Why Nitrile Gloves Is a Better Alternative Compared To Latex
The Solution To Latex Gloves: Why Nitrile Is The Better Alternative

Natural rubber latex allergy is a significant medical concern in healthcare today. Latex-sensitive patients and healthcare workers face a serious risk from any product containing latex. To date, there is no known cure for latex allergy except eliminating exposure to latex products.

One of the fastest and only ways to reduce this risk is obvious: switch to latex-free gloves. Yet, some institutions seem reluctant to make the change. This document provides facts to help your institution evaluate your current use of latex gloves and justify the substitution of nitrile gloves. In terms of quality of protection for healthcare workers, reduction in risk of allergic reaction in the entire hospital population, and overall value.

Latex is a milky sap produced by rubber trees. The sap is blended with chemicals during manufacturing to give latex its elastic quality. Natural rubber latex is often found in rubber gloves, condoms, balloons, rubber bands, erasers and toys. If you are allergic to latex, your body treats latex as an allergen and sets off an allergic reaction. Latex allergies are most common in people who have regular exposure to latex products such as rubber gloves. That is why this allergy is most common among healthcare workers and people who have undergone multiple surgeries.

Latex allergies have been in the spotlight for so long; it is reported that around 30% of the population have developed an allergy to latex. That’s why more care practices are starting to switch the use of latex gloves and opted for the new synthetic variety called Nitrile. Nitrile was invented around 1990, designed to offer greater protection against chemicals and bodily fluids; Nitrile is also tear resistant and most importantly, ‘hypoallergenic’, (meaning your chances of developing an allergy to Nitrile is extremely rare).

Latex Sensitivity & Latex Allergy

The three common reactions associated with latex glove use are:

1. **Irritant Contact Dermatitis**: The result of damage to the skin caused by factors like soaps and cleansers, multiple hand washings, inadequate hand drying, rubbing inside powdered gloves, or certain chemicals used in manufacturing gloves. Symptoms include dry, crusty hard bumps, sores, and horizontal cracks on the skin.

2. **Allergic Contact Dermatitis, or delayed hypersensitivity**: A Type IV immunereaction, caused by chemical additives used in glove manufacturing, rather than latex itself. Onset of Type IV reactions is slow, usually beginning 18 to 24 hours after exposure and peaking at 48 hours after exposure. Each exposure may lead to increased sensitization and more severe reactions, with symptoms such as red, raised, palpable area with bumps, sores, and horizontal cracks that may extend up to the forearm.

3. **Latex allergy**: Characterized by immediate hypersensitivity, a true latex allergy is a systemic Type I IgE-mediated response to plant proteins in natural rubber latex, leading to local swelling, redness, edema, itching, and systemic reactions. Type I reactions are immediate; usually within minutes, symptoms occur may include:
   - **Rhinitis** – Irritations and inflammation of the mucous membrane inside the nose.
   - **Conjunctivitis** - Inflammation of the outermost layer of the eye and the inner surface of the eyelids.
   - **Urticarial** - skin rash notable for pale red, raised, itchy bumps.
   - **Laryngeal edema** - an abnormal accumulation of fluid in the **interstitium**, which are locations beneath the skin.
   - **Bronchospasm** - a sudden constriction of the muscles in the walls of the bronchioles causing breathing difficulties.
   - **Asthma** - A common chronic inflammatory disease of the airways.
   - **Angioedema** - A rapid swelling (edema) of the dermis, subcutaneous tissue, mucosa and sub mucosal tissues.
   - **Anaphylaxis** - a serious allergic reaction that is rapid in onset and may cause death.
   - **Death**
**Problem By Latex**

**Impact on Patients**
Unknowingly exposing a latex allergic patient to latex gloves and other latex products can be fatal. Without testing every hospital patient, whether or not they’re in a high-risk category, it’s impossible to tell which ones may be latex sensitive or latex allergic. Therefore, all patients should be assessed for a history of latex allergy.

**Impact on Healthcare Workers**
For the latex allergic healthcare worker, impact can range from lost time at work, job reassignment to avoid latex contact, and in extreme cases, loss of career. Under most occupational and safety hazard regulations, reasonable workplace accommodation must be made to allow a disabled worker to perform the essential functions of the job. However, if exposure cannot be prevented, sensitized workers with severe asthma and other life-threatening latex allergic reactions must be removed from the workplace. Removal from the workplace may cause the individual psychological distress manifesting itself in anger, depression, anxiety, and denial. When someone is unable to maintain his or her current profession, their self-esteem, interpersonal relationships, and economic well-being may be adversely affected. For co-workers of the latex allergic individual, unwanted overtime may be the result, along with the stress of handling extra duties while the allergy sufferer is off the job.

**Impact on Healthcare Facilities**
In a healthcare facility, a latex allergic employee means treatment costs that might be covered by Workers’ Compensation insurance, possible litigation costs, federal or regulatory guideline compliance concerns, rearranging work schedules, and dealing with morale issues among the rest of the staff.

**Impact on Food & Beverage Industry**
An increasing number of consumers appear to be latex sensitive. A published report indicates that latex proteins will transferred from latex gloves to foods during preparation. Latex sensitive consumers have been reported to have had allergic reactions after consuming foods contacted by latex gloves. Use of non-latex gloves would protect latex sensitive consumers. Also, Latex gloves will release a bad odour while nitrile gloves wouldn’t. The National Institute for Occupational Health (NIOSH) recommends that food workers should use non-latex gloves.

**Treatment Costs**
In the US, it can cost between $5,000 and $25,000 to treat a single anaphylactic episode resulting from latex allergy. Overall treatment for Type I allergy, ranging from diagnosis to emergency care following an anaphylactic episode, is estimated at $218,000 per employee. For those who cannot return to work due to natural rubber latex allergy, the average total cost, paid by Workers’ Compensation insurance and the healthcare facility, can be as high as $1,163,740 per employee.

**Competition for Nurses**
As competition for nurses increases among healthcare facilities, those not yet latex-safe could find themselves at a disadvantage in attempting to attract the best nursing talent. An effort to create a latex-safe environment generates loyalty among current workers and helps ensure that a facility will not be eliminated from consideration by potential candidates for future positions.
Nitrile Gloves As A Solution

To reduce the risk to latex sensitive patients and workers, every facility should take the steps necessary to become latex-safe which includes identifying acceptable alternatives to known latex-containing products. Switching to a synthetic latex glove, such as nitrile gloves that is comparable to the latex ones in maintaining excellent barrier protection during use and comparable in its fit and feel is an important step in creating a latex-safe environment. Standardizing on nitrile gloves eliminates confusion and the possibility of accidental latex glove use when treating a latex– sensitive patient

Background of Nitrile Gloves

Neil Tillitson and Luc DeBecker both worked on the invention of the nitrile glove during the late 1980s and finally perfected the formulae and the manufacturing technique in 1990. They filed for a patent in May of 1991 and the patent was finally granted to the Tillitson Corporation in 1997.

Nitrile gloves are about 3 times more puncture resistant than latex and this makes the nitrile glove an excellent candidate for ambulance operators, health clinics, paramedics and very, very popular with dentists and dental hygienists. In fact, the "Nitrile Exam Glove" has become the de-facto standard for dentists worldwide since about 1999.

There are several other excellent applications for the nitrile glove:

- Automotive manufacturing and maintenance - good resistance to petrochemicals.
- Oil and fuel refining, storage, pipeline and delivery - good resistance to petrochemicals.
- Manufacturing of transmission belts, o-rings, gaskets, oil seals, v-belts and synthetic leather.
- Manufacturing and handling of many petroleum-based adhesives and solvents.
- Blood-donation clinics, methadone clinics, vaccination clinics and any place where hypodermic needles are used.

Nitrile butadiene rubber (NBR) is a family of unsaturated copolymers of propene nitrile, combined with one of many butadiene monomers. Although the physical properties of nitrile are dependent on the polymer composition, nitrile butadiene rubber is generally resistant to oil and petroleum fuels. When there is more nitrile in the mixture, resistance to oil is better, but this also reduces the flexibility of the material.

This resistance to petro-chemicals makes NBR a useful material for gloves used in handling hydrocarbons. And nitrile's puncture resistance makes them ideal for disposable exam gloves, especially for infection-prone environments where puncture resistance is important. Nitrile gloves are used in engine manufacturing and in related processes to make fuel and oil handling hoses, seals, and grommets. Nitrile butadiene rubber maintains form and strength throughout a wide range of temperatures from −40 °C to +108 °C and this makes it an ideal material for extreme industrial situations. Nitrile rubber is also used to create moulded items, synthetic rubber footwear, synthetic adhesives, flexible sealants, synthetic sponge, expandable insulation foam, and rubber mats and matting.

In summary, Nitrile rubber is more resistant than natural rubber to oils and acids and it is 3 times more puncture-resistant than latex gloves. Nitrile gloves are quite resistant to aliphatic hydrocarbons. Nitrile gloves, just like latex gloves, can be attacked by aromatic hydrocarbons, ozone, ketones, aldehydes and esters.

With so many other types of gloves available, why would anyone want to use nitrile gloves? Because nitrile butadiene rubber is very different from natural (latex) rubber.
Nitrile gloves were at first heralded as a solution to a growing minority of people who have developed allergies to the latex proteins that accompany latex gloves. However, nitrile gloves are ideal for environments where puncture resistance is important and where resistance to hydrocarbons is critical.

There are some applications where nitrile gloves are the only gloves that make sense especially in the dentists industry. Dentists prefer nitrile gloves because, along with the reduced possibility of allergic reactions for their patients, nitrile gloves offer superior puncture resistance; important when those evil-looking little hooks that dentists love are being handled. In this age of scary blood-borne diseases, dentists are all too aware of the need to protect themselves.

Automobile mechanics have been discovering the advantages of wearing nitrile gloves. For years, disposable gloves were considered useless by the automotive industry, because latex simply dissolved when it made contact with grease, oil, diesel fuel or gasoline. In addition, wearing gloves might have been considered an effeminate affectation in a field of human endeavour where being macho just naturally comes with being chronically dirty. Enter the digital age. Now, a sparkling clean maintenance facility is an indication that a repair shop might be trusted to have the correct digital diagnostic equipment. Gloves are able to withstand the high temperatures under the hood and they are very resistant to almost all of the chemicals in an automobile's system. Add to this their great puncture resistance and the nitrile glove has found a natural environment in which to shine.

**What is Nitrile Gloves made of**

![Chemical Structure of Nitrile Butadiene Rubber](image)

**Nitrile Butadiene Rubber**, also known as Buna-N and more commonly known as "Synthetic Rubber".

There are trade names for nitrile rubber: Krylac, Europrene and Nipol are some of the most common. Perhaps because of the low start up production cost for nitrile rubber, it is produced mainly in Taiwan and China. Recently (2008), the European Union levied a very significant price-fixing tariff against most nitrile rubber producers, but this has not resulted in any significant price reductions for glove manufacturers.

Emulsifier (actually, soap), propene nitrile, various butadiene monomers, activators (to generate radicals), and a time-saving catalyst are added to polymerization vessels during production of "hot" nitrile rubber. Water (distilled water is preferable, but not absolutely necessary) is used as the reaction medium inside the PVs (polymerization vessels). The PVs are heated to 36 degrees Celsius to initiate the polymerization reaction and to encourage polymer branches.

Monomers are usually permitted to react for 6 to 15 hours, depending upon the mixture and the desired properties. Polymerization is permitted to continue until about 70% conversion is achieved. At 70% (or sometimes a little higher) conversion, the "shortstop" (such as dimethylthioiarbamate and diethyl hydroxylamine) is fed into the PVs to react with all remaining free radicals. When the resultant slurry has "short stopped", all the unreacted monomers (as a percentage, less than 1% at this point) are removed using a slurry steam-stripping process.

It is important to recover close to 100% of the unreacted monomers for products which will come into contact with human skin, for many reasons. The steam process accomplishes this well, but the waste from this process has been
problematic; sometimes requiring additional processes in order to meet environmental standards.

After monomer recovery, the synthetic latex is sent through a series of filters to remove coagulated solids. Then the liquid is blended with an antioxidant in order to further stabilize the product. The liquid polymer is then purposely coagulated using calcium nitrate and aluminium sulphate in a special aluminium holding tank. The coagulated synthetic rubber is washed and dried into crumbs and the crumbs are carried into large cylindrical containers for shipment to glove manufacturers (among others).

The process may sound complicated, but when this process is contrasted with what is required to produce natural rubber (including the collecting of the sap), it's not so bad. The process is actually quite forgiving of inaccuracies and temperature control does not need the precision required by so many other industrial processes. Given recent developments, nitrile rubber is probably going to become less expensive during the next few years, but there will always be demand for this product, because of its resistance to oils, solvents and its special ability to resist punctures.

**Why Should We Switch to Nitrile?**

It’s clear that the best way to reduce risk to patients, employees, and healthcare facilities themselves is to create a latex-safe environment, in part by switching to nitrile gloves.

**Converting to nitrile will:**

- Greatly reduce absenteeism and occupational disability costs due to latex allergy/sensitivity over time.
- Provide cost benefits by standardizing on fewer glove types, reducing both the number of suppliers used and order frequency, and by increasing order quantities.
- Improve morale among existing employees and help attract new staff members.
- Minimize confusion over choice of gloves.

Disposable nitrile gloves offer superior performance in a variety of work applications. There are lots of reasons why disposable nitrile gloves are the best choice and here are the top 10:

1. Nitrile gloves are 3 times more puncture resistant than regular latex gloves
2. Nitrile provides a stronger barrier of protection and offers greater chemical resistance.
3. Nitrile gloves have a lower resistance to friction, making them easier to put on and take off your hands
4. Nitrile gloves do not contain any natural rubber latex, so they can be used by anyone with latex allergies
5. Even though they are disposable, nitrile gloves can usually be worn more than once because of their superior puncture and tear resistance
6. Nitrile gloves can be worn under other work gloves to make them water-proof
7. Nitrile reacts to your body temperature and conforms to the shape of your hand, making a snug and comfortable fit
8. Nitrile has a longer shelf life than natural rubber latex (5 years)
9. Nitrile can better withstand permeation, making them less likely to absorb water in damp environments
10. Nitrile gloves are versatile and can be used across a large spectrum of industries

For countless industries, nitrile gloves are an ideal choice because they can offer numerous more benefits than latex gloves for many applications.
Helping To Make the Switch

A change in gloves is a major decision that will impact everyone in your facility, as well as your administrators. We are able to help you by providing the information you need to make the best possible latex-free choice for your facility in terms of performance and cost. Our sales staff will conduct a comprehensive review at your facility to demonstrate precisely what the financial impact of a switch to nitrile gloves should be. Our staff medical consultants will assist in educating your employees as to the benefits and proper use of nitrile gloves. When you’re ready for the better alternative to latex, let us help you make the switch. Knowing that your patients and employees are safer and your facility is better equipped to serve their needs is one less thing for you to worry about.

What Do We Propose

In developed countries like United States and European countries, Nitrile examination gloves have mostly replaced latex examination gloves. Nitrile Examination gloves are more chemical resistance than the latex examination gloves making it more suitable in almost every facilities. In the past, nitrile examination gloves used to be far more expensive than latex examination gloves due to better quality and no latex protein allergic potential. However, in the recent years, nitrile prices have drop significantly due to widespread usage that leads to reduction in cost to produce. Nitrile examination gloves and latex examination gloves have reached a similar price point where conversion to a better quality gloves doesn’t increase the cost for adoption. Also, Malaysia is a one of the largest exporter of nitrile examination gloves. Many factories have converted their production line from making latex gloves to nitrile gloves. In developed countries, the high concern about latex allergies from latex gloves and BPA poisoning from vinyl gloves leads to the massive adoption of nitrile examination gloves as infection control standard. It is time for our health workers to deserve a better hand barrier protection for the same cost that they would pay for latex examination gloves.