

Teenage Alcohol Abuse

November 2008



Case Study

You and your partner receive a call to respond to house for an 11-year-old boy who is lethargic. The patient's parents explain that he had abdominal pain and 2 episodes of vomiting before he became lethargic. The patient's mother is concerned that he possibly drank mouthwash. She shows you a half-empty bottle. Upon further examination, you find that the mouthwash contains 20% ethanol. The patient is only responsive to painful stimuli.

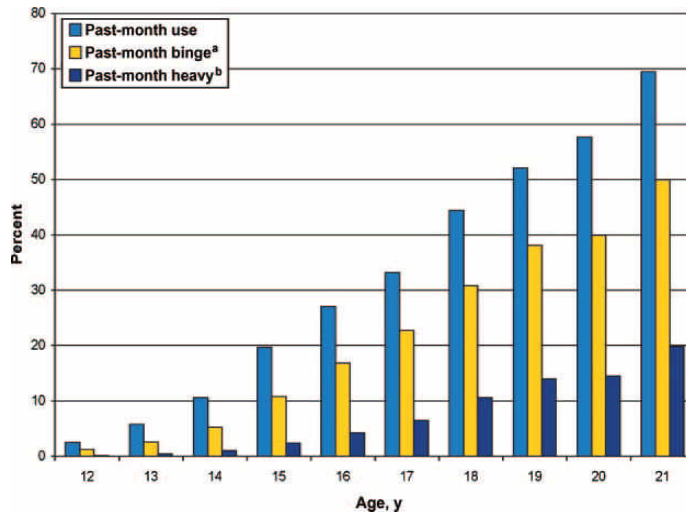
Assessment/vital signs are:

BP: 110/65 HR: 105 RR: 14
SpO ₂ : 93% RA
Fingerstick glucose: 55
Skin: cool to touch, pale, dry
Lungs clear bilaterally
GCS: 11(eyes 2, motor 5, verbal 4)
Pupils 3/2 PERRLA
No signs of trauma

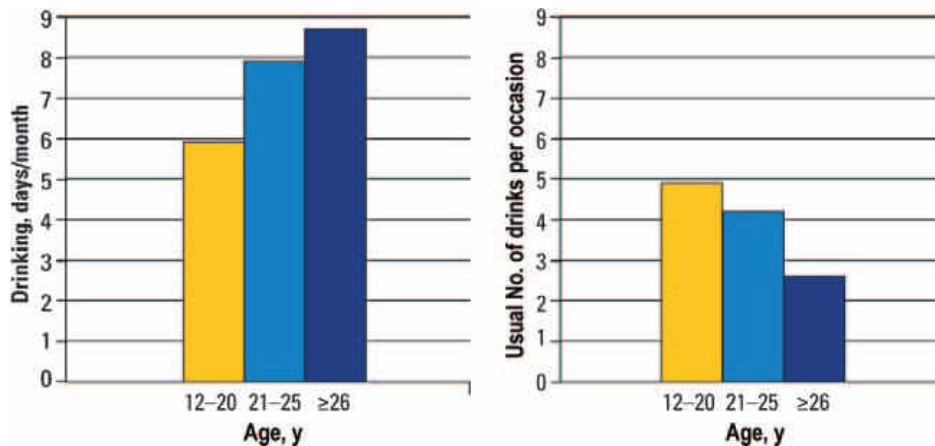
How do you treat this patient?

Prevalence

High school student alcohol consumption is rampant. 85% of high school students report drinking more than a "few sips" of alcohol in their lifetime. This consumption can lead to risky behavior and dire medical consequences. In general, adolescents drink less frequently than adults, but when they do drink, they drink more heavily. When youth between the ages of 12 and 20 consume alcohol, they drink on average about five drinks per occasion about six times a month. 26% of high school students surveyed reported "binge drinking" which is 5 or more drinks in a row within a couple of hours in the past 30 days. Overall, 51% of all students had ever binge drunk. This binge-drinking can lead to potentially life-threatening medical consequences.



Past-30-day alcohol use (any, binge, or heavy) according to age. Binge drinking was defined as 5 drinks per occasion; heavy drinking was defined as 5 drinks per occasion on 5 of the past 30 days. Data source: Substance Abuse and Mental Health Services Administration data from the 2005 National Survey on Drug Use and Health.



Number of drinking days per month and usual number of drinks per occasion. Data source: Substance Abuse and Mental Health Services Administration data from the 2005 National Survey on Drug Use and Health.

Teenagers who consume alcohol participate in risky behaviors such as driving motor vehicles while intoxicated. One comprehensive survey found that 10.5% of high school students across the country reported driving while intoxicated in the past 30 days. Often these kids are driving with other teenagers in the car. The percentage of alcohol-related fatal motor vehicle collisions has increased by 12% in the past 10 years (NHTSA). Twenty-eight percent of 16- to 20-year-old drivers who were killed in motor vehicle crashes had been drinking.

Despite increased law enforcement efforts, underage children are still able to purchase alcohol. One survey found that 5.6% of high school students who reported drinking alcohol bought the alcohol themselves.

Summary

Teenagers don't drink frequently but when they do drink, they consume excessive amounts of alcohol. This binge drinking leads to high-risk behaviors and potentially life-threatening medical complications.

What are Kids Drinking?

- Pretty much whatever they can get their hands on
 - Beer, wine, mixed drinks
- Energy drinks mixed with alcohol
 - Lessens subjective intoxication
 - Increased alcohol-related consequences (taken advantage of sexually, driving intoxicated, being injured, etc.)
- Flaming Moe's/Flaming Homer
 - 1 part Tequila
 - 1 part Schnapps
 - 1 part Crème de Menthe
 - 1 tbsp cough syrup
 - Set drink on fire (drink after fire goes out)



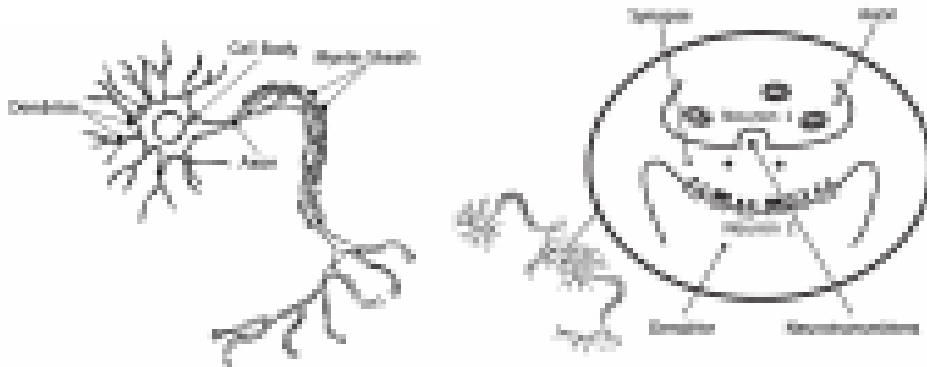


Pathophysiology



Review

Nerve cells convert chemical messages received at the cell body into an electrical signal that is conducted along the axon to the terminal. At the terminal, the electrical signal is converted back into a chemical message (i.e., a neurotransmitter) that is released from the terminal and carries the information to the next neuron in the circuit.



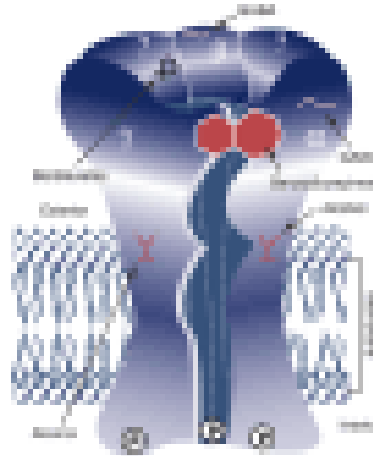
Ethanol is the alcohol found in alcoholic beverages. In its pure form, ethanol is colorless, volatile and flammable. One of the ways ethanol alcohol affects the body is by acting on the central nervous system.

Alcohol increases the effects of the major inhibitory neurotransmitter in the brain, gamma-aminobutyric acid (GABA) at the GABA_A receptor. Alcohol binds to the GABA_A receptor and increases GABA's ability to be activated. When the GABA receptor is activated, it **inhibits** electrical signaling through the neuron. This inhibition causes a variety of symptoms such as respiratory depression, hypotension and unsteady gait.

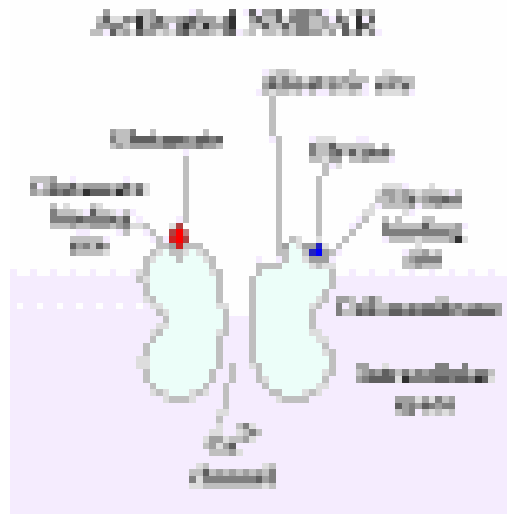
The GABA receptor activation is also enhanced by benzodiazepines and barbiturates. Common benzodiazepines include versed (midazolam), ativan (lorazepam), and valium (diazepam). Phenobarbital and barbital are

examples of barbiturates. If more than one GABA receptor site is activated (ie. alcohol + benzodiazepines), the effect can be synergistic. This can result in severe medical consequences (respiratory failure, severe hypotension). For example, benzodiazepines overuse rarely causes death unless combined with alcohol or a barbiturate.

GABA Receptor



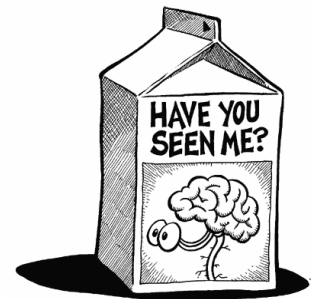
Alcohol further decreases electrical activity in the central nervous system by inhibiting the major excitatory neurotransmitter, glutamate, particularly at a glutamate-receptor protein called the N-methyl-d-aspartate (NMDA) receptor. NMDA is responsible for approximately 75% of the excitatory transmissions in the brain. By inhibiting glutamate at the NMDA receptor, alcohol slows the flow of calcium (Ca) into cells. This results in decreased firing of neurons resulting in decreased mental status, lethargy, respiratory depression and hypotension.



Summery

Alcohol increases the effect of the GABA which **depresses** the nervous system

Alcohol suppresses the excitatory neurotransmitter glutamate which works on the NMDA receptor. This also **depresses** the nervous system.



Alcohol inhibits gluconeogenesis which is the new production of glucose in the body. Gluconeogenesis generates glucose from non-carbohydrate sources such as fat and muscle. This typically occurs in the body's liver and in the cortex of the kidneys. Because of this inhibition, hypoglycemia is often seen in conjunction with alcohol intoxication.

Clinical Features

The toxicity of ethanol is dose related, however, a patient's tolerance for alcohol varies greatly. In most states in the United States, including Illinois, the legal blood alcohol concentration (BAC) limit is 80 mg/dL. The amount of alcohol that a person needs to consume in order to raise their blood alcohol level depends on many factors including height, weight, % body fat, sex, age, presence of liver disease, time of last meal.

Signs and symptoms of acute alcohol intoxication include slurred speech, nystagmus, uninhibited behavior, poor coordination, unsteady gait, memory impairment, stupor, respiratory depression/failure or coma. Hypotension may occur as a result of ethanol-induced peripheral vasodilation, or secondary to volume loss.

Up to Date

Effects of blood alcohol concentration

Blood alcohol concentration, mg/dl	Clinical effects
20-50	Diminished fine motor coordination
50-100	Impaired judgment; impaired coordination
100-150	Difficulty with gait and balance
150-250	Lethargy; difficulty sitting upright without assistance
300	Coma in the non-habituated drinker
400	Respiratory depression

The unhabituated drinker clears ethanol from the blood stream at an approximate rate of 15 to 20 mg/dL per hour.

Diagnosing

Alcohol intoxication can mimic many other toxicological and medical emergencies. It is important to conduct a thorough assessment of the patient in order to find clues into what may be causing a patient to have an altered mental status. Some of the many mimicking pathologies include:



Head injury
Hypo or hyperglycemia
Narcotic overdose
GHB/ "club drugs"
Stroke

Assessment & Treatment

Assess and secure scene safety

Use BSI (Body Substance Isolation)

Airway (c-spine immobilization if indicated),
Breathing, **C**irculation, **D**isability
Correct life-threats as they are discovered

BLS/ALS Initial Medical Care
(Accucheck is essential!)

S.A.M.P.L.E. History-
Including alcohol, prescription medications, illegal drug
consumption

Consider Toxicologic Emergency SOP
(Narcotic, cyclic antidepressant, beta-blocker or calcium channel
blocker overdose)

Head-To-Toe Assessment-assess for signs of trauma

Other Treatment Considerations: Gastric lavage and activated charcoal are not effective in severe alcohol intoxication because alcohol is rapidly absorbed in the gastrointestinal tract. Gastric decompression may be used in emergency departments to prevent vomiting and aspiration.

Airway

What do all of these people have in common?



John Henry "Bonzo" Bonham
Drummer of Led Zeppelin



Ronald Belford "Bon" Scott
Lead Singer AC/DC



Jimi Hendrix
Singer/songwriter

They all **died** due to aspiration of emesis after severe alcohol intoxication. Aggressive airway management is essential to prevent aspiration and possible death. Have suction equipment ready for possible emesis. Consider the use of nasal and oropharyngeal airways. Intubation may be necessary if patients are unable to maintain their own airways.

Trauma?

If there is any possibility of a traumatic injury in an intoxicated patient, immobilize the patient. Alcohol can mask the pain associated with spinal injuries. Also, evaluate the reliability of the patient's presenting story. Intoxicated patients are often unreliable sources of information. Attempt to find witnesses to the event. When in doubt, immobilize the patient.

Legal aspects

The intoxicated patient **CANNOT** refuse medical treatment. Call for police assistance if you need help transporting the patient to the hospital. Medical control contact is important to document the call especially if you are transporting an intoxicated patient against their wishes.

Case Study 1 Conclusion

The paramedics in this true scenario completed their initial assessment, provided 100% O₂ via non-rebreather mask. They establish IV access and administered 25g IV D50 and 2.0 mg narcan. There was no change in mental status after these interventions. The emergency department found that the patient had an ethanol level of 111mg /dL. The CT scan was

normal. The patient was diagnosed with an alcoholic ketoacidosis (AKA). After fluid, electrolyte, vitamin replacement and monitoring in the pediatric intensive care unit, the patient was discharged home without any residual effects.

Case Study 2

You are called to a scene for an unresponsive 16-year-old female. On your arrival to a suburban home, three teens escort you to a bedroom where you find an unresponsive female named Mary. Upon your initial assessment you notice emesis in the patient's nose and mouth.

BP: undetectable (no radial pulse)
HR: 32 Irregular RR: 0
SpO2: 56% on RA
Skin: cyanotic, cool, dry
Pupils: 2/1 PERRLA

The teens report that their parents are out of town. They don't know Mary's past medical history, allergies or medications. They admit to drinking alcohol but report that they didn't drink "that much".

How would you treat this patient?



The paramedics suctioned the airway, ventilated the patient using a BVM and 100% O₂. They established an IV and a normal saline fluid bolus. They obtained an accucheck of 82. The HR increased to 66 after 3 minutes of assisted ventilations. They intubated the patient with a 7.0 ETT taped at 21 cm measured at the lips. After 400 mls NS bolus, the crew obtained a BP of 78/45. The crew transported to patient to the emergency department continuing to provide assisted ventilations. There were no more additional changes in status enroute.

On arrival to the ED, the patient was placed on a mechanical ventilator. A Foley catheter and a NG tube were placed. Blood alcohol level was 362 mg/dL. The patient was given additional fluid, electrolyte and vitamin replacement. She was transferred to the Pediatric Intensive Care Unit for further hemodynamic monitoring and evaluation for possible hypoxic brain injury.







Estimate Blood Alcohol Level-Men

Drinks	Weight (lbs)							
	100	120	140	160	180	200	220	240
1	.04	.03	.03	.02	.02	.02	.02	.02
2	.08	.06	.05	.05	.04	.04	.03	.03
3	.11	.09	.08	.07	.06	.06	.05	.05
4	.15	.12	.11	.09	.08	.08	.07	.06
5	.19	.16	.13	.12	.11	.09	.09	.08
6	.23	.19	.16	.14	.13	.11	.10	.09
7	.26	.22	.19	.16	.15	.13	.12	.11
8	.30	.25	.21	.19	.17	.15	.14	.13
9	.34	.28	.24	.21	.19	.17	.15	.14
10	.38	.31	.27	.23	.21	.19	.17	.16

Estimate Blood Alcohol Level-Women

Drinks	Weight (lbs)							
	100	120	140	160	180	200	220	240
1	.05	.04	.03	.03	.03	.02	.02	.02
2	.09	.08	.07	.06	.05	.05	.04	.04
3	.14	.11	.10	.09	.08	.07	.06	.06
4	.18	.15	.13	.11	.10	.09	.08	.08
5	.23	.19	.16	.14	.13	.11	.10	.09
6	.27	.23	.19	.17	.15	.14	.12	.11
7	.32	.27	.23	.20	.18	.16	.14	.13
8	.36	.30	.26	.23	.20	.18	.17	.15
9	.41	.34	.29	.26	.23	.20	.19	.17
10	.45	.38	.32	.28	.25	.23	.21	.19

What's a Standard Drink?

<p>12 oz. of beer or wine cooler ~5% alcohol</p>	<p>5 oz. of table wine ~12% alcohol</p>	<p>3-4 oz. of fortified wine (sherry or port) ~12% alcohol</p>	<p>2-3 oz. cordial, liqueur or aperitif ~24% alcohol</p>	<p>1.5 oz. of brandy (a single shot) ~40% alcohol</p>	<p>1.5 oz. of spirits (single shot of 80-proof gin, vodka, whiskey, etc.) ~40% alcohol</p>
					

Amstel light 3.5% alcohol Budweiser 5.0% alcohol Sierra Nevada 5.7% alcohol

