

## Active Barrier Apparel: The Simple, Evidence-Based Workplace and Patient Safety Strategy

Bitu A. Kash<sup>1\*</sup> and Elise Davis<sup>2</sup>

<sup>1</sup>Department of Health Policy & Management, School of Public Health, Texas A&M Health Science Center, Texas A&M University

<sup>2</sup>NSF Center for Health Organization Transformation (CHOT), School of Public Health, Texas A&M Health Science Center

\*Corresponding author: Kash BA, Department of Health Policy & Management, School of Public Health, Texas A&M Health Science Center, Texas A&M University, MS 1266 | 235 Administration Building, College Station, TX 77843-1266, Tel: 979-436-9462; E-mail: [bakash@sph.tamhsc.edu](mailto:bakash@sph.tamhsc.edu)

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### Commentary

Healthcare worker attire has been deeply rooted in culture and tradition for hundreds of years. Starting with Hippocrates, many argue that the physician is a member of a distinguished profession and should dress as such [1]. White coat ceremonies throughout universities encourage this opinion, and imply that the attire of health workers is necessary to uphold the dignity of the health worker. Yet, recent years have revealed the potential role of health worker apparel in the transmission of healthcare-associated infections [2].

Healthcare workers often face the most dangerous work conditions and environments [3]. Healthcare workers are at risk of becoming ill or infected by exposure to infectious diseases, and can be exposed to pathogenic microorganisms and fluids capable of transmitting disease, which may become colonized and infected [4-7]. Procedures are in place to clean and disinfect most hard surfaces that patients may come in contact with. Yet, the most mobile surface of all, the healthcare worker uniform is often overlooked. Uniform technology currently purchased and used by health services organizations and workers is outdated, and adopting new active barrier technologies is an easy leap forward in protection of both healthcare workers and patients. Currently, uniforms and apparel (scrubs, lab coats, smocks, pants, skirts and shirts), worn by the U.S. healthcare workforce are non-protective uniforms [8]. During a work shift these non-protective uniforms and apparel have been shown to rapidly acquire and retain multi drug resistant organisms (MDROs) that can pose a significant risk to life and health [9-13]. Additionally, many health workers are responsible for cleaning their own uniforms, which is inadequate in eliminating infectious organisms, and which is not completed after every shift as it should be [14]. As healthcare delivery has extended to alternative sites and MDROs have become more prevalent in community settings, risk increases. It is important therefore to place attention on methods to reduce the potential exposures to microorganisms, body fluids, and other potentially infectious materials which can be found on healthcare worker uniforms in many different settings [8,12-16]. These methods include looking beyond traditional controls and focusing on how uniforms can be engineered to be protective.

Advances in textile technology, like newly available healthcare worker active barrier apparel is designed as a replacement for traditional non-protective apparel and works by first repelling splatter and spills of fluids and other material and then by reducing the risk of microbial transmission by lowering the bacterial burden on the fabric. Since most occupational exposures to blood and body fluids are unexpected or unanticipated, technologies like these serve as a barrier when personal protective equipment (PPE) is not worn.

This editorial outlines guidance from professional societies and legislative actions that have provided positions on active barrier apparel as a best practice for healthcare apparel. This type of technology can replace today's traditional apparel or uniforms, such as scrubs and white coats worn in healthcare settings throughout the United States.

### Recently Published Guidance

The Association of Professionals in Infection Control and Epidemiology's (APIC's) recent guidance - Ten Ways to Protect Patients includes a statement on attire: "*What you wear matters! Make sure your attire does not become a source of infection.*" [17]. In November of 2015, the updated "Recommended practices for surgical attire," was released by the Association of perioperative Registered Nurses (AORN) to address surgical attire, including scrub attire, stating that apparel should be tightly woven, low linting, stain resistant, and durable, and that scrub attire may be made of antimicrobial fabric [18].

Also, the Society for Healthcare Epidemiology of America (SHEA) has recently provided expert guidance on healthcare personnel attire for non-surgical settings through extensive literature review and survey of health workers in various settings [2]. Their 2014 guidance states that the role of attire in cross-transmission remains poorly established. Until more definitive information exists, priority should be placed on evidence-based measures. A randomized crossover trial in the intensive care unit setting compared traditional non-protective scrubs to active barrier scrubs [12]. This research documented a significant reduction in surface MRSA burden and concludes that for settings with high rates of hospital-acquired infections and exposure to drug-resistant pathogens such as MRSA, the use of antimicrobial apparel may be a useful in combination to other infection prevention measures. SHEA recommends mandates on laundering, storage, and use of white coats in various places of hospitals and clinics, keeping in mind that the use of white coats in medical settings is a symbol of professionalism. Additionally, after a thorough due diligence review of healthcare worker apparel solutions, the American Hospital Association (AHA) has also taken interest in these types of technologies and has, for the first time, endorsed an active barrier apparel technology [19].

### Legislative Action and Policy

Legislative activity enacted by the U.S. Congress and the signed by the President also addresses the issue of healthcare worker safety and the potential role that innovations in healthcare worker attire can have in providing safer healthcare [20]. The National Defense Authorization

Act encourages the Department of Defense to incorporate the effective use of emerging technologies, including innovative textile products designed to reduce the chance of spreading infections in healthcare settings where appropriate. The Milcon/Veterans Affairs Appropriations Bill encourages the Department of Defense to incorporate the use of current commercially available active barrier technologies by healthcare workers and patients that have been proven to be effective in the medical care setting [21]. Finally, the Defense Appropriations Bill encourages the Department of Defense to incorporate commercially available, effective technologies, including innovative textile products, to reduce opportunities for spreading infections in healthcare settings [22].

### Filling a Gap

Significant opportunities exist to fill the gap in healthcare safety, enhance workplace safety, and improve patient satisfaction by implementing a simple new technology based on evidence and research. The implementation of an active barrier attire strategy will not likely increase operating costs for hospitals and clinics, and has the potential to prevent exposure and reduce risk of colonization and infection among health care workers, patients, and the community at large.

As healthcare facilities transform into High Reliability Organizations (HROs) we expect to observe improvement in performance and outcomes due to the implementation of evidence-based innovations that prevent or reduce the risk of failures, such as exposure to infectious diseases to those who work in healthcare, one of the most dangerous work settings. Textiles used for uniforms currently worn by workers in healthcare are outdated. Adopting new active barrier technologies can help protect workers and patients, is cost efficient, and is an easy leap forward in providing safer environments for healthcare workers.

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