Wearing the suit, and taking it off

Experts say the greatest Ebola risk comes when removing the protective gear.

By Alan Zarembo

The suit is the difference between life and death.

In the heart of the Ebola epidemic in West Africa, health care workers are wearing sealed head-to-toe in waterproof suits that have been tested against viral, bacterial and chemical intrusion. Goggles, face masks and double gloves complete the Fortress Around the User.

But for all the safeguards, the suit has one glaring weakness: the wearer.

The greatest risk comes when removing the suit. Procedures in a choreographed series of steps that fail to maintain the sterility of the protective gear can lead to contamination.

I honestly believe you could probably wear a trash bag and be safe," said Dr. William Fitcher, a University of North Carolina critical-care specialist who spent several weeks in the West African nation of Guinea this summer treating Ebola patients. "But if you just rip that trash bag off and have fluid flying everywhere you're at risk.

The suit — and the extensive training to use it correctly — lies at the heart of growing concern from nurses and other health care workers who say they are being left dangerously vulnerable to the Ebola virus.

They have complained that hospitals are widely unprepared and understaffed.

The chaos of handling Ebola suits is evident in the arrival at the Texas Memorial Hospital in Dallas. The Liberian Airlines flight carrying two nurses who cared for a confirmed Ebola patient did not arrive as scheduled.

Nurses from the hospital said to workers who cared for Duncan were given fully protective gear and had no proper training in how to use it. The hospital has disputed that, saying the staff was provided with gear that was consistent with federal guidelines "at that time.

Unlike Ebola, or any other infectious disease, the Ebola virus is present in every body fluid, including saliva and sweat. Transmission occurs when the virus comes in contact with mucous membranes or broken skin.

The suits used in Africa are sealed against the world.

Virus spurs demand for gear

Protective apparel makers' shares surge.

Sean Casey, head of the Ebola response team in Liberia for International Medical Corps, said workers in the African heat sweat profusely in their suits, losing about a quart of water an hour.

"It's incredibly hot," he said in an email from Liberia, where the aid group runs a 70-bed Ebola treatment unit. "People sometimes feel claustrophobic when their masks get soaked in sweat. Some like it to waterboarding." (Editor's note: The word "waterboarding" is a reference to the use of water in the Ebola protective gear to prevent it from getting wet and contaminated.)

In the most secure laboratories, scientists breathe only purified air delivered through a hose attached to their hermetically sealed "space suits." To leave the laboratory, they must pass through a chemical shower that lasts several minutes. "It's like being in a car wash," said Thomas Geletten, an Ebola expert at University of Texas Medical Branch in Galveston.

U.S. hospitals use a wide variety of protective clothing, infectious-disease doctors said that they often faced a trade-off between maximum protection, comfort and functionality.

One common suit, the Tyvek made by DuPont, can sell for as little as $15, with goggles and other accessories.

Until this week, the U.S. Centers for Disease Control and Prevention advised that all people entering a patient's room wear splash-proof gowns, gloves and a face mask.

New guidelines released Tuesday called for a hood that covers the neck and a step-by-step process for gear removal — including multiple hand washings — under the supervision of a site manager.

Suits will be standardized, though the CDC is still deciding whether that standard will be the full-body suits already in use at some larger hospitals.

Nurses from Texas Health Presbyterian said Wednesday that despite months of alerts from the CDC about the possibility of Ebola patients in the U.S., their hospital had no clear rules on how to handle a case.

The nurses said some nurses wore gloves with no wrist tape to seal them. Their gowns did not cover their necks from exposure. They wore no protective booties. Dr. Thomas Frieden, head of the CDC, said this week that after Duncan was diagnosed with Ebola, some workers at Texas Health Presbyterian began wearing three or four layers of gear out of the belief that it was safer. In fact, he said, having to remove more equipment increased the risk.

Hospitals across the country are assessing their protocols, training and equipment.

"If you're not careful and don't have somebody watching you like a hawk, it's easy to contaminate yourself," said Dr. Zachary Rubin, who heads infection prevention at UCLA Medical Center.

At his hospital, a team of about 60 emergency department workers are going through drills on how to suit up and remove protective gear. "Every time we go through it, we learn a little bit more," he said.

The best protection is years of practice. The international aid group Doctors Without Borders has been responding to Ebola outbreaks in Africa for decades. The group's procedures are considered the gold standard — and its safety record backs that up.

At the end of a shift inside a treatment unit, a worker leaves through a special exit and undresses under the direction of a monitor. The process, which starts with the fully suited worker being sprayed with a chlorine disinfectant, involves more than 50 steps.

Remove the outer gloves, the apron, the goggles and hood. Untie and roll down the covers. Remove the inner gloves. Slip on the boots, step into the low-risk area and spray them again. Gloved hands are rinsed in the chlorine solution eight times during the process.

Staff members are rotated out of high-risk areas every four weeks to prevent complacency.

Ebola armor

Protective suits shield healthcare workers from bacteria, viruses and other hazards. The humanitarian group Doctors Without Borders recommends standard gear as a shield from dangerous contaminations.

Personal protective equipment

Goggles or face shield

Mask

Disposable suit is secured with front zipper

Surgical gloves

Second pair of surgical or rubber gloves

Rubber boots

Source: Doctors Without Borders

Ebola in Africa is on the rise, and the U.S. is on high alert. The Los Angeles Times is tracking the latest developments from the epicenter of the epidemic in West Africa. For more information, visit latimes.com/ebola.