Smart Textile Development Stages

Time Horizon	Barrier	Communication Early Warning	Sustainability	Active Functionality
0-3 years **SMART**	• Barrier maintained with lower basis weights at lower cost • Fully impervious to bacteria, virus, prions and fluids • Simpler material structures	• None at present	• Incorporation of some biopolymers at low additive levels • Downgauging and lightweighting • Reduction of medical waste costs	• Water vapor transmission rate and breathability of fabric influenced by body temperature • Connectivity — gowns and gloves • Cooling or heating apparel and surgical drapes
3-5 years **SMARTER**	• Odor elimination • Smoke elimination • Tear-proof and puncture-proof drapes, gowns and gloves	• Detection and disclosure of a break in barrier	• Biobased polymers becoming economically justifiable • Move to green materials via current or green manufacturing technologies, reducing energy usage	• Monitoring capabilities — temperature, blood pressure, breathing, oxygen — through embedded sensors • Conformable materials for comfort, ease of donning and doffing apparel • Integrated RFID tracking for compliance
5+ years **SMARTEST**	• Active enhancement of the environment around the drape to promote bacterial and viral barrier	• Sensors fine-tuned to detect patient distress, providing feedback and alerts • Self-healing/repairing of breached materials	• Self-cleaning surfaces in hospitals — operating room tables, curtains and cubicles • Reusable and disposable products • Re-sterilizable and reusable products	• Encapsulated solidifying technology that provides instant rendering of bodily fluids non-contaminating, both in mobility and potency

Table 1