

Role of Textiles in Internal Medicine

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Textiles in internal medicine refer to a specialized branch of technical textiles (meditech) designed for hygiene, wound care, infection control, and, increasingly, for advanced, implantable, or smart, therapeutic applications. These materials are designed to be biocompatible, non-toxic, and often antimicrobial to improve patient comfort and facilitate recovery.

Here is an Overview of Textiles in Internal Medicine

Key Classifications of Medical Textiles

Medical textiles are classified by their application, including both wearable and internal (implantable) products:

- **Non-Implantable Materials:** These are used externally for wound care and include bandages, gauze, sponges, and plasters. They are designed to be highly absorbent to manage wound fluids and, in some cases, to deliver drugs or act as antibacterial barriers.
- **Implantable Materials:** Used inside the body for, or in, surgical procedures, such as surgical sutures (both biodegradable and non-biodegradable), vascular grafts, artificial tendons, and ligaments.
- **Healthcare and Hygiene Products:** These include items for infection control in hospital environments, such as surgical gowns, drapes, masks (like N95), and patient bedding.
- **Extracorporeal Devices:** These are used outside the body to support organ functions, such as artificial kidneys (dialysers), livers, and mechanical lungs.

Common Materials and Fibers

Textiles for medical use are made from natural, synthetic, or specially engineered fibers:

- **Natural Fibers:** Cotton is widely used for bandages, gauze, and bedding due to its high absorbency. Silk is frequently used for sutures.
- **Synthetic Fibers:** Polyester, polypropylene, and polyamide are used for their high strength, durability, and resistance to bacteria. Polytetrafluoroethylene (PTFE) is used for vascular grafts.
- **Specialty/Biodegradable Fibers:** Chitosan, alginate, and collagen are used for their biodegradability and ability to promote healing in wound dressing.

Key Applications in Medicine

- **Wound Care & Dressings:** Advanced dressings now use textile structures that are non-adherent to the wound, such as those made from chitosan, which can stop bleeding

(hemostasis).

- **Cardiovascular & Orthopedic Implants:** Textile fabrics are used for artificial veins, arteries, and heart valves. In orthopedics, textiles help in repairing tendons and cartilage.
- **Infection Control:** Antimicrobial-coated textiles, often using silver or copper nanoparticles, are used in scrubs and patient gowns to reduce Hospital-Acquired Infections (HAIs).
- **Smart Textiles:** These are in development to monitor patient health, such as clothing that can measure heart rate, breathing, and blood pressure, transmitting data directly to doctors.

Important Properties

Medical textiles must meet strict requirements:

- **Biocompatibility:** The material must not be rejected by the body.
- **Sterilizability:** Ability to be cleaned using physical or chemical methods.
- **Sterility and Low-Linting:** Essential to avoid contamination.
- **Porosity:** Crucial for allowing tissue growth in implants.
- **Moisture Management:** The ability to absorb or repel fluids.

The market for medical textiles is a rapidly expanding, high-value sector driven by an aging population and advancements in biotechnology.

In internal medicine, textiles—often termed medical textiles or Meditech—are engineered fiber-based structures used for everything from hygiene and infection control to sophisticated organ support.

Key Categories and Applications

Medical textiles are broadly classified into four functional groups based on their interaction with the human body:

- **Extracorporeal Devices:** These are mechanical organs used for blood purification and treatment outside the body.
- **Artificial Kidney (Dialysers):** Utilize hollow cellulose or polyester fibers as membranes to filter waste from the blood.
- **Artificial Lung:** Employs microporous membranes or microfibers (often polypropylene) that allow gas exchange.
- **Artificial Liver:** Uses hollow fiber bioreactors to transform human cell lines and detoxify plasma.
- **Implantable Materials:** Used to repair or replace internal structures.
- **Vascular Grafts:** Woven or knitted polyester (Dacron) or PTFE tubes used to replace damaged arteries.
- **Heart Valves:** Covered with polyester fabrics to allow the

valve to be sutured to surrounding tissue.

- **Surgical Sutures:** Can be absorbable (made of collagen, polyglycolic acid) or non-absorbable (silk, nylon, polyester).
- **Healthcare and Hygiene Products:** Essential for preventing Nosocomial (Hospital-Acquired) Infections.
- **Protective Apparel:** Includes surgical gowns, masks, and caps made from non-woven polypropylene to provide a barrier against pathogens.
- **Bedding and Curtains:** Advanced textiles often include antimicrobial coatings (like silver or copper) to reduce microbial load in patient rooms.
- **Non-Implantable Materials:** Used externally for wound care.
- **Advanced Dressings:** Made of alginate, chitin, or collagen to promote faster healing and manage exudates.
- **Compression Bandages:** Used in the management of deep vein thrombosis (DVT) and lymphatic diseases.

Advanced & Smart Textiles

- **Biomonitoring:** “Smart” textiles integrated with sensors can continuously monitor patient vital signs like heart rate, temperature, and blood oxygen levels.
- **Drug Delivery:** Some textiles are engineered to release medications, such as antibiotics or anti-inflammatory drugs, directly to a localized area over time.

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