Sustainable Medical Textiles

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Definitions

**Textile**
“woven fabric, fibres, filaments and yarns, natural and manufactured, and most products for which these are a principal raw material”

**Medical Textile**
“a textile structure which has been designed and produced for use in any of a variety of medical applications, including implantable applications”

(The Textile Institute, 2021)
Medical Textiles

• Emerging subspecialist field
• First recognized as a field of the technical textile industry in 1995
• Between 2000 and 2021
  • 3238 papers published about medical textiles in journals recognized by Pubmed
  • 2075 of those published in last 5 years
  • 2077 on antimicrobial textiles

(Morris & Murray, 2021)
Currently

- Fastest growing sector of technical textile industry
  - 2020 USD 13 billion
  - 2026 USD 17-25 billion
    - Global orthopaedic market 2019 USD 45 billion

- Growth driven by
  - Technology - nanotechnology, electrospinning, new materials
  - Demand
  - Political agenda - sustainability
• Furnishing fabrics and textiles in fixtures and fittings in healthcare establishments

• Components of devices for environmental hygiene control
The Design Process
Properties of the device materials

- Physical: structure, size, permeability, laundering
- Mechanical: strength, durability, flexibility, wear
- Biological: antithrombogenic, immunosuppressant, antimicrobial, pharmacological
- Cosmetic
- Economic
- Environmental
Fibres and Filaments

- Natural
  - Animal
  - Vegetable
  - Mineral

- Synthetic
  - Natural polymer
  - Synthetic polymer
  - Other
Fibres and Filaments

- Natural
  - Animal
- Vegetable
- Mineral
Fibres and Filaments

- Synthetic polymers

(Akbari and Ryzard 2019)
Fibres and Filaments
Fibre

Yarn

Fabric

Garment

Finishing
Making a Fabric

- Main categories
  - Weaving
  - Knitting
  - Non Woven

- Other options
  - Braiding
Finishing of the fabric (fibre or yarn...)

- Many options
  - Surface modification
  - Heat treatment
  - Plasma treatment
  - Molecular imprinting

- Sterilisation
  - Testing to determined standard
Applications
Healthcare/hygiene

- Linen – bed linen, blankets, curtains, patient clothing, hoist slings, staff clothing
- Chair/table covers
- Sanitary wear and incontinence products
- Wipes and cleaning materials
- PPE
- Environmental hygiene control
Manufacturing

(Images courtesy of Toray Textiles Europe Limited)
Manufacturing

(Images courtesy of Anze Limited)
References


