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Gwen Zirngibl and Heather L. Burrows

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# In Brief

## Hymenoptera Stings

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### Author Disclosure

Drs Zirngibl and Burrows have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

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The order Hymenoptera includes three distinct families: bees (*Apidae*), wasps (*Vespidae*), and ants (*Formicidae*). All members of this order are capable of stinging and have the potential to cause anaphylactic and nonanaphylactic reactions in humans. The insects differ in their normal behavior and method of envenomation.

Honey bees and bumblebees have barbed stingers and die after a single sting. They live in commercial hives and tree hollows and tend to sting only when provoked. Wasps, hornets, and most yellow jackets, all members of

the *Vespidae* family, do not have barbed stingers and can sting multiple times. They tend to be more aggressive than bees, stinging without provocation. Wasps build honeycombs in shrubs and under eaves, hornets build nests in trees or shrubs, and yellow jackets build nests in the ground.

Finally, harvester and fire ants envenomate by anchoring their mandibles into the skin and pivoting; both are capable of multiple stings. These ants build large nests in mounds 1 to 2 feet in diameter and at least several inches in height. They bite aggressively if their nests are disturbed. Knowing the nesting locations and typical behavior of the insects helps in counseling patients on avoidance.

Hymenoptera stings can result in a wide spectrum of responses, from local swelling to anaphylaxis. The typical reaction involves localized pain, pruritus, erythema, and mild swelling at the sting site. For bee stings, treatment involves removal of the stinger by gentle scraping to avoid releasing more venom, applying ice packs, and using mild analgesics such as acetaminophen and antihistamines. These mild reactions resolve within hours to days.

More involved local reactions can lead to significant swelling and erythema contiguous to the site of the sting. This swelling can be life-threatening if in proximity to the airway. In evaluating these more extensive reactions, cellulitis may be considered, but tissue infection would be unlikely in the 24 to 48 hours after a sting, and antibiotics rarely are needed. Treatment continues to be supportive, although oral corticosteroids may be warranted. Large local reactions can take 5 to 10 days to resolve. These patients often have similar

reactions with repeat stings. The risk of future anaphylaxis in patients after a large local reaction is not more than 5% to 10%.

The most severe reaction to a Hymenoptera sting is an acute systemic reaction (anaphylaxis), which accounts for ~40 to 50 fatalities per year in the United States. Potentially life-threatening reactions occur in 0.4% to 0.8% of all children. Symptoms can be cutaneous (hives, angioedema, including laryngeal), respiratory (throat tightening, cough, wheezing), circulatory (dizziness, hypotension, shock), and gastrointestinal (abdominal pain, nausea, vomiting). These reactions are almost all immunoglobulin E mediated. Immediate treatment involves prompt recognition, epinephrine injection, supportive therapy, and transport to an emergency department.

After the acute treatment, education on insect avoidance, prescription of injectable epinephrine, and referral to an allergist for skin testing and venom immunotherapy is advisable. Immunotherapy reduces the risk of systemic reactions in patients who have a history of systemic reactions, with an efficacy up to 98%. An exception to this course of management is made for patients younger than 16 years who experience an isolated cutaneous systemic reaction (generalized hives). These patients have a less than 1% risk of anaphylaxis if re-stung. For this reason, children younger than 16 years who experience a large local reaction or only generalized hives usually are not candidates for immunotherapy desensitization and do not require skin testing. Consultation with an allergist about proper management of an individual patient is prudent.

Sometimes indistinguishable from an anaphylactic reaction is a toxic reaction from a large number of stings. This response is due to massive envenomation, leading to extensive edema and hypotension. The number of stings needed is estimated to be greater than 100. Treatment in these situations continues to be supportive.

For all types of reactions, counseling on prevention is necessary. Any known nests in the vicinity of the patient's home should be removed. Patients should be advised against walking barefoot and should wear long pants and sleeves when outdoors. Perfumes and bright or flowery patterned clothing may attract some stinging insects, so these should be avoided also. Patients should avoid eating or drinking outside and must be aware that nonspecific insect repellants do not repel Hymenoptera.

**Comments:** Insect stings cause more systemic reactions than insect bites and are a common cause of concern among parents. It is important to note that more severe reactions to insect stings occur much less commonly in children than in adults (mostly those older than 45 years).

More severe systemic responses are defined as involvement of two organ systems distant from the site of the

sting and can result in angioedema, flushing, hoarseness, and wheezing, as well as hypotension, abdominal pain, vomiting, or uterine cramping. Although it is important to diagnose and counsel on systemic responses, the good news is that children experience different allergic responses than adults. Of those who experience systemic reactions, children have limited to mild involvement in 60% of cases, compared with 15% in adults.

As mentioned by Drs Zirngibl and Burrows, prospective studies in children have noted that fewer than 1% of patients have more severe reactions than the prior reaction; insect allergy skin testing and immunotherapy are therefore not warranted in children younger than 16 years. The immunoglobulin E-mediated biphasic reaction of anaphylaxis may include an immediate response within minutes to hours and a delayed response that occurs hours later. Because there is no way to predict which child might develop the delayed response, children who present to the emergency department should be observed for 4 to 6 hours after resolution of symptoms.

Parents must be educated about interventions for systemic reactions. These procedures include immediate epinephrine administration, which can be

injected through clothing, followed by transport to an emergency department for additional treatment. Prescribing epinephrine for children who experience generalized acute urticaria is warranted because of the few patients having a risk of more severe reactions in the future.

Having epinephrine available and education about administration are warranted because studies have shown that epinephrine is underutilized. The most common reasons include use of an antihistamine in place of epinephrine or lack of a prescription. Epinephrine should be stored away from sunlight or extreme temperatures to protect the drug from degradation. For patients at risk for severe anaphylaxis, the recommendation is to carry two doses of epinephrine because both may be needed at the time of sting. A medical identification bracelet or necklace is recommended. Practice parameters suggest referral to an allergist when the patient has experienced a systemic reaction, he or she would benefit from additional education regarding avoidance or emergency treatment, or is a candidate for venom immunotherapy (the latter not usually a pediatric recommendation).

*Janet Serwint, MD  
Consulting Editor*

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