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Mini review

The essential measures to improve the management of anaphylaxis

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Abstract: Studies of anaphylaxis in humans is scarce. It has been proven that the frequency of anaphylactic reactions is in increase and its management is not adequate and/or below an acceptable level. The prescription of auto-injectable epinephrine for use outside the hospital, which is the treatment of choice for an anaphylactic reaction, and its correct administration is drastically low. The proper management of anaphylaxis involves improving the training of patient's behaviors to allow both (i) prevention (avoiding known triggers of anaphylaxis) and (ii) effective treatment (adherence to a self-care plan and training to apply epinephrine with an auto-injector). Therefore, it is necessary to ensure and monitor the correct prescription of adrenaline auto-injectors as well as the training of health professionals in such use.

Keywords: anaphylaxis; autoinjector; adrenaline, self-care plan; public health; caregiver education

Estimates of anaphylaxis-related mortality have ranged from 0.5 to 5.5 per million population with death reported to occur in 0.3% to 2% of patients experiencing severe anaphylactic reactions [1]. But studies on anaphylaxis are scarce. Admissions to emergency department wards are more frequent in adults than children: 2.3 per 1,000 admissions in adults, versus 1 per 1,000 admissions in pediatric emergency areas. Recent publications indicate that its frequency is higher than previously thought 15 years ago [2].

Anaphylaxis can affect people of any age, from infants to the elderly. Among children, patients under 1 year of age are the most affected group. In a Madrid hospital, its incidence was higher in children than in adults. Food allergy was the most frequent cause (90%). The food most involved was cow milk (42%), followed by eggs (24%) and nuts (24%). The highest frequency of anaphylaxis was observed in infants 6 to 12 months, the age at which cow's milk and complementary feeding are generally introduced. Anaphylaxis was underdiagnosed and triggers were uncertain. The prescription

of autoinjectable epinephrine was low in these patients (5%). Recommendations for the pharmacological treatment of anaphylaxis in young children are extrapolated from those of older patients. Available epinephrine auto-injectors (AI) don't contain an optimal dose for babies less than 10 kg. In many cases, the weight of the patients prevented pediatricians from prescribing AI. Anaphylaxis remains underdiagnosed and mistreated in pediatric age [3]. Data in the United States show that between 1.6% and 5.1% of citizens have presented anaphylaxis [4]. Up to 1% of hospitalizations and 0.1% of emergency room visits for anaphylaxis, can lead to death [5]. In Australia, New Zealand, the United Kingdom, Brazil, and the United States, drugs are the most common cause of fatal anaphylaxis, as well as in other regions where data are available [6].

Symptoms of anaphylaxis are usually sudden onset and can progress in severity from minutes to hours. Several risk factors for severe anaphylaxis have been identified: allergy to peanuts and tree nuts, pre-existing respiratory or cardiovascular diseases, asthma, previous biphasic anaphylactic reactions, advanced age, and mast cell disease [7–9]. It is important to recognize mild anaphylaxis not only to prevent progression from a mild event to a more serious one, but also to prevent recurring episodes in the future. Anaphylaxis can present as hypotension alone, although it often occurs without hypotension. Most cases of anaphylaxis will include cutaneous manifestations, but its absence does not exclude the diagnosis of anaphylaxis [10]. Studies on severe anaphylaxis have shown that most of these patients had no history of severe reactions. Biphasic reactions occur in up to 20% of patients who develop anaphylaxis and may involve unaffected organs in the initial reaction. A structured review demonstrated that the administration of intramuscular epinephrine to the thigh as the initial treatment for acute anaphylaxis immediately after the diagnosis of anaphylaxis is the best treatment (Strong recommendation; Evidence B) [11].

A patient with symptoms of anaphylaxis should receive adrenaline immediately, even if the initial symptoms are not life-threatening, as it can rapidly progress from mild symptoms to severe symptoms. In severe anaphylaxis, the median time to cardiac or respiratory arrest was 30 minutes. Even shorter is the time to act in Hymenoptera venom-induced anaphylaxis (15 minutes) or drug-induced anaphylaxis (5 minutes). Prompt recognition and appropriate treatment is required [8,10].

The use of first-line antihistamines and steroids instead of adrenaline is of concern, since anaphylaxis can be fatal quickly and the maximum effect of antihistamines and steroids is reached in more than 1 hour. Epinephrine is the only agent that rapidly counteracts the effects of mediators released by mast cells and basophils after exposure to the culprit allergen. Adrenaline administered through AI it is the main out-of-hospital treatment. Patients and their caregivers must be trained to use the device quickly and correctly. Insufficient use of adrenaline is common: in a pediatric population only 16.7% of patients who experienced anaphylaxis used an AI. In a population of patients with previous anaphylaxis who had been trained in the correct use of AI, only 39% were able to demonstrate the correct use of the device, although 93% of patients answered that they knew how to handle them. But 22% did not correctly remove the device. safety cap, 26% did not handle the injector correctly, 37% of the patients did not identify the injection site, and 38% of the patients did not keep the injector in place for at least 10 seconds [12]. These rates are similar to those previously reported in children and parents of pediatric allergic patients. The factor most related to the proper use of the device was patient education [13].

Correct management of anaphylaxis involves educating patients in self-care behaviors to enable prevention (avoiding known triggers of anaphylaxis), effective treatment (adherence to a self-care plan, and training to apply adrenaline with an AI) and ensure the prescription of epinephrine. Arround three-

quarters of physicians cannot demonstrate correct technique, and physicians generally do not know how to use them correctly [14–17].

Research suggests that the barriers to using AI are not just practical, but incorporate complex psychological characteristics. Specific training in the use of AI that considers psychosocial factors and self-care behaviors can be effective in increasing adherence to the use of AI [18]. The AI should be prescribed in conjunction with a personalized anaphylaxis emergency action plan that lists common signs and symptoms of anaphylaxis and directs the patient to inject epinephrine immediately, then call emergency medical services or go to an emergency department. An important aspect of reducing the risk of long-term anaphylaxis involves in-office monitoring of the patient at regular intervals. Such visits should include a reassessment of the patient's ability to properly use an AI and advice on needed improvements. An educational nursing intervention at school is sufficient [19].

A recent review showed inappropriate use of AI by clinicians, patients, and caregivers in multiple settings [20]. AI prescription rates are suboptimal for at-risk patients. In addition, there is a general reluctance to administer epinephrine. Even when patients with a previous episode of anaphylaxis carried an AI, many did not use it at the time of their reaction. This is compounded by the fact that many anaphylaxis action plans require antihistamines to be given before epinephrine. The initial use of antihistamines and steroids in place of adrenaline in circumstances of clear anaphylaxis is a major cause for concern [20].

Unfortunately, few patients with anaphylaxis episodes attended in the emergency department are referred to the allergist for further follow-up. Patients who have been prescribed an AI, who have an anaphylactic episode as a consequence of wasp or bee sting (indicated for immunotherapy), whose reaction has been presumably induced by food, drugs or exercise and those who have had a severe reaction to an unknown trigger should be refer for follow up by an allergist. All patients should receive a discharge letter describing the details of the nature and circumstances of their anaphylactic reaction, the treatment provided, as well as the suspected causative agent [21].

As a recent letter relates, we have a problem [22]. It is the responsibility of healthcare professionals to know how to properly prescribe and employ the usage of AI. Many healthcare professionals do not know how to use them. The professional mission should be to teach patients and families when and how to use them, review their prescription before expiration, and promote the education of caregivers (including schools). The health administration must demand the standardization of these devices and the existence of AI with appropriate doses for the pediatric age.

Conflicts of interest

The author declares there is no conflicts of interest.

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