

North American Snake and Scorpion Envenomations

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KEYWORDS

• Snakebite • Rattlesnake • Coral snakes • Scorpion • Envenomations • Antivenom

KEY POINTS

- Among venomous North American snakes and scorpions, the greatest morbidity and mortality is attributable to the effects of the crotalinae family (pit viper), specifically the rattlesnake.
- Antivenom use in North America has historically been most frequently used for rattlesnake envenomations. Although no commercially available coral snake antivenom is currently being produced in the United States, scorpion-specific antivenom was recently approved by the Food and Drug Administration.
- Complications, such as coagulopathies, neurotoxicity, rhabdomyolysis, and, very rarely, compartment syndrome, may occur following snake bites and require holistic, intensive nursing care.
- To optimize patient outcomes, medical toxicologists should be consulted early in the care of patients (via regional poison centers) following snake and scorpion envenomations to assist with procurement of antivenom and identify its appropriate use.

Envenomations by snakes and scorpions in North America, although uncommon, do occur, and the victims may seek medical treatment. Combined, snake and scorpion encounters result in more than 25,000 calls a year to poison centers. Regardless of geographic practice area, exposures will occur that may result in a significant envenomation. The goal of this article was to provide critical care nurses with a fundamental knowledge of varied snake and scorpion envenomation presentations and treatments to assist in optimizing patient outcomes.

SNAKE ENVENOMATIONS

Epidemiology

Although the exact incidence of venomous snake bites is unknown, estimates from the American Association of Poison Control Centers (AAPCC) indicate that nearly 8000

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individuals sustain venomous snake bites yearly in the United States. Of these bites, fewer than 10 deaths occur annually.^{1,2} Estimates from Mexico report up to 27,000 bites annually, resulting in roughly 100 fatalities from rattlesnakes alone.³ Largely because of the colder climate, numbers of snakebites in Canada are significantly lower, and often result from snakes in private collections. The incidence of snake bites among other countries is not as clearly defined, but worldwide statistics reveal significantly higher numbers of envenomations, as well as greater morbidity and mortality.

Similar to traumatic injuries, snake bites occur more commonly in young adult men, although school-aged children represent a significant percentage of bites as well. The incidence of bites increases among snake handlers and collectors and with use of ethanol or other intoxicants. Additionally, warmer months when snakes, as well as humans, are likely to be more active results in increased environmental encounters and bites.^{4,5}

Native venomous snakes have been identified in all states except Alaska, Hawaii, and Maine, with the highest numbers found in the Appalachian, southern, and western areas, and with lower numbers among the New England and northern states. The areas of highest incidence for snakebites are indicated in **Fig. 1**, although venomous snakebite calls have been received from all states except Hawaii.⁴ Given this, health care providers throughout North America should maintain a fundamental familiarity with the presentation and management for each of these envenomations.

Although roughly 2500 known species of venomous snakes exist worldwide, approximately 30 species are known to exist in North America. The Viperidae and Elapidae families represent the venomous species of medical importance. Common Viperidae species belong to the subfamily Crotalinae, and include different types of rattlesnakes (*Crotalus* and *Sistrurus* genera), copperheads, and water moccasins (genus *Agkistrodon*). Of the venomous snakebites reported in North America, almost exclusively they are attributable to Crotalinae, or pit vipers. The Elapidae family, including coral snakes, are responsible for the few remaining venomous snake bites.^{4,5}

CHARACTERISTICS OF VENOMOUS NORTH AMERICAN SNAKES

Crotalinae and Elapidae snakes each possess distinct characteristics that may aid in identification (**Figs. 2** and **3**). Crotalinae possess a triangular-shaped head with vertically elliptical eyes and a single pair of hollow front fangs. Because of heat-sensing organs, which appear as pitlike depressions in the skin behind their nostrils, snakes in the Crotalinae subfamily are often referred to as “pit vipers.” In addition to these general characteristics, specific species of pit vipers demonstrate individually identifying characteristics. Depending on their maturity, rattlesnakes, as their name suggests, may have rattles on their tails that they use as a warning and are often reported to be heard before a strike. Water moccasins, also referred to as “cottonmouths,” have a distinct white mouth. Copperheads are reddish-brown in color with hourglass markings on their bodies.

The coral snakes of the Elapidae family in North America are classically known for their brightly colored alternating bands of red, yellow, and black. Because of similar color markings, nonpoisonous king snakes may be easily confused with the coral snake. These 2 snakes can be differentiated by head color and sequencing of the color bands: coral snakes have black snouts, and king snakes have red snouts. In the coral snake, the red and yellow bands are next to each other, but in the king snake, a black band separates the 2 colors. A familiar folk saying may help to recall the differences: “Red on yellow kills a fellow; red on black, venom lack” (see **Fig. 3**).

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