

# NEWS FROM THE PIT

Arizona Poison and Drug Information Center



## Rattlesnake Bite Hazard for Migrants Crossing US Mexico Border

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As an emergency physician in Southern Arizona, I occasionally find myself caring for patients that are in Border Patrol's custody. Migrants crossing over the US/Mexico border into Arizona face many dangers in the form of heat exposure, overexertion, dehydration, and various types of traumatic injuries, including rattlesnake bites. I see migrants in custody as being a vulnerable population on many fronts. They are frequently impoverished, they are incarcerated, and there are often language and cultural barriers between the patient and the healthcare team. Additionally, accessing follow-up care is often a challenge. These folks, sometimes referred to as "border crossers", represent a unique sub-population within our typical snakebite patients, which also makes them a perfect topic for discussion at News From The Pit!

### NEWSLETTER HIGHLIGHTS

Risks and outcomes associated with rattlesnake bites among migrants

Image 1: Sidewinder (*Crotalus cerastes*)

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Let's start by discussing how someone that was bitten while crossing the border may differ from our typical patient bitten at home. The Arizona Poison and Drug Information Center is aware of assisting in the care of 34 migrants in the last 20 years, who were envenomated while making the journey over the border. We decided to look at those records and compare what we found with some of our previously published studies. There were 30 males and four women ranging in age from 17 to 48 years old. There was only one minor, a 17-year-old male who was noted to have walked a kilometer after sustaining a bite to the leg. Our dataset does not include information on how migrant snakebite victims come to medical care. In some cases, victims might be aided by BORSTAR (Border Patrol Search, Trauma, and Rescue Unit), which is a specially trained unit of Border Patrol that performs rescue of migrants and Border Patrol agents who are injured or trapped in hazardous environments.

Of the 34 cases, four had tourniquets, far more often than our typical patients. Rapid and proper application of a tourniquet can probably prevent some of the venom from being absorbed into systemic circulation. However, this isn't a very good idea for rattlesnake venom because bites are very rarely fatal, and restricting the blood flow will likely result in a greater amount of tissue damage at the bite location. We also wanted to look at the time from the snakebite until antivenom was started because if we can give antivenom quickly, we have the best chance of limiting damage from venom to the tissues around the bite site. Previously we reported finding that more than 80% of our patients received antivenom in under four hours, a commonly used cutoff time. The details we needed to calculate time to antivenom were only available for 21 patients. Of these, we found that five individuals received antivenom within four hours, and four patients had a delay to starting antivenom that exceeded a full day.

One migrant's experience illustrates how an inappropriate prehospital intervention, alongside a delay in care, may contribute to severe morbidity. A 43-year-old male was bitten by a rattlesnake on his hand. He did not obtain medical care immediately, and one day after the bite he decided to cut open the bite site. Eventually the patient made it to the hospital, with a very severe hand infection, in addition to the venom induced damage. He ultimately spent 48 days in the hospital and ended up having three fingers amputated.

We also found that at least four of the patients underwent a fasciotomy, a surgical procedure intended to relieve pressure from internal swelling believed to be so significant that it is cutting off circulation to the limb. In general, toxicologists recommend against this invasive and frequently unnecessary surgery for a rattlesnake bite because it leaves large open wounds that take a long time to heal.





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We recently published a study involving a review of over 4,000 poison center records in which we reported finding only two deaths. One of those two deaths occurred among our 34 migrants.

When interpreting all of these numbers, we must consider the issue of survivorship bias. This concept is often illustrated using an example from World War II. A group of scientists at Columbia University analyzed the pattern of damage on bomber planes returned from missions. Certain areas had heavy damage. Your first thought might be to put extra armor over the frequently damaged areas. But this fails to consider all the planes which did not make it back. You may be asking yourself; how does all of this relate to the health of migrants and the danger of rattlesnake envenomation? As emergency physicians, toxicologists, and hospital-based healthcare workers in general, we only see patients who make it to the hospital alive. The Arizona Poison and Drug Information Center records only include cases that make it to the attention of the healthcare system and individuals who reached out on their own behalf. It is challenging to estimate the number of migrants crossing the US/Mexico border who perish in the desert during the journey, and likely impossible for us to know how many times a rattlesnake bite may have contributed to their demise.

This is where the crucial work of Dr. Greg Hess at the Office of the Medical Examiner comes in. Migrant deaths in Southern Arizona were uncommon in the 1980s and 90s, and the Medical Examiner would, on average, recover less than 20 migrant remains a year. That began to change in 2000 with 75 migrant remains, 77 in 2001 and 146 remains in 2002. The Medical Examiner has now examined 3,959 migrants from 2000 through the end of August 2024 with an average of 168 deaths per year from 2002 – 2023. Many of these deaths are due to environmental exposure: heat, cold, dehydration, or a combination of the above. Sometimes a decedent is not found and recovered in a timely manner and the remains are decomposed or skeletal. In those circumstances the cause of death is undetermined secondary to the prolonged postmortem interval. These factors, amongst others, make it difficult to know exactly how often migrants encounter venomous reptiles and become injured by them. Copious additional information concerning migrant deaths can be found here, <https://www.pima.gov/216/Data-Dashboards-Reports>, on Pima County's Undocumented Border Crosser Deaths dashboard.



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In summary, migrants seem more likely than the general population to have performed some type of pre-hospital intervention such as application of a tourniquet, experience a considerable delay to care, or undergo a surgical procedure. In addition, migrants may also be at a higher risk for having a worse outcome. Getting bitten by a rattlesnake is a hazard of the deserts in the southwest, and migrants crossing the border are at risk by virtue of outdoor exposure. This vulnerable population needs the healthcare team to provide vigilant and exceptional care to counteract these factors.

