit. Reasons could include health concerns, family and friends, a recommendation from their doctor, saving money, setting a good example, improving their future, regaining control of their life, caring for the environment, caring for their pets, or because they are expecting a baby. Next, the individual should identify their triggers. It is important to remind those wanting to quit that certain places, situations, and feelings will make them want to vape. These can include things like being offered a vape, a new flavor being available, going to a party, drinking alcohol, withdrawal symptoms, usual routines such as

being on the phone or driving, and certain emotions like boredom or sadness. Once triggers have been identified, a personalized strategy should be developed to avoid or manage them. Not all triggers can be avoided, so the individual must develop skills to resist relapse when the trigger occurs. The final step in making a quit plan is to set the individual up for success by choosing strategies and tools that will help them quit. This includes identifying supportive people in their life, resources for expert help, and creating a list of distractions to use when cravings occur. Quit plans have been found to help those wanting to quit vaping stay on track, persevere through withdrawal symptoms, and achieve permanent smoking cessation (Smokefree.gov, ND).

Since nicotine and other substance use disorders arise from a combination of genetic, neurobiological, psychological, social, and environmental factors, behavioral interventions to support cessation are recommended to help the individual be successful. Individual therapy can help the patient develop a personalized plan for cessation. This type of therapy may include techniques such as motivational interviewing and cognitive behavioral therapy. Skills to help patients resist relapse when triggers occur can be built in a therapy setting. Contingency management is a type of individual therapy that uses incentives to promote smoking cessation. While this type of therapy is not appropriate for everyone, it can be helpful for smoking cessation in adolescents. Family therapy and group therapy are also counseling methods that individuals may benefit from (Kaliamurthy & Camenga, 2022).

There are evidence-based pharmacological methods to support smoking cessation. Nicotine replacement therapy has been widely successful in supporting smoking cessation in the adult population. Nicotine replacement works by binding to nicotinic acetylcholine receptors (nAChRs). Nicotine replacement therapy typically uses a combination of a nicotine patch with a short-acting nicotine product for breakthrough cravings. A nicotine patch is applied to the skin every 24

hours. Nurses should advise patients to remove the old patch when placing a new one and to change the application site daily. The patch dose depends on the number of e-cigarette cartridges used each day, and patches are available in 7mg, 14mg, or 21mg strengths. The dose of nicotine patches should be weaned. Once the initial dose is selected, that dose is used for 4-6 weeks. Following this initial period, the next lower dose is prescribed and used for 2-4 weeks. The dose can be weaned every 2-4 weeks until the patient is no longer dependent on nicotine (Kaliamurthy & Camenga, 2022).

There are different options for breakthrough cravings when an individual is using nicotine replacement therapy for cessation. Gum and lozenges are available in 2mg or 4mg doses and can be used every 1-2 hours. The 4mg dose is typically prescribed for adults with more severe nicotine dependence; otherwise, the 2mg dose is typically used. Lozenges are also available in 1mg doses (Kaliamurthy & Camenga, 2022). Nasal sprays are also available (Mayo Clinic, 2025). Patients should be advised that, when using the gum, results are best if they chew the gum some, then hold it between their cheek and oral gums.This method ensures effective nicotine absorption. Though there are not currently any FDA-approved medications to treat nicotine dependence in adolescents aged 16 years and younger, nicotine replacement therapy is commonly used in this population to manage symptoms of withdrawal. The American Academy of Pediatrics encourages the use of nicotine replacement therapy for adolescents with moderate or severe nicotine dependence (Kaliamurthy & Camenga, 2022).

Nicotine replacement therapy is most effective when combined with varenicline or bupropion therapy (Kaliamurthy & Camenga, 2022). Varenicline (Chantix) is the preferred pharmacological treatment for e-cigarette smoking cessation for use with nicotine replacement therapy. Varenicline is a partial agonist that binds to nAChRs. It can be used for patients aged 17 and older. Treatment with this medication should begin one week before the patient’s selected quit date. The

dose is gradually increased, starting with 0.5mg by mouth once daily for the first three days. Then it is increased to 0.5mg twice daily for days 4-7. On day 8, the dose is increased to 1mg twice daily and is continued for twelve weeks. In some cases, the provider may choose to prescribe a second course of treatment to support effective cessation. Patients taking this medication should be advised to notify their provider of any symptoms of suicidality (Kaliamurthy & Camenga, 2022).

Bupropion sustained-release (Budeprion SR, Wellbutrin SR) can be used in combination with nicotine replacement therapy for e-cigarette smoking cessation. The mechanism of action is not fully understood, but it does modulate dopaminergic transmission in the brain. Although it is only FDA-approved for those aged 18 and older, it is often used off-label for adolescents younger than 18 years. Bupropion SR should be started at least 1 week before the patient's selected quit date, and the dose should be gradually increased. The initial recommended dose is 150mg once daily by mouth for three days. It is then increased to 150mg twice daily. Treatment with bupropion SR is recommended for 2-3 months. After this time, the provider can consider discontinuation; however, evidence suggests that this medication can be used to support cessation for up to a year. In some cases, it may be used longer. This medication can also be helpful for patients who also experience symptoms of depression, a common condition for those who use e-cigarettes. Bupropion SR is contraindicated for those with seizure disorders, eating disorders, or who have abruptly discontinued the use of alcohol, benzodiazepines, or antiepileptic medications (Kaliamurthy & Camenga, 2022).

There are many available resources for e-cigarette smoking cessation. The University of California, San Francisco, offers a hotline that connects callers to the state's smoking-cessation quitline. This service connects individuals to a smoking cessation coach who can provide information about resources available in their

state. This service is free for all users. The hotline number is 1-800-QUIT-NOW and can be shared with any patients seeking support or more information about e-cigarette smoking cessation. There are also quitlines available in other languages, as well as programs that use texting to answer questions and provide support (CDC, 2024d).

Sometimes, patients may be unable to stop smoking e-cigarettes even with behavioral and pharmacological support. When this occurs, the healthcare team should refer the patient to a higher level of care, such as an intensive outpatient program. This type of program can help the individual gain skills to be successful with e-cigarette smoking cessation. Since the use of e-cigarettes is associated with mental health challenges, a referral for behavioral health evaluation and treatment for psychological conditions can be helpful to support cessation (Kaliamurthy & Camenga, 2022).

There are potential challenges to e-cigarette smoking cessation that nurses should be aware of. In adolescents, nicotine replacement therapy may require insurance prior authorization and parental consent. Mental health challenges may need to be addressed before cessation can be attempted; however, there is a shortage of mental health professionals in many regions, and availability may vary (Kaliamurthy & Camenga, 2022). Individuals with mental health conditions are more likely to use nicotine and also have greater difficulty with cessation. These individuals may require enhanced support to quit using nicotine successfully. Nurses should remind patients with mental health conditions who are trying to quit using nicotine that research has found that eliminating nicotine has positive effects on mental health, with depression and anxiety symptoms decreasing after a few months of being nicotine-free.

Due to the increased popularity of e-cigarettes and the effects of nicotine use on mental health, there have been recent policy changes to reduce public health

risks. In 2019, the minimum age to buy e-cigarettes was raised from 18 to 21 years old. Beginning in 2020, a ban on the sale of mint-, candy-, and fruit-flavored disposable and cartridge-based e-cigarettes was implemented to reduce their appeal to adolescents and young adults. E-cigarette packaging has also been regulated with a ban on highly identifiable logos or cartoon characters (Javed et al., 2022).

Section 7 Personal Reflection

How does clear and effective communication, especially regarding terminology, improve patient outcomes? How does Nicotine Replacement Therapy work? Why do you think this is an effective strategy for successful e-cigarette smoking cessation? What resources and supports would you recommend to an e-cigarette user who is interested in quitting?

Section 8: Patient Education

There are many resources available to help members of the healthcare team deliver effective patient and family education that can improve outcomes. Key points that should be communicated to patients include the fact that there are no safe tobacco products. This can help to correct the misconception that e-cigarettes are safe to use because they don't contain smoke. Patients and families should be advised that most e-cigarettes contain nicotine which can have harmful psychological effects on the user, can lead to nicotine dependency, disrupt child and adolescent development, and can be harmful to fetuses if pregnant women use them. Nurses should communicate that the aerosol from e-cigarettes is also dangerous because it can contain cancer-causing substances and other microscopic particles that are inhaled into the lungs (CDC, 2025).

There is information that is specifically about e-cigarettes that nurses can include in effective patient education. Many individuals, especially adolescents and young adults, do not realize that most e-cigarettes contain nicotine. Due to the variability in nicotine tolerance, acute nicotine exposure can be toxic. There has been evidence of children and adults experiencing nicotine poisoning due to swallowing, breathing, or absorbing e-liquid through the eyes or skin. It is estimated that 80% of calls to US poison control related to e-cigarettes are for children under five years of age who have been exposed to e-liquid (CDC, 2025).

Nurses must consider the unique effects e-cigarettes have on adolescents when discussing e-cigarettes with this population and their caregivers. They should be advised that nicotine is especially harmful to the developing brain during adolescence, significantly increasing their risk of mental health challenges due to e-cigarette use. Patients and caregivers may not be aware that the adolescent brain is not completely developed until age 25, which can extend the developmental risk of using e-cigarettes past the age they can legally purchase them. Though an adolescent may believe they are a casual e-cigarette user, they should know that the adolescent brain becomes dependent on nicotine more easily than adults', with signs of addiction sometimes occurring before regular or daily e-cigarette use. Adolescents and caregivers should know that those who use e-cigarettes are at increased risk for using traditional cigarettes and other substances in the future (CDC, 2025).

Nurses must specifically educate patients who use e-cigarettes regarding the mental health consequences of using these products, especially for those with preexisting mental health conditions. Individuals who have a pre-existing mental health condition and who use e-cigarettes should have individualized patient education that includes information that e-cigarette cessation in this population has shown to improve mental health symptoms. Many individuals are able to use lower dosages of their psychiatric medications after nicotine cessation. In addition

to lower levels of anxiety, depression, and stress, e-cigarette cessation in this population was found to improve mood and quality of life (CDC, 2025).

Nurses must consider the unique differences between the adolescent and adult populations that use e-cigarettes. They tend to have different reasons for initiating use of e-cigarettes. Most adults begin using e-cigarettes as an alternative to smoking traditional cigarettes. In contrast, most adolescents begin using e-cigarettes out of curiosity, peer exposure, or to self-medicate mood problems, such as anxiety. The risks of use for these populations also differ, with brain development being a central concern of adolescent nicotine use. Therefore, patient education and resources provided to patients should be tailored to the target population to improve outcomes (Nimmi et al., 2025).

Dual users also require specific patient education. Patients should understand that although e-cigarettes contain fewer chemicals than traditional cigarettes, they are not safe. Many may believe that e-cigarette use is a step-down method to smoking cessation; however, no e-cigarette product is FDA-approved for this purpose. Individuals should also be advised that the dual use of both traditional cigarettes and e-cigarettes significantly increases the risk of adverse mental health conditions, more than either product alone (CDC, 2025). Cessation counseling for dual users must consider the unique needs of this population. The nurse should discuss triggers, financial cost, and other elements of cessation counseling as they relate to both traditional and e-cigarettes.

Section 8 Personal Reflection

What should all nicotine users understand about tobacco products? Why is it important for patient education to include the adverse mental effects that nicotine can have? Why should patient education materials to be targeted to adults or adolescents instead of using just one resource for both? What

information about e-cigarette smoking cessation should you share with someone who has a co-occurring mood disorder?

Section 8 Case Studies

Case Study #1

Tony is a 17-year-old male who is visiting his primary care office for an annual well visit. The nurse, Sam, completes the usual health history questions, including an appropriate screening tool for substance use. Based on this screening tool, Tony confirms that he uses e-cigarettes daily. Sam asks Tony about the type, volume, and frequency of Tony's e-cigarette use.

Using evidence-based care, what should be Sam's next step?

a. Notify Tony's parents of his substance use
b. Educate Tony on the mental health risks of using e-cigarettes
c. Assess Tony's mental health
d. Refer Tony to local resources for cessation support

Since the evidence supports that e-cigarette use directly affects mental health, especially in the adolescent population, Sam asks Tony about current mental health symptoms. Tony confirms that he has been anxious, depressed, and lonely.

Open-ended question: How can Sam explain the link between Tony's nicotine use and Tony's mental health symptoms?

What possible nursing interventions are appropriate? Select all that apply.

a. Refer Tony to a local resource to discuss nicotine use further
b. Briefly educate Tony on the risks of using e-cigarettes

c. Create a quit plan with Tony's parents for him to follow

d. Identify a quit date and make a plan to stop using e-cigarettes

e. Refer Tony for a follow-up appointment with his PCP to discuss his nicotine use

f. Tell Tony he should stop using e-cigarettes

g. Provide a patient education handout about e-cigarette risks

h. Refer Tony to inpatient substance use care

i. Document and report mental health symptoms to the provider

When deciding which nursing interventions are appropriate, the nurse must also consider the setting and time constraints. The conversation the provider needs to have with Tony will take longer than is usually allotted for a well visit. Sam must consider this, and though there is time for brief patient education, Tony will benefit more from a longer conversation where he and the provider can discuss what led to his e-cigarette use, determine if he wants to quit, and discuss the elements of a quit plan. They will also need to determine how Tony's mental health can be supported through the smoking cessation process. Referring Tony to either a local resource that specializes in smoking cessation counseling or to an experienced PCP will allow time for a quality discussion that can improve Tony's outcome. If age-appropriate patient education material related to e-cigarette smoking cessation is available, that can be shared with Tony. Any mental health concerns should always be shared with the provider for a more thorough assessment, treatment, and follow-up care.

Case Study #2

Monica, a 24-year-old female, presents to the emergency department with symptoms of a panic attack. She is restless, agitated, and irritable. She has a history of anxiety. During screening, she states she quit using e-cigarettes two days ago. What information is important for the nurse to gather and why?

The nurse needs to assess the volume, duration, and frequency of e-cigarette use before Monica quit using e-cigarettes. More information needs to be obtained about Monica's smoking cessation attempt, including if there was a gradual reduction in nicotine use, and if cessation was supported through counseling, nicotine replacement therapy, and/or medications. This information is necessary due to the risk of possible acute psychiatric changes due to the abrupt cessation of heavy nicotine use, especially for users with co-occurring mental health diagnoses.

After assessing Monica's nicotine use, the nurse should:

a. Plan to transfer Monica to the behavioral health unit
b. Provide information about supported e-cigarette smoking cessation
c. Discharge Monica as her symptoms are related to nicotine withdrawal
d. Continue the physical assessment and health history

The physical assessment and health history interview must continue because Monica's symptoms can not be attributed solely to nicotine withdrawal until other conditions, such as other substance use or cardiopulmonary complications, are ruled out.

Case Study #3

Greg is a 56-year-old male with a history of depression who presents to the primary care office for smoking cessation counseling. When interviewing Greg, the nurse, Charlie, asks Greg about previous attempts to quit smoking. Greg states he has tried to quit several times without success. He states that he currently mostly uses e-cigarettes and only uses traditional cigarettes once or twice a day.

What should the nurse share with Greg about dual nicotine use?

There is a misconception that if an individual replaces some traditional cigarette use with e-cigarettes, they are reducing harm. Charlie must advise Greg that using both e-cigarettes and traditional cigarettes is called dual use and that the actual health risks of dual use are greater than those experienced by individuals who use only one source of nicotine.

What information is important for Charlie to gather about Greg's previous smoking cessation attempts?

Information that can help support an individualized and successful smoking cessation plan must include the volume, frequency, and duration of nicotine use, exactly what types of e-cigarettes are used, when was the last time Greg tried to quit, and what has caused him to relapse in the past.

Greg and Charlie discuss Greg's withdrawal symptoms. He states that after a few hours of not having a cigarette, he feels "edgy", like he can't focus or relax. He states that those symptoms resolve as soon as he uses nicotine.

How should Charlie explain nicotine dependence to Greg?

Over time, the brain becomes accustomed to and adapts to receiving nicotine. When nicotine is not used, there are physiological consequences that produce withdrawal symptoms. The more nicotine is used to alleviate the withdrawal

symptoms, the more reinforced the behavior becomes. When nicotine is used at higher frequency and higher volumes, withdrawal symptoms can be more severe. Charlie should also include that Greg's mental health diagnosis can also contribute to worsened withdrawal symptoms and increased difficulty with smoking cessation. Family history and genetics can also affect addictive behaviors. Charlie can encourage Greg by letting him know that inability to quit smoking, even when you want to quit, is not a moral failing, but a complex combination of genetic, environmental, and physiological factors.

Greg tells Charlie that he has never used smoking cessation counseling before, but desires to quit using nicotine completely. Given his past failure with cessation, Greg is nervous that he won't be able to tolerate withdrawal symptoms. Charlie wants to work with Greg and the healthcare provider to create a quit plan.

What elements should be included in this plan? Select all that apply.

a. Identify potential situations that may trigger Greg to want to use nicotine.
b. Identify friends and family that can be encouraging and supportive of Greg's efforts to quit
c. Discontinue use of all psychiatric medications
d. Set a quit date within 48 hours
e. Set a quit date within 2 weeks
f. Schedule a follow-up appointment to evaluate how the plan is working
g. Calculate the daily, weekly, monthly, or annual cost of Greg's nicotine use
h. Discussion regarding the health risks of nicotine use
i. Discussion about how Greg could put more effort into quitting

j. Identify Greg's reasons for quitting

k. Identify coping strategies or distractions for when cravings occur

l. Discuss Nicotine replacement therapy

Greg has never tried nicotine replacement therapy. He is afraid he could get addicted to another nicotine source. Charlie explains NRT to Greg. Why is nicotine therapy beneficial, especially for heavy nicotine users and those with co-occurring mental health conditions?

Individuals are gradually weaned from Nicotine use, often also using medications that help to reduce the severity of withdrawal symptoms. There is a baseline dose of nicotine that is delivered through a patch, which is gradually reduced, and lower doses of nicotine from lozenges or gums can be used for breakthrough cravings. This prevents complications from abrupt cessation for heavy nicotine users and provides more support for permanent cessation success. Charlie should also share with Greg that psychological counseling can be effective in helping him to manage anxiety and other challenges of smoking cessation.

Case Study #4

Angie is a 16-year-old who recently moved with her family to a new city. She has had difficulty making friends. Her mom is initially relieved when she starts spending time with some girls from school. After a few months, Angie's mom observes changes in Angie's mood. She is more irritable, her grades have declined, and she isn't interested in activities she used to enjoy. Angie's mom brings her to the pediatrician to discuss the recent changes in Angie's demeanor.

The nurse, Kim, wants to screen Angie for substance use. What is likely to be the most accurate method?

a. Ask Angie about substance use with her mom present

b. Ask Angie about substance use without her mom present

c. Have Angie fill out a validated screening tool questionnaire that asks about substance use

d. Ask Angie if there is anything she needs to tell the doctor

Substance use screening tools for adolescents are often more accurate when self-administered. It's best to have Angie complete the screening tool questionnaire on her own.

Based on the answers to the screening tool Angie completes, she reports she has used e-cigarettes and alcohol multiple times per week over the past month.

What information should the nurse share with Angie about nicotine use in the brief time available at a clinic appointment? Select all that apply.

a. Most e-cigarettes do not contain nicotine

b. Most e-cigarettes contain nicotine

c. No level of nicotine use is considered safe

d. The adolescent brain is particularly vulnerable to the mental health effects of nicotine

e. Adolescents become addicted to substances more quickly than adults

f. There are protective factors in the adolescent brain that prevent addiction

g. Nicotine affects mental health

h. E-cigarette cessation is impossible for adolescents

i. The use of nicotine and alcohol together increases the risk of adverse mental health effects

Angie is open to a conversation about e-cigarette cessation. She shares that she is nervous to quit because she feels like e-cigarette use helps her feel better. She also states that she wants friends, that this is what her friends like to do, and that they probably won't like her if she doesn't vape or drink with them. What response can the nurse share with Angie about nicotine and mental health?

The nurse should share with Angie that nicotine use worsens already-existing mental health symptoms. If Angie was feeling depressed before using e-cigarettes, the nicotine can actually worsen things, even if in the moment it feels like it is helping. Although the nurse wants to tell Angie that her friends don't sound like real friends, the nurse must recognize that doing so could affect the patient-clinician relationship, making it more difficult to provide effective counseling to Angie. A referral to counseling to help Angie learn strategies to cope with mental health symptoms will likely be more effective than criticizing her friend choices in the moment.

Section 8: Conclusion

Since e-cigarettes have only become popular in the past few decades, there is still much to learn about their effects on the mental health and physical health of users (CDC, 2025). Nurses can make a significant impact on outcomes for those who use e-cigarettes. There are many misconceptions about e-cigarette use that nurses can address with patients. Providing evidence-based information through patient education can prevent e-cigarette use and correct misinformation. When nurses understand how nicotine specifically affects the brain, they can better understand how nicotine affects mental health. With this information, they can also recognize the sometimes subtle signs that an individual's mental health is affected by e-cigarette use. Nurses should be knowledgeable about which populations are at increased risk for use of e-cigarettes as well as those who are at

increased risk for adverse mental health effects of e-cigarettes. This information can help guide patient education and contribute to prevention. Nurses who are aware of evidence-based e-cigarette screening and cessation techniques can help identify patients who need supportive care and locate resources to help users quit. Through effective interventions, including clear communication and targeted patient education, nurses can reduce the mental health challenges that are caused by e-cigarette use.

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