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Medication Allergies Versus Side Effects: What Nursing Professionals Need to Know

1.00 Contact Hour

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Outcomes

≥ 92% of participants will know the difference between the presentation and management of allergic reactions and medication side effects/adverse drug reactions.

Objectives

After completing this continuing education course, the participant will be able to:

1. Define the types of adverse drug reactions (ADRs).
2. Identify how drugs can stimulate an allergic response.
3. Compare and contrast type A and type B ADRs.
4. Differentiate between the characteristics and presentation of allergic reactions and side effects.
5. Describe an appropriate management plan, including prevention strategies, for allergic reactions and side effects.
6. Develop an action plan for a patient who presents with symptoms of a medical emergency related to a drug allergy.

Introduction

Healthcare professionals are often faced with caring for patients taking medications, sometimes many, which can interact and/or generate allergic reactions, side effects, or both. As such, the care provider must be acquainted with the recognition and management of both allergic reactions and side effects so that they can work with their healthcare team and the patient to prevent, recognize, and mitigate reactions and side effects to ensure the patient's safety while still receiving important medications.

Definitions

True medication allergies and side effects may be difficult to differentiate at times since some symptoms may overlap. However, each phenomenon is mediated by different physiological mechanisms, and it is important that the nursing professional be able to distinguish between the two. While allergies are mediated by the immune system, side effects (also known as adverse drug reactions or ADRs) are often related more to the mechanism of the medication and are additional (secondary) effects (Mayo Clinic, 2024a; National Cancer Institute [NCI], n.d.).

Sometimes, side effects may not necessarily be a negative thing; however, the term adverse reaction implies a negative side effect. So, while these terms may be used interchangeably, that is not 100% accurate.

Impact on Patient Safety

Of course, either an allergic reaction or side effect can impact patient safety. As of 2023, 10% of the U.S. population claimed to have a drug allergy, and up to 20% of emergency room visits were for anaphylactic reactions. In hospitalized patients, the number of those reporting a drug allergy is higher, about 15–20% (Doña et al., 2024). According to data from numerous studies, as of 2021, the prevalence of ADRs was about 8% in the primary care setting; about 12–38% of these were felt to be preventable. Cardiovascular medications appear to be one of the most common drugs with associated side effects/ADRs (Insani et al., 2021). Drug allergies are more common in younger to middle-aged adults, and women are affected more than men (Institute for Quality and Efficiency in Health Care, 2023). With reported metrics showing this number of patients who have a history of a medication allergy or drug side effect, it is important that nursing professionals be aware of both conditions and how to recognize and appropriately manage each.

Legal and Ethical Considerations

While the five rights of medication administration are designed to protect all patients when receiving medications, these cannot account for or predict those who may have an untoward event. Of course, ensuring that the right patient is receiving the right dose of the right medication at the right time by the right route is critical, but a nursing professional must still anticipate potential complications. One specific area of concern is frequent changes in medication packaging and unfamiliar placement of medication warnings. Another more pertinent issue is blindly following medication orders without ensuring that the patient does not have a history of an allergy or adverse reaction to the specific prescribed medication. The ability of the patient to contribute key factors of their medical history related to previous allergies and ADRs cannot be overstated. A failure to appropriately check and administer medications can lead to patient harm and disciplinary action against the nursing professional and other members of the healthcare team (Hanson & Haddad, 2023).

Understanding Basic Concepts

Medication Allergy



Allergies are mediated by the immune system and can occur with any substance, natural or synthetic, medication, food, or other. Some medications are more likely than others to cause allergic reactions (i.e., cardiovascular medications). The pathophysiology behind allergic reactions, and potentially anaphylaxis, is an aberrant immune response to a medication or its components. After identifying the medication as foreign, the body generates antibodies to the medication, and the immune system begins to attack the specific chemicals in the body (Mayo Clinic, 2024a). Various chemicals are released from the activation of mast cells and basophils upon binding to the cellular antibody immunoglobulin E (IgE) or directly to the medication. These include histamine, tryptase, carboxypeptidase A, and proteoglycans. Secondary cellular signaling compounds are then activated (cytokines and chemokines) and cause typical symptoms, which can range from mild to severe. Another mechanism called “off target” is an interaction between the medication and the T-cell receptor or human leukocyte antigen (HLA) receptor. Regardless of the exact mechanism, symptoms can be similar (Dougherty et al., 2023). While an allergy can develop after a single exposure, it is more likely after multiple exposures to the allergen. This process is called sensitization, and the individual becomes inappropriately hypersensitive to the medication (Dougherty et al., 2023; Mayo Clinic, 2024a).

Types of Allergic Reactions (Type I–IV Hypersensitivity)

There are four distinct types of hypersensitivity (allergies). These are aptly named type I–IV and all operate on slightly different premises.

Type I Hypersensitivity

This hypersensitivity requires a sensitization stage due to the interaction between IgE and immune cells. Antibodies against the medication require the action of both B cells and T-helper cells, as well as the use of the HLA complex and T-cell receptor complex to activate mast cells and basophils. Re-exposure after this sensitization generates a quick and systemic activation of the sensitized cells, resulting in the release of vasoactive mediators. Type I hypersensitivity is known as a humoral response activation and an IgE immediate sensitivity reaction (Dougherty et al., 2023).

Type II Hypersensitivity

Type II is the least common of the four hypersensitivity types and is an antibody-mediated cellular destruction. This involves both IgG and IgM antibodies and occurs when the drug or its components bind directly to cells, including red blood cells, platelets, or neutrophils. This cell-mediated complex functions as an antigen. When immunoglobulin G (IgG) and immunoglobulin M (IgM) bind the bound cells, they are targeted for destruction by the macrophages (Dougherty et al., 2023).

Type III Hypersensitivity

This reaction occurs via an antigen-antibody complex formed and located in the serum. Known as an “immune complex deposition,” the drug behaves like a soluble antigen and binds to the corresponding IgG. This occurs in numerous body tissues and can generate hallmark symptoms such as vasculitis, synovitis, and glomerulonephritis when the complex is found in the blood vessels, joints, and glomeruli, respectively. This hypersensitivity type is mediated by the complement cascade. Unlike types I, II, and IV, this hypersensitivity is dose-dependent: a more profound reaction will be generated based on a higher dose (Dougherty et al., 2023).

Type IV Hypersensitivity

Finally, type IV hypersensitivity is mediated by T cells. T cells are directly activated by the medication and subsequently activate other immune cells, including macrophages, eosinophils, or neutrophils. There are no antibodies involved in this type, and it is a direct cellular response, most common with cutaneous T cells and memory effector cells. When the offending agent penetrates the skin or enters the circulatory system, T cells are stimulated. In some cases, dendritic cells may also play a role in this response by way of the HLA complex. Since the stimulus for this reaction is via the skin, Stevens-Johnson Syndrome/toxic epidermal necrolysis (SJS/TEN) is likely. Drug reactions with eosinophilia and systemic symptoms/drug-induced hypersensitivity syndrome (DRESS/ DIHS) and hepatitis can also result (Dougherty et al., 2023).

Examples of Common Medications Leading to Allergic Reactions

There are numerous medications and drug classes that are known to cause allergic reactions. Even substances such as latex, bananas, and kiwis can produce strong responses (Mayo Clinic, 2024b). Antibiotics, especially penicillin-based ones, are the most common medication known to cause an allergic reaction. However, more recently, chemotherapy and monoclonal antibody therapy (given for cancer, asthma/chronic obstructive pulmonary disease [COPD], irritable bowel disease [IBD], and many other conditions) have also been linked to allergic or anaphylactic responses (American Academy of Allergy, Asthma, and Immunology [AAAAI], 2023). Other medications such as anti-inflammatory analgesia (i.e., ibuprofen) and acetylsalicylic acid (i.e., aspirin), cardiovascular medications, contrast dyes used in radiology testing, anesthetics, antiepileptics, antidepressants, and antihypertensives, specifically angiotensin-converting enzyme inhibitors (ACEi), have also contributed to allergic reactions. Medications given orally are less likely to cause an allergic response when compared to those given intravenously or as a skin preparation (Institute for Quality and Efficiency in Health Care, 2023).

Anaphylactic Versus Anaphylactoid Reactions

Anaphylaxis is mediated by IgE and is an immediate, systemic, and severe reaction to a medication (or other antigen) by mast cells and basophils. Anaphylactoid reactions, on the other hand, are not mediated by IgE, mast cells, and basophils but can look like anaphylaxis

based on timing and presentation. Due to the clinical overlap, both terms were consolidated under the heading of anaphylaxis (McLendon & Sternard, 2023).

Medication Side Effect



Side effects, unlike allergic reactions, do not occur because of actions in the immune system. They can also be severe, life-altering, and/or life-threatening. A side effect or adverse reaction is linked directly to the medication itself. Unlike allergies, side effects are much more predictable and are called out in the prescribing information and drug insert. There is also a direct relationship between the drug dose and the side effects that appear. One example is the known side effect of drowsiness in an individual who has taken an antihistamine (i.e., diphenhydramine) (Kommu et al., 2024).

Type A and B Adverse Drug Reactions

ADRs can be divided into two types. Type A reactions occur because of known pharmacological properties of the medication. These can occur in any individual who is given a therapeutic dose. Type A is the more common of the two reactions and comprises 85–90% of ADRs. Type A reactions include overdoses, side effects, and drug interactions. On the other hand, type B reactions are less frequent and less predictable than type A. These occur in only about 10–15% of patients receiving a medication and include hypersensitivity (allergic) reactions (6–10% of type II ADRs), idiosyncratic reactions (related to genetic causes or increased sensitivity to the medication or its components), and pseudoallergic reactions (“allergy-like” reactions not mediated by the immune system but caused by a direct activation of inflammatory cells) (Kommu et al., 2024).

Clinical Presentation

Both allergic reactions and side effects have well-delineated presentations. Please see Table 1 regarding the presentation and management of these conditions.

Table 1: Presentation and Management of Allergic Reactions, Side Effects, and Anaphylaxis

	Allergy	Side effect/ADR	Anaphylaxis
Onset	Suddenly, almost immediately (or within a few hours) of administration	Unpredictable, could be immediately or within days or months	Suddenly, almost immediately (or within a few hours) of administration
Symptoms (not all inclusive)	Pruritus, flushing, rash, swelling of mucus membranes (eyes, throat, lips), chest tightness, dyspnea, vomiting, abdominal cramping, diarrhea, tachycardia, syncope, hypotension, altered mental status, sense of impending doom, itchy eyes, tearing, bladder and/or uterine cramping	Depends on the specific side effect/ADR (i.e., hypersensitivity reactions; SJS/ TEN – peeling skin; DRESS/ DIHS – facial edema, fever, lymphadenopathy, elevated eosinophils; vomiting, diarrhea, rash, blurry vision, headache, fatigue, etc.)	Pruritus, flushing, rash, swelling of mucus membranes (eyes, throat, lips), chest tightness, dyspnea, cough, stridor, hypoxemia, vomiting, painful abdominal cramping, tachycardia, hypotension (systolic blood pressure < 90 millimeters of mercury [mmHg]), end-organ failure (i.e., hypotonia, syncope, incontinence)
Severity	Mild to severe	Mild to moderate (usually); can become severe if left untreated	Life-threatening

	Allergy	Side effect/ADR	Anaphylaxis
Management	Discontinue medication; supportive respiratory and circulatory interventions; can also use Histamine receptor-2 (H2) blockers (i.e., famotidine), antiemetics, and corticosteroids (i.e., methylprednisolone)	Depends on the side effect/ADR (i.e., drug overdose – antidote, if available; urticaria – antihistamines; SJS/TEN – managed in a burn center; DRESS/DIHS – corticosteroids (topical and/or systemic) Potential medication adjustment (dosage or medication itself)	Discontinue medication; emergency care; intramuscular epinephrine; supportive respiratory (i.e., bronchodilators) and circulatory interventions (i.e., intravenous fluids, vasopressors); other supportive care (i.e., corticosteroids, H2 blockers, glucagon)
Prevention	Avoid triggers; notice and treat early signs and symptoms (s/s); staff must be able to recognize s/s also	Avoid triggers, if possible; report side effects to providers, including the nurse, at visits	Avoid triggers; notice and treat early s/s; staff must be able to recognize s/s also

(Dougherty et al., 2023; Institute for Quality and Efficiency in Health Care, 2023; Kommu et al., 2024; McLendon & Sternard, 2023; U.S. Food and Drug Administration [FDA], 2024; Whyte et al., 2022).

Diagnostic Testing

Though the nursing professional may not be the one ordering diagnostic testing, they may be present when it is performed or need to have insight into what the results mean to better care for their patients. Since anaphylaxis is a medical emergency, there is no testing; however, in the case of an allergic reaction, several different tests are available. These include (Institute for Quality and Efficiency in Health Care, 2023):

1. Skin prick test: identifies if the immune system reacts to pre-specified substances; done by injecting a small amount of the antigen under the skin of the forearm – a positive result is identified if the skin becomes red, itchy, or raised.
2. Patch test: like the skin prick test but less invasive; a small patch with the suspected antigen is placed on the skin for one or two days – a positive result is determined if allergy symptoms develop.
3. Blood test: blood samples are collected to identify if any antibodies to the medication are present.
4. Provocation test: identifies if a suspected medication causes an allergic reaction; the individual is given a small dose of the suspected drug and then given a larger dose, and they are monitored closely (usually in the hospital) for the development of symptoms – a positive result is identified by symptom development.

In the case of adverse events, the same tests can be used for suspected hypersensitivity reactions (Kommu et al., 2024). However, for non-hypersensitivity side effects/ADRs, there are few official tests. Pharmacogenetic/pharmacogenomic testing, via blood, saliva, or a cheek

swab, can identify how a particular person responds to a particular medication; however, these tests are not necessarily accessible to everyone (MedlinePlus, 2025).

Nursing Responsibilities

The primary role of the nursing professional when caring for a patient who is experiencing either a drug allergy or side effect relates directly back to the nursing process and superb communication with the healthcare team. The very first step is to conduct a thorough assessment and determine what medications have recently been taken and for what indication. The nursing professional should evaluate the physiological responses present in the patient to generate their nursing diagnosis. Whether the nursing professional is administering the medication (i.e., inpatient unit or infusion area, including chemotherapy treatment rooms), they must be vigilant to symptoms and monitor the patient closely. After making a well-supported nursing diagnosis, the nursing professional must identify the relevant desired clinical outcomes and plan how they are going to help the patient achieve those outcomes. Implementation brings those outcomes from planning to fruition, and finally, evaluation can help the nursing professional determine if the interventions were appropriate and met the goal (Open Resources for Nursing [Open RN], 2021).

The steps for managing a patient who is experiencing a severe allergic reaction are something that nursing professionals must be familiar with. Since the onset is rapid and severe, there can be no time wasted in trying to figure out what to do. If medication is being administered (i.e., blood transfusion, chemotherapy), then the infusion should be immediately discontinued (Mayo Clinic, 2024a). Since the airway and breathing are compromised in addition to the circulatory system, supportive measures, such as intubation, must be available. Strict monitoring of blood pressure, heart rate, and respiratory rate and effort is also required. The treatment of choice is epinephrine/adrenaline given intramuscularly; however, sometimes this life-saving treatment is delayed or missed due to a failure to recognize that the patient is experiencing anaphylaxis (Whyte et al., 2022). Depending on the severity, supplemental oxygen may be required, and intravenous access should be established (Mustafa, 2024).

Patient education is also very important. They should be educated on potential side effects when the medication is prescribed and/or administered (if in the hospital or clinic). Since patients may confuse verbiage and identify an expected or unexpected ADR as an allergy, they should be educated on the difference. Patients who have known allergens to medications (or foods, insect stings, etc.) should always carry an epinephrine autoinjector on their person (Golden et al., 2024).

To prevent anaphylaxis, it is imperative that the individual not have contact with the trigger. This can be facilitated with the use of medication alert cards, lists, or bracelets. Patients must also be aware of potential side effects and/or allergic reactions and have the ability to report their symptoms promptly to their healthcare team, whether admitted to an inpatient unit, receiving treatment in a clinic, or taking medications at home. In addition to awareness, prevention and management plans are required. These should be well-outlined with the healthcare team.

Finally, in the case of an allergic reaction, anaphylaxis, or side effects, the nursing professional may need to report this event to the FDA MedWatch or the FDA Adverse Event Reporting System (FAERS) (FDA, 2019; Kommu et al., 2024). Reporting parameters may vary based on the clinical setting, the specific event, and requirements by regulatory bodies, such as the Centers for Medicare and Medicaid. Prompt reporting is necessary to ensure patient safety (Kommu et al., 2024).

Case Study

Mary Jane is an 87-year-old female who presents to the emergency department with complaints of shortness of breath, chest pain, dyspnea, and a feeling of impending doom. Upon arrival, she is hypoxemic (oxygen saturation – 91% on room air), hypotensive (blood pressure – 85/65 mmHg), tachycardic (pulse – 157 beats per minute), flushed, complaining of itchy palms, experiencing abdominal pain, and stating she is “going to pass out.” Earlier today, she received a monoclonal antibody for her pre-existing Crohn’s disease. She has received this medication before (four doses) and never experienced any of these symptoms. She has baseline abdominal pain and cramping, but this is “much worse” and rated an 8/10.

She is prescribed supplemental oxygen, intravenous fluids, and close monitoring. The emergency staff suspect she may be having an allergic reaction to her monoclonal antibody and administer a dose of intramuscular epinephrine. She begins to recover, and her vital signs stabilize within the next hour. She is admitted overnight for continued monitoring. The emergency team reported the anaphylactic reaction to the FDA MedWatch and FAERS.

Upon discharge, the nursing professional provides discharge instructions including a provider-initiated referral for follow-up in the allergy and immunology department, the need to alert her gastroenterologist about this anaphylactic event, signs and symptoms to watch for, and the need to carry a medication list, and possibly a medical alert bracelet, at all times. They also discuss that she should immediately return to the emergency department if the symptoms return.

Summary

Many individuals are on at least one medication at some point in their lives. Allergies, including anaphylaxis, and side effects can happen at any time. It is important that the nursing professional has solid knowledge and skills to care for a patient experiencing any of these events. As part of the nurse’s routine care, they should educate patients on potential allergies or other side effects, make appropriate monitoring and action plans with the patient, and administer life-saving interventions if the situation calls for it. Only by having both knowledge of these reactions and the ability to apply it can we keep our patients safe when they are taking their medications.

Implicit Bias Statement

CEUFast, Inc. is committed to furthering diversity, equity, and inclusion (DEI). While reflecting on this course content, CEUFast, Inc. would like you to consider your individual perspective and question your own biases. Remember, implicit bias is a form of bias that impacts our practice as healthcare professionals. Implicit bias occurs when we have automatic prejudices, judgments, and/or a general attitude towards a person or a group of people based on associated stereotypes we have formed over time. These automatic thoughts occur without our conscious knowledge and without our intentional desire to discriminate. The concern with implicit bias is that this can impact our actions and decisions with our workplace leadership, colleagues, and even our patients. While it is our universal goal to treat everyone equally, our implicit biases can influence our interactions, assessments, communication, prioritization, and decision-making concerning patients, which can ultimately adversely impact health outcomes. It is important to keep this in mind in order to intentionally work to self-identify our own risk areas where our implicit biases might influence our behaviors. Together, we can cease perpetuating stereotypes and remind each other to remain mindful to help avoid reacting according to biases that are contrary to our conscious beliefs and values.

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