LATEX IN THE PERIOPERATIVE SETTING: STRATEGIES FOR PATIENT AND STAFF SAFETY

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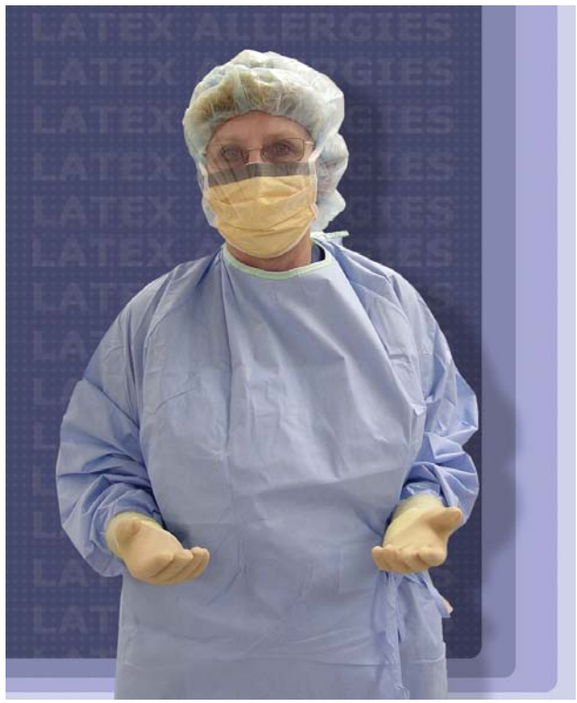
AORN INDEPENDENT STUDY ACTIVITY
AORN VIDEO WITH STUDY GUIDE



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PURPOSE/GOAL

The purpose/goal of this activity is to provide perioperative nurses with important information related to latex safety.

OBJECTIVES

After viewing the videotape and completing the study guide, participants will be able to:

- Describe the basic principles of natural latex allergy.
- Compare the three types of adverse reactions associated with latex products.
- Explain three conditions associated with increased risk for latex allergy reactions.
- List at least four ways to provide a latex-safe environment for patients and health care workers.

GUIDE FOR STUDY

This study guide is intended to be used in conjunction with the accompanying video. We suggest that you take the following steps to complete this activity.

1. Read the overview and objectives for this educational activity, and compare them with your own learning objectives.
2. View the video.
3. Read the study guide, paying particular attention to those areas that reflect the objectives.
4. Consult a dictionary for definitions of unfamiliar words.

OVERVIEW

Latex is the thin, elastic material used to make balloons for birthday parties, paint for living room walls and masks for Halloween. It is also the same material that can adversely affect millions of health care professionals and their patients.

Every day in health care settings across the country, individuals are exposed to natural rubber latex. This material is used in medical products and equipment from surgical gloves to medication vial stoppers, from intravenous tubing to catheters.[1]

Repeated exposure to natural latex allergens can result in a latex sensitivity or allergy. It is estimated that 1% to 6% of the general public[2,3-7] and 10% to 17% of health care workers[8] are at risk for developing latex allergies.

Latex is known for its strength, pliability, and affordability, which are reasons why it has so many applications in the health care industry. Several types of synthetic materials are also referred to as latex, but these are safe for latex-sensitive individuals.

Sensitivity and allergy to natural rubber latex is a continuing concern in health care environments because reactions can be severe and have the potential to be life threatening. Avoiding exposure to natural rubber latex products reduces the risk of allergic reactions; however, with thousands of items on the market containing natural rubber latex, this is not always practical.

A Brief History of Latex

Rubber items have been in existence since approximately 1600 BC. Archeologists have discovered that indigenous populations in Central and South America harvested liquids from morning glory vines to create rubber balls and hollow figurines.[9]

The advantages to using rubber-based products in health care were recognized in approximately 1834, when rubber was first used for surgical gloves.[10] By the early 1900s, surgical gloves were commonly used to guard against the spread of disease.

The latex gloves used in today's health care settings begin as a natural chemical compound derived from the sap of the rubber tree (*Hevea brasiliensis*). During the manufacturing process, the natural latex is combined with a variety of chemicals such as preservatives, anti-oxidants, and accelerators.

Porcelain molds of products (eg, medical gloves, balloons, condoms) are dipped into the liquid latex. Once cured, the latex becomes one of the most elastic polymers available. Unfortunately, dipped products made from natural rubber latex contain more soluble proteins than heat-molded latex products and can release more allergen.[3,11,12]

First Recorded Allergic Reaction in 1927

The first description of an apparent allergic reaction to latex was reported in 1927. A dental partial plate, with a rubber base, caused urticaria and oral angioedema in a patient.[10]

In 1933 a latex hypersensitivity to rubber gloves was reported and similar reactions were sporadically reported over the years. Although irritant and delayed-contact reactions to rubber products were recognized, it wasn't until 1979 that immediate-type allergic reactions were reported with more frequency.

Since 1974 the US Food and Drug Administration (FDA) has received over 1,700 reports of allergic reactions to latex; 17 deaths have been reported.[13]

Reasons for Increased Prevalence

There are several theories about the increased prevalence in reports of problems with latex. Some experts believe the increase is because health care workers are now familiar with the signs of latex hypersensitivity and are reporting the problem more frequently.

Others believe the recommendations issued by the Centers for Disease Control and Prevention (CDC) for universal precautions in 1987 led to increased use of latex gloves. Recent estimates show a 20-fold increase in medical glove use (in billions of pairs) since the introduction of universal precautions in 1987.[14]

To meet the growing demand for latex gloves, manufacturers may have changed their manufacturing practices, leaving more water-soluble latex proteins in gloves. In turn, these glove changes may have contributed to the problem by sensitizing health care workers to latex. One estimate is that occupational exposure to natural rubber latex has sensitized about 17% of health care personnel in the United States and Europe.[15]

Problems Associated with High-Protein Allergen

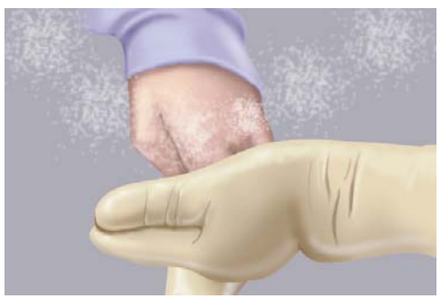
Repeated exposure to the proteins in natural rubber latex, through contact or inhalation, can lead to latex allergy. Some of the proteins present in natural rubber latex, as well as the chemicals and additives used in its processing, are responsible for allergic sensitization. Of the multiple proteins found in latex, certain specific proteins, especially, rubber elongation factor, are considered a major latex allergen.[10]

It is theorized these extractable, water-soluble proteins interfere with the IgE immunoglobulins in the body causing a wide range of allergic reactions.[10]

Fortunately not all latex allergies are true allergies; some are sensitivities. *Sensitivity* can be described as developing an immunologic memory to specific latex proteins. *Allergy* can be described as the demonstrated expression of sensitivity, such as hives, rhinitis, conjunctivitis, and in severe cases, anaphylaxis.

Individuals with sensitivity may or may not be symptomatic, but those sensitized to latex should be protected from latex reactions, just like those who have a true latex allergy.

There's an additional complication related to the use of latex gloves. To make gloves easier to put on and remove, they are coated with a cornstarch powder. This powder binds the allergenic proteins from the gloves so that when gloves are donned or removed, the particles become aerosolized and can be inhaled.



New Rules Address Latex Allergy Problems

As a result of the increased number of reported incidents, and the serious nature of the latex allergy reactions, the FDA issued its *Allergic Reactions to Latex-Containing Medical Devices* alert in 1991. The alert suggested ways to identify and protect allergic individuals in clinical settings.

On September 30, 1998, the FDA began requiring manufacturers of medical devices that contain latex or dry natural rubber to attach warning labels indicating the product contains latex and has the potential for causing allergic reactions.

Specific labeling statements are required.[16] One example reads: "Caution: This Product Contains Natural Rubber Latex Which May Cause Allergic Reactions." Warnings of this type help health care facilities purchase appropriate products for latex-allergic individuals; however, this only applies to products and pharmaceuticals regulated by the FDA.

The FDA recommends using non-allergenic products where appropriate. Products include non-latex gloves, reduced-protein gloves, and powder-free latex gloves.[16]

The National Institute of Safety and Health (NIOSH), part of the Occupational Safety and Health Administration (OSHA), issued an Alert June 23, 1997, *Preventing Allergic Reactions to Natural Rubber Latex in the Workplace*.

The alert recommends steps to reduce exposures to latex. The National Institute of Safety and Health also recommends selecting products and implementing the following work practices to reduce the risk of allergic reactions:

- Provide reduced protein, powder-free gloves to protect from infectious materials.
- Ensure workers use good housekeeping practices to remove latex-containing dust from the workplace.
- Provide educational programs and training materials about latex.
- Periodically screen high-risk workers for latex allergy symptoms.
- Evaluate current prevention strategies whenever a worker is diagnosed with latex allergy.

In addition, professional associations like the American Academy of Allergy, Asthma and Immunology (AAAAI),[17] and the American College of Allergy, Asthma and Immunology (ACAAI)[18] also promote the use of low-allergen, powder-free latex gloves to provide a latex-safe environment in health care facilities.

The Association of periOperative Registered Nurses (AORN) provides a Latex Guideline as part of its *Perioperative Standards and Recommended Practices*.

Reactions Caused by Latex

Exposure to latex products can cause three different kinds of adverse reactions:

- irritant contact dermatitis,
- delayed type IV hypersensitivity reaction or allergic contact dermatitis, and
- immediate immunoglobulin E (IgE) [type I] hypersensitivity reaction or latex allergy.[19, 20]

It is possible to have one, two, or all three types of reactions.[19, 20] Irritant contact dermatitis and delayed type IV hypersensitivity reaction are the most common, but both can lead to increased latex sensitivity and more severe reactions.

Irritant contact dermatitis is a non-allergenic reaction of the skin. Irritant contact dermatitis is not a true allergy, but is the result of damage to the skin. Irritation like this can be caused by soaps and cleansers, multiple hand washings, inadequate hand drying or frequent wearing of latex gloves or skin contact with glove powders.

Symptoms of irritant contact dermatitis include:

- red, swollen, dry skin;
- thickening and fissuring of the skin;
- itching;
- burning; and
- formation of papules.

Delayed type IV hypersensitivity reaction is also called *allergic contact dermatitis*. This is a T-cell mediated allergic reaction and is usually localized to the area of contact. Delayed type IV hypersensitivity reaction is caused by the chemical compounds used in manufacturing latex products and not the latex itself. The chemicals cause previously sensitized T-cell lymphocytes to stimulate proliferation of other lymphocytes and mononuclear cells, resulting in tissue inflammation and dermatitis.

This reaction is called delayed because the onset is slow, usually beginning 18 to 48 hours after exposure.[21,22]

Symptoms include

- swelling;
- redness extending beyond the area of skin contact;
- itching;
- cracking, hardening, or thickening of the skin; and
- eczema.

Immediate type I hypersensitivity reaction or *latex allergy* is the true latex allergy reaction. Although it is the least frequent of the latex reactions, it is the most serious. This is a systemic Type I IgE-mediated response to the plant proteins in natural rubber latex. In sensitized individuals, an anti-latex IgE antibody stimulates mast cell proliferation and basophil histamine release.[21,23]

Like its name suggests, the reaction is immediate, with symptoms usually occurring within five to 30 minutes of exposure. Reactions may be treated by removing the latex product and treating with medications according to the symptoms. This systemic allergic reaction can include the following symptoms:

- hives;
- eczema;
- eyelid and facial swelling;
- generalized wheal and flare reactions;
- burning and itching;
- allergic rhinitis;
- swelling of the throat, nasal passages, and bronchi;
- difficulty breathing;
- allergic conjunctivitis;
- asthma;
- anaphylaxis; and
- death.

Groups at Risk for Developing Latex Allergy
There are three main factors that influence the type and severity of sensitivity reactions: the individual's susceptibility, routes of exposure, and the frequency and amount of exposure.

Individual Susceptibility
Some individuals are more at risk of developing a latex sensitivity than others. In a study, conducted from 1997 to 1999, 1,040 health care workers were tested and results showed that latex glove-related symptoms were seen in 21.8% of nurses, mostly consisting of mild dermatitis.[24]

In addition to health care workers, those at high risk for sensitization include other individuals occupationally exposed to latex, such as food service workers; atopic individuals with a history of asthma, eczema, and rhinitis; people who react to medications; and individuals with multiple environmental allergies including food allergies.[25]

Individuals with a history of type I allergic reactions to certain foods are considered at risk. The list of foods includes avocado, potato, banana, tomato, chestnut, kiwi fruit, and papaya. This is because there is a cross reactivity that exists between natural rubber latex proteins and certain food allergens.[4, 26-28]

Certain populations of patients are also at a higher risk than others for developing sensitivity to latex or for having anaphylaxis, the most severe reactions from latex exposure. According to the *AORN Latex Guidelines*,[25] these patients include:

- children with myelodysplasia (ie, spina bifida),
- children with a history of multiple surgeries beginning in infancy,
- anyone with a history of type I reaction,
- anyone with positive test results to natural rubber latex, and
- patients who have suffered any type I reaction are considered to be at high risk for anaphylaxis.

Routes of Exposure
There are four main routes of exposure to natural rubber latex: cutaneous contact, mucosal contact, airborne contact, and IV exposure.

Cutaneous contact
Cutaneous contact is the least likely to cause a severe reaction and is usually from contact with adhesive tape, rubber anesthetic face masks, blood pressure cuffs and tubing, monitoring probes, as well as contact with latex gloves.

Mucosal contact
The majority of severe latex reactions result from latex proteins coming in contact with internal tissues during invasive procedures or after contact with mucous membranes of the mouth, vagina, urethra, or rectum.[29,30] Case reports describe intraoperative anaphylaxis after the peritoneum or internal tissues come into contact with surgical gloves.

Airborne contact
Aerosolized glove powder is the most common source of airborne contact with latex protein. Latex proteins bind to the glove starch powder during the manufacturing process and are expelled into the air when gloves are opened, donned, or removed. Inhalation of latex proteins can lead to bronchospasm or laryngeal edema.[25]

IV exposure
IV exposure can occur when medications are drawn up from a vial containing a rubber stopper. Protein can be leached from the vial stopper. Whenever possible, medications should be used from a latex-free vial.[25]

Ingestion
Although rare, individuals ingesting or chewing on latex products before general anesthesia have become anaphylactic during surgery.[31]

Frequency and Amount of Exposure
The risk of latex allergy is also related to the frequency and amount of exposure to natural latex products. This means people who are occupationally exposed to latex are at a higher risk for developing latex sensitivity.

Health care workers at risk of latex allergy include physicians, nurses, personnel in the operating room, aides, dentists, dental hygienists, laboratory technicians, and housekeeping personnel.[32]

Indicators that suggest allergic sensitization in health care workers include irritant contact dermatitis or skin breakdown; glove-related eczema; and urticaria work-related conjunctivitis, rhinitis, or asthma. Health care workers showing these symptoms should not ignore their symptoms of sensitization. There are cases of operating room personnel experiencing intraoperative anaphylactic reactions attributed to latex.[10]

Methods for Diagnosing Latex Allergy
There are several methods for diagnosing latex allergy. Usually, a diagnosis can be made from an accurate history and clinical examination to determine if there is a history of type I reactions to latex products.

Latex sensitivity can be confirmed through a skin prick test (SPT), an easy, inexpensive way to test for urticaria-type reactions. During this test, a drop of diluted latex extract is placed on the skin to check for reaction.

Another test is called the wearer or use test. This test can determine allergic contact dermatitis-type reactions. It requires the individual being tested to wear part or all of a latex glove or a patch to check for a response. Because of the risk of anaphylaxis, individuals with a history of anaphylaxis should not be given this test.

A third test is the radioallergosorbent test (RAST) test. This blood test measures the specific IgE antibodies against latex allergens.

Whether patient or health care worker, anyone who has experienced a reaction to a latex product should be evaluated by a health care provider experienced in latex allergy diagnosis and management.[25]

Those with an identified latex allergy should wear a medical alert bracelet and carry an emergency epinephrine syringe.

Preventing Allergic Reactions
All health care facilities and providers have an ethical responsibility to prevent latex sensitivity in patients and employees by creating an environment in which it is safe to be treated and to work. Because there is no cure for latex allergy, prevention is the key to avoiding a latex allergy reaction.

There are two goals to preventing allergic reactions: prevent reactions in individuals who are latex-sensitized and prevent initial sensitization of non-sensitized individuals.

Both prevention methods require limiting latex exposure. Although a *latex-free* environment is an admirable goal, it's nearly impossible to remove all latex products from a health care facility.

Creating a *latex-safe* environment is more practical. Latex-safe means every reasonable effort has been made to remove high-allergen and airborne latex sources from coming into direct contact with affected individuals. [25] An environment in which a latex aeroallergen level is less than 0.6 nanograms per cubic meter is considered latex-safe, especially for health care workers who are sensitized to natural rubber latex.[33]

Two ways to limit exposure to latex include selecting appropriate products and changing behaviors.

Selecting Appropriate Products
The list of natural rubber latex products is a long one. Triggering items include latex gloves, latex glove powder, orthodontic elastics, dental dams, nasogastric tubes, balloons, pacifiers, urinary catheters, enema kits, barium enema catheters, condoms, and balloon catheters. It seems, however, that powdered latex gloves are the most common item contributing to the latex load in health care facilities.[25]

The results of a follow up study of 1,040 health care workers show that simple measures such as avoiding unnecessary glove use, the use of nonpowdered latex gloves by all workers, and the use of nonlatex gloves by

sensitized individuals can stop the progression of latex symptoms. These measures can also avoid new cases of sensitization.[24]

When establishing a latex-safe environment, pertinent clinical data should be obtained on every latex or latex-containing product used in the facility, with an emphasis on the protein and powder content of each product, if powdered gloves or other powdered items are used.[25]

Research shows that low-powder, powder-free and non-latex gloves provide alternatives to protect health care workers from occupational latex exposure.[34]

Powder-free gloves are more expensive than traditional gloves, because of the extra rinsing process to remove the powder from gloves, however, this cost outweighs the cost of a potential fatal latex allergy reaction.

AORN's *Recommended Practices for Product Selection in Perioperative Practice Settings* provides guidance to assist practitioners with product evaluation and selection.[35] A directory of products containing latex and appropriate latex-free substitutes should be maintained and readily accessible to all health care providers.[36]

Nonlatex gloves made of synthetic materials are alternatives to high-protein powdered gloves. Materials for these gloves used in health care settings include neoprene, nitrile, vinyl, polyurethane, and co-polymers.[37]

New nonlatex gloves are also in development. On the horizon is an alternative to conventional rubber latex called guayule (pronounced why-YOU-lay). Guayule is similar to rubber, but comes from a shrub that grows in the desert of the southwestern United States. This natural rubber product provides a nonallergenic latex for medical applications like surgical gloves, catheters and angioplasty balloons. A special process is used to filter out the proteins that cause latex allergies.[38]

Changing Behaviors

Some reactions, like irritant contact dermatitis, can be reduced by removing the irritant source once it is identified. Changing behaviors will help limit latex exposure. This includes: thoroughly washing and drying hands; using only powder-free latex gloves, gloves low in latex proteins or nonlatex gloves; and changing gloves more frequently.

Here are additional ways for health care workers to reduce latex exposure[32]:

- Use hand creams only when gloves are not worn. Applying hand creams before donning gloves can increase the amount of latex proteins on the skin.
- Wash hands immediately after removing gloves to reduce latex allergens on the skin and to avoid transfer of latex proteins to other surfaces.
- Avoid touching eyes, nose, or mouth while wearing gloves.
- Wear a well-fitting mask to prevent airborne contact with glove powder.
- Use proper hand care to prevent skin breakdown.
- Become familiar with procedures for preventing latex allergy.

Protecting Patients

If the entire facility is maintained as a latex-safe environment, few additional precautions will be needed for latex allergic individuals. If the facility is not latex-safe, however, additional latex precautions are required.[25]

Latex-allergic individuals should be treated in an environment using strict latex avoidance. Because the presence of even small amounts of residual aerosolized latex in the air or on surfaces can trigger a life-threatening reaction, all latex that may potentially contact the individual should be removed from the patient's environment.[25]

A latex-free cart is helpful for consolidating latex-free items in a single place.[25] Manufacturer documentation should be obtained to ensure the latex-free status of contents for all latex-free carts.

Examples of alternatives for commonly used latex products include: disposable plastic tubing; silicone catheters and drains; non-latex gel pads for electrocardiogram (ECG) leads; white cotton bandages; plastic, paper, or silk adhesive tape; cloth towel or paper caps for surgical caps; disposable plastic blankets for hypothermia blankets; glass syringes; and disposable plastic tubing and blood pressure cuff covers.[1]

Item list for a Latex-Free Cart

- latex protocol
- stethoscope
- tourniquets
- syringes
- bandages and tape
- ambu bag and airways
- IV supplies
- suction tubing
- stop cocks
- silicone catheters
- gloves,
- Webril
- stockinette
- latex precaution signs
- a list of common latex-containing items and latex-free alternatives

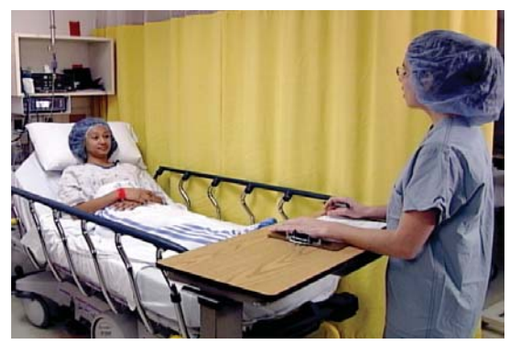
Specialty care areas, such as the OR, emergency room, and labor and delivery departments, should develop a list of items to meet their special care needs.

Emergency carts (ie, code carts) should also contain latex-free items such as syringes, gloves and resuscitation equipment.

Managing Latex-Allergic Individuals

There is no predictor of whether or when a latex-sensitive individual will react. The safest approach is to treat all individuals with a natural rubber latex sensitivity as if they are allergic.

Some providers pretreat latex-allergic individuals with certain medication regimens, such as diphenhydramine, ranitidine, and corticosteroids, to prevent initial allergy symptoms, however, this approach is controversial. Pretreated individuals may present with anaphylaxis as the first sign of a reaction.[25]



Preoperative Patient Assessment

Failure to check patient allergies before surgery can result in serious injury or death. Ideally, patients should be screened for latex sensitivity or allergy in the physician's office.[39] This information should be conveyed to the entire health care team.

If a patient presents to the facility and reports a latex sensitivity or allergy, he or she should be evaluated further.

During a patient's assessment, perioperative nurses should assess for the following risk factors:

- history of multiple surgeries beginning at an early age
- food allergies
- exposure to latex
- history of allergic reaction to latex
- inadvertent latex exposure and impending anaphylaxis.[25]

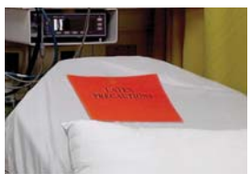
If it is determined the patient may be latex sensitive or at risk, latex allergy precautions should be initiated until diagnosis can be determined.

The perioperative registered nurse should develop a plan of care for the latex-allergic patient that prescribes interventions to attain the expected outcomes.[25] The major outcome is to provide a safe environment so the patient is free from signs and symptoms of a latex-allergic response.

In addition to the interventions and activities selected to be performed, the latex allergy should be addressed in the individualized plan of care, implementation of latex-allergy precautions as needed, and continuity of care.

Once a latex-allergy or susceptibility is identified, thorough documentation is necessary. Communicating with the entire health care team is essential.

The latex-allergic individual should be treated in a latex-safe environment. All latex-containing devices and products should be removed from within the immediate care environment. This includes removing all latex products from the patient's room; notifying other departments of the patient's sensitivity; flagging the patient's chart, door of room, the patient's gurney, and identifying wrist band; using the latex order set; and obtaining the latex safe product list from the computer.



If the latex-allergic patient is not cared for in a facility-wide, latex-safe environment, he or she is at risk for reaction upon arrival in the postanesthesia care unit (PACU). When the patient re-enters the mainstream care environment, he or she is at risk because of the aerosolized powder-containing latex proteins being transferred through the air or shed from scrub attire of individuals working with or near powdered latex products.

In a facility that is not latex safe, it may be necessary to use a positive pressure isolation room if a latex-safe environment of care has not been previously established for the patient.

AORN recommends health care facilities follow these preoperative, intraoperative, and postoperative latex-safe guidelines:

Preoperative

Latex-safe checklist to use before a surgical procedure:

- Notify the OR of the potential or known latex-allergic patient 24-48 hours (or as soon as possible) before the scheduled procedure.
- Identify the patient's risk factors for latex allergy and communicate these to the health care team.
- Schedule procedure as the first case of the day, if the facility is not latex-safe. This reduces the potential for airborne contact with latex-bound powder.
- Notify all other care providers of the patient's allergy status.
- Educate the patient about the latex-safe plan and ensure the involvement of all providers.
- Involve the patient, family members, and significant others in planning the patient's care.
- Secure latex-fee products for all latex-containing items on surgeon's preference card and those used by the anesthesia care provider.
- Notify the surgeon if no alternative product is available.
- Notify the anesthesia care provider if a latex-containing product is to be used; develop a plan of emergency care.
- Remove as many latex items from the OR as is practical.

- Remove boxes of latex gloves and replace with nonlatex gloves (sterile and nonsterile).
- Double-check all supplies and equipment for latex and remove any items containing latex.
- Have a latex-safe cart available.
- Provide latex-sensitive patients with a "latex allergy" identification band and ensure that the bed and chart are also clearly labeled.

Latex-allergic reactions in awake patients

- itchy eyes,
- generalized itching,
- urticaria,
- shortness of breath,
- feeling of faintness,
- agitation,
- nausea and vomiting,
- abdominal cramping,
- diarrhea, and
- wheezing.

Intraoperative

Latex-safe checklist to use during a surgical procedure:

- Continue implementing the perioperative latex-safe plan of care.
- Mark the OR room doors with "Latex Precautions" signs.
- Mark the patient's admitting bed and transport vehicles.
- Remind all health care team members of the necessity for following latex avoidance procedures.
- Restrict traffic flow in the room before and during the procedure.
- Use latex-free IV tubing or replace injection ports with three-way stopcocks. Tape over any remaining ports to prevent inadvertent use.
- Use medication in ampules or latex-free vials, when available. Do not remove stoppers.
- Use latex-free syringes.
- Use latex-free blood pressure cuffs and connecting tubing. If they are not available, wrap the patient's arm to prevent blood pressure cuff tubing or tourniquet cuff tubing from coming into contact with the patient's skin.
- Do not use latex tourniquets (eg, Penrose drains) to start IV lines or as drains in a wound.
- Use a 100% silicone (not silicone-coated) or polyvinyl chloride catheter if a urinary catheter is ordered for a procedure.
- Verify that additional items requested after the case is in progress are latex-free before delivering them to the sterile field.
- Be prepared for the possibility that the procedure may require more than the scheduled equipment, such as a laparoscopy procedure converting to an open laparotomy.
- Monitor for anaphylactic reactions to latex throughout the procedure as reactions may occur immediately after induction or up to 40 minutes later.
- Have IV fluids and medications for treatment of allergic reaction available immediately.
- Inform PACU staff members in advance of the patient's arrival time.

Latex-allergic reactions in an anesthetized patient

- tachycardia,
- hypotension,
- wheezing,
- bronchospasm,
- cardiorespiratory arrest,
- flushing,
- facial edema,
- laryngeal edema;, and
- urticaria.

Postoperative activities

Latex-safe checklist following the surgical procedure:

- Continue the perioperative latex-safe plan of care.
- Ensure that latex-free supplies are available to follow the patient to all future locations in the health care facility.
- Provide a latex-free resuscitation bag, oxygen mask and supplies.
- Transport the patient to a latex-safe area.
- Provide education for the patient and his/her family members or significant others related to latex allergy.

Developing a Latex Allergy Program

Because caring for a latex-allergy patient is a complex process, a multidisciplinary task force should be formed to address latex issues. Representatives from departments like surgical services, labor and delivery, emergency, housekeeping, risk management, safety, pharmacy, and nursing should be included. The goal of the task force is to develop a protocol for creating a latex-safe environment for patients who are latex-allergic.[25] Patient safety is the overriding concern.

The protocol should include, at a minimum:

1. A policy for care of the patient with a latex allergy.
2. A latex allergy screening tool or questionnaire.
3. Pre-employment latex assessment for new employees.
4. Protocol for removing devices and supplies with high latex protein count, discontinuing use of powdered latex products, and replacing latex items with non-latex items.
5. Latex allergy pre-operative, intraoperative and postoperative checklists.
6. Latex free item lists for latex-free carts.
7. Training program to educate patients and staff about latex allergy and its management.

Summary

Sensitivity to natural rubber latex is a continuing concern in health care environments. Repeated exposure to natural rubber latex allergens can result in reactions that can be severe and have the potential to be life-threatening. Since 1974 the FDA has received over 1,700 reports of allergic reactions to latex with 17 deaths reported. Exposure to latex products can cause three different kinds of adverse reactions: irritant contact dermatitis, delayed type IV hypersensitivity reaction and immediate IgE type I hypersensitivity reaction. It is theorized that allergic reactions are caused by extractable, water-soluble proteins interfering with the IgE immunoglobulins in the body.

Some individuals have an increased risk for developing a latex sensitivity, including health care workers, individuals with a history of asthma, and individuals with multiple environmental allergies. In addition, certain populations of patients are also at a higher risk than others for developing sensitivity to latex or for having a severe reaction.

All health care facilities and providers have a responsibility to prevent latex sensitivity in patients and employees by creating an environment in which it is safe to be treated and to work. A latex-safe environment is one in which every reasonable effort has been made to remove high-allergen and airborne latex sources from coming into contact with affected individuals. Preventive measures include selecting appropriate products and changing behaviors. Every health care facility should have a plan in place to identify and treat patients and health care workers who are at high risk for latex allergy.

Glossary

Allergen: A substance that in some individuals can cause an allergic or hypersensitivity reaction but is not normally considered harmful.[40]

Allergenic: A substance that can elicit a hypersensitivity reaction in certain individuals.[41]

Allergy: An immune reaction to an environmental agent that results in a symptomatic reaction.[40, 41]

Antigen: Any molecule or substance, more often a protein, which has the ability to bind to an antibody.[40, 41]

Irritant contact dermatitis: A nonallergic, cutaneous response to an irritant. Normally this reaction is primarily localized to the site of exposure. This is not a latex allergy.

Allergic contact dermatitis (type IV: T-cell mediated/delayed hypersensitivity): A delayed, T-cell mediated hypersensitivity response attributed to chemicals (ie, antigens) used in the latex and some synthetic manufacturing processes and absorbed through the skin.[40] This reaction generally is localized to the contact area.

Latex: Also known as natural rubber latex, this milky cytosol is acquired by tapping the commercial rubber tree, *Hevea brasiliensis*.

Latex allergy (type immunoglobulin E [IgE]-mediated/immediate hypersensitivity response): A localized or systemic allergic response to one or more specific proteins (ie, antigens)[40] found in latex to which the individual has been sensitized and has developed antibodies.

Latex-free environment: An environment in which all latex-containing products, not simply gloves, have been removed. This state is considered unattainable due to the ubiquitous nature of latex products.

Latex-safe environment: An environment in which every reasonable effort has been made to remove high-allergen and airborne latex sources from coming into direct contact with affected individuals. The airborne latex protein load should be less than 0.6 ng per cubic meter.[33]

Latex precautions: Interventions to prevent reactions in people (eg, patients, health care workers) allergic to latex proteins.

Reactions associated with latex: Irritant contact dermatitis, allergic type IV cell-mediated contact dermatitis, and type I IgE-mediated latex allergy. Only the type I IgE-mediated response constitutes a true latex allergy.

Sensitization: The development of immunological memory in response to exposure to an antigen.

Sensitivity: A clinical manifestation of symptoms or response that develops after sensitization.

True Allergy: Altered reactivity to an antigen, which may result in subsequent pathologic reactions upon exposure to that particular antigen.

END NOTES

1. The Perioperative Environment. In *Berry & Kohn's Operating Room Technique* 11th ed. St. Louis, MO: Mosby, Inc.; 2007.228-229.
2. Kam PCA, Lee MSM, Thompson JF. Latex allergy: an emerging clinical and occupational health problem. *Anaesthesia* 1997;52(6): 70-575.
3. *Latex Allergy Protocol*. Park Ridge, IL: American Association of Nurse Anesthetists, 1993.
4. Sussman GL, Beezhold DH, Latex allergy: a clinical perspective. *Surgical Services Management* 1997;3(2): 25-28.
5. Tomazic VJ. Adverse reactions to natural rubber latex. *FDA User Facility Report* 1997;19(1):2.
6. Porri F, et al. Prevalence of latex sensitization in subjects attending health screening: implications for a perioperative screening, *Clin and Exper Allergy* 1997;27(4): 413-417.
7. Bernardini R, et al. Prevalence and risk factors of latex sensitization in an unselected pediatric population. *J Allergy Clin Immunol* 1998;101(5): 621-625.
8. Sussman GL. Latex allergy: an overview. *Can J Allergy Clin Immunol* 2000;5(5):317-322.
9. Hosler D, Burkett SL, Tarkanian MJ. Prehistoric polymers: rubber processing in ancient Mesoamerica. *Science* 1999;284:(5422)1988-1991.
10. Dyck RJ. Historical development of latex allergy. *AORN J*. 2000;72:(1)27-40.
11. Reddy S. Latex allergy. *American Family Physician* 1998;57(1):93-100.
12. Yunginger JW. Natural rubber latex. *Immunology and Allergy Clinics of North America* 1995;15(8): 583-595.
13. FDA answers latex glove questions. *Food and Drug Administration User Facility Reporting*. Fall 1997; (21):3.
14. Swanson M, Olson DW. Latex allergen affinity for starch powders applied to natural rubber gloves and released as an aerosol: from dust to don, *Can J Allergy and Clin Immunol* 2000; 5(8):328-336.
15. Reed D. Update on latex allergy among health care personnel. *AORN J*. 2003;78:(3)407-426.
16. U.S. Food and Drug Administration. Title 21 Food and Drugs, Chapter I Food and Drug Administration, Department of Health and Human Services, Subchapter H Medical Devices. http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm. Accessed August 20, 2007.
17. American Academy of Allergy, Asthma and Immunology. http://www.aaaai.org. Accessed August 21, 2007.
18. American College of Allergy, Asthma and Immunology. http://www.acaai.org. Accessed August 21, 2007.
19. Bensky KP. Latex allergy: who, what, when, where, why, and how. *CRNA: The Clinical Forum for Nurse Anesthetists* 1995;6(11):177-182.
20. Strzyzewski NM. Latex allergy: everyone is at risk. *Plastic Surgical Nursing* 1995;15(winter): 04-206.
21. Hancock DL. Latex allergy: prevention and treatment. *Anesthesiology Review* 1994;21 (September/October): 153-163.
22. Heese A, et al. Allergic and irritant reactions to rubber gloves in medical health services. *Journal of the Am Academy of Dermatology* 1991;25(11):831-841.
23. Steelman VM. Latex allergy precautions: a research-based protocol. *Nursing Clinics of North America* 1995;30(9):475-493.
24. Filon FL, Radman G. Latex allergy: a follow up study of 1040 healthcare workers. *Occup Environ Med*. 2006;63:121-125.
25. AORN Latex Guideline. In: 2007 *Standards, Recommended Practices, and Guidelines*. Denver, CO: AORN, Inc.;2007:203-218.
26. Grzybowski M, et al. The prevalence of anti-latex IgE antibodies among registered nurses. *J of Allergy and Clin Immunol* 1996;98(9):535-544.
27. Brown RH, Schauble JA, Hamilton RG. Prevalence of latex allergy among anesthesiologists: identification of sensitized but asymptomatic individuals. *Anesthesiology* 1998;89(8):292-299.
28. Ahlroth M, et al. Cross-reacting allergens in natural rubber latex and avocado. J *Allergy and Clin Immunol* 1995;96(8):167-173.
29. Sussman G, Tarlo S, Dolovich J. The spectrum of IgE-mediated responses to latex. *JAMA* 1991; 265(6):2844-2847.
30. Axelsson JGK, Johansson SGO, Wrangsjo K. IgE-mediated anaphylactoid reactions to rubber. *Allergy* 1987;42 (1):46-50.
31. Eckinger P. Latex allergy: oh, what a surprise! another reason why all anesthesia equipment should be latex-free. *Anesth Analg*. 2004; 99(2):629.
32. NIOSH *Alert preventing allergic reactions to natural rubber latex in the workplace*. June 1997. http://www.cdc.gov/niosh/latexalt.html. Accessed August 20, 2007.
33. Baur X, Chen Z, Allmers H. Can a threshold limit value for natural rubber latex airborne allergens be defined? *J Allergy Clin Immunol*. 1998;101 (1PT1): 24-27.
34. Lopes RAM, Benatti MCC, Zollner RDL. A review of latex sensitivity related to the use of latex gloves in hospitals. *AORN J*. 2004;1(80):64-71.
35. Recommended practices for product selection in perioperative practice settings. In *2007 Standards, Recommended Practices, and Guidelines* Denver, CO:AORN, Inc.;2007:637-640
36. *2007 Standards, Recommended Practices, and Guidelines*. Denver, CO:AORN, Inc.;2007.
37. Korniewicz, D. Advantages and disadvantages of non-latex surgical gloves. *Business Briefings: Global Surgery*. 2004. http://www.business-briefings.com/pdf/952/Korniewics.pdf. Accessed August 31, 2007.
37. Rosenthal J. Another rubber tree plant. *Fast Company*. 2007;115:42.
39. Fogg D. Latex safety. *AORN J*. 2003;3(79):646-647.
40. Janeway CA, et al. The induction, measurement, and manipulation of the immune response. In *ImmunoBiology: The Immune System in Health and Disease*, 4th ed. New York: Elsevier Science Ltd/Garland Publishing:1999:33-75.
41. **Mosby's Medical and Nursing Dictionary**. St Louis:The CV Mosby Co:1983.

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POSTTEST

Multiple Choice: Please choose the one answer that best completes the following statements.

1. It is nearly impossible to create a latex-safe health care environment.
   a. True
   b. False

2. It is estimated ___ percent of health care workers are at risk for developing latex allergies.
   a. 1% to 6%
   b. 10% to 17%
   c. 20% to 25%
   d. more than 25%

3. Natural rubber latex gloves begin as a natural chemical compound derived from the sap of the rubber tree.
   a. True
   b. False

4. Repeated exposure to ___ in natural rubber latex can lead to latex allergy.
   a. manufacturing chemicals
   b. additives
   c. proteins
   d. preservatives

5. Interference with the IgE immunoglobulins in the body is the cause for latex allergic reactions.
   a. True
   b. False

6. All latex allergies are classified as “true allergies.”
   a. True
   b. False

7. Allergy can be described as the demonstrated expression of sensitivity, such as:
   a. hives
   b. rhinitis
   c. anaphylaxis
   d. all of the above

8. Patients who are only sensitized to latex do not require special safety measures.
   a. True
   b. False

9. The ___ requires special labeling statements for medical devices containing natural rubber latex.
   a. CDC
   b. OSHA
   c. FDA
   d. NIOSH

10. Irritant contact dermatitis is a true allergy.
    a. True
    b. False

11. Delayed type IV hypersensitivity reaction is caused by the chemical compounds used in manufacturing latex and not in the latex itself.
    a. True
    b. False

12. Immediate type I hypersensitivity is a systemic allergic reaction.
    a. True
    b. False

13. A true latex allergy reaction can occur within ____ of exposure.
    a. five5 to 30 minutes
    b. six6 to 8 hours
    c. 18 to 48 hours
    d. 48 to 56 hours

14. What are the factors that influence the type and ` severity of sensitivity reactions?
    a. individual susceptibility, frequency and amount of exposure
    b. routes of exposure, frequency and amount of exposure
    c. individual susceptibility, routes of exposure and frequency of exposure
    d. susceptibility, routes of exposure, and frequency and amount of exposure

15. Some individuals are more at risk than others for developing a latex sensitivity.
    a. True
    b. False

16. Which groups are at risk for becoming sensitized to latex?
    a. individuals occupationally exposed to latex
    b. individuals with a history of food allergies
    c. anyone with a type I reaction
    d. all of the above

17. The majority of severe latex reactions result from which route of exposure?
    a. cutaneous contact
    b. mucosal contact
    c. airborne contact
    d. IV exposure

18. When establishing a latex-safe environment, clinical data should be obtained on every product used in the facility.
    a. True
    b. False

19. Precautions to protect latex-allergic individuals include:
    a. latex-free items on a special cart
    b. patient assessment
    c. flagging the patient’s chart
    d. all of the above

20. Aerosolized glove powder is the least common source of airborne contact with latex protein.
    a. True
    b. False

Answer sheet for Latex Allergies
1943

1. B
2. B
3. A
4. C
5. A
6. B
7. D
8. B
9. C
10. B
11. A
12. A
13. A
14. D
15. A
16. D
17. B
18. A
19. D
20. B