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Spring has sprung and, with it, a new generation of spiders and snakes, oh my! The “Venomous Snakes and Spiders” article identifies snakes and spiders in South Carolina that can be deadly. Being aware of these creatures and knowing how to avoid them will make your spring and summer less threatening. This article also includes how to identify venomous snakes and spiders and how to treat their bites in case you are unlucky enough to get bitten.

Warmer weather generates greater risk for thunderstorms and lightning strikes, too. The “Electrical Injuries” article seemed timely with a higher potential for a direct lightning strike injury and electrocution during repair of electrical power from storm outages. “The SMART Approach to Wellness” outlines a self-directed, goal-oriented, motivating pathway to achieve better personal health. “Practitioner Pearls” reviews smartphone applications that can be useful in getting back into shape after a year of COVID-19 shutdowns and home quarantines. It will be good physically and mentally to be active again.

It is a pleasure to share these articles in our *Working Well* publication. We welcome comments or suggestions on topics for future articles related to health, wellness and safety. You can contact me at darawl@lexhealth.org. Enjoy!

— Dana Rawl, MD, MPH

Note: Front page cover picture is a copperhead snake.

Venomous Snakes and Spiders

By Dana Rawl, MD, MPH

Temperatures will soon rise, and people will embark on more outdoor adventures. Snakes and spiders will start their warm weather activities as well, increasing the risk for human confrontations. This information on venomous snakes and spiders may help in preventing bites and stings and understanding first-aid measures for treatment if a close encounter results in an injury.

Snakes

The most common venomous snakes in the Southeast are rattlesnakes, copperheads, cottonmouth/water moccasins and coral snakes. Venomous snakes bite about 7,000 to 8,000 people in the U.S. each year and about five of those envenomated die. The death rate would be much higher, but most individuals seek immediate medical attention for anti-venom treatment, which drastically improves survival and morbidity. Disability and permanent injury such as amputations or loss of limb function are more common consequences.

Rattlesnakes, such as the diamondback and the cane break in South Carolina, can accurately strike one-third or more of their body length from a coiled or stretched-out position. Rattling is an ominous sound and serves as a warning when the snake feels threatened, but they may not always rattle before striking. Rattlesnakes are commonly found near old sheds, rock or brush piles, logs or open areas, warming themselves or hunting for small rodents. They can also be found cooling themselves in shady areas on hot days.

Adult copperheads are usually smaller than rattlesnakes and typically have a light and dark copper-colored banding in the shape of an hourglass. They are extremely camouflaged in pine straw. They strike when threatened or stepped on but are normally not aggressive. Copperheads find cool and moist areas, such as shade forests, swamps or river edges, more suitable.

Cottonmouth snakes can be as large as 4 to 5 feet long and are thick in girth. Characteristically, they display their open, white mouth when threatened. They live mainly in swampy areas and thrive around freshwater river or creek edges. Cottonmouth snakes tend to be aggressive and swim towards activity in the water.

The coral snake is a smaller, thinner snake with black, red and yellow bands and can be confused with a non-venomous scarlet king snake with similar markings. The adage is “red on black, put it back; red on yellow, kill a fellow.” Coral snakes are not aggressive and tend to hide in leaf piles or burrow into the ground in woody or sandy areas.

Rattlesnakes, copperheads and cottonmouths are all pit vipers and produce venom that is cytotoxic, causing significant tissue damage and affecting clotting activity. Signs and symptoms of envenomation can include local puncture marks; redness, bruising, blisters and swelling; severe pain at the site; nausea and vomiting; difficulty breathing; rapid heart rate and weak pulse; change in vision; metallic, mint or rubber taste; and numbness or tingling around the mouth, tongue or scalp.

In comparison, a coral snake’s venom is a neurotoxin that causes muscle weakness, slurred speech and double vision. Symptoms are slow to onset, and the bite may not be painful. Paralysis and respiratory failure result from significant envenomation.

There have been no reported deaths from a coral snake bite since the late 1960’s.

First aid for a snake bite starts with getting medical attention fast. Call 9-1-1. Get an ambulance to transport the victim. If there



Wash the area (of the snake bite) with soap and water, if able, and cover with a clean, dry dressing.

is envenomation, the faster anti-venom can be started, the better outcome. Identification of the snake can be helpful in treatment. If possible and safe, take a picture of the snake. Stay as calm as possible. Have the victim sit or lie down with the affected extremity in a resting, neutral position. Remove any constricting articles (e.g., rings, watches) from the affected extremity. Wash the area with soap and water, if able, and cover with a clean, dry dressing. Mark the time and the leading edge of any pain, swelling or redness on the skin.

Do not pick up or trap the snake. Do not wait for symptoms to appear. Do not apply a tourniquet, cut the wound or attempt to suck out any venom. Do not apply ice or elevate



the wound. Do not drink alcohol for pain or take any aspirin, ibuprofen or naproxen.

Spiders

There are two concerning venomous spiders in the U.S.: the black widow and the brown recluse. Neither is aggressive, but both will bite if they are threatened or touched. Both spiders can be found outside in dark, secluded areas, such as rock crevices or wood piles, or in and around enclosed structures, such as sheds, well houses, outhouses, barns or buildings.

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Electrical Injuries

By Dana Rawl, MD, MPH

There are more than 30,000 nonfatal electrical incidents per year in the United States with approximately 1,000 deaths. Nearly 300 of those deaths are from high-voltage exposure.

Electrocution deaths are the fourth-leading cause of workplace-related traumatic death. Most electrical incidents result in a shock sensation with no medical aftereffects. Significant exposure may cause damage to muscles, bones, joints, skin and internal organs including the brain and heart. Unfortunately, the extent of damage from an electrical injury may not be obvious initially.

The severity of electrical injury depends on multiple factors, including voltage and amperage, type of current, duration of exposure, resistance of tissues exposed and pathway of current through the body. These factors are known as Kouwenhoven's factors, but a newer concept of electrical field strength may be a better predictor of injury severity.

Electrons flow from high to low concentration through a conductive material. The potential gradient between high and low concentration of electrons is the voltage (V). Electrical injury may be separated into low voltage, less than 500V and high-voltage injuries. High-tension power lines may have voltage greater than 100,000V. High-voltage injuries tend to cause deep burns.

The current is the amount of energy or volume of electrons flowing down a potential gradient that is measured in amperes (A), and the reduction of the flow of electrons through a material is the resistance (R) measured in ohms. The resistance varies between areas of the body where tissues with more electrolytes and water, such as blood vessels, nerves and muscles, conduct electricity better. Bone, fat and skin are poor conductors of current, so the result is greater resistance. Greater damage from electrical injury occurs in tissues with higher resistance because there is more energy dissipation with resistance. For example, thick skin with high resistance may dissipate greater electric energy, resulting in more skin damage (a larger skin burn); however, it may reduce energy exposure to internal tissues. In contrast, a low-resistance entry site, such as thin skin or a mucous membrane, may show a small entry burn

but allow more transmission of electric energy to internal tissues.

The type of current refers to either direct current (DC) or alternating current (AC). DC defines a flow of electrons in one direction (e.g., a car battery or defibrillator), whereas AC defines electron flow back and forth as with low-frequency (50 Hz to 60 Hz) household outlets.

DC electrical exposure usually results in a single convulsive contraction throwing the victim away from the electrical source. In comparison, low-frequency AC exposure can produce muscle tetany (extensive muscle contraction) and cause the person to involuntarily grip the electrical source, leading to longer exposure duration. The "let-go" current is the maximum amperage that causes the hand to contract but still allows conscious release from the electrical source. For a 150 lb man, the let-go current is about 75 milliamps (mA) for DC and 15 mA for AC. Low-frequency AC drastically lowers the let-go amperage level. It is said AC is three to five times more dangerous than DC given the same voltage and amperage.

The pathway of electricity through the body determines which internal structures may be affected. More appropriately, the terms "source" and "ground" are used to determine the pathway instead of "entry" and "exit" since AC continually reverses current direction. The hand is the most common source point for electrical injury followed by the head. Current traveling between hand and foot or hand and hand is likely to pass through the heart, increasing the risk for heart damage (related to conversion of electric energy to heat) or arrhythmias. Even a short duration low-voltage, low-frequency AC of 60 to 100 mA of energy across the heart can induce ventricular fibrillation compared to DC of 300 to 500 mA.

Another factor involved in assessing internal body damage from electrical exposure is current density. As noted, resistance through tissue determines the energy dissipated



A quick accident site assessment for hazards, however, must be performed to ensure your safety before approaching the injured person.

into that tissue. If the proportion of tissue has higher resistance, then there is a higher current density, causing the electrical energy to be more focused on that area and resulting in more damage. For example, a current traveling down an arm will readily pass through a cross-section of low-resistance tissue, such as blood vessels, muscle and nerves. When the current reaches a joint, there is a larger cross-section of higher-resistant tissue, such as bone, ligaments and tendons, causing a higher proportion of damage to the joint.

Electrical field strength describes the intensity of electrical energy across the affected area and predicts the degree of tissue damage along with Kouwenhoven's factors. The voltage encountered over the contacted surface area determines the electrical field strength. As such, a high-voltage exposure over a large surface area may be equally or less damaging than a low-voltage exposure over a much smaller, focused surface area.

A low electrical field strength injury usually results in an uncomfortable "shock" sensation, whereas a high electrical field strength exposure may result in thermal or electrochemical tissue damage, including hemolysis,

thrombosis, coagulation necrosis, muscle or tendon injury. Extensive tissue damage can lead to fluid loss in the tissues and cause general dehydration as well as a local or extensive compartment syndrome, which occurs when the pressure inside a muscle compartment exceeds the blood flow pressure and causes muscle necrosis. Muscle injury can lead to electrolyte abnormalities, rhabdomyolysis and acute kidney failure.

Someone with electrical exposure may present with little to no symptoms and/or no notable injuries, or he or she may have a myriad of complaints and severe pain with obvious tissue injury. The source of the electrical injury (high or low voltage, AC or DC) and details of the event are critical in determining severity of injury and appropriate evaluation, monitoring and treatment. The circumstances of the event, including the person's location, physical position and any witness reports describing muscle contractions, loss of consciousness or blunt trauma, are all important factors contributing to his or her evaluation.

In any workplace or situation, the priority in attending to someone who has been electrocuted is to break the electrical

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The SMART Approach to Wellness

By Dana Rawl, MD, MPH

Most of us want to be healthy for life. Unfortunately, life in general can be an excuse for unhealthy habits. Stress, long work hours, family responsibilities, expenses and no time are some excuses that we tend to use to justify not caring for ourselves. Studies have shown that a healthy lifestyle contributes to a longer life, higher levels of energy and vitality, less emotional stress, less pain and illness, and weight control.

Getting started on a healthier you involves planning, goal setting and a SMART approach. SMART stands for Specific, Measurable, Attainable, Relevant and Time-bound. SMART goals are:

Specific: Goals should not be vague. Define a goal as specifically as possible and include how to accomplish it and why the goal is important for you.

Measurable: Keep track of your progress. Put a number on a measure, such as a weight goal, step goal or calorie goal. Use a log, journal or phone app to monitor your actions and results.

Accountable: Set goals that you can achieve at your current ability level. Once you attain your goal, reset to another realistic goal. Your confidence will soar. Monitor your achievements in your journal or phone app.

Realistic: An unrealistic goal will discourage you. Set realistic goals that you can attain at an appropriate pace.

Time-bound: Set a target date to achieve your goal, then break that timeline into smaller timeframes with proportionate goals as mile markers in route to goal completion. Every mile marker passed is positive motivation to continue.

Focus on three to five wellness goals to start, such as losing weight, lowering calorie intake and increasing physical activity. Set realistic goals for each wellness activity and a target date to complete them. Monitor your daily activity and document your results. Be accountable for your activities including positive and negative actions. The more you achieve, the better you will feel. Your confidence will grow with every attained goal. Once you meet your initial goals, reset previous goals or add new goals, such as stopping smoking or alcohol, improve sleep or engage in stress reducers.

Wellness can be challenging, but achieving your goals should be enjoyable, satisfying and habit forming. Don't waste another day to get healthy, be healthy and enjoy the rest of your life!



Reference:

<https://www.sfadvancedhealth.com/blog/health-goals>

<https://www.familyhconline.com/5-health-goals>

Venomous Snakes and Spiders

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Black widow spiders are about a half-inch in diameter and are jet black in color with a characteristic red hour-glass shape on the underside of the spider's abdomen. They build their webs between objects in undisturbed areas, and bites usually occur when there is direct contact with the web and spider. The fangs of the spider can produce two small puncture marks in the skin. The venom is neurotoxic and commonly causes immediate burning pain at the wound site. Nausea and/or vomiting can occur, and cramping pain can spread to the chest, abdomen or muscles. Medical evaluation is warranted for proper treatment and to assess the need for anti-venom to treat severe symptoms.

The brown recluse spider is brown in color with a dark violin-shaped mark on its head. They are shy spiders and prefer secluded dry areas. Their bites can cause a stinging sensation, but generally, these bites are not initially painful. The venom injected is proteolytic and destroys local tissue. Within a few hours, the skin develops a pale central blister with surrounding redness (target lesion), swelling and tenderness. Within a few days, the affected tissue will show signs of necrosis (tissue destruction) with darkening of the wound. Depth of tissue destruction may not be realized for days or weeks. Medical treatment consists of rest, ice, compression and elevation. Pain management and wound debridement may be required.

Employers should recognize that outside workers are more at risk for snake or spider encounters and should educate their employees on risk of injury, identification, prevention and appropriate protocol if they are bitten or stung. Emphasize professional medical evaluation and treatment in managing a venomous bite or sting. Precautions should include instruction to not handle any snakes or spiders, avoid areas where the creatures live, wear protective clothing, such as boots, long-sleeve shirts and long pants when working outdoors, and wear leather gloves when handling brush and debris.

Always look before you reach or step. Be safe out there! 🍃

References

<https://www.cdc.gov/niosh/topics/snakes/types.html>
<https://www.cdc.gov/niosh/topics/spiders/types.html>

Electrical Injuries

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source by shutting off the current. A quick accident site assessment for hazards, however, must be performed to ensure your safety before approaching the injured person. You should not attempt to disengage the injured person from the electrical source until the power source is shut off. Call 9-1-1 and initiate emergency response procedures.

Once the site is safe, resuscitative measures can begin, including cardiopulmonary resuscitation, if necessary. Avoid moving the injured person and protect his or her spine and neck. Be aware that this person could have fallen or been thrown due to the electrocution and could have sustained a spinal injury. Electrical injury, blunt trauma, thermal burns, cardiac injury and neurological injury can all be associated with electrocution and can induce shock. Keep the injured person warm and dry and perform first-aid measures as needed. Transporting the person who has been electrocuted to an emergency room for comprehensive evaluation and treatment via ambulance is warranted.

Next to elimination, prevention is the best and probably least costly policy to alleviate hazards in the workplace. Electrical devices and equipment should be routinely serviced and evaluated to ensure proper insulation, appropriate grounding and safe circuitry that includes protective circuit-breaking measures. Ground-fault circuit breakers are effective when implemented and trip with as little as 5 mA of current. Employers should incorporate education and training into prevention programs to avoid electrical injury, such as not using poles, ladders or lift equipment near power lines; developing standard operating procedures for grounding equipment; and de-energizing equipment when serviced. Direct, definitive communication and team concepts should also be emphasized to complement a safe prevention program.

References:

Runde, D.P. *Electrical Injuries*. Jan. 2020. <https://www.merckmanuals.com/professional/injuries-poisoning/electrical-and-lightning-injuries/electrical-injuries>
Zemaitis et al, *Electrical Injuries*. Dec. 7, 2020. <https://www.ncbi.nlm.nih.gov/books/NBK448087/>

Has Fitness Taken a Backseat During the Pandemic? There's an App for That!

By Donna Padgett, ACNP

Spring is here, and most of us are weary from dealing with COVID-19, including the weight gain and lack of motivation to be active after being confined at home for the past year. Quarantines combined with cold, gloomy days have resulted in most people staying cozy at home, watching Netflix, TV and movies, and eating too much. Gyms have been closed or have limited access, so what do we do for exercise and fitness?

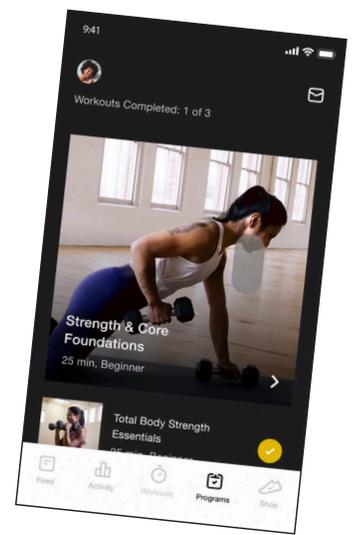
The answer may be a workout app. Many are available and some are free. You can do these workouts anywhere, and there is no need for equipment. Some apps allow you to customize your workout to your fitness level and interest. Many also include information on nutrition.

Hip2Save.com has suggested seven of the best free workout apps to try in 2021.

1. **Map My Fitness by Under Armour®** (<https://mapmyfitness.com/>) has access to more than 800 workouts with routines created by Under Armour trainers. It can sync with the latest applications and most wearables, including Google Fit, Android Wear, Garmin®, Fitbit®, Jawbone® and more.
2. **7 Minute Workout** (<https://workoutinc.net/>) features professionally designed workouts that are short and effective. It is compatible with Apple Health

to track workouts and calories burned.

3. **Freeletics** (<https://freeletics.com/en/training/coach/get/>) provides access and downloadable free HIIT routines that can be monitored with Apple Watch. It also provides access to digital fitness coaching.
4. **JEFIT** (<https://jefit.com/>) has 1,300-plus weight-training exercises available with the ability to track workouts. It has fully customizable routines and exercises and can sync with Apple Health.
5. **ClassPass** (<https://brandcycle.shop/kq55>) supports unlimited streaming audio or video workouts. It has interconnectivity to plan workouts with friends and can connect with HealthKit to monitor calories burned.
6. **Nike® Training Club** (<https://www.nike.com/ntc-app>) has an extensive Nike Training Club workout library and features body-part focused workouts (arm, legs, abdominal muscles, etc.). It also includes strength, endurance, yoga and mobility workouts with various levels of intensity and workout durations from 15 to 45 minutes. Nike Training Club connects to Apple Watch and Apple Health.
7. **FitOn** (<https://www.jdoqocy.com/click-3278587-14413773>) has marquis celebrity trainers with



workouts to include yoga, cardio, strength, HIIT, toning, stretching, pilates and more. It connects to Apple Watch, Fitbit and Garmin. Users can participate in challenges.

Out of shape? Only have a few minutes? No exercise equipment at home? Short on cash? No worries! There is a free fitness app just for you.

Remember... fitness not only makes you look and feel better, but it helps strengthen your immunity, too! 🌿



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