North Texas' Venomous Snakes

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Avoiding Encounters … Or Enjoying Them When They Do Occur

When it is spring and we've had rain, the abundance of life is particularly evident. People report wildlife sightings everywhere, including plenty of snake encounters posted to social media. Some reflect delight and appreciation, or even boasting about lucky finds in exactly the way a birder would report a new "lifer." Others are nervous pleas to identify a photograph of a snake that is feared to be a threat to the lives of humans and pets.

Venomous snake bite is an uncommon event in the U.S., although it is a potentially very serious medical emergency when it does occur. Cases of venomous snake bite from ten states were reported to the North American Snakebite Registry for three years from 2013 through 2015.[i] Most of the 450 cases were from Arizona and Texas, and 19% of the bites resulted from intentional interactions (with captive snakes, showing off, attempting to kill the snake, etc.). Almost all the bites came from pit-vipers – rattlesnakes, copperheads, and cottonmouths. Only three coralsnake bites were reported. There were no deaths among these 450 cases.

Western diamond-backed rattlesnake from near Austin

The small field guide by Andy Price, *Venomous Snakes of Texas*,[ii] includes a table showing annual deaths in Texas from 1997 to 2005. Most years there were no deaths from snakebite, and only five deaths were reported for those nine years. Deaths from lightning strike outnumbered those from snakebite. If you are interested in, or worried about, Texas' venomous snakes, get this guide. Price discusses how venom works, what to do in case of snakebite, and he provides information about where each one is found,

what its habits are, and what it looks like. Alternately, you can download my pdf guide to venomous snakes in north Texas.[iii]

A Texas coralsnake seen in the Piney Woods

Coralsnakes are often thought of as among our more deadly snakes, but a 2009 article in *Toxicon* reported the first U.S. death from coralsnake bite in over 40 years.[iv] It is also instructive to note that this death occurred when some men who had been drinking discovered the snake, captured it, and then tried to kill it. The person who died used a broken beer bottle to try to stab the snake, was bitten, and then did not pursue treatment. Unfortunately, carelessness, attempts to kill the snake, and failure to seek treatment were pivotal factors in this man's death.

The point of all this is to say that venomous snakebite – especially the risk of dying from one – is low among the risks we face in daily life. The majority of snakes in Texas are nonvenomous, and all of them (venomous or nonvenomous) want nothing to do with us. Great care must be taken when we encounter a venomous snake, and that is the subject of the rest of this article.

Avoiding Venomous Visitors

Someone whose position about snakes is generally "live and let live" may still believe that a snake near their house must be killed in order to prevent future encounters. It is hard to argue with someone who says "if I find a rattlesnake in my yard, I'm killing it." Nevertheless, I'm going to attempt that argument, not because I value snakes over people, but because I think there's a better solution. Let's look at the points in my argument:

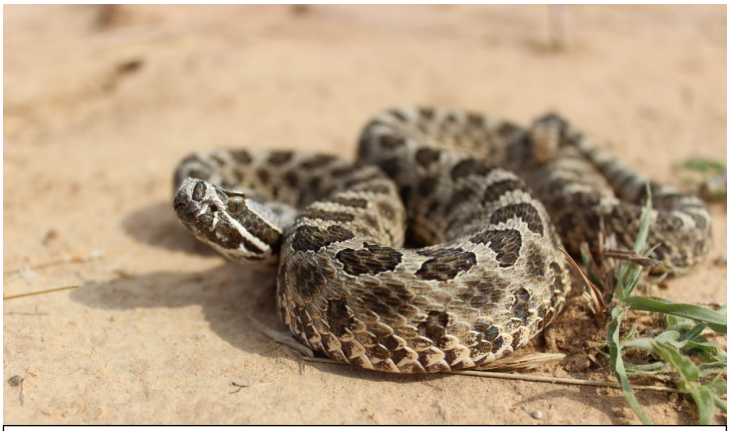
A. If you live in an area where snakes show up from time to time, then killing *that* snake creates an opening for another snake to move in. If you live in an area that has recently been cleared for homes to be built, or if your house adjoins "wild" property, chances are that that will not be the last snake you see. What if you sprayed the snake with a garden hose from a safe distance, frightening it and running it off your property? Snakes learn about their surroundings, and that snake may learn that people and houses are scary and it's best to stay away.

B. By the way, when threatened by a human, a snake experiences fear and agitation – it may look "mad" but it is really frightened; it will not hold a grudge and go on the offensive if it sees you again.
C. Do you have loose items stacked outside your house, wood piles, or an old shed with a space underneath it? A wandering snake will think of these as shelter and a place to hunt a mouse or lizard to eat, and it may settle in and stay a while. You can minimize encounters with snakes by clearing out these items.
D. The most dangerous encounter with a venomous snake is the one that you stumble into, unprepared and unaware. That happens when people walk barefoot at night in places where a snake might show up. It also happens when people reach down with bare hands to pick things up without being able to see what's nearby. Better to use a stick or a tool to probe around the hidden nooks before putting your hand there. The same principle applies when you are hiking or camping – watch where you step or put your hands.
E. Many snakebites occur when someone tries to kill the snake. You may be more careful and better organized than the guy who tried to kill the coralsnake with a beer bottle, but you are still going to have to get close to the snake. As you attack it, the snake will make frantic attempts to defend itself or get away, and this is a high-likelihood situation for you to be bitten.

You may or may not be convinced, but I think the best strategy is to prevent snake encounters around the house and to safely frighten away any unwanted snakes that you find. There's one additional thing: snake "repellents" are not going to help. Wishful thinking and good salesmanship sells a lot of bags of stuff based on ingredients similar to mothballs or some other chemical scent-based substance. One snake control company in Arizona posts photos of rattlesnakes they find resting on top of the stuff or sheltering behind a bag of it.[v] That speaks volumes about the effectiveness of the product.

Safe Space

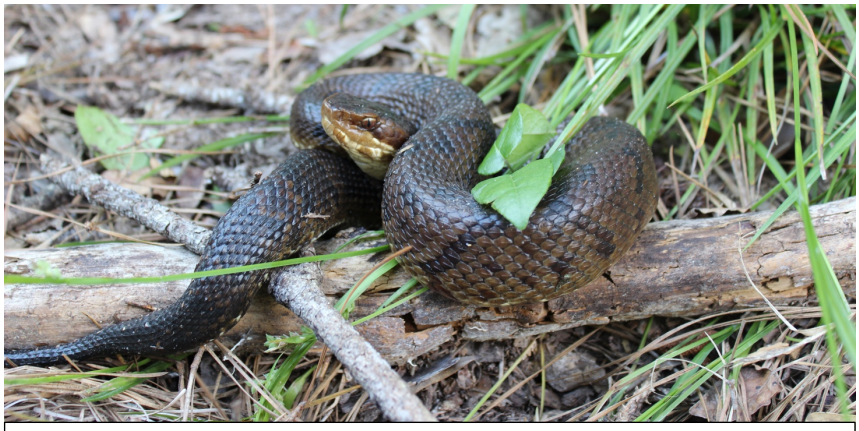
What about the naturalists and wildlife-watchers among us? What if we find a snake and want to watch it or photograph it – can that safely be done? The answer is "yes," and it depends on our dispelling the myth that venomous snakes chase people. I don't mean to insult anyone who came across a rattlesnake that crawled toward them in a way that looked like it was chasing them. That has happened to a



A western massasauga like the one Steve and I saw

friend, actually, but a lifetime of experience and study tells me that he was just in the way of a snake trying to escape to safety. I describe this encounter in *Herping Texas*[vi] and I will briefly re-tell it here.

Steve and I found a massasauga rattlesnake one night years ago, and we crouched around the snake to admire it. The snake was still as a statue, probably confused by our lights and hoping we would pass on by. I wanted to see it in a different position and so I touched the snake with my snake hook. At that point, convinced that hiding had failed and it was now under attack, the little rattlesnake flew into action, coming straight at Steve. That caused Steve to fly into action as well, practically back-flipping out of the way. The snake kept on going, past us and into the roadside vegetation. That's all it was – no attack, just a blind attempt to get away. However, when something like that happens, the natural assumption people make is that the snake was attacking or chasing.



A northern cottonmouth, another venomous snake that will not chase you

With that in mind, let's think about how you can safely observe a snake. When you first spot it, think about how close you are and what it is doing. If the snake is very close, check your footing and step away or to the side until you're about ten feet away. If the snake is moving, don't get in its way and remain still so that you can watch what it does. You may get a great opportunity to observe how the snake's amazing body moves among rocks and branches, or see it swim (a beautiful display of graceful curves). From a safe distance, it doesn't matter if you are able to identify it, because even if it is venomous, it cannot hurt you from ten feet away. If the snake moves in your direction, just remember that this is just a navigation error on the snake's part and move out of the way.

I do not mean to suggest to anyone that venomous snakes are no big deal. Just as these snakes are not "mean" or "bad," they are also not "friendly" and they do not know if our intentions are benign. They are simply wildlife – fascinating, often beautiful, and potentially quite dangerous if we don't keep our distance. What I have learned is to respect them without undue fear and to understand their habits well enough to watch them in the field without incident.

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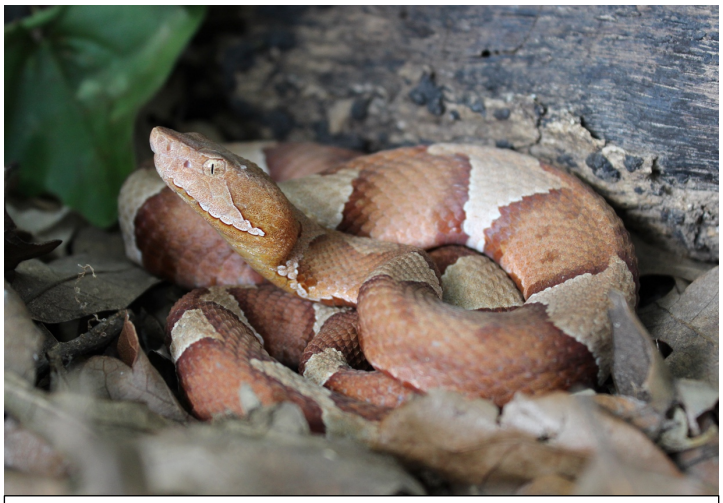
Venoms and Snake Bite

In north Texas, we are blessed (from a herpetologist's point of view, anyway) to have representatives of all four "kinds" of North America's venomous snakes: rattlesnakes, copperheads, cottonmouths, and coralsnakes. When we are camping or just taking a walk in the woods, these are the snakes that we should watch out for, because a bite from any of them is a medical emergency.

East Texas has the eastern copperhead, a two-toned tan to reddish-brown snake with hourglass-shaped crossbands. As you move west, there is a transition into the broad-banded copperhead with a slightly darker pattern and broad crossbands. The northern cottonmouth is a chunky relative of the copperhead whose babies start out reddish and cross-banded a little like a copperhead but darken as they grow until they might be nearly plain dark brown. In our area we have four kinds of rattlesnakes, with the two biggest being the western diamondback and the timber rattlesnake. In a few places we might see two smaller species, the western massasauga and the western pygmy rattlesnake.



A broad-banded copperhead from Wise County

Together, the copperheads, cottonmouths, and rattlesnakes are "pit-vipers," a name referring to the heat-sensitive pits in their faces. They have relatively long fangs that fold against the roof of the mouth when not in use, and venom that acts mostly to break down tissues ("hemotoxic" venom).

We occasionally see Texas coralsnakes in our area. These are fairly small, shy and secretive snakes with black, yellow and red rings. That is the usual pattern, but some coralsnakes have speckles or blocks of black color within the red rings, and the occasional genetic outlier may be mostly black. As is the case with other snakes, there is no perfect rule for identifying which ones are dangerous[vii]. Coralsnakes have small heads, short fangs, and venom that primarily acts on the nervous system ("neurotoxic" venom).

There are a few other Texas snake species that have venom, sort of. Such snakes have glands that produce toxins and bigger teeth in the back of the mouth that can help get the toxin into the bloodstream of a small animal that the snake intends to eat. I'm not counting such species (lyresnakes, nightsnakes, or the hog-nosed snakes, for example) as "venomous" because bites from

them are rare or nonexistent, most of them are small species, and their toxins are not medically significant for humans.

Pit-viper venom

Pit-vipers (rattlesnakes, copperheads, and cottonmouths) have relatively large venom glands that help make their heads look chunky and somewhat arrow-shaped. Each gland is connected to a fang by a small tube or duct. When a rattlesnake strikes at a rat that it wants to eat, its mouth opens as the snake lunges forward, and muscles pull the fangs down into position. When the snake bites the rat, muscles at the back of the head squeeze the venom glands so that venom travels through the hollow fangs and is injected into the animal. The venom goes to work immediately, first disabling the rat and rapidly killing it so that it does not get away, and additionally beginning to break down its tissues, starting the process of digestion before the rat is even swallowed.

Snake venom is a cocktail of various substances that, depending on the species, attack blood cells and blood proteins, blood vessels, muscles including the heart, and connective tissues. Some snake venoms interfere with nerve transmission. In most pit-vipers, venom primarily affects tissues such as blood, the cardiovascular system, and muscle, resulting in swelling, bruising, problems with blood pressure as well as with the ability of blood to clot. More detailed information about pathophysiology (how snake venom damages the body) can be found online in a series of articles by Dr. Spencer Greene published in Medscape[viii].

Although the venom of most pit-vipers is described as hemotoxic, a few North American rattlesnake species are nonconformists when it comes to venom. Their venom may contain significant neurotoxic components and so they may cause symptoms such as weakness or paralysis. One of those snakes is the Mojave rattlesnake (found in the Trans-Pecos region of Texas) and the other is the timber rattlesnake, which occurs in a few North Texas localities. Different populations of the timber rattlesnake in different geographical areas may contain venom that is primarily neurotoxic, primarily hemotoxic, or both[ix].

Coralsnake venom

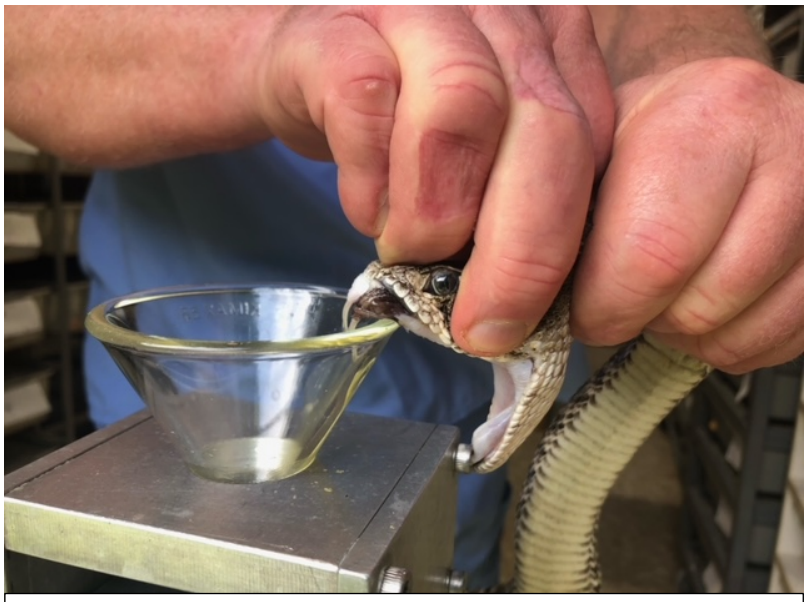
Coralsnakes have venom glands connected to each fang by a duct, but unlike the pit-vipers, the fangs of coralsnakes are short and fixed in position, angled a little toward the back. As a result, people sometimes have the mistaken idea that a coralsnake is only able to inject venom if it hangs on and chews. This is not true; a coralsnake can bite, inject venom, and let go. Because coralsnakes are shy and generally focus on getting away when they are disturbed, bites are rare and generally happen if the snake is handled or restrained.

These snakes eat other snakes and lizards, and generally grab their prey and hang on. Their venom tends to stop the prey from struggling and thrashing by interfering with the action of the other animal's nerves and paralyzing it.

According to Greene[x], the effect of coralsnake venom on humans could include such things as neuromuscular paralysis. However, in a review of all bites from Texas coralsnakes that were reported to the North American Snakebite Registry over a period of five years[xi], none of the fourteen patients developed symptoms severe enough to require antivenom. All of them experienced paresthesias, which are altered sensations such as the pins and needles feeling when your arm has "gone to sleep" when you lay on it and press a nerve. Several of the coralsnake patients described their paresthesia as feeling "electric," and three of them experienced pain rated as "severe."

What are the chances that I will be bitten?

The CDC reports that "each year, an estimated 7,000–8,000 people are bitten by venomous snakes in the United States, and about 5 of those people die"[xii]. Even that number of venomous snake bites is too many, but this means that snake bite affects only 0.002% of the U.S. population annually. And remember that death from snake bite is even more rare.



Jim Harrison extracts venom from a rattlesnake. The venom is used for production of antivenom and in research. (Photo courtesy of the Kentucky Reptile Zoo)

These are statistics from the overall population, and we can assume that those of us who go hiking, camping, and spending time in nature might be at a little greater risk just because we are closer to the snakes. With a little bit of safety awareness and avoiding close contact with snakes, venomous snake bite should be very low on our list of worries.

Sometimes a venomous snake bites but does not inject venom (the so-called "dry bite"). It can happen, but don't count on it. There are varying statistics on how often dry bites occur, but suffice it to say that most bites by venomous snakes result in some venom being injected. If you are bitten by a snake you think might be venomous, do not hesitate to go to the nearest hospital for treatment.

If you are bitten – what NOT to do

I'm not a physician, and so any part of this article regarding first aid and medical treatment is based on my review of articles and treatment protocols that were written by physicians and trained authorities. Don't take my word for it, listen to physicians and medical toxicologists. Principally, I relied on the Unified Treatment Algorithm, developed by a consensus team of experts[xiii], the Medscape series of articles by Spencer Greene[xiv], and the Wilderness Medical Society's practice guidelines for snake bite[xv].

I still remember my "snake bite kit" that I had when I was a kid, back when the best wisdom was to apply a tourniquet, cut the fang marks, and suck out the venom. If you still have one, throw it away! Or treat it as a piece of history that we have outgrown, even though you can still buy such kits. The medical authorities I reviewed all say that cutting fang marks just adds more injury and you cannot suck out any significant amount of venom. Tourniquets are extremely damaging, and constricting bands or anything that keeps hemotoxic venom trapped around the site of the bite just worsens the damage to that area.

What about ice? Some experts will tell you that using an ice pack for pain relief, applying it for short periods and leaving it off at other times, is OK. All the experts reviewed agree that applying ice for longer periods will add more damage and do nothing to treat the envenomation.

The experts also warn that managing pain with aspirin or other non-steroidal anti-inflammatory drugs (NSAIDs) is not recommended because these drugs affect bleeding and clotting, which are already likely to be affected by pit-viper venom and don't need anything else throwing them into chaos. The experts advise against using alcohol or common medications (NSAIDS, Benadryl, etc.) before getting to the hospital.

Electric shock began to be talked about in the 1980s as a treatment for venomous snake bite. Stories emerged of people hooking their friends up to a car battery or tasing a snake bite victim as a way to try to neutralize the venom. All this turned out to be misguided and electricity has been shown to be useless and potentially harmful in snake bite first aid.

So what can you do?

Jim Harrison of the Kentucky Reptile Zoo says you need two things if you are bitten by a venomous snake: a car and someone to drive you to the hospital. What he means is that the truly helpful things are going to happen in the hospital, so don't waste one minute getting there. Snake bite experts say, "time is tissue," meaning that the more quickly you reach the hospital, the less tissue will be damaged by pit-viper venom before you can receive antivenom.

Do not worry too much about identifying the snake that bit you. The treatment you will get will be based on what symptoms you have, not on the exact species of snake. If you or a companion can *quickly* and *safely* take a photo of the snake, do so, but do not endanger yourself trying to kill the snake and for goodness sake don't take the snake along for the ride to the emergency room! (People have been known to take the snake – captured alive – to the ER, and that endangers everyone nearby and does not substantially help inform treatment.)

One very helpful thing that you should do immediately is to take off any rings or other jewelry on the limb involved in the bite. Especially with pit-viper bites, there will be considerable swelling and a ring will act like a tourniquet, depriving a finger of oxygen, intensifying the swelling, and adding to the damage. Additionally, you should keep the victim from moving around if at all possible and help them to be as quiet and calm as they can be.

Initial bruising and swelling following a bite from a small western diamond-backed rattlesnake

You may run into advice about elevating or not elevating the bitten limb. In the case of a pit-viper bite, Spencer Greene outlines reasons to elevate the bitten limb or at least place it no lower than the heart (in the case of rattlesnake bites)[xvi]. Positioning it lower than the heart aggravates swelling, he says, risking damage and adding to the patient's pain.

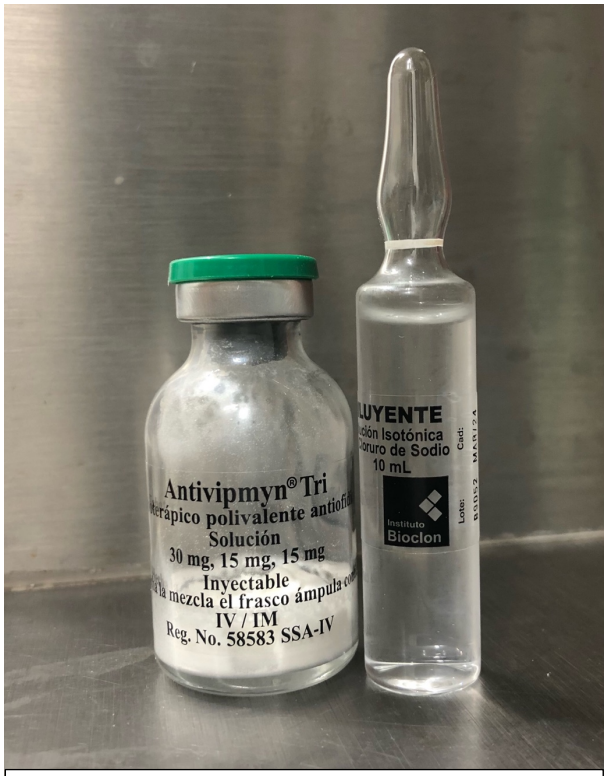
There is an app that you can get for your smartphone that can be very helpful if you are bitten. SnakeBite911[xvii] was developed by the makers of CroFab, an antivenom used to treat North American pit-viper bites. It can help you locate a hospital that stocks that antivenom (it does not tell you which hospitals might have Anavip, a newer antivenom made by a different company). It can help you dial 911 or the number for Poison Control and remind you of the things to do and not do while on your way to the hospital. It will prompt you to take a photo of the bitten extremity every 15 minutes so that the swelling and bruising can be tracked as it progresses from the bite toward the heart.

Another resource you should know about is a Facebook group run by venom experts. The National Snakebite Support group (https://www.facebook.com/groups/national.snakebite.support) receives requests for information and consultation by victims or their families. It is a disciplined group in

which only the expert staff are allowed to reply to posts asking for assistance, and this almost completely prevents the misinformation and chaos that we've all sometimes seen in social media. It is sometimes possible to get consultation in real time while sitting in the ER getting treatment.

Consultation such as described above can be helpful because not all emergency physicians have much experience treating snake bite. In his book, *Their Blood Runs Cold*[xviii], Whit Gibbons tells the story of being called to the emergency room after a graduate student of his was bitten by a timber rattlesnake. After a series of embarrassing clashes about who was the most knowledgeable doctor, Gibbons followed the physician to the back area and discovered that the doc was consulting a boy scout manual!

It's a safe bet that your physician will be better trained than the one in Gibbons' story, but there can still be issues. I recall meeting a friend at the ER a few years ago after he sustained a rattlesnake bite. He needed antivenom and it seemed to take forever for it to arrive. Meanwhile the doc confided in me that he was worried about the swelling in my friend's finger and a fasciotomy might be needed. A fasciotomy – cutting through the covering of the muscle to relieve extreme pressure – is now considered mostly unnecessary for snake bite and can do considerable harm. I was very mindful of the limits of my knowledge and wanted to avoid the kind of confrontation that Whit Gibbons had described. As it turned out, the doc made the very appropriate decision to fly my friend by helicopter to another hospital where there was a specialist.



Antivenom. The powder is reconstituted using the vial of saline, and then administered by IV. (Photo courtesy of Kentucky Reptile Zoo)

The clear consensus is that when there are severe symptoms, antivenom is the definitive treatment. Essentially the antivenom binds to the molecules of the venom to neutralize them and allow them to be removed from the body. If you are bitten by a pit-viper, your first priority should be to get to a facility where antivenom is available and can be administered by people who know what to expect in treating snake bite. Many people, even some physicians, have excessive worries about adverse reactions to the antivenom used for pit-vipers. In one study[xix] of 373 adults and children who received such antivenom, adverse events considered to be severe occurred in only four (1.1%) of these patients.

The bottom line

Bites from venomous snakes are relatively uncommon and almost all are survivable. If you spend much time outside in places where snakes can be found, it's a good idea to learn about the snakes, how their venom works, and what to do (and *not* do) if a bite occurs. Of primary importance is getting to a hospital; if severe symptoms are present you should go to any hospital that can get you medically stable. It might then be advisable to be transferred to a hospital with antivenom and personnel who are experienced in treating snake bite. A person who is not sure they are getting the most appropriate care should advocate for themselves, using resources like the Poison Control Center or the National Snakebite Support group.

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