CASE 2.1
Anaphylaxis | Level 1

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1. What subjective and objective evidence supports the diagnosis of anaphylaxis?

SUBJECTIVE FINDINGS: After 5 minutes of receiving one dose of amoxicillin, the patient experienced lip swelling, complained of difficulty breathing, and developed a rash. She described the rash as itchy.

OBJECTIVE FINDINGS: On physical exam the patient's lips, tongue, and uvula are swollen; the rash is urticarial in nature with flushing and involvement of the neck, chest, and arms bilaterally. She is tachycardic with a heart rate of 160, tachypneic with a respiratory rate of 35, has positive dyspnea, and an oxygen saturation of 90% on room air. She also has positive nasal flaring, which is indicative of respiratory distress.

2. Develop a plan for anaphylaxis for the patient upon discharge.

The primary pharmacologic recommendation for anaphylaxis is the use of intramuscular (IM) epinephrine. This is the only medication that has been proven to prevent morbidity and mortality associated with anaphylaxis reactions in any patient population. Although it may seem logical to also give diphenhydramine or another antihistamine in addition to epinephrine, this is not recommended practice. The only medication recommended for an anaphylactic reaction is IM epinephrine. The recommended dose of epinephrine is 0.01 mg/kg of epinephrine (1:1000 [1 mg/mL] concentration) administered intramuscularly. Once given intramuscularly, epinephrine can take 5 to 10 minutes to start working and lasts for about an hour from a one-time dose. The dose can be repeated for one additional dose in 5 to 15 minutes after the first dose is given if the patient is still experiencing signs and symptoms of an anaphylactic reaction, which consist of hives, itching, flushing, swollen lips, swollen tongue, sensation of throat closure, choking, shortness of breath, wheeze, cough, syncope, dizziness, hypotension, and tachycardia. Giving too much epinephrine can result in cardiac arrhythmia and death. It is recommended that the dose be repeated only once unless the patient is in the care of medical professionals that deem additional doses are appropriate. The primary goals of treatment with epinephrine are to prevent any obstruction to airflow and to prevent the patient going into distributive shock. Prevention of airway obstruction and distributive shock are vital in an anaphylactic reaction in order to prevent the ultimate outcome of untreated anaphylaxis, which is death. Epinephrine helps prevent airway obstruction and distributive shock by increasing bronchodilation, decreasing

the release of inflammatory mediators, and increasing vasoconstriction from its effects as an alpha-, beta-1, and beta-2 adrenergic agonist. For ease and expedited use, epinephrine is commercially available as autoinjectors in doses of 0.15 and 0.3 mg for outpatient use. The recommended dosing for the autoinjectors is dependent on weight-based ranges with patients weighing 10 to 25 kg receiving the 0.15 mg autoinjectors and patients weighing more than 25 kg receiving 0.3 mg autoinjectors. After the initial dose is administered, another dose can be repeated just one more time if needed 5 to 15 minutes after the initial dose if the patient is still experiencing signs and symptoms of anaphylaxis. For this patient, she should receive a prescription for the 0.15 mg autoinjector with a minimum quantity of two autoinjectors in the event the injection needs to be repeated in an anaphylactic situation. Please see question 4 below for more detailed instructions on autoinjector use and application.

3. Assess the pharmacologic therapy for the patient's acute otitis media. Why is this therapy no longer appropriate? What medication recommendation can you make to treat this infection?

The use of amoxicillin is no longer appropriate treatment based on the anaphylactic reaction the patient had after one dose. Based on the physical assessment, the patient had tympanic irritation and moderate bulging with symptoms for 7 days indicating this patient needs treatment for her acute otitis media. Due to the allergy to amoxicillin, this patient can no longer receive amoxicillin or amoxicillin–clavulanic acid. There is generally less than 10% cross-sensitivity with cephalosporins if the patient has a penicillin allergy. The cross-sensitivity of cephalosporins is based on the concept that the first-generation cephalosporins most resemble the beta-lactam ring structure found in penicillin. Studies demonstrate the cross-sensitivity is more closely related to the structure of the side chain on the beta-lactam ring of the cephalosporin structure. With the low chance for cross-sensitivity with penicillin allergy, it would be acceptable to give this patient a third- or fourth-generation cephalosporin, such as cefdinir. Based on the new allergy to amoxicillin and the guidelines for managing pediatric acute otitis media, this patient should be given cefdinir 322 mg (14 mg/kg) once daily or divided as twice daily to treat acute otitis media. The first dose should be administered in a physician's office so the patient can be observed for 1 to 2 hours to watch for an anaphylactic reaction. She should receive treatment for at least 5 days. If the physician is not comfortable giving cefdinir, then another option would be for the patient to be prescribed a combination of clindamycin 230 mg (10 mg/kg/dose) 3 times daily to treat the acute otitis media infection.

4. Devise the most pertinent patient education for the patient and caregiver.

The first step is for the patient and all caregivers to identify an anaphylactic reaction. Some signs and symptoms of an anaphylactic reaction include hives (raised, red, itchy patches of skin); swelling (in the eyes, lips, tongue, hands, feet, and throat); runny nose; trouble breathing; dizziness; or passing out. Once it is identified to be an anaphylactic reaction, the patient needs to receive a dose of epinephrine administered intramuscularly. Immediately after recognition of symptoms, call emergency medical services and have the patient lie down. Once the autoinjector is available, take it out of the box. Take off the carrier cap and remove the autoinjector from the carrier tube. Then remove the safety cap. Press the tip (opposite side from safety cap) firmly into the outer thigh regardless of clothing in the way. Hold the tip in place for at least 10 seconds. Education for the patient and all caregivers on how to use the epinephrine autoinjectors is key to its success in an anaphylactic situation. Under no circumstance should the patient try to stand up in an anaphylactic situation because this can make the patient go into distributive shock and cause empty ventricle syndrome. After the emergency medical services is contacted, the epinephrine from the autoinjector is administered, and the patient is lying down, the caregiver should wait for medical services to arrive and monitor the patient, watching for any signs and symptoms to indicate that the anaphylactic reaction is still occurring to determine if another dose of epinephrine needs to be administered (if avail-