

Today's surgical gloves fit better, feel better, work more safely - and moisturize your hands in the bargain.

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Some would say that today's surgical gloves are better than ever. After you read this article, it may be tough to argue that claim. As you'll see, surgical glove manufacturers have seemingly addressed every conceivable complaint and concern you've ever heard from the OR team by designing gloves that fit and feel better, work more safely and moisturize your hands in the bargain. Here's a rundown of seven notable advances.

1. Dermal coatings

Dermal coatings are meant to prevent dermatitis by moisturizing wearers' hands during and after surgical glove use. Medline pioneered this movement when it placed an inner coating of pure aloe in its Aloetouch exam glove. After adjusting the thickness, grit, grip and feel unique to surgical gloves, Medline 18 months ago added a dermal coating to its surgical gloves. Cardinal recently added its Neu/Thera dermal coating to the Esteem surgical glove. Both companies worked for several years to develop a coating that would hydrate but not feel greasy and that would withstand the heat and sterilization gloves experience during manufacture.

"We did not stumble into this," says Tony Yeh, PhD, Cardinal's vice president of applied technology. "It took a lot of time for our R&D team to identify the active ingredients, then test to see how they would interact with the glove substrate and the glove-making process."

Neu/Thera is comprised of ingredients that help maintain skin elasticity, prevent moisture loss, rehydrate and promote healing.

"The minute you take this glove off, you can tell the difference," says Jeannie Thompson, Cardinal's vice president of marketing. "We did a presentation where attendees wore one glove for 15 minutes. When they took it off, you could see the difference."

During focus-group studies about five years ago, Medline found nurses' No. 1 job-related health complaint is contact dermatitis. The company turned to aloe for its soothing and healing properties, and investigated the concept of creating a non-greasy dermal coating.

"When people think of aloe, they think of it in lotions and other cosmetic products where the feel is greasy. The greasy feel comes from the lotion. In its natural form, aloe is not greasy at all," says Paul Bottcher, Medline's senior product manager. "We developed a process to dehydrate the aloe, ship the freeze-dried aloe to our manufacturing plants overseas, and place it inside the glove. Body heat rehydrates the aloe when the glove is worn."

2. Latex-free with improved fit and feel

Latex-free gloves are the fastest-growing segment of the surgical glove market, now comprising about one-third of surgical gloves sold in the United States. This is due in large part to facilities' commitment to averting latex allergy reactions and gloves' improved fit, feel and comfort.

"Getting [latex-free] products so they feel right has taken some time," says Milt Hinsch, the technical services director for Regent Medical. "The early synthetics didn't feel like latex, and only people with diagnosed latex allergy used them."

Chemists could create a soft plastic, says Mr. Hinsch, but once it was stretched, it would not return to its former shape as natural rubber latex would.

Surgical Glove Manufacturers		
Ansell	(800) 321-9752	www.ansell.com
BarrierMed, Inc.	(800) 966-1604	www.barriermed.com
Cardinal Health	(847) 578-2249	www.cardinal.com/allegiance
Dynarex Corporation	(800) DYNAREX	www.dynarex.com
ECI Medical Technologies	(800) 668-5289	www.elastyfree.com
Kimberly Clark Health Care	(800) 524-3577	www.kchealthcare.com
Howard Medical Company	(800) 443-1444	www.howardmedical.com
Maxxim Medical	(800) 346-8849	www.maxximmedical.com
Medline	(800) MEDLINE	www.medline.com
Regent Medical	(800) 843-8497	www.regentmedical.com
Sempermed	(800) 366-9545	www.sempermed.com
SmartPractice	(800) 822-8956	www.smartpractice.com
Tilotson Health Care	(800) 445-6830	www.thcnet.com
World Medical Supply	(800) 545-5475	www.powderfree.com

"The isoprene molecule gives natural rubber latex its stretch," says Mr. Hinsch. "The first material developed was neoprene, which was chlorinated isoprene. It had very good properties, but was a thick glove without the feel surgeons need."

Improvements in neoprene led to Regent's Biogel Skinsense N, which, according to Mr. Hinsch, is softer and durable enough for orthopedics and other procedures involving surgical hardware. About 18 months ago, Ansell introduced the Derma Prene Ultra neoprene glove.

"It contains no accelerator chemicals, which has lowered the glove modulus, which is how much a glove squeezes the hand, especially across the palm," says Ansell clinical consultant Janie Thomas, RN. "The material is soft and flexible, similar to the fit, feel and comfort of latex."

Polyisoprene, a polymerized isoprene, is the latest development. At first, its feel more closely resembled latex, but was not as strong and was sometimes stiffer than latex. In recent years, a second generation of polyisoprene gloves was introduced to address these issues. Even as polyisoprene gloves' acceptance grows — "It's amazing how many customers are moving to completely synthetic glove usage," says Ms. Thomas — manufacturers continue to tinker. Keith Boulter, president of ECI Medical Technologies, makers of Elastyfree surgical gloves, predicts polyisoprene gloves will soon be even stronger and softer.

3. Powder-free latex gloves

Powder is used in manufacturing so latex gloves will release from their molds. Manufacturers now wash that powder away, usually with chlorine, or don't use it at all. "Our manufacturing process doesn't use powder. Very few manufacturers use this technique because it's expensive to make latex gloves this way. A lot of gloves don't qualify and have to be discarded," says Richard Pascoe of World Medical Supply, which makes the Pristine Powder-free Glove.

Elastyfree is another glove manufactured powder-free. Mr. Boulter says this process was worth developing because it eliminates chlorination.

"Chlorination leaves residual chlorine, which is a potential irritant," he says. "Also, chlorine is aggressive and weakens the glove material. The challenge is to not put powder on the gloves, then you don't have to take it off."

4. Preventing slip-down

As surgical facilities convert to disposable surgical gowns made of slippery synthetics such as polypropylene, surgeons and staff more often complain of glove slip-down. The glove cuffs, generally made in a funnel shape with a larger opening at the top, would not anchor on the gown fabric. Regent Medical set out to redesign the glove cuffs to prevent this problem.

"Although this wasn't really a glove problem, it was a problem for our users. We redesigned the cuff so it would be more tubular and would prevent slip-down," says Mr. Hinsch.

The new design required that Regent invest in new porcelain formas, which are the molds the gloves are made on. After nearly two years, the Optifit feature became available on Biogel Skinsense, Supersensitive and its new Orthopedic glove.

5. Smooth or "grippy"

Manufacturers used to achieve various glove grips by texturing the glove mold itself. This enhanced the grip for surgeons but reduced tactile sensitivity. Now manufacturers alter the grip chemically. Cardinal developed Surface Modification Technology (SMT) to smooth the glove surface.

"It was a very technical challenge to modify the surface of the glove without changing the integrity of the glove itself," says Dr. Yeh. To measure the differences in grip (offered as SMT or regular), Cardinal borrowed a coefficient-of-friction measuring device used in the suture business.

The glove's grip is also made slippery by chlorination. So if you're looking for a better grip, shop for a non-chlorinated glove.

"Non-chlorinated gloves have a true rubber grip that lasts through the procedure. The majority of clinicians will agree that a stronger grip is good; the goal is to have control of the instrument during the procedure. We do have smooth-grip gloves for those who need it, mainly ophthalmology and microsurgery," says Mr. Bottcher.

6. Easier donning

Powder-free gloves aren't as easy to don as powdered ones. To ease donning with wet or dry hands, some manufacturers coat the inside of gloves with polymers. The polymers do slick the surface but can flake off when the glove stretches but the coating does not, says Dr. Yeh.

Cardinal created a triple-layer glove called Protegrity. The outside layer is a natural rubber latex, the inside layer is strong, smooth nitrile. Between them is an intermediate layer that helps adhere the nitrile.

ECI Medical's Elastyfree glove has five layers, with special coatings on the inside and the outside to eliminate the need for powder.

"The inside layer provides donnability, and the outer coating will maintain its grip whether the glove is wet or dry. It doesn't want to be sticky or slippery. We've improved it in just the last six months through chemical compounding," says Mr. Boulter.

7. Reduced irritants

While latex allergy is a devastating problem for some healthcare workers, Type IV allergic reactions to irritants in the gloves are more widespread, and manufacturers are working to reduce or eliminate these. The Pristine Powder-free Surgical Glove is manufactured powder-free, and the glove is washed repeatedly to remove chemical irritants and reduce latex protein to the lowest possible level.

"Processed water brings the latex protein down to an extremely low level and removes all chemical residue," says Mr. Pascoe, who adds that it is the only surgical glove is used by In Vitro Fertilization clinics because it meets IVF's rigorous standards for non-toxicity. Medline puts its gloves through a non-chlorine wash (chlorine is an irritant) before adding the aloe dermal coating.

And you can afford it

You used to pay more for gloves that are latex-free, powder-free, contain special coatings or have been processed to reduce proteins or remove chemical irritants. But the cost gap between those and powdered latex gloves is closing. Here are per-pair price ranges:

- powder-free latex gloves range from 90 cents to \$1.50;
- synthetic gloves range from \$1.25 to \$1.60;
- polyisoprene gloves run from \$1.50 to \$1.75; and
- powdered latex gloves cost as little as 60 cents (though natural rubber latex is getting more expensive, and that will soon be reflected in latex glove prices).

"When making purchasing decisions, people should consider quality of product versus price," says Michael Pavesi, the vice president of sales and marketing for BarrierMed. "Comfort, fit, feel, finger dexterity, barrier protection — the clinical values of the glove should not all come second to price." ■

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