American Red Cross

Scientific Advisory Council

ARC SAC Advisory
Use of Epinephrine Auto-Injectors for Anaphylaxis

Overall Recommendation:

The available scientific evidence supports the position that early administration of epinephrine in an individual experiencing anaphylaxis plays a key role in reducing mortality.

Recommendations and Strength (using table below):

Standards: There is no evidence to support a standard treatment.

Guidelines: The lay rescuer should be trained to assist with the administration of epinephrine by auto-injector or (where State regulations permit) to administer epinephrine by auto-injector when the patient indicates that they are having a severe allergic reaction or anaphylaxis, are awake, and provide a prescribed epinephrine auto-injector.

Options: A second dose of epinephrine may be required for continued signs or symptoms of anaphylaxis within 5 – 15 minutes after the first dose.

Questions to be addressed:

Should lay rescuers be taught how to assist patients by administering epinephrine (auto-injector) during an anaphylactic reaction?

- How is anaphylaxis defined?
- What percent of the population has anaphylaxis?
- What are the most common signs and symptoms of anaphylaxis?
- What is the median time to cardiac or respiratory arrest from anaphylaxis?
- What is the initial treatment of choice for anaphylaxis, including in the community non-medical setting?
- What epinephrine auto-injectors are available in the US and what doses are used? Is there an advantage of one autoinjector over the other?
- Is a second injection of epinephrine needed for anaphylaxis?
- Can first aiders recognize anaphylaxis and use an auto-injector to treat?

Introduction/Overview:

Anaphylaxis is a serious allergic reaction of rapid onset and that may be fatal within minutes. Almost everyone knows of a person with a nut or other food allergy, or has heard of a person dying after developing anaphylaxis. The four most common triggers are foods, insect stings, medications, and natural rubber latex. The median time to respiratory or cardiac arrest is reported to be 30 minutes for food and 15 minutes for anaphylaxis due to venomous stings.

Epinephrine is widely considered the initial treatment of choice for anaphylaxis and self-injectable intramuscular epinephrine (by prescription) has become the standard of first aid treatment for anaphylaxis occurring in the community, non-medical setting. Past ARC SAC reviews on use of epinephrine for anaphylaxis conclude that as an option (rather than standard or guideline), the lay rescuer may be trained to *assist* with the administration of epinephrine when the patient identifies him or herself as having an allergic reaction, is awake, and provides the epinephrine auto-injector. In light of growing evidence and new guidelines supporting early administration of epinephrine for anaphylaxis, and in light of new regulations in many States allowing trained lay persons/first aiders to administer (rather than just assist) epinephrine by auto-injector for anaphylaxis, the triennial scientific review on use of epinephrine auto-injectors by trained first aiders was revised and reflects a strengthening of treatment recommendations to the guideline level.

Summary of Scientific Foundation:

The most common signs and symptoms of anaphylaxis involve the skin or mucous membranes, such as swelling of the lips, tongue or eyes or hives (itched raised red rash or flushing) in 90%, followed by respiratory (breathing difficulty, wheezing) in 70%, abdominal cramping, pain or diarrhea in 40% and cardiovascular symptoms such as passing out or shock in 10 – 30%. The sudden onset of signs or symptoms in two systems (skin, respiratory, cardiovascular, or gastrointestinal) in a person with a history of prior anaphylaxis should strongly suggest acute anaphylaxis. More than 1% of the general population may be affected by anaphylaxis.

While epinephrine is widely considered the initial treatment of choice for anaphylaxis**,** there are no randomized, controlled trials of epinephrine in anaphylaxis, and placebo controlled trials are considered unethical since all anaphylaxis guidelines and global medical organizations state that epinephrine is fundamentally important in anaphylaxis management. Use of epinephrine for anaphylaxis is based on longstanding clinical use, fatality studies, epidemiologic studies, prospective studies in animal models, dramatic observational nonrandomized uncontrolled studies of patients experiencing anaphylaxis at the time of the investigation, and randomized controlled studies in patients not experiencing anaphylaxis at the time of the investigation.

Epinephrine auto-injectors been used for decades by individuals with a history of anaphylaxis and their family members. In general, epinephrine by auto-injector is well-tolerated by the recipient; adverse events related to epinephrine injection are related to accidental miss-dosing or injection of epinephrine intravenously by Advanced Life Support or medical personnel.

Epinephrine auto-injectors have been criticized for pre- and post-use needle exposure, inadequate needle length to reach thigh musculature, and potential for accidental injection of epinephrine into the finger (the latter two leading to inadequate delivery of epinephrine to the recipient). Auto-injectors have been redesigned to address these concerns. Newer more compact designs of epinephrine auto-injectors are in design. All epinephrine auto-injectors in the US are expensive and have expiration dates of 12 – 20 months. There are two doses: 0.3 mg (adult) and 0.15 mg for children 33 – 66 lbs. There is no infant dose auto-injector. Between 18 and 35% of those receiving epinephrine will require a second dose, usually within 5 – 15 minutes after the first dose. Because of this potential need for a second dose, manufactures of epinephrine auto-injectors are now manufacturing 2-pack or dual dose products.

There is a recent study suggesting that first aiders may not recognize anaphylaxis or understand indications for use of epinephrine auto-injectors. This is especially of concern since fatality studies suggest that delayed injection of epinephrine in anaphylaxis is potentially associated with poor outcomes or death.

Regulations related to administration of epinephrine auto-injectors to victims of anaphylaxis vary from State to State but may allow trained first aid providers to administer epinephrine by auto-injector (rather than to assist). While the revised guidelines reflect this possibility, it is up to the first aider to determine if their State allows for administration versus assistance with injection by epinephrine auto-injector.