Latex

Protecting patients and staff

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Perioperative nurses should have a good understanding of the science of latex allergies and how to protect patients and healthcare professionals (HCPs) when updating hospital policies and guidelines. (See *What is latex?*)

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Who is at risk for latex allergy?

Individuals who have been exposed to latex through a history of multiple surgeries face a higher risk of developing a latex allergy. According to the American Latex Allergy Association (ALAA), children born with spina bifida are included in this high-risk group.[1] In fact, approximately 68% of spina bifida patients have a sensitivity to latex.[1] Individuals born with long-term genitourinary abnormalities also may become sensitized to latex because of repeated urinary catheter usage.[2] HCPs as well face an increased risk because of repeated exposures to latex products. People with food allergies are another group who may find themselves reacting with an allergic response to latex.[3]

The ALAA lists four foods with the highest risk of cross-reaction to latex as banana, avocado, chestnut, and kiwi.[3] A moderate risk of latex cross-sensitivity

occurs with foods such as apples, carrots, celery, tomatoes, potatoes, papayas, and melons.[3]

Risk factors for latex allergy also include individuals who have contact dermatitis of the hands, hives, and itching after wearing latex gloves or contact with a natural rubber latex product.[2] Individuals who develop generalized symptoms of rhinitis, hay fever, and asthma may have an undiagnosed allergy to latex proteins.[2]

Allergy testing can be done for individuals suspected of having a latex allergy. Diagnosis of latex allergy must be done by a licensed medical professional who obtains a medical history, performs a physical exam, and may utilize both skin testing and blood tests to diagnose a latex allergy.[4]

Skin prick testing for latex sensitization gives results within 20-30 minutes and can detect latex antigens.[5] Routinely, a skin prick test involves a tiny amount of allergen being dropped onto the skin (often the inner arm) and then a lancet is used to introduce the allergen below the skin. A "positive" skin prick test would show an itchy, red wheal. A radioallergosorbent blood test for latex allergy measures the immunoglobulin E (IgE) antibody in blood. This test takes

allergies

7 to 14 days to deliver results. It might be utilized when an individual suffers from eczema and skin issues or is unable to stop taking antihistamine medication before testing.[6] (See *History of latex allergy*.)

Routes of exposure

Direct exposure to skin happens when HCPs wear latex gloves. Airborne latex/cornstarch particles can be inhaled and cause respiratory reactions. Direct exposure to mucous membranes occurs when a patient has a latex urinary catheter inserted. If the patient is allergic to latex and the HCPs wear latex gloves during surgery, the patient could suffer an internal exposure. Another internal exposure would occur if a latex device such as a drain was placed during surgery.[2]

Latex allergy/anaphylaxis symptoms

Three types of reactions to natural latex rubber are: an irritant contact dermatitis, a type IV (cell-mediated) hypersensitivity, and a type I (IgE-mediated) hypersensitivity reaction.[8]

An irritant contact dermatitis is not an immune system response to an allergen and should not be called a latex allergy. An irritant contact dermatitis results from frequent hand washing, sweating, and irritation from powder lubricants. This dermatitis can easily occur in HCPs. Symptoms of an irritant contact dermatitis include: itchy, dry reddened, cracking skin. The symptoms do not extend past the contact area. For example, if surgical gloves are the irritant, the symptoms are only where the gloves touch skin. Irritant dermatitis rarely results in papules, vesicles, or oozing skin.[8]

Type IV hypersensitivity (cell-mediated), also known as delayed cutaneous hypersensitivity, is an allergic response to an allergen. Type IV hypersensitivity is a delayed immune reaction mediated by T-cell lymphocytes. This dermatitis occurs with exposure to the chemicals used in manufacturing. The reaction may take 24-48 hours to develop.[8] Symptoms include: erythema with papules, vesicles, and oozing skin areas. If an HCP repeatedly comes in contact with the allergen, this rash may become a chronic problem. This delayed allergic reaction may also occur in combination with a type I (IgE-mediated) reaction.[8]

Type I hypersensitivity (IgE-mediated) allergic reactions are life-threatening, potentially anaphylactic reactions. This reaction is triggered by skin or mucosal contact or inhalation of latex proteins. The body reacts to the latex allergen (usually within 1 hour of exposure) by releasing the antibody called IgE. Symptoms vary greatly, but may include the following:

- skin symptoms: itching, redness, and urticaria
- oral symptoms: itching and swelling of lips and/or tongue
- throat symptoms: itching, scratchy throat, tightness, and hoarseness
- lung symptoms: cough, wheezing, difficulty breathing, and bronchospasm
- gastrointestinal symptoms: vomiting, diarrhea, and cramps
- cardiac symptoms: weak pulse, dizziness, and fainting.[10]

Treatment of latex allergy/anaphylaxis

Therapy is individualized for each of these conditions, but essentially involves avoidance of the offending source that causes the reaction.[8]

What is latex?

Natural rubber latex comes from the rubber tree, *Hevea brasiliensis*. The rubber trees were originally found in Brazil, but the seeds were exported during the late 1800s. Today's commercial natural rubber primarily comes from Thailand, Indonesia, Malaysia, and Sri Lanka.[7]

Over the centuries, workers learned to tap the rubber trees and collect sap without damaging trees. This protein-rich liquid sap is then mixed with chemicals during the curing and manufacturing process.

According to the ALAA, the latex products made by a dipping and low-temperature curing method (balloons, gloves, and condoms) leave the latex protein intact and are most likely to cause an allergic reaction.[8]

Thirteen allergenic proteins have been isolated from the *H. brasiliensis* tree to date. Any one of these proteins can cause an allergic response in susceptible people.[9]

Cornstarch is the second component of the latex allergy. Cornstarch powder is added to gloves making them easier to slip onto hands. However, the cornstarch powder absorbs latex proteins and when gloves are removed, this mixture of powder and latex becomes aerosolized latex proteins. People who are sensitive can suffer an allergic reaction when they breathe in these latex-cornstarch particles.[2]

History of latex allergy

Latex items have been traced back to 1600 BC by archaeologists, but gloves and other latex products did not become routinely used until the 1900s. Even as late as the mid-1800s, physicians did not routinely wear gloves. It was during this time that several physicians recognized that hand washing and wearing gloves could help prevent infections and death.[11]

Physicians such as Ignaz Semmelweis and Joseph Lister first recognized that hand washing helped protect patients from infections and helped to decrease patient mortality.[12]

During the 20th century, increasing numbers of HCPs began wearing latex gloves and utilizing latex products. Unfortunately, reports of reactions in the form of irritant contact dermatitis also increased.[4]

With the identification of HIV in the 1980s, glove usage again markedly increased. During the 1980s "universal precautions" became the phrase used to encourage HCPs to protect themselves and their patients by wearing gloves and eye protection.[13] As latex gloves were worn in increasing numbers, the incidences of type I hypersensitivity (IgE-mediated) reactions also grew.[14]

In 1984, the first anaphylactic reaction traced to latex gloves was reported and HCPs began dealing with patients with latex allergies. Perioperative staff learned about the danger of latex allergy and they struggled to find out whether products used in their ORs contained latex.[15]

During the decade of 1987 through 1997, the FDA received reports of 1,700 severe reactions to latex and 16 deaths. The deaths all occurred in 1989 among children with spina bifida. A reaction to latex cuffs used on the tip of barium enema catheters was attributed with causing the deaths.[15]

In 1997, the FDA required labeling of medical devices that contain natural rubber latex. Over the next few years, this labeling helped perioperative staff identify latex in products and provide a latex-safe environment. This labeling helped decrease phone calls to vendors asking whether their products were manufactured to contain latex.[15]

Individuals who have developed a type I hypersensitivity (IgE-mediated) response to natural rubber latex face a risk from airborne (aerosolized) exposure if latex glove cornstarch powder is present in the environment.

Treatment of the patient in the OR with a type I hypersensitivity reaction/anaphylaxis involves immediate intervention. A severe acute reaction to latex should be treated as any other case of anaphylaxis. The initial steps include:

- stopping the procedure and removing all sources of latex in the immediate vicinity
- irrigating the area with copious amounts of sterile water
- securing the patient's airway, resuscitating the patient as necessary, and stabilizing cardiovascular function
- administering drugs for resuscitation and treatment of anaphylaxis (typically epinephrine, diphenhydramine, ranitidine, dopamine, and glucocorticoids, as prescribed and indicated)
- changing gloves and instruments, once the patient is stabilized and completing the surgery, avoiding all latex products.[4]

Providing a latex-safe environment

A preoperative patient assessment should include questions about latex allergy.[2] Any patient who is latex allergic should be identified per the institution's allergy protocol. For example, a facility may document latex allergy in the following ways: in the patient's electronic health record, with an allergy bracelet and with signage inside the patient's room. Communication regarding a patient's latex allergy begins with preadmission testing and continues throughout the patient's hospital experience. At each phase of care, latex-free supplies should be utilized to avoid an allergic reaction.

Working in a latex-safe environment

HCPs face an increased risk of developing a latex allergy. According to the U.S. Occupational Safety and Health Administration, 8% to 12% of HCPs are latex sensitive.[16] However, the ALAA estimates this number to be closer to 17%.[1] For some of those workers, the reaction involves a contact dermatitis. For other HCPs, exposure to latex triggers a type I hypersensitivity reaction.

HCPs are at increased risk of developing a latex allergy if they often wear latex gloves. At-risk HCPs involve more than surgeons, lab technicians, and nurses. This group also includes: housekeepers and

laundry workers, gardeners and grounds keepers, pharmacists, food service workers, and reprocessing workers in central supply. One way to decrease their exposure to latex is to switch to latex-free gloves. In addition to latex exam gloves, the glove inventory can include low powder, latex-free exam gloves made from nitrile, vinyl, neoprene, or polymer. The sterile gloves inventory can also be adjusted to include different types of gloves. Use of low-protein, powder-free natural rubber latex gloves or latex-free gloves can minimize latex exposure and the risk of reactions in both HCPs and patients. Quality-of-life scores improved for HCPs with latex allergies after latex products were removed from the workplace.[2] The ALAA provides a database of latex-free medical devices at http://latexallergyresources.org/medical-products.

Diagnosis of latex allergy must be done by a licensed medical professional who obtains a medical history and performs a physical exam.

Updating a latex allergy policy and procedure

Perioperative nurses writing or updating a latex allergy policy and procedure should begin with the most recent edition of Association of periOperative Registered Nurses' (AORN) *Perioperative Standards and Recommended Practices*. Several perioperative standards apply to the latex allergy issue. The 2014 edition includes a recommendation to provide a latex-safe environment for patients through each phase of the perioperative experience and for (HCPs).[2]

Standard 1: Assessment: The perioperative nurse will assess the patient for risk of latex allergy.[17]

During this phase, the perioperative nurse(s) conducts a preoperative interview with the patient and his or her support person/s and a review of the patient's medical records. This assessment includes the patient's current health status (both physical and psychological), current medical diagnoses, his or her needs, proposed surgical procedure, and the patient's medical history including allergies.

The perioperative nurse should identify high-risk groups: patients with repeated exposures to latex, a history of spina bifida, and a history of long-term urinary catheter care; those with multiple food allergies, asthma, and contact dermatitis; and patients who are exposed to latex through their work such as HCPs and those in the food service industry.

Questions about potential latex allergy should be included in the preadmission testing interview. Broad screening questions about any allergies, including latex and food allergies, can be increasingly more specific if the patient answers yes. During this process, the nursing staff should identify any patient recognized to be high risk for latex allergy and, depending on hospital protocol, contact the admitting surgeon with this information. The surgeon may choose to proceed with surgery using latex-safe protocol or he may choose to have the patient tested for latex allergy.

The staff should also notify the OR of a patient's latex allergy so latex-safe precautions will be used during preparations for that patient's surgery.

Standard 2: Diagnosis: The perioperative nurse will determine appropriate nursing diagnosis based on patient's assessment.[17]

The perioperative nurse uses nursing diagnoses (care practice guidelines) to prioritize the patient's needs and individualize the care. If a patient says he or she has a latex allergy or answers the questions pointing toward a latex allergy, the perioperative nurse should recognize this patient faces a serious risk. An appropriate nursing diagnosis would be "risk for allergic reaction to natural rubber latex."[18] A latex-safe environment meets the goal for this patient's care. Environmental preparation includes latex-free supplies and equipment. After the 1997 FDA labeling directive, OR staff can check for latex content as they pick and open packages. Scheduling patients with a latex allergy as first surgery of the day decreases the risks from airborne exposure. Latex-safe terminal

cleaning of the room should be done the night before the surgery. This practice and the air exchanges overnight should reduce the aerosolized latex particles. If scheduling the patient with a latex allergy as the first case is not possible, as much time as possible for air exchanges should be allowed.

Another recommended practice is that all personnel should remove latex gloves, wash their hands, and don latex-free gloves before entering the room of a patient with a known or suspected latex sensitivity or allergy.[2]

The perioperative nurse should obtain signage to hang on the OR doors; this alerts personnel entering the room of latex-safe precautions. Postoperatively the patient with a latex allergy is transported to a latex-safe postanesthesia care area. At each phase of this patient's hospital experience, staff caring for the patient communicates the latex allergy during handoff communication.

Standard 3: Outcome identification: The perioperative nurse identifies expected outcomes for each patient.[17]

The perioperative nurse uses the patient's assessment and nursing diagnoses to develop expected outcomes. The nurse utilizes ethical principles such as beneficence (doing good) when he or she recognizes the risk of a latex allergic reaction and makes latex-safe care a priority.

Successful management of a patient with a latex allergy involves the absence of signs and symptoms of either type IV (cell-mediated) or a type I (IgE-mediated allergic) reaction.

Standard 4: Planning: The perioperative nurse plans individualized care for each patient.[17]

The perioperative nurse uses the assessment of each patient, the appropriate nursing diagnoses, and expected outcomes to individualize the patient's care. Planning and preparing for the patient helps the perioperative staff achieve a latex-safe environment. When notified of a patient's latex allergy, the perioperative staff assigned to that patient will begin removing latex products from the OR and replacing them with latex-safe products. For example, latex-free nonsterile exam gloves are used by the circulating nurse and anesthesia care provider. According to the AORN recommended practices, if no latex-safe equipment is available, either eliminate the latex-containing equipment or cover the equipment with a protective stockinette (for example, cover the BP cuff tubing) and keep it away from the patient's skin/mucous membranes to prevent a reaction.[2]

Standard 5: Implementation: The perioperative nurse provides the planned care for each patient.[17]

The perioperative nurse will use the prior steps (assessment, diagnoses, expected outcome, and planning) to individualize nursing interventions. Currently many latex-free products can be purchased to replace products that formerly contained latex. Supplies such as gloves, catheters, elastic wraps, and pulse oximetry probes can be purchased in latex-free form. The availability of latex-free products and labeling have made providing a latex-safe OR environment easier to achieve.

According to AORN 2014 standards, rubber stoppers should not be removed from vials but rather punctured once as the medication/liquid is drawn up into a syringe or other receptacle and labeled.[2] The nurse and anesthesia care provider will monitor the patient's responses throughout the operative procedure and watch for any signs and symptoms of latex allergic response and modify the plan of care as needed.

The AORN Implementation Standard 5b also includes coordination of care and promoting healthy behaviors. Individuals diagnosed with a latex allergy and their families will benefit greatly from learning about latex allergy and how to avoid latex and an allergic reaction in the future.

Standard 6: Evaluation: The perioperative nurse evaluates the patient's condition and determines whether the expected outcome was attained.[17]

The perioperative nurse will evaluate whether the steps of the nursing process kept the patient with a latex allergy safe by monitoring the patient's responses. If a type I response is going to occur, it often begins within the first hour of surgery. Documentation of latex-safe care will be done and handoff communication will include the patient's latex allergy risk.

Moving forward Today's HCPs find themselves dealing with latex allergy issues. When HCPs understand the science of latex allergies, they can better

provide safe care for their patients and themselves. By utilizing the latest edition of the AORN *Perioperative Standards and Recommended Practices*, perioperative nurses can update their policy and apply this information to their practice. This knowledge will help maintain a safe environment for their patients, coworkers, and themselves. **OR**

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