SOUTH SUBURBAN EMS EDUCATION

South Suburban EMS Education Corporation
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Continuing Education Self-Study Packet

Intoxicology: The Science Behind the Sauce

This packet contains materials needed to complete 3 hours of continuing education. Please review the required materials, case studies, and attachments. After reviewing the materials, complete the attached quiz. You must score 80% or higher to obtain credit for this module.

Materials:

Introduction

EMS World – Acute Alcohol Poisoning

EMS1.com – Effective EMS Response to Acute Alcohol Intoxication

EMS1.com – Drunk Versus Diabetes: How Can You Tell?

JEMS – To Transport or Not to Transport? Part 1 of 2

Broome County Fire News – Phoenix FD Suffers Close Call From CO2

Quiz

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Introduction

Alcohol serves a variety of purposes in our daily lives. We use it for cleaning, disinfecting, and for fuel. Alcohol is found in hairspray, nail polish, and antifreeze. We drink alcohol during celebrations and recreational events. When used and consumed responsibly, alcohol provides many benefits to our lives. When used improperly or in excess, however, the toxic effects of alcohol can cause life-threatening situations

EMS providers must have a keen eye for signs of toxic conditions, as well as a strong sense of situational awareness when working with patient suspected of alcohol intoxication. There are four primary types of alcohol of concern to the EMS provider. Ethanol, methanol, ethylene glycol, and isopropyl.

The following articles and case studies discuss some of the dangers of alcohol intoxication, both to patients and care providers. Review the materials presented, and be prepared to discuss your findings in the second module of this program. Complete the attached quiz and bring it with you to the second module.

Acute Alcohol Poisoning

by Scott R. Snyder, BS, NREMT-P, Sean M. Kivlehan, MD, MPH, NREMT-P, Kevin T. Collopy, BA, FP-C, CCEMT-P, NREMT-P, WEMT On Mar 1, 2014

Figure 1: Expected Clinical Exam Findings With Increasing Blood Alcohol Concentrations

Blood Alcohol Concentration	Clinical Exam Findings
0.02–0.05 g/dL	Diminished fine motor coordination
0.05–0.1 g/dL	Impaired judgment, coordination
0.1–0.15 g/dL	Difficulty with gait and balance
0.15–0.25 g/dL	Lethargy, difficulty sitting upright without assistance
0.25–0.3 g/dL	Coma in the nonhabituated drinker
0.3–0.4 g/dL	Respiratory depression

EMS providers frequently encounter intoxicated patients. But how much do they really know about alcohol, how it works, and how to help those who have overindulged?

An alcohol is an organic compound in which a hydroxyl group (-OH) is bound to a central carbon atom that in turn is bound to three other atoms. As such, alcohols are also referred to as *hydroxylated hydrocarbons.* Common alcohols encountered in the prehospital environment are ethanol, methanol, ethylene glycol and isopropyl alcohol. While the term *toxic alcohol* has traditionally been used to refer to methanol, ethylene glycol and isopropyl alcohol, the ingestion of any alcohol, including ethanol, can be toxic in a large enough quantity.[1] This month's continuing education article focuses on acute ethanol intoxication in the nonalcoholic patient. Next month we'll take an in-depth look at ethanol and the chronic alcoholic.

Epidemiology

Ethanol intoxication is common in patients who seek care in emergency departments, but it's not always their primary reason. A late-'80s study found that depending on the location of the ED, 15%–40% of presenting patients had detectable levels of ethanol in their blood.[2]

A common cause of acute ethanol intoxication is binge drinking.[3] The National Institute on Alcohol Abuse and Alcoholism (NIAAA) defines binge drinking as a pattern of drinking that increases a person's blood alcohol concentration (BAC) to 0.08 g/dL. In women this usually occurs after about 4 drinks within about 2 hours. In men it occurs after about 5 drinks within about 2 hours. The CDC reports that according to national surveys:[4]

• One in six U.S. adults binge drinks about four times a month, consuming about eight drinks per binge.

• Although binge drinking is more common among young adults (18–34), binge drinkers 65 and older report binge drinking more often—an average of 5–6 times a month.

• Compared to those with lower incomes, binge drinking is more common among those with household incomes of $75,000 or more.

• More than half of the alcohol consumed by adults in the United States is in the form of binge drinks, as is about 90% consumed by youth under age 21.

• The CDC reports that in addition to acute alcohol poisoning, binge drinking is associated with unintentional injuries (auto crashes, falls, burns, drownings), intentional injuries (domestic violence, sexual assault, firearm injuries), poor control of diabetes, liver disease, hypertension, stroke and cardiovascular disease. In 2011, 9,878 people were killed in alcohol-impaired-driving crashes, accounting for 31% of the total motor vehicle traffic fatalities in the United States.[5] All of these sequelae have direct impact on the prehospital emergency environment.

Ethanol is available in our communities in many different forms. The most familiar is probably alcoholic beverages, but ethanol is also found in many common household products. The amount of ethanol contained in an alcoholic beverage is typically measured in terms of alcohol by volume (ABV) and defined in units by the number of milliliters of pure ethanol present in 100 milliliters of solution at 20°C, expressed as a percentage of total volume. There are about 0.5 ounces (15 gm) of ethanol in a standard drink. The NIAAA identifies examples of standard drinks as 12 fluid ounces (355 mL) of beer (about 5% ABV), 5 fluid ounces (148 mL) of wine (about 12% ABV) and 1.5 fluid ounces (44 mL) of “hard” liquor, or 80-proof spirits (about 40% ABV).[6] Common household products containing ethanol include over-the-counter medications, mouthwash and perfumes.

Pathophysiology

The ingestion of any of the alcohols can result in clinical inebriation, and the strength of any alcohol’s inebriating effects is directly proportional to its molecular weight. As such, at the same concentration, isopropyl alcohol is more intoxicating than ethanol, which is more intoxicating than methanol. Ethanol and isopropyl alcohol are the most common alcohols ingested, and their acute toxic effects are due to the effects of their parent compounds. Conversely, the toxic effects of methanol and ethylene glycol are a result of the toxic metabolites they produce.

Ethanol (CH_3CH_2OH), aka ethyl alcohol, is a volatile, flammable, colorless liquid that readily crosses cell membranes. Ethanol is absorbed in the gastrointestinal system, with the majority of absorption taking place in the stomach (70%) and duodenum (25%); a small amount (5%) is absorbed by the more distal intestinal tract.[7] With an empty stomach, peak ethanol levels are reached about 30–60 minutes after ingestion. The absorption of ethanol is slowed by the presence of food in the stomach.

Ethanol is a central nervous system (CNS) depressant, and its mechanism of action is not completely understood. One important action of ethanol is its effect on GABA receptors in the brain. GABA receptors are a class of receptors that respond to the inhibitory neurotransmitter gamma-aminobutyric acid (GABA), the primary inhibitory neurotransmitter in the central nervous system. Ethanol increases the effects of GABA, resulting in sedative effects similar to those of benzodiazepines, a class of drugs that bind to the same GABA receptor.

There are multiple pathways for ethanol metabolism, but the primary pathway occurs in the liver via the actions of alcohol dehydrogenase, an enzyme. In addition to the liver, alcohol dehydrogenase is also located in the lining of the stomach (gastric mucosa), and ethanol metabolism occurs there as well. Gastric metabolism of ethanol is decreased in women, which leads to a decreased “first-pass” metabolism that may contribute to the higher blood ethanol levels seen in women compared to men after ingesting an equivalent dose per kilogram of body weight. About 90% of ethanol elimination takes place in the liver, with small amounts also excreted in the urine, sweat and exhaled breath. It is this excreted ethanol in the breath that is detectable in a breath alcohol testing device such as a Breathalyzer. Ethanol intoxication occurs when ethanol enters the bloodstream faster than the liver can metabolize it into nonintoxicating byproducts.

Acute ethanol intoxication can lead to metabolic disturbances such as lactic acidosis, hypophosphatemia, hypokalemia and hypomagnesemia. These electrolyte abnormalities occur when the electrolytes are used during the metabolism of alcohol, and also as a result of the dehydration and malnutrition that can occur with alcohol use. Both acute and chronic alcohol consumption can decrease cardiac function, promote dysrhythmias and exacerbate coronary artery disease. Cardiac function is altered by the direct toxic effects of alcohol on the myocardium and also by the hypertension that can accompany acute ingestion. The loss of electrolytes such as phosphate, potassium and magnesium can result in cardiac dysrhythmia. Acute alcohol ingestion can result in a decreased cardiac output in nonalcoholic patients with preexisting cardiac disease. This may be clinically significant.

Clinical Exam Findings

Most EMS providers are familiar with the signs of ethanol toxicity. The most recognizable clinical sign is inebriation. Patients mildly inebriated may initially appear euphoric and exhibit diminished fine motor coordination and decreased social inhibition, which can deteriorate to impaired judgment and coordination, agitation, combativeness and altered mental status (*Figure 1*). Clinical signs such as slurred speech, ataxia and nystagmus are common in moderate to severe ethanol intoxication. The warm, flushed skin common to ethanol toxicity is the result of peripheral vasodilation and may also lead to symptoms such as a feeling of warmth described by the patient. This vasodilation, as well as fluid loss secondary to vomiting and urination, can result in hypotension and a compensatory tachycardia. In children, ethanol ingestion can lead to hypoglycemia and hypoglycemic seizures. This is less common in the adult patient.

As intoxication becomes more severe, patients will exhibit an unsteady gait and impaired balance. Progressing central nervous system depression will result in the patient becoming increasingly lethargic, and he may have difficulty sitting upright without assistance. As

intoxication increases coma will develop, and respiratory depression can lead to respiratory failure. *Figure 1* shows the clinical exam findings associated with ethanol intoxication, though it should be noted there is a poor correlation between BAC and clinical exam findings in patients with alcohol habituation.

For example, respiratory depression and subsequent death may occur in the nonhabituated patient at concentrations of 0.4–0.5 g/dL, but it is not uncommon for a chronic alcoholic to appear minimally intoxicated with a BAC as high as 0.4 g/dL.[8] Another factor that may affect a patient's clinical exam is whether the patient is presenting with an increasing or decreasing BAC. It is a known phenomenon, termed the Mellanby effect, that the clinical manifestations of ethanol intoxication are more prominent when BAC is rising.[9]

Consider ethanol intoxication as a source of altered mental status or altered level of consciousness only after all other possible causes have been assessed for and ruled out. Medical and traumatic causes such as hypoglycemia, stroke, hypothermia, hypoxia, drug overdose, head trauma and other causes have serious consequences if not identified, managed correctly in the field, and their sufferer transported to an appropriate receiving hospital.

An intoxicated patient and any bystanders on scene should be asked about the use of any additional drugs or medications. Of particular concern is the coingestion of drugs such as opiates, barbiturates, benzodiazpines and other CNS depressants. The combined effect of such drugs and ethanol increases the risk of respiratory depression and respiratory arrest. The use of sympathomimetic drugs should also be elicited. The use of alcohol mixed with energy drinks by adolescents and young adults has been increasing, and combining caffeine with alcohol can contribute to a complex clinical presentation where the caffeine in an energy drink antagonizes some of the effects of alcohol.[9] Cocaine may be used in combination with ethanol, and the combined use of these drugs can result in the formation of the metabolite cocaethylene. Although cocaethylene is less toxic than cocaine, its half-life is 3–5 times longer. The risk of sudden death among persons coingesting ethanol and cocaine may be as high as 18 times that among cocaine users alone.[8]

Treatment

Treatment of the patient with ethanol toxicity is mostly supportive in nature, as there is no antidote currently available in the United States. Ethanol is rapidly absorbed via the gastrointestinal tract, so activated charcoal is not indicated unless there is coingestion of another toxic absorbable substance.

Due to the CNS-depressant properties of ethanol, respiratory depression is possible, and BVM ventilation should be provided if breathing is inadequate. Vomiting or regurgitation and subsequent aspiration is a concern in any patient with CNS depression, requiring frequent if not constant monitoring of the airway. An antiemetic such as ondansetron (Zofran) or prochlorperazine (Compazine) can be administered in intoxicated patients who are nauseous and/or vomiting. For those patients who are semi- or unconscious, keep a suction unit nearby and ready for immediate use should the patient vomit or regurgitate. In addition, a patient can be rolled onto their side and placed in the recovery position in order to clear the airway and keep it

cleared. If a patient cannot protect their airway or if breathing is inadequate, perform endotracheal intubation and bag-mask ventilation as necessary.

That being said, every intoxicated patient with an altered level of consciousness and subsequent decreased GCS score does not necessarily require endotracheal intubation. A 2009 study looked at 73 patients who presented to the ED with decreased consciousness as a result of drug or alcohol intoxication. Their GCS scores ranged from 3–14, and 12 patients had scores of 8 or less. No patient with a GCS of 8 or less aspirated or required intubation. There was one patient who required intubation, and this patient had a GCS of 12 on admission to the ward. So, while the well-known adage from trauma may state that "a GCS less than 8 means intubate," it may not necessarily hold true in drug or alcohol intoxication. Rather, a decreased level of consciousness (and subsequently a decreased GCS) is simply one data point to consider when determining an airway and ventilation management plan for your patient.

Patients with ethanol intoxication can be uncooperative, combative and even violent. Any behavior or actions that infringe on scene safety (on the scene or in the back of your ambulance) and place you, your crew or the patient in danger should not be tolerated. If verbal strategies are insufficient to correct inappropriate and dangerous behavior, the patient should be restrained via physical or chemical means. If you decide to use physical restraints, call for law enforcement backup to assist. IV benzodiazepines such as midazolam (Versed) or lorazepam (Ativan) and IV antipsychotics such as haloperidol (Haldol) are useful for sedation. Whether physical or chemical methods are used to restrain a patient, pay constant attention to their airway, breathing and circulation status. Administration of a benzodiazepine or antipsychotic may worsen the respiratory depression in a severely intoxicated patient.

All patients with altered mental status should have a blood glucose determined and dextrose administered if they are found to be hypoglycemic. In patients with altered and/or decreased mental status, establish IV access and give dextrose via that route. Intoxicated patients who are alert and oriented, have an intact gag reflex and can follow directions may be administered oral glucose. However, the risk of aspiration should be evaluated, and IV dextrose administered if any risk of aspiration or vomiting exists.

While patients with chronic alcoholism may suffer from vitamin and mineral deficiency, this is not usually the case with nonalcoholics suffering an episode of acute intoxication. Therefore, the administration of IV or intramuscular thiamine is not necessary in this population. If a patient presents in a coma secondary to acute alcohol toxicity and their history is unknown, 100 mg of thiamine can be administered IV to prevent or treat Wernicke's encephalopathy.

IV fluid volume administration with fluids such as normal saline should be performed only in patients with clinically significant hypotension that may accompany cases of severe intoxication. IV fluid administration is not necessary in cases of mild or severe intoxication, as it will not decrease the severity of intoxication or increase the elimination of ethanol.[11]While there is no medication currently approved by the FDA for the treatment of acute ethanol intoxication, there is one that has been studied. Metadoxine has been shown to decrease the half-life and accelerate the elimination of ethanol from the blood, improve the symptoms of ethanol intoxication and decrease its recovery time.[9,12–13]

Patient Autonomy

A consideration that may arise in the patient with acute ethanol intoxication is patient autonomy and the right to refuse treatment. Any patient who has been ingesting ethanol has the right to refuse evaluation and treatment if they are conscious, alert, oriented and competent enough to understand the benefits of receiving an evaluation and treatment versus the risks of not.

It's easy to determine a patient's competency when they present on the far ends of the intoxication spectrum. A patient may have had a drink or two but still be clearly alert to person, place, time and event and have a competent conversation about the risks and benefits of consenting to evaluation and treatment. This patient may indeed be able to refuse evaluation and treatment. A prehospital provider should feel comfortable having such a patient sign a refusal form. A patient does not lose their autonomy simply because they have been drinking alcohol!

On the opposite end of the spectrum, an intoxicated patient who responds only to painful stimuli and is unable to engage in coherent conversation can easily be considered not competent and can be evaluated, treated and transported to an emergency department against their will under the principle of implied consent.

More challenging is the patient in the middle of that spectrum. Such a patient may be conscious and alert to person, place, time and event yet seem to have impaired judgment. Superficially they seem competent (they can answer basic questions), yet you are left wondering if they are truly able to make an informed decision. The typical tool used to determine a patient's competency—their orientation to person, place, time and event—is woefully inadequate for determining competency in such cases. The topic of consent and determining a patient's ability to make decisions is beyond the scope of this article, but some basic guidelines can be stated here.

Try to make the patient understand the risks of not consenting to evaluation, treatment and/or transport to an emergency department. Explain the risks and ask the patient to explain them back to you. If you believe they do not understand the risks involved in their decision, treat them under the principle of implied consent. These situations can be extremely difficult and challenging. If an error is to be made, make it in the interest of patient care and transport the patient against their will.

In addition, try to determine if the environment is safe for an intoxicated patient prior to allowing them to refuse treatment. Is the patient with sober family members who can monitor them and call for help if their condition deteriorates? Will the patient be driving a motor vehicle or engaging in some other activity where intoxication increases the risk of injury to themselves or others? Is the patient in the company of friends or people who may take advantage of them in their intoxicated state? If such a situation exists, try to create an environment that is safe for the patient. Utilize law enforcement to assist in the creation of a safe environment, or even to persuade the patient to consent to evaluation, treatment and transport.

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From the Editor
by Greg Friese, Editor-in-Chief

02/03/2015

Effective EMS response to acute alcohol intoxication

Careful assessment is important for EMS since alcohol poisoning kills six people in the U.S. each day; most deaths occur among middle-aged adults

Every day six people in the United States die from alcohol poisoning after a single episode of binge drinking, according to a new report from the Centers for Disease Control and Prevention.

Alcohol poisoning deaths are the result of drinking a large amount of alcohol in a short period of time – a binge. The resulting high levels of blood alcohol impact brain function, airway protection, respiratory drive, and heart rate.

EMS providers, who frequently make contact with patients under the influence of alcohol, might not be surprised by these findings. "Honestly I expected the death rate to be higher," said Chad Pore, Butler County (Kansas) EMS Director.

"We recently cared for a young adult male that was highly intoxicated after drinking at a party," said Pore. "There was a high potential for aspiration that our medics needed to recognize with solid assessment skills."

Alcohol is one of many causes of respiratory depression.

"For any patient with decreased respiratory drive the first tool for our medics is end-tidal carbon dioxide monitoring," said Pore. "We have the capability and it is the expected norm for our care."

Butler County EMS monitors end-tidal carbon dioxide (ETCO2) in somnolent and intoxicated patients for signs of respiratory depression (image courtesy of Butler County EMS)

"We can't dismiss a patient as just drunk," said Jonathan Blatman a paramedic that works in the Philadelphia area. "Traumatic brain injury and other things cause altered mental status."

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Binge drinking is a popular American pastime

More than 38 million U.S. adults report binge drinking an average of four times per month and consume an average of eight drinks per binge. Binge drinking is defined as consuming four or more drinks for women and five or more drinks for men on an occasion. Increased consumption increases the risk of death.

CDC scientists analyzed deaths from alcohol poisoning among people aged 15 years and older. Alcohol dependence, also known as alcoholism, was identified as a contributing factor in just 30 percent of these deaths, and other drugs were noted to have been a factor in only about 3 percent of the deaths.

Myth: Binging is a high school and college kid problem

The CDC VitalSigns report found that three in four alcohol poisoning deaths involved adults ages 35-64 years.

"This study shows that alcohol poisoning deaths are not just a problem among young people," said CDC Alcohol Program Lead and report coauthor Robert Brewer, M.D., M.S.P.H.

Pore concurred with the CDC findings. "We see binge drinking in patients of all ages."

The VitalSigns reports most deaths occur among men and non-Hispanic whites. Alcohol poisoning death rates varied widely across states and ethnic/racial groups. Alaska reported 46.5 deaths per million residents to 5.3 deaths per million residents in Alabama. The states with the highest death rates were in the Great Plains, western United States, and New England. American Indians/Alaska Natives have the most alcohol poisoning deaths per million people.

While this study reveals that alcohol poisoning deaths are a bigger problem than previously thought, it is still likely to be an underestimate.

Fact: Plenty of binge drinking happens on campus

The ambulance of the University of Delaware Emergency Care Unit, responds to all on-campus emergency requests and provides back-up EMS support to the city of Newark. (Image University of Delaware Emergency Care Unit)

"The findings about the age of patients were surprising to me," said Dr. Chad Asplund, Medical Director of Georgia Regents University Student Health Services. "Especially for women, who are generally smaller and can get intoxicated with fewer drinks."

Binge drinking is a common occurrence on college campuses.

"We know students consume too much, too quickly and are not aware of the alcohol content," said Asplund. "Students getintoxicated quickly when they think they are having fun playing beer pong."

Blatman has assessed many alcohol poisoning patients in a career that has included three years of collegiate EMS and 10 years in a college-town EMS agency. "Alcohol intoxication was not the only complaint we responded to on campus, but it was a significant proportion of our calls," said Blatman.

Arman Fardanesh, EMS Deputy Chief in Newark, home of the University of Delaware, had a similar assessment of the frequency.

"Every college campus has binge drinking. Some campuses are worse," said Fardanesh. "Our campus has experienced several fatalities directly attributable to alcohol poisoning and several more from trauma secondary to intoxication."

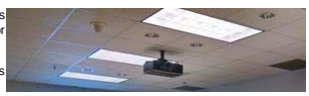
Assessment and transport: Err on the side of caution

After a binge drinking episode family, friends, and other caregivers might be tempted to simply let their friend, roommate, or spouse 'sleep it off.' Or a police officer might encounter the patient after responding to a disturbance, altercation, or person down and then police officers make the decision to call EMS.

A full assessment of the patient's vital signs and recent history is warranted. Determine the type and volume of alcohol, as well as other beverages and foods the patient has consumed.

"Mixing alcohol with highly caffeinated drinks, like Red Bull or Monster Energy, can be associated with consuming even more alcohol," said Asplund.

"Because there is always a risk of aspiration, we tell students that if they are unsure about the safety of their roommates or acquaintances that they should call 911," said Asplund.



Fardanesh, who is also the faculty advisory for the on-campus

emergency care unit, explained a similar approach at the University of Delaware.

"We have an amnesty program which encourages students to look out for their peers and call 911. No one will get in trouble for calling 911.

"The EMS decision to transport requires getting a full picture," said Blatman. "It is a combination of determining the patient's competence to refuse care, how much and what they drank, and any other drug ingestions.

"A patient is no longer competent and able to refuse care if they are not alert and not oriented, if they are unable to recall events during the alcohol ingestion, or if they are unable to quantify the amount of alcohol they have ingested," said Blatman.

University of Delaware Emergency Care Unit members are all full-time students and EMTs. Students respond to emergencies 24/7 and regularly complete classroom and hands-on training activities. (Image University of Delaware Emergency Care Unit)

EMS care for a patient with respiratory depression secondary to alcohol ingestion includes airway protection, an OPA or NPA depending on the presence of a gag reflex, preparing for the patient to vomit, assisting ventilations if indicated, and monitoring respiratory status with capnography.

"Don't be confrontational. Patients are generally calm and somnolent," said Blatman. "Let them stay that way by avoiding arguments or provocation."

Responding with law enforcement

In some systems a police officer is part of the 911 medical response. An on-scene preliminary breath test with a breathalyzer can provide insight into the patient's blood alcohol concentration, but is not likely to change the course of treatment or transport decision.

"The patient's blood alcohol concentration is not a diagnostic tool. The UDECU medical control is more interested in the patient's level of consciousness and other vital signs," said Fardanesh.

Alcohol poisoning death prevention

"Alcohol poisoning deaths are a heartbreaking reminder of the dangers of excessive alcohol use, a leading cause of preventable deaths in the U.S." said CDC Principal Deputy Director Ileana Arias, Ph.D. "We need to implement effective programs and policies to prevent binge drinking and the many health and social harms that are related to it, including deaths from alcohol poisoning."

"The findings of the CDC report present an opportunity for us out to help our community," said Pore.

EMS agencies might apply the techniques that are being used on college campuses to educate on the dangers of binge drinking.

"In our presentations we play a game about which drinks have higher alcohol content," said Asplund. "A Long Island Iced Tea or a Jell-O shot can have a deceptively high amount of alcohol."

The University of Delaware and surrounding community have also provided education to the business that sell and serve alcohol.

"We train people, like bartenders and bouncers, to recognize people that have overconsumed alcohol and should not be served," said Fardanesh. "We also want people to call 911, even if they are unsure. There are too many times when somebody should have called and nobody did."

Target interventions to high-risk individuals

In addition to widespread community education campaigns, EMS agencies can target interventions to specific individuals.

"We know from repeat encounters with some individuals that we need to work with our hospital partners to assist patients that call us regularly because of alcohol dependence," said Pore.

The research findings point to a similar need for community wide and targeted interventions.

"The report emphasizes the importance of taking a comprehensive approach to reducing binge drinking that includes evidence-based community strategies, screening and counseling in healthcare settings, and high-quality substance abuse treatment for those who need it," said Brewer.

EMS1.com News

EMS News in Focus
by Arthur Hsieh

08/01/2011

Drunk versus diabetes: How can you tell?

When the conditions are ripe, the distinction between intoxication and a diabetic emergency can easily be blurred

Scenario: Dispatch calls your unit to the side of a roadway, where police officers have detained a driver on suspicion of driving under the influence of alcohol intoxication. You find the female driver handcuffed in the back seat of a police cruiser. She is screaming profanities and hitting her head against the side window.

An officer tells you that she was weaving in and out of traffic at highway speed, and it took several minutes to pull her over. She was noncooperative and it took several officers to subdue her. She sustained a laceration to her head, which the officers want you to evaluate.

The woman continues to swear at you as you open the car door. You note that she is diaphoretic, and breathing heavily. You can smell what appears to be the sour, boozy smell of alcohol, even though you are not close to her. You can see that the small laceration near the hairline on her right forehead has already stopped bleeding. Her speech is slurred, and she appears to be in no mood to be evaluated. The police officers are ready to take her down to the station to be processed for DUI.

Sound familiar? It should — this is a scene that is played out often in EMS systems. While it may seem initially that these incidents are not medical in nature, they really deserve close attention by the EMS crew.

In this article we will focus on the challenges of evaluating a patient who is intoxicated versus a patient who is experiencing an acute diabetic emergency. There have been numerous instances where EMS providers have exposed themselves to serious liability secondary to medical negligence. Let's take a closer look.

Diabetes
Diabetes is a serious disease that affects nearly 26 million people in the United States.[1] Advances in diabetic care have resulted in an improvement in morbidity and mortality rates, and many persons with diabetes live full, productive lives.

However, there are situations where blood glucose levels become too high (**hyperglycemia**) or too low (**hypoglycemia**). In either of these situations, not enough glucose crosses the cell membrane of brain cells, causing a deterioration of the patient's mental status. Other signs and symptoms are associated with each condition.

Hypoglycemia

The normal blood glucose range is 90 — 130 mg/dcl.[2] As blood glucose levels (BGL) fall, the body reacts by releasing glycogen from the liver and large skeletal muscles. Glycogen can be used by these organs to maintain metabolism. However, critical organs such as the brain and heart do not possess glycogen; they have to depend upon normal BGLs to function properly.

As hypoglycemia worsens, the body enters a phase commonly known as "insulin shock": the skin becomes cool and diaphoretic. The heart rate rises, and the patient may become tachypneic. Confusion sets in; the patient may become combative and noncooperative as he loses consciousness.

Hyperglycemia

The body uses the hormone insulin to help glucose move across cell membranes, out of the bloodstream, and into the cell where it is used for metabolism. The body closely regulates insulin and glucose levels so that there is a precise balance of the two.

If insulin is not present in the correct amount, BGL begins to rise. Paradoxically, there may be an excessive amount of glucose in the bloodstream, yet the cells themselves are starving for it. This triggers the hunger reflex to set in, causing the patient to eat (polyphagia), increasing BGL even more. As in hypoglycemia, confusion sets in as the brain begins to malfunction. Eventually the patient loses consciousness.

The body does not tolerate high BGLs. The kidney's nephrons can become "clogged," causing them to fail. The body tries to excrete excess glucose through the urinary tract by forcing the patient to urinate excessively (polyurea). As dehydration sets in, the body triggers a thirst reflex, causing the patient to drink more fluids to compensate (polydypsea).

Meanwhile, the body begins to use stored fats and proteins to create energy metabolism. This is not as efficient as using glucose; rather than creating simple byproducts of water and carbon dioxide during glucose metabolism, fat metabolism result in ketone bodies, which can cause the body to become dangerously acidotic (diabetic ketoacidosis, or DKA). The body tries to excrete the ketones by breathing them out of the respiratory tract. The odor associated with exhaled ketone bodies has been described as "sweet," "acetone" and, ominously, like alcohol.

Alcohol intoxication
Ethanol is the active ingredient in alcoholic drinks. It is rapidly absorbed out of the digestive tract and into the blood stream. In small doses, it acts as a sedative and euphoric; people tend to have lessened inhibitions in the initial phases of intoxication, resulting in giddiness, and heightened energy.

As ethanol levels rise, this phase is followed invariably by increasing drowsiness, clumsiness, and a decreasing level of consciousness. A highly intoxicated patient may become combative without realizing what is happening. Nausea and vomiting are common side effects of excess intoxication. Eventually, the patient will lose control of their airway, causing obstruction by the tongue or emesis. Death will ensue if the condition is not corrected.

Differentiating the patient with "intoxicated" symptoms
It should be obvious that the distinction between the patient who is intoxicated and the patient experiencing a diabetic emergency can be blurred. When the conditions are ripe, it can become very easy to mistake one for the other.

When faced with a situation like the one described in the opening scenario, take a minute to think. The patient's combativeness may be the result of hypo- or hyperglycemia, so restrain the patient as necessary and perform a thorough assessment.

Look carefully for medical alert jewelry, especially around the wrist and neck. If personal identification is available, such as a wallet or purse, check for any information that might point to a medical condition, such as prescriptions, a medical card or, especially, for the insulin-dependent diabetic, small tuberculin syringes.

Establish baseline vital signs. Evaluate BGL using glucometry if available. Check for scarring on the anterior abdomen from repeated insulin injections, and the presence of an insulin pump strapped to a pants belt.

Most importantly, smelling alcohol on the breath is NOT a "rule out" finding!

While this article centers on the diabetic patient, there are other causes of altered mental status, including seizure, brain injury, stroke, drug overdose, and psychological conditions. In other words, if your initial impression is that the patient is intoxicated, pause for a few minutes and *completely* assess for other possible conditions. If you can't be absolutely certain about the underlying cause, don't make a risky decision — transport to an appropriate medical facility.

Treatment
Regardless of the underlying cause, safety is paramount. Restrain the combative patient prior to initial treatment. Remember to not place the patient in the prone position.

Therapeutic interventions for a hypoglycemic patient include oxygen and intravenous dextrose, usually 50% in water concentration. If the patient is noncooperative, it may be difficult to initiate IV access. Glucagon administered intramuscularly (IM) may be easier to deliver in such circumstances, although it may take time for the medication to take effect.

If the patient is awake, cooperative, and following your commands, oral administration of glucose may be effective. It may take longer to take effect, so be patient.

A patient with hyperglycemia may be dehydrated, as evidenced by tachycardia, tachypnea and possible hypotension. You may need to provide IV hydration in such circumstances.

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To Transport or Not to Transport? Part 1 of 2

W. Ann Maggiore
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The question of when it's medically and legally safe to leave a patient at a scene after EMS assessment is a thought-provoking one. According to the 2005 JEMS 200-City Survey (February 2006 JEMS), 71.3% of U.S. EMS systems allow providers to treat patients without transporting them, and 35.7% have a policy that allows EMS to refuse transport. When can we evaluate a patient but not transport them? When is patient refusal not a refusal at all? Is it ever appropriate to encourage a patient to go to the ED by private vehicle?

This article explores the inherent dangers of "no transport" situations and addresses incidents when EMS providers decide that transport is not needed or encourage a patient to sign a refusal form.

Case No. 1: You're called for a "baby not breathing." You're on ALS mutual aid to a town six miles from your station, in another fire district. BLS arrives first and reports back that the baby is now breathing fine, and you hear her crying loudly. On arrival, you find a four-month-old female in the arms of one of the BLS providers, in no apparent acute distress. According to the baby's father, she was vomiting and suddenly became limp, and her extremities turned blue. He says she stopped breathing but started again after he called 9-1-1. Your assessment finds all vital signs within normal limits.

Should this baby be transported by an ALS unit? Yes, according to Dr. Laura Kay, MD, medical director for the Santa Fe County and Los Alamos fire departments in New Mexico. "This baby had an ALTE-apparent life-threatening event. She needs a full workup to evaluate for possible causes of her presentation, including reflux, seizures, RSV, dehydration and sepsis. This will require a full evaluation in the Emergency Department. Sending her in by private car-or, worse yet, not sending her in at all-is asking for trouble."

This is clearly a case when, although there's no "emergency" at the time EMS sees the patient, a serious emergency occurred only minutes earlier, and transport in an ALS unit is appropriate. Deterioration en route is possible, and management to include the following may be necessary as indicated by further history and physical assessment: blow-by oxygen, cardiac monitoring, blood glucose assessment and IVF therapy.

Case No. 2: You're called to an affluent suburb for a "58-year-old woman passed out." En route, you learn from dispatch that the patient is now awake but "still clammy." You arrive at an upscale home to find a group of 10-12 well-dressed women having a small gathering. One of them, who identifies herself as a retired RN, tells you the patient was sitting and talking to her when she suddenly slumped over, and "almost had a seizure." She tells you the patient remained unconscious for about 30 seconds, then regained consciousness and vomited. Alcohol is not a factor. When you arrive six minutes after dispatch, the woman is conscious and alert, although still very pale and clammy. Her vital signs are all within normal limits, but her pulse rate is 100 and her 12-lead ECG shows a borderline sinus tachycardia without ectopy. She has no significant medical history and takes only an antihypertensive medication. She does not want to go to the hospital.

Is it safe to send this patient to the hospital with a friend? "No," says Kay. "You can't determine why this otherwise healthy woman suddenly lost consciousness in the prehospital setting. She needs a full evaluation-one that can't be done by EMS. If you put her in the car with a friend, she could arrive at the hospital in cardiac arrest in the back seat of the car-not an optimal situation." The differential diagnoses in this case include dysrhythmia, seizure, TIA/CVA, drug intoxication/overdose and syncope due to dehydration, bleeding or other causes. At a minimum, this patient should receive oxygen, an IV and cardiac monitoring en route to the hospital.

Negligence is defined as a failure to act as would a reasonable EMS provider with your training given the same or similar situation. Is it reasonable not to transport a patient who appears in no acute distress when you see them? If a patient isn't actively refusing transport, are there any situations when it's reasonable to suggest that a patient go to the hospital by other means? Should EMS ever encourage a patient to sign a refusal form? EMS resources are not limitless, so we must also consider whether we should conserve valuable resources rather than spending them on a patient who may not need them.

What the studies show

There's no simple answer to these questions, and a careful case-by-case assessment is essential. A series of studies conducted in different areas of the U.S. have shown that EMS providers are incapable of adequately evaluating patients to determine whether alternative means of transport may be appropriate. This inability to fully assess a patient largely results from the lack of laboratory facilities and radiography in the field.

A study from the Oregon Health Sciences University evaluated the use of protocols allowing EMTs to determine the need for treatment and transport.1 This study concluded that 3-11% of patients who EMS determined did not need transport later had a critical event, and it recommended that EMS systems should determine what rate of "undertriage" was acceptable.

The authors of this study followed up a year later with another publication looking at hospital follow-up of patients categorized in the field as not needing an ambulance, using a set of EMS protocols.2 The second study concluded that the protocols led to a 9% undertriage rate and further found that patients with psychiatric complaints and dementia were at high risk for undertriage by EMS.

"EMS can't even really do a full physical exam with a patient's clothes on," says Mark Hauswald, MD, an emergency physician and associate dean for clinical affairs at the University of New Mexico School of Medicine in Albuquerque, and the author of one of the studies.

Hauswald's study was a prospective survey that linked medical record review. Paramedics completed a brief questionnaire for each patient transported to the university hospital in a one-month period.3 Ambulance transport was defined as "needed" if the charted differential diagnosis included diagnoses that could necessitate treatment in the ambulance. ED care was defined as "needed" if treatment of these diagnoses would necessitate resources not available in local urgent care centers. In his study, paramedics recommended alternative transport for 97 patients, 23 of whom needed ambulance transport, and recommended non-ED care for 71 patients, 32 of whom needed ED care. The study concluded that paramedics can't safely determine which patients do not need ambulance transport or ED care.

Another study from 2002 found that in the urban system studied, "paramedics cannot reliably predict which patients do and do not require ED care."4 This study took place in a large Florida county (with more than 1 million residents) with a two-tiered, dual response to 9-1-1 calls, with eight local fire departments with ALS capability and a private ALS ambulance transport service. The study found that for 85 cases in which paramedics felt that ED transport was not necessary, 27 patients met the criteria for ED treatment, 15 were admitted, and five were admitted to an intensive care unit. These two studies make it clear that when paramedics make a decision against transporting a patient, that decision carries a high level of risk.

Finally, another study from Minnesota looked at paramedics who worked eight-, 12- and 16-hour shifts to determine whether the non-transport rate varied in the final hour of the paramedics' shifts, concluding that "[t]here was a statistically significantly smaller number of patients signed off in all phases of the eight hour shifts." The study recommended that "[d]ecreasing shift lengths to eight hours will significantly reduce the number of patient sign-offs and result in less potential liability."5

No transport in medical cases

The following medical case involved a "no transport" decision and resulted in a wrongful death suit against EMS.6 The plaintiff called 9-1-1 after his mother experienced difficulty breathing and became unconscious. On EMS arrival, she had regained consciousness. The paramedics evaluated the patient, who had emphysema and a tracheotomy, and was on home oxygen. She did not want transport. Although the son requested transport, he ultimately signed a form, at his mother's direction, refusing transport.

A few hours later, her condition worsened, and the same EMS crew returned, this time transporting her. She went into cardiac arrest during transport, and died after seven days on mechanical ventilation. The son filed suit, alleging that EMS should have transported her the first time he called. The parties disputed the events that led up to the failure of EMS to transport. Testimony indicated that the son repeatedly asked EMS to transport her but that the paramedics said she was not sick enough to go. He also testified that he felt coerced into signing the refusal form, and that his mother was disoriented and unable to make an appropriate decision about transport.

In this case, the EMS medical director, Dr. Kevin Merigian, testified that the paramedics had followed protocol and could not force a patient into transport if they refuse it. The trial court, however, found that the paramedics had failed to fill out several of the evaluation categories on the run form and had been in too much of a hurry to complete the report, indicating an incomplete evaluation in violation of a state statute requiring a "full evaluation" prior to a decision not to transport. In particular, a box regarding "fainting" was not marked despite the initial call for a patient who had passed out.

The trial court also found that the son's signature on the refusal form was invalid, because he was not adequately informed of his mother's condition due to the incomplete assessment. Ultimately, the appellate court reversed a verdict against the paramedics because the plaintiff failed to present any expert testimony. However, this case clearly demonstrates some of the problems with "no transports" and refusal forms.

Two cases from Ohio involve failures to transport address stroke patients. In one, a plaintiff filed suit, alleging EMTs failed to transport him one night despite the fact that he told them he thought he was having a stroke.7 The EMTs told the patient's wife he was suffering from a "panic attack" and that his vital signs were fine. The next morning, he had obvious neurological deficits, and was subsequently diagnosed with a stroke. He testified that he told the EMTs he had double vision, and they said he would have to walk to the stretcher. He said he was unable to do so. The run sheet showed that the patient had said he had vertigo, ringing in his ears, tingling in his fingers and a "hard time standing." He had also vomited.

In the second suit, a woman awoke with dizziness, had difficulty grasping objects with her left hand, and fell down twice. The run form filled out by EMS stated that "[s]quad [was] not needed, patient felt dizzy and wanted checked out; no problems found." The plaintiff suffered a stroke the following day. Because in Ohio, EMTs are immune from all but willful or wanton errors, the court dismissed both cases. However, the care rendered by EMS can be seriously questioned.

In making a decision not to transport in medical cases, EMS must first consider the reason for the initial 9-1-1 call. Calls for chest pain, trouble breathing, neurological dysfunction, or sudden changes in level of consciousness are serious until proven otherwise. The patient's age and underlying medical history should be taken into account. EMS should thoroughly assess and document the patient's condition.

If vital signs, including oxygen saturation and blood glucose levels, are within normal limits, consider the distance to the hospital; a private transport to a hospital five minutes away is much different than one to a hospital 30 minutes across town. Patients should not be permitted to drive themselves to a hospital after an encounter with EMS. EMS should also be very wary of leaving a patient who will be at home alone. In those cases, if you're considering a "no transport," you should ask if someone can come stay with the patient.

It's also important to remember that women may have unusual presentations of cardiac events, as will patients with diabetes. An unexplained loss of consciousness always merits a full hospital evaluation, preferably with EMS transport and constant cardiac monitoring.

EMS providers who work in high call volume systems often become cavalier and are quite comfortable in pulling out a refusal form any time a patient has no obvious acute illness or injury. Many of these forms become legally meaningless, because they are signed by patients who have not had a full assessment, or a discussion of what may happen if they refuse transport, so the refusal is not "informed." Further, some EMS providers actively discourage patients from EMS transport if they feel they're not serious enough to warrant it. This is a dangerous game of "Russian Roulette," and although no harm may result from this approach nine times out of 10, the 10th time could result in a lawsuit for wrongful death when the patient dies after EMS leaves with a ill-gotten refusal form in hand.

Some EMS run forms even have check boxes for "transport not needed." If your system uses such forms, your medical director should define the types of situations in which transport may not be needed according to system protocols. Checking that "transport not needed" box could lead to a legal disaster if a patient, who has been seen by EMS but not transported, later decompensates, because a plaintiff may easily claim negligence for failing to properly assess the patient. A poster-size trial exhibit of that report will go a long way toward impressing a jury that the EMS system didn't do its job.

Part two of this article will discuss non-transport decisions in trauma cases, destination decisions and EMS system abuse.

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Legal and Ethical Operations and Protcols Systems & Products Systems & Products Column Legal & Ethical Non-transport & Patient Refusal

PHOENIX FD SUFFERS CLOSE CALL FROM CO2

On May 31, 2011, the Phoenix (AZ) Fire Department was dispatched for a female employee who had fallen at a Mc Donald's. The female was pregnant and upon arrival was found lying on the floor near the top of a basement stairway.

Firefighters began patient assessment but the patient was not really talking, more crying and muttering, breathing too fast. While firefighters worked on their patient, two other firefighters went down the stairwell to see if she might have fallen or slipped on something.

After descending the stairs they felt something wasn't right. One was not feeling well, so they went back up the stairs. As one crew member reached the top of the stairs he fell, the other crew member reported feeling dizzy and light-headed. They reported to their Captain that something in the basement was not right. The Captain quickly ordered the crew to take the patient and evacuate the building and, with the assistance of a police officer on scene, completely evacuated the restaurant and called for the haz mat team.

The crew had noted a liquid carbon dioxide (CO2) tank in the basement. There has been a move lately for restaurants to switch from the pressurized CO2 tanks to liquid CO2 to carbonate beverages. Where a pressurized CO2 bottle has to be filled every couple days, the liquid CO2 tank usually lasts a month. The liquid CO2 tank has an expansion rate of 3,000 to 1.

Upon arrival of the haz mat team they descended the basement stairs with full turnout gear and SCBA and several gas meters. As they went down the stairs their meters started to alarm. At the bottom of the stairs all of the meters alarmed, including their natural gas meter, which was showing nearly 100% gas. The team evacuated to reevaluate the situation. They turned off utilities to the restaurant and discussed their findings.

They had seen the liquid CO2 tank and felt that the incident might be a CO2 leak from the tank. However, there was a CO2 detector right next to the tank and it was not in alarm mode. They later found that someone had taped over the sensor to prevent it from going off when the tank was being filled and had not removed the tape, rendering the meter useless.

They were also surprised about their natural gas meter going off but later learned that CO2 will mimic natural gas and give a false positive on gas meter readings. Up until this time, crew members had never been aware of this.

The crew reentered the building to shut down the CO2 tank. There were no shut down procedures on the tank but they found thumb valves and shut them down. They noted that oxygen readings were only 17% as opposed to normal air readings of 21% oxygen.

Because CO2 is heavier than air and clings to the ground, they had to use a confined space fan and bellows to ventilate the basement. They found that the tank, which had just been filled that morning was already half empty. The CO2 has leaked out and filled the basement, displacing the oxygen.

This was a "near miss" call for their firefighters. Had the two who went down to the basement not immediately sensed that something was wrong, they might have both passed out in the basement. With the oxygen depleted air, they could have suffocated in a short period of time. When others came to rescue them, they could have suffered a similar fate. They were very lucky that no one died that day. It was noted that potential rescuers often become the victims of CO2.

Though a CO2 leak in the basement caused a decrease in oxygen, similar incidents can occur even outside. Because CO2 is heavier than air and settles next to the ground, it creates a cloud of CO2. A person who enters cloud can become dizzy and pass out, and if they remain in the oxygen deprived cloud, they can die of asphyxiation even outdoors.

CO2 creates two hazardous situations:

- It displaces air, causing a reduction of oxygen concentration
- The high concentration of CO2 has a "narcotic effect"- CO2 narcosis. In situations, such as the Mc Donald's incident where there was a 25% concentration of CO2, victims can feel light headed, experience a constriction of their visual field, have an increased heart rate and pass out. Victims may also note a bitter taste in their mouth from their saliva mixing with the CO2 creating carbonic acid.

The Phoenix FD has posted a video regarding the incident on youtube at
http://www.youtube.com/watch?v=eY__H-CMvw0

* * * *

CARBON DIOXIDE BLAMED FOR GEORGIA DEATH

Sept. 24: Pooler, GA: A Florida women died of asphyxiation after carbon dioxide, used to make the restaurant's soda fizzy, leaked into the women's bathroom of the Mc Donald's on Sept. 7.

A line which was used to funnel excess CO2 out of the restaurant got disconnected, causing the gas to flow into the wall next to the women's bathroom instead of going outside. An 80-year old woman in the rest room died and a 56-year old women was found unconscious nearby. The restaurant's liquid CO2 tank had just been filled that morning.

Nine people- three firefighters, a Mc Donald's employee, and a Savannah family of three who tried to help the two women found down in the restroom- were all taken to the hospital with dizziness and trouble breathing. The 80-year old women died the next day. The other eight people have since been released from the hospital.

Officials in Pooler were trying to determine the cause of the mysterious incident when the Phoenix Fire Department contacted the Chief of the Pooler Fire Department and relayed to them information about a incident in Phoenix in May. This enabled Pooler officials to determine that CO2 was the cause of the women's death.

Editor's note: Since the publicity about these incidents, many firefighters in our area have reported seeing these liquid CO2 tanks at Mc Donald's and many other area restaurants. Just one more hazard that you need to be aware of!

Name: _____ Date: _____

Continuing Education – Intoxicology: The Science Behind the Sauce

1. The majority of alcohol absorption takes place in the _____.
   a. Brain
   b. Stomach / intestines
   c. Arteries
   d. Rectum
2. Ethanol acts as a _____ to the central nervous system:
   a. Stimulant
   b. Mediator
   c. Depressant
   d. All of the above
3. All of the following are considered "one standard drink" except:
   a. One shot - 80 proof gin
   b. 12 oz – 5% alcohol beer
   c. 12 oz – 12% red wine
   d. 8 oz – 7% malt liquor
4. The best approach to interaction with intoxicated patients is:
   a. With a condescending attitude
   b. Confrontational
   c. Provocative
   d. Calm and concise
   e. Laughing at the patient
5. T / F It may be considered appropriate to restrain an intoxicated patient to protect the safety of the crew and or patient.
6. Any patient with an altered mental status should have their _____ evaluated.
   a. Blood pressure
   b. GCS
   c. Pupils
   d. Blood Sugar
   e. All of the above

This scenario should be used to answer questions 7, 8, and 11.

You respond for the person that fainted but is now conscious. Upon arrival, the patient is A & O x4, denies any medical issues or complaints, and does not appear to be in any distress. You do not note any trauma to the patient. Bystanders state that the patient has had 4 – 5 draft beers over the last 3 hours. They state the patient bent over to pick up a dollar bill they dropped, then fell over and passed out, striking her head. They state the patient was "passed out" for 30 seconds. The patient does not want to be checked out, and verbally refuses transport to the ED.

7. Is the patient "legally intoxicated"?
    a. Yes
    b. No
    c. Not enough information provided to answer

8. In Illinois, can the patient be restrained and forced to be seen at an ED?
    a. Yes, at the paramedic's discretion
    b. No, if the patient is A & O x4
    c. Yes, but only if medical control gives permission to restrain the patient and take protective custody
    d. No, but the patient must be forced to sign a refusal of care document

9. Carbon dioxide, CO2, _____.
    a. Is heavier than air
    b. Is found in compressed form at many restaurants and places serving carbonated fountain beverages
    c. Will displace oxygen in enclosed spaces, causing asphyxia
    d. Smells like bitter almonds
    e. A, B, and C

10. Discuss several considerations for scene safety when entering scenes with intoxicated patients.

_____

_____

_____

11. Refer to the scenario given for question 7. In this scenario, what are the main points which MUST be documented clearly on the PCR in order for the document to stand in court?

_____

_____

_____

_____

_____

_____

12. Discuss the legal implications of EMS personnel carrying breathalyzer equipment to legally determine if a patient is intoxicated. Why or why not would it be a good idea? Would it be beneficial to patient care?

_____

_____

_____

_____

_____