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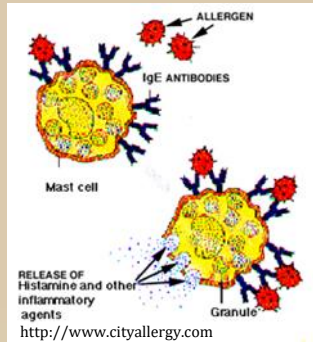
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Anaphylaxis: Signs, symptoms, and pathophysiology

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Underlying Pathophysiology

- A systemic, immediate, hypersensitivity reaction produced by immunoglobulin E (IgE-mediated) immunologic release of mediators from mast cells and basophils (Lieberman, 2013).
- Type 1 hypersensitivity reactions usually have an early and a late phase. The early phase is generated by mast cell and basophil mediators that also initiate the later phase events (Casey, 2013).
- Most cases of anaphylaxis are immunoglobulin E (IgE)-mediated. Antibodies exposed to a particular allergen attach to mast cells and basophils, resulting in their activation and degranulation (Arnold, & Williams, 2011).
- A variety of chemical mediators are released including histamine, heparin, tryptase, kallikrein, platelet-activating factor, bradykinin, tumor necrosis factor, nitrous oxide, and several types of interleukin (Arnold, & Williams, 2011).

Significance of Pathophysiology

- Histamine is the main component of granules and, once released, acts mainly via H1 receptors to trigger vasodilation and increased vascular permeability (Casey, 2013).
- H1 receptor activation also causes smooth muscle contraction in the airways, leading to bronchospasm, and in the GI tract causing nausea, vomiting, bloating abdominal cramps and diarrhea (Casey, 2013).
- Vasodilation of skin vessels may induce urticaria (Casey, 2013).
- Vasodilation in the soft tissues in the throat and upper airways (angioedema) (Casey, 2013).
- Histamine stimulation of H1 receptors in local nerve endings causes pruritus and sometimes pain (Casey, 2013).
- Prostaglandins and leukotrienes are even more potent vasodilators and broncho-constrictors than histamine. The combined vasodilator effects may be sufficient for loss of up to 35 per cent of circulating volume within 10 minutes (Casey, 2013).
- Leukotrienes act as signals to recruit late-phase cells (potential cause for biphasic reaction) (Casey, 2013).
- Late-phase responses are due to recruitment of other cells, especially eosinophils, neutrophils and lymphocytes; which produce cytokines that promote further inflammation and also damage surrounding tissue (Casey, 2013).
- Epinephrine is a sympathomimetic – it activates the sympathetic nervous system (Casey, 2013).
 - Actions of Epinephrine
 - Alpha-1 receptor binding causes systemic vasoconstriction, countering the effects of histamine and preventing or relieving hypotension, loss of circulating volume, and angioedema that might obstruct the airways (Casey, 2013).
 - Beta-1 adrenergic receptor binding increases heart rate and cardiac output to help manage shock (Casey, 2013).
 - Beta-2 binding causes bronchodilation and also reduces the release of histamine from mast cells (Casey, 2013).

Symptoms

Ohio Department of Health

SYMPTOMS

For **Any** of the Following Symptoms
(Stay with individual. Never leave alone.)

One or more of the following:

LUNG: Short of breath, wheezing, repetitive coughing

HEART: Pale, blue, faint, weak pulse, dizzy, confused

THROAT: Tight, hoarse, trouble breathing and/or swallowing/speaking

MOUTH: Significant swelling of the tongue and/or lips

SKIN: Many hives over body, widespread redness

GUT: Repetitive vomiting, severe diarrhea

NEURO: Feeling something bad is about to happen, anxiety, fear

<https://www.odh.ohio.gov/odhprograms/chss/schnurs/guidepub.aspx>

Implications for Nursing Care

- Food allergy is the most common trigger of anaphylaxis in children and adolescents, however other triggers include, but are not limited to drug allergies, chemicals, insect venom, and exercise. (Gupta, 2014).
- Most patients make at least one mistake in administration of autoinjectors; furthermore, most patients make multiple mistakes and will not benefit from self-administration of the potentially life-saving treatment if the need arises (Bonds, Asawa, & Ghazi, 2015).
- A large percentage of patients use epinephrine injectors incorrectly; therefore, it is essential that healthcare providers demonstrate for patients the proper use of an epinephrine autoinjector and confirm patient proficiency (Campbell, Li, Nicklas, & Sadosty, 2014).

Introduction

Anaphylaxis is an emergent, life-threatening condition and quick provider response is imperative. Symptoms of anaphylaxis may include, but are not limited to, difficulty in breathing, an abrupt fall in blood pressure, edema, hives, itching, and gastrointestinal cramping (McCance, & Heuther, 2014, p.1675). A study published in the *Journal of Allergy and Clinical Immunology* (JACI) indicates the prevalence of anaphylaxis in the general population is at least 1.6%, and possibly affecting as many as 1 in 20 in specific populations (Wood, Camargo, Lieberman, Sampson, Schwartz, Zitt, & Simons, 2014). When a patient has an acute and severe anaphylactic response, that patient's healthcare provider must be ready to immediately act using an expert level of awareness, and evidence based-knowledge. This paper is intended to cultivate a spirit of inquiry into, and a better understanding of anaphylaxis. Every provider must be able to recognize anaphylaxis; but, exceptional providers will recognize anaphylactic: signs, symptoms, underlying pathophysiology, significance of the pathophysiology, significance of the required nursing care, and implications for future management of the disease process.

Pathophysiologic Process: Case Study

A 31-year-old anxious appearing woman presents to the emergency department triage desk. The patient states that she thinks she is having an allergic reaction. She further states that she is aware of an existing peanut allergy that was described to her in childhood by a parent. The patient states that she is very cautious to not ingest any peanut containing products, so she has never experienced any allergy symptoms that have required medical attention. The patient has visible urticarial on her arms and exposed neck-line, which she states "itches". The patient states that she feels a tightness in her chest, and a sensation of nausea; however, she has not "thrown-up". Initial vitals are as follows: respirations of 20, Lung sounds are clear but diminished in the bilateral bases, blood pressure 85/50, oral temperature 37.6 C, heart rate of 100 with a thready radial pulse, pulse ox saturation of 93% on room air, pupils are equal, round, and reactive to light at 3 mm, oral mucosa appears dry with mild to moderate edema. She states her last menstrual period was approximately 4 weeks ago, has not experienced any changes in her bowel or bladder habits, has not been otherwise sick. The patient denies illicit drug and/or tobacco use, and drinks 1-2 alcoholic drinks per week. Lastly, the patient describes the only other change in her daily habits is that yesterday she started a "very-strenuous" physical training regimen for an upcoming athletic event, that she wishes to participate in.

Engaging Patients in Their Own Preparedness and Therapy

- Action Plans:
 - Provide an anaphylaxis plan of action that is illustrative and written in an understandable form
 - Provide the plan of action to patients, parents, caretakers, and schools
 - Evaluate the content of the written plan of action and determine the understandability
- Ensure that patients, parents, caretakers, and schools understand:
 - The significance of risk
 - The possibility of increasing severity with subsequent exposure
 - Relevant avoidance measures
 - Early recognition of symptoms
 - Appropriate treatment with Epinephrine, or an Epinephrine autoinjector
- Improve adherence through tailored self-management plans, one-on-one counseling sessions, or telephone follow-up. Follow-up discussions after a visit should include the following questions:
 - Did you pick up your medicine?
 - Do you have any questions about what we discussed regarding how to use the medicine and why you need it?
 - Did you have any managed care insurance problems?

Bennett, Fromer, & Hayden, 2014

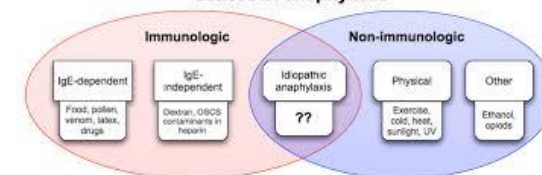
Conclusion

- The timely administration of epinephrine is essential to the effective treatment of anaphylaxis, and such administration is dependent on correctly diagnosing anaphylaxis (Campbell, Li, Nicklas, & Sadosty, 2014).
- No absolute contraindication to epinephrine use in the setting of anaphylaxis (Campbell, Li, Nicklas, & Sadosty, 2014).
- Epinephrine auto-injector education is essential
- Anaphylaxis can progress rapidly from mild manifestations involving one organ-system to severe involvement of multiple organ-systems (Campbell, Li, Nicklas, & Sadosty, 2014).
- Patient's having been treated for anaphylaxis whom are not candidates for hospital admission must be monitored in the emergency department for at least several hours given the risk for a biphasic reaction, marked by reoccurrence of anaphylaxis symptoms after an initial remission (Grossman, Baumann, Garcia Peña, Linares, Greenberg, & Hernandez-Trujillo, 2013).
- Education on patient specific anaphylactic associated triggers is essential
- Anaphylaxis is associated with significant morbidity and can be fatal (Nowak, Farrar, Brenner, Lewis, Silverman, Emerman, & Wood, 2013).
- A patient can be experiencing an anaphylactic reaction without shock (Nowak, Farrar, Brenner, Lewis, Silverman, Emerman, & Wood, 2013).
- Anaphylaxis is a long term diagnosis, that does not end with discharge from the emergency department (Nowak, Farrar, Brenner, Lewis, Silverman, Emerman, & Wood, 2013).

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Causes of anaphylaxis



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