CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

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Guidance on Completing a Written Allergy and Anaphylaxis Emergency Plan

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abstract

FREE

Anaphylaxis is a potentially life-threatening, severe allergic reaction. The immediate assessment of patients having an allergic reaction and prompt administration of epinephrine, if criteria for anaphylaxis are met, promote optimal outcomes. National and international guidelines for the management of anaphylaxis, including those for management of allergic reactions at school, as well as several clinical reports from the American Academy of Pediatrics, recommend the provision of written emergency action plans to those at risk of anaphylaxis, in addition to the prescription of epinephrine autoinjectors. This clinical report provides information to help health care providers understand the role of a written, personalized allergy and anaphylaxis emergency plan to enhance the care of children at risk of allergic reactions, including anaphylaxis. This report offers a comprehensive written plan, with advice on individualizing instructions to suit specific patient circumstances.

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The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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INTRODUCTION

Anaphylaxis is a potentially life-threatening, severe allergic reaction.[1] As such, it is a medical emergency that requires an immediate assessment of the patient and administration of epinephrine. Given the unpredictable nature of anaphylaxis, preparedness promotes optimal outcomes. Thus, national and international anaphylaxis guidelines, as well as several American Academy of Pediatrics (AAP) clinical reports ("Self-injectable Epinephrine for First-aid Management of Anaphylaxis," "Management of Food Allergy in the School Setting," and "Medical Emergencies Occurring at School"), recommend the provision of emergency action plans to pediatric patients who are at risk of anaphylaxis, in addition to the prescription of epinephrine autoinjectors.[2–7] Guidance from the Centers for Disease Control and Prevention for managing food allergy in schools and early education programs also supports the inclusion of written emergency plans for the management of children with food allergy.[8]

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Written action plans have been shown to improve outcomes for asthma,[9] and similarly, action plans have the potential to improve outcomes of anaphylaxis by reducing the frequency and severity of reactions, improving knowledge of anaphylaxis, improving use of epinephrine autoinjectors, and reducing anxiety of patients and caregivers.[10] Action plans serve as an important tool for anaphylaxis education and treatment.

Currently, several different anaphylaxis action plans are available, but variations exist in content and treatment recommendations, which can lead to confusion. A survey of AAP Section on Allergy and Immunology members found that there is wide variation in terms of which plans are used by pediatric allergy specialists.[11] Therefore, a universal plan for pediatric patients could be beneficial to patients, families, health care professionals, and schools to facilitate care for children at risk of anaphylaxis. The AAP Allergy and Anaphylaxis Emergency Plan associated with this clinical report was developed with the support and advice of various committees, councils, and sections within the AAP. It is available online (www.aap.org/aaep) and shown in Fig 1. This plan takes into consideration several aspects of anaphylaxis emergency care, including the recognition of signs and symptoms and treatment. This clinical report focuses on providing guidance to the clinician to complete the plan. The guidance in this clinical report has not undergone a systematic review nor a strict weighing of the evidence and, as such, should not be considered a practice guideline. Clinical guidance regarding treatment with epinephrine in the first-aid management of anaphylaxis is covered in a separate clinical report.[5]

WHEN TO PROVIDE A WRITTEN EMERGENCY PLAN

An allergy and anaphylaxis emergency plan, developed by the health care provider, is a document written in simple lay terms that can guide the patient, family and nonfamily caregivers, and school personnel in the event that the child experiences an allergic reaction. Allergic reactions can occur anywhere and at any time, and health care providers may not be present at the time a child has an allergic reaction. Therefore, the emergency action plan serves as a guide for the patient, caregiver, and/or school personnel to determine how to treat allergic reactions.

It is beneficial to provide an allergy and anaphylaxis emergency plan when there is a diagnosis of an allergic disorder that places the child at risk of anaphylaxis (eg, food allergy, insect sting allergy). A new written plan can be provided, for example, annually at the beginning of the school year, to address any need for adjustment of medication doses or whenever there is any change in allergic triggers, comorbid conditions, or any new medical information that would warrant a change in the plan.

COMPLETING THE ALLERGY AND ANAPHYLAXIS EMERGENCY PLAN

Demographic Information and Allergy History

The initial section is completed with the child's demographic information, including name, date of birth, and age, as a personalized plan for the child. The plan should be dated so that it is easy to determine when the health care provider created the emergency plan. Allergic triggers can be listed in the space provided. It is advisable to include the weight of the child at the time the plan was created to allow confirmation of correct medication dosages.

Having a history of asthma and/or of anaphylaxis is associated with a higher risk of severe reactions and, as such, these should be noted.[12,13] The presence of asthma is associated with an increased likelihood of having respiratory symptoms during an allergic reaction and can cause the reaction to be more difficult to treat. In a recent study of anaphylaxis-related hospitalizations over 2 decades in the United Kingdom, 75% of patients with fatal food-induced anaphylaxis were noted to have concurrent asthma.[14]

A child's ability to self-carry emergency medications and/or self-administer medications can be indicated. This ability will depend on the age and maturity of the child. All states have laws to allow self-carry by students in schools; however, some states require a student's physician and parents to sign a form stating the student has the maturity to self-administer relevant medications. Although no specific guidelines exist to determine when it would be appropriate for a child to self-carry and/or self-administer epinephrine autoinjectors, a survey of members of the AAP Section on Allergy and Immunology found that most pediatric allergy specialists begin to expect children 9 through 11 years of age to be able to recognize signs and symptoms of anaphylaxis and expect children 12 through 14 years of age to self-carry epinephrine autoinjectors and self-administer the device.[11] In a study of family and nonfamily caregivers of children with food allergy, most expected the child to be able to recognize anaphylaxis at approximately 6 through 8 years of age and believed that epinephrine autoinjector use was appropriate for children 6 through 11 years of age.[15] Thus, these decisions may benefit from personalization with the input of the family. Of note, if it is determined that self-carrying/self-administration is appropriate, it is important to designate adults

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to be additionally and primarily responsible for treatment, because the child may not be depended on to self-treat if he or she is panicked or severely symptomatic.

Treatment Pathways

Epinephrine is the first-line treatment of anaphylaxis; therefore, the form indicates that if there is any uncertainty about whether anaphylaxis is occurring, epinephrine should be administered immediately. The early use of epinephrine has been shown to be associated with better outcomes. In studies of fatal and near-fatal anaphylaxis, delayed or lack of administration of epinephrine was noted in the majority of cases.[13] Studies have shown that the early use of epinephrine in the treatment of food-induced anaphylaxis was associated with a decreased likelihood the child would require hospital admission.[16,17] Therefore, the plan instructs on prompt treatment with epinephrine for symptoms of anaphylaxis.

When allergic reactions are suspected, the caregiver or school personnel should observe for signs and symptoms of an allergic reaction and determine the appropriate treatment pathway as outlined on the allergy and anaphylaxis emergency plan (Fig 1). If any severe symptom develops, anaphylaxis is highly likely, and epinephrine should be injected immediately.[1,5] Epinephrine administration should be followed by activation of emergency medical services (calling 911), monitoring of the child, and consideration of adjunctive treatment with oral antihistamines and/or bronchodilators for known asthmatics or in the presence of respiratory symptoms, including wheezing or shortness of breath.

In some circumstances, it may be beneficial to treat with epinephrine even if anaphylaxis is not occurring, such as when anaphylaxis is likely to develop after an exposure or when it may be difficult to determine by the observer. Therefore, the plan provides options that can be selected at the physician's discretion to address these possibilities. For example, if the child has a history of very severe anaphylaxis, such as with respiratory distress, hypoxia, hypotension, or neurologic compromise after exposure to specific allergen(s), then the health care provider may consider recommending epinephrine to be administered immediately after a likely ingestion or sting at the onset of the first symptom (even mild ones, such as itchiness of the face/mouth, a few hives, or mild symptoms of stomach discomfort or nausea), because severe reactions can progress rapidly.[6,18] Other scenarios in which to consider immediate epinephrine use after definitive ingestion or sting when only mild symptoms are present (assuming additional doses are available, should symptoms emerge and progress) may include a child who has a history of repeated anaphylaxis with exposure to the specific allergen(s), a child who has a history of significant reactions with trace exposures, or a child with comorbid asthma that is poorly controlled. The allergen(s) can be listed as a "special situation" (box within the "For Severe Allergy and Anaphylaxis" box on the left-hand side of the form). Although controversial,[19] there may be situations in which the health care provider may consider recommending epinephrine to be administered immediately after a definite ingestion or sting and before symptoms develop (manually write in "no" in place of "mild"), because severe reactions can occur suddenly without significant warning signs.[18] An example is if a child has had a history of severe cardiovascular collapse to a specific allergen. These suggestions are based on expert opinion, not from data acquired through controlled trials.

In some situations, licensed health care providers will not be available in a school setting and there is a desire to simplify the instructions for delegates or designated individuals. In these cases, the health care provider can indicate that definitive allergen exposures would require immediate treatment with epinephrine. If the administration of antihistamine by delegates or designated individuals is not permitted by school or local regulations, this scenario would be another in which the health care provider should consider instructing epinephrine to be used in the event of a definite allergen exposure even if mild symptoms occur (see below for more details on the completion of the form for no permission to use antihistamine).

If there is a mild symptom alone, an oral antihistamine may be administered first. If additional symptoms are observed after oral antihistamine has been administered or if more than 1 organ system is involved, then epinephrine is indicated. Education about anaphylaxis and epinephrine is helpful, and additional advice about the administration of epinephrine is provided in another AAP clinical report.[5]

The use of antihistamine is included as an option because this plan provides instructions for managing allergic reactions with a range of severities. Several studies have examined allergic reactions attributable to accidental or intentional exposures in food-allergic children and noted that 30% to 70% of reactions are characterized as mild in severity. In a cohort of 512 young children (3–15 months at enrollment) with allergies to milk, egg, and/or peanut followed over 3 years, 70% of the 1171 reactions occurring during the study time frame were considered to be mild (defined as skin and/or oral symptoms and/or upper

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respiratory symptoms, but not all 3 organ systems).[20] In a study in 88 children with milk allergy (median age: 32.5 months) followed for 1 year, 53% of reported reactions were mild (defined as cutaneous symptoms [angioedema excluded], rhinitis, or conjunctivitis).[21] A recent Canadian study of accidental exposures to peanut in 1941 children (mean age: 7 years) with confirmed peanut allergy reported that 30% of exposures resulted only in mild symptoms (defined as involving only pruritus, urticaria, flushing, or rhinoconjunctivitis).[22] Therefore, in the event of a mild allergic reaction involving isolated skin symptoms, mild facial or oral symptoms, or mild gastrointestinal tract discomfort, none of which meet the criteria for anaphylaxis, the use of oral antihistamines may be an option.

Another concern is that if epinephrine is stipulated in all cases of allergic reaction regardless of severity, a child may be hesitant to voice any symptoms for fear of epinephrine autoinjector use. Thus, emphasizing the option to observe and also having the option of using antihistamines for mild allergic reactions allows the plan to be individualized according to the child's history. However, it is not possible to know the eventuality of any allergic reaction, and consideration can be given to use epinephrine liberally. If an option is needed where antihistamine alone is not permitted (eg, if school or local policies do not permit delegates or designated individuals to administer antihistamines), then no antihistamine would be listed under medications. In this situation, mild symptoms would not be treated and close observation and watching for possible progression would be indicated. However, there is an option to list all of the allergens under "special situation" to indicate that any symptoms would require the administration of epinephrine.

After initiating treatment, additional instructions for contacting emergency medical services (calling 911) and monitoring for progression of symptoms are provided on the plan. For those who are initially treated with epinephrine, a second dose of epinephrine can be given if symptoms persist or recur. For those who are observed only or for those who receive antihistamines as the first treatment, any progression of symptoms would warrant epinephrine use, and the use of an antihistamine should not delay the administration of epinephrine.

In some severe cases of anaphylaxis, rapid vasodilation and extravasation of fluid have been reported, resulting in a decrease of up to a 35% in circulating blood volume within minutes.[23] Upright posture in cases of food-induced anaphylactic shock has been reported to be associated with fatalities.[24] This "empty ventricle syndrome" has not been reported in children; however, it would be prudent to place the child in the supine position to prevent pooling of blood in the lower extremities after epinephrine is administered. This position may not be tolerated in some circumstances, such as if a child is vomiting or having difficulty breathing. In these situations, the child can be placed in the lateral decubitus position (lying on his or her side).

Medications

Medications, specifying dosage, should be clearly indicated at the bottom of the form. Standard dosing for epinephrine in the treatment of anaphylaxis in health care settings is 0.01 mg/kg, intramuscularly, with the use of a 1:1000 dilution (maximum of 0.3 mg in a prepubertal child and 0.5 mg in a teenager). Intramuscular injection of epinephrine in the lateral thigh is the preferred route of administration because it results in higher and faster peak plasma concentrations than subcutaneous or intramuscular injection in the deltoid.[25]

Providing epinephrine ampules, needles, and syringes to patients and families for weight-based dosing is often not practical and subject to human error; therefore, epinephrine autoinjectors are prescribed for use in the community setting. Currently, only 2 epinephrine autoinjector dosing options exist, 0.15 mg or 0.3 mg. Package inserts state that the 0.15-mg dose is appropriate for children weighing 15 to 30 kg, and the 0.3-mg dose should be prescribed for those who weigh greater than or equal to 30 kg. On the basis of the lack of readily available alternatives and the favorable benefit-versus-risk ratio, prescription of the 0.15-mg autoinjector can be considered for those weighing 7.5 to 15 kg.[5] Because of the concern of underdosing in children nearing 30 kg, expert consensus suggests that children be switched to the 0.3-mg dose autoinjector when they reach 25 kg, with consideration of switching to this higher dose at a lower weight if the child has asthma or other risk factors for severe reaction.[5] Physicians can discuss the rationale for selecting autoinjector doses with each individual family. Two epinephrine autoinjectors should be available at all times, because a second administration may be needed if there is not a quick or adequate response to the first dose of epinephrine.

H_1 antihistamines are effective for the treatment of acute cutaneous symptoms, such as pruritus and urticaria, associated with allergy.[26] Therefore, in cases of isolated mild symptoms, the use of oral antihistamines may be appropriate. Diphenhydramine is the most commonly used H_1 antihistamine. Standard dosing is 1 mg/kg, up to 50 mg. First-generation H_1 antihistamines, such as diphenhydramine, cross the blood-brain barrier, causing

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sedation and impairment in cognitive function. These side effects can potentially complicate the neurologic assessment of a child who is experiencing an allergic reaction. These adverse effects are significantly less likely to occur for second-generation H_1 antihistamines, because these medications cross the blood-brain barrier to a much lesser extent.[26] In a randomized double-blind study of 70 allergic reactions during oral food challenge, cetirizine (second-generation H_1 antihistamine) was shown to have a similar efficacy and onset of action compared with diphenhydramine in treating cutaneous symptoms during acute food-induced allergic reactions. Given these findings, in addition to the longer duration of action compared with diphenhydramine, cetirizine is a good option to consider for the treatment of isolated mild symptoms of an allergic reaction.[27]

Additional Instructions Regarding Completion of the Emergency Plan

Space is provided for parents' and health care providers' signatures as an additional measure to indicate parental understanding and agreement with the allergy and anaphylaxis emergency plan. Space is provided to indicate the dates of the parents' and health care providers' signatures.

The second page provides space for additional instructions, such as statements of disability. Space is provided to include contact information for health care providers, parents/guardians, and other caregivers.

There is blank space on the second page that can be used to provide information specific to the school or child or illustrations of using the autoinjector.

The plan is given to the patient and his or her family so they may review it and share it with the school or other child care facility or caregivers. The health care provider may speak to the family regarding the benefits of permitting 2-way sharing of information between the school and the health care provider and completing any forms that would be required to allow this exchange of information.

In addition to providing this allergy and anaphylaxis emergency plan, the patient should have updated prescriptions for emergency medications. It is also helpful for the health care provider to review with the patient and/or family members instructions for, and show the proper use of, epinephrine autoinjectors by using a training device that has the same mechanism but does not contain medication or the needle. Patients and family members should be reminded to check expiration dates on their epinephrine autoinjectors and be familiar with proper storage conditions. Additional information about anaphylaxis management is reviewed in another AAP clinical report.[5]

SUMMARY

1. National and international guidelines support the use of a written allergy and anaphylaxis emergency plan to enhance the care of children at risk of anaphylaxis. Although several plans are currently available, they differ in content and treatment recommendations, potentially leading to confusion. Thus, a universal plan may be beneficial to patients, families, health care professionals, and schools.
2. An allergy and anaphylaxis emergency plan, developed by the health care provider, would be beneficial for patients who are at risk of anaphylaxis and those who have been prescribed an epinephrine autoinjector.
3. The written plan may serve as a guide for patients, family and nonfamily caregivers, and school personnel in the management of allergic reactions.
4. Epinephrine is the medication of choice for the initial treatment of anaphylaxis, and early administration is associated with optimal outcomes. In the event of a definite exposure to an allergen that has previously caused a severe reaction, or if anaphylaxis develops, immediate use of epinephrine is warranted. If exposure to an allergen triggers only a mild symptom, observation only or initiating treatment with an antihistamine may be appropriate.
5. This allergy and anaphylaxis emergency plan allows health care providers the opportunity to individualize the treatment plan according to the child's history, family input, and local regulations. Options and considerations for completing the plan are reviewed in this clinical report.

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ABBREVIATION

AAP: American Academy of Pediatrics

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Allergy and Anaphylaxis Emergency Plan

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Attach child's photo

Child's name: _____ **Date of plan:** _____

Date of birth: ____/____/_____ **Age** _____ **Weight:** _____kg

Child has allergy to _____

Child has asthma. ☐ Yes ☐ No (If yes, higher chance severe reaction)
Child has had anaphylaxis. ☐ Yes ☐ No
Child may carry medicine. ☐ Yes ☐ No
Child may give him/herself medicine. ☐ Yes ☐ No (If child refuses/is unable to self-treat, an adult must give medicine)

IMPORTANT REMINDER
Anaphylaxis is a potentially life-threating, severe allergic reaction. If in doubt, give epinephrine.

For Severe Allergy and Anaphylaxis
What to look for

If child has ANY of these severe symptoms after eating the food or having a sting, **give epinephrine.**

- Shortness of breath, wheezing, or coughing
- Skin color is pale or has a bluish color
- Weak pulse
- Fainting or dizziness
- Tight or hoarse throat
- Trouble breathing or swallowing
- Swelling of lips or tongue that bother breathing
- Vomiting or diarrhea (if severe or combined with other symptoms)
- Many hives or redness over body
- Feeling of "doom," confusion, altered consciousness, or agitation

☐ **SPECIAL SITUATION**: If this box is checked, child has an extremely severe allergy to an insect sting or the following food(s):_____. Even if child has MILD symptoms after a sting or eating these foods, **give epinephrine.**

Give epinephrine!
What to do

1. Inject epinephrine right away! Note time when epinephrine was given.
2. Call 911.
   - Ask for ambulance with epinephrine.
   - Tell rescue squad when epinephrine was given.
3. Stay with child and:
   - Call parents and child's doctor.
   - Give a second dose of epinephrine, if symptoms get worse, continue, or do not get better in 5 minutes.
   - Keep child lying on back. If the child vomits or has trouble breathing, keep child lying on his or her side.
4. Give other medicine, if prescribed. Do not use other medicine in place of epinephrine.
   - Antihistamine
   - Inhaler/bronchodilator

For Mild Allergic Reaction
What to look for

If child has had any mild symptoms, **monitor child.**
Symptoms may include:

- Itchy nose, sneezing, itchy mouth
- A few hives
- Mild stomach nausea or discomfort

Monitor child
What to do

Stay with child and:

- Watch child closely.
- Give antihistamine (if prescribed).
- Call parents and child's doctor.
- If symptoms of severe allergy/anaphylaxis develop, use epinephrine. (See "For Severe Allergy and Anaphylaxis.")

Medicines/Doses

Epinephrine, intramuscular (list type):_____ Dose: ☐ 0.15 mg ☐ 0.30 mg (weight more than 25 kg)
Antihistamine, by mouth (type and dose): _____
Other (for example, inhaler/bronchodilator if child has asthma): _____

_____ _____ _____ _____
Parent/Guardian Authorization Signature **Date** **Physician/HCP Authorization Signature** **Date**

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FIGURE 1
AAP Allergy and Anaphylaxis plan.

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Allergy and Anaphylaxis Emergency Plan

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Child's name: _____ **Date of plan:** _____

Additional Instructions:

Contacts

Call 911 / Rescue squad: (___) _____-_____

Doctor: _____ Phone: (____) _____-_____

Parent/Guardian: _____ Phone: (_ __) _____-_____

Parent/Guardian: _____ Phone: (_ __) _____-_____

Other Emergency Contacts

Name/Relationship: _____ Phone: (__ _) _____-_____

Name/Relationship: _____ Phone: (_ __) _____-_____

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FIGURE 1
Continued

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