Laundering and Restoration of Reusable Surgical Barrier Textiles

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Reusable Surgical Textiles

- Barrier Surgical Gowns and Drapes - Fluid Resistant Textiles
  - Protect health care workers from blood and bodily fluids
  - Provide comfort and allow for sterilization
  - Several degrees of protection available
Fabric Technology

- Muslin
  - Traditional reusable OR fabric

- Poly/Cotton Blend
  - Repellent finishes

- Polyester Microfiber Technology
  - Continuous filament threads
  - Tightly woven
  - Repellent finishes
Reusable Surgical Textiles

- Muslin
Reusable Surgical Textiles

- Cotton/polyester blends
Reusable Surgical Textiles

- 100% polyester ‘microfiber’
Reusable Surgical Textiles

- Laminated fabrics – Gore-Tex®
Reusable Surgical Textiles
Microfiber Technology

- Continuous filaments vs. staple fibers
  - Significantly lower linting potential
Fluid Repellent Finishes

- Polyester is “naturally” hydrophobic
  - But highly oleophilic
- Fluoropolymers
  - Water and oil repellent
  - Mill applied, cured
Environmental Issues

- Reusable Surgical Textiles can reduce medical waste significantly
  - One garment can replace 150-200 disposable gowns
  - Considerable medical waste incineration or landfill impact
  - Significant cost savings can be achieved
Environmental Issues

- AHA & EPA agreement: Hospitals for a Healthy Environment
  - Goals: Reduce the overall volume of hospital waste (both regulated and non-regulated waste) by
    - 33 percent by 2005 and
    - 50 percent by 2010
  - See www.h2e.org
Regulatory Issues

- Surgical gowns, drapes wraps and towels are “Class II Medical Devices” as defined by FDA
- Commercial laundries that reprocess surgical textiles may need to register with FDA
- Reporting Requirements –
  - Strike-through
  - Complaint handling
Standard Laundry Process

- Time
  - 30-45 minutes

- Temperature
  - 160-180°F

- Mechanical Action
  - Rated Capacity of Washer

- Chemical Action
  - pH 11.0-11.5
  - Surface Active Agents
Standard Laundry Process

- Chemical Action
- Mechanical Action
- Temperature
- Time
Reusable Care Concerns

- Low absorptivity
  - Laminated fabrics: Impervious to fluid transmission
  - Barriers reduce chemical transmission through fabric
  - Reduced soil removal efficacy
Reusable Care Concerns

- Polyester - affinity to oily soils
  - Recommended temperature between 140-160°F
  - Use nonionic detergents – more difficult to rinse
Reusable Care Concerns

- Rinsing of detergent is key to barrier performance
  - Any residual detergent will affect barrier performance negatively
  - Must add extra rinsing time and steps
  - No fabric softeners or anti-static agents can be used
Reusable Care Concerns

- Polyester - Alkaline hydrolysis potential
  - Reduce the amount of alkali, reduce pH to <10.5
  - Keep temperature <180°F
Soil Characteristics

- Blood Soils
  - Low temperature flushes to reduce “setting”
  - Enzyme detergent in prewash zone of tunnels
Soil Characteristics

- Oily Soils – Body Oils or Mineral Oils
  - Polyester has a high affinity for these soils
  - High surfactant detergents with oily soil emulsification properties
  - Cloud point of detergent 100-120°F
  - High phosphate detergents work better
  - Solvent-based detergent additives can help
Soil Characteristics

- **Tape Residue**
  - Use special tape with water/alkali soluble adhesive
  - Very difficult – if the wrong tape is used
  - Solvent detergent re-washes, high temperature reclaim process
Reusable Care Concerns

- Fluoropolymer finishes: Can be removed with harsh laundering processes
  - Reduce alkali
  - Avoid use of oxalic acid
  - Avoid some harsh solvents
Barrier Fabric Process

- Increased Time
  - 45-60 minutes

- Reduced Temperature
  - 140-160°F

- Increase Mechanical Action
  - 65-75% of rated capacity

- Change Chemical Ratios
  - More detergent, less alkali
Barrier Fabric Process

Mechanical Action

Chemical Action

Temperature

Time
Drying Process

- Achieve “bone-dry” state
  - Dry at 170-200°F
  - Maintain maximum temperature for 3-5 minutes
  - Cool-down to 100°F
Reusable Protection

- Suter test - Hydrostatic resistance
  - AATCC 127-1985
- Oil and water repellency tests
  - AATCC 118-1992
- Resistance of Protective Clothing Materials to penetration by blood or bloodborne pathogens
  - ASTM F1670-95
  - ASTM F2671-95
Repellency Performance

- Oil Repellency is a major issue in surgical protective barrier materials
  - Suter test doesn’t reflect oil repellency performance
  - Oil stains can cause concern with health care personnel
Barrier Rejuvenation

- Modified fluoropolymers can be added in the final rinse cycle
  - Use rate of 2-6 oz/cwt
  - Cost of 2-4 cents per garment
  - Good drying is critical
- “Maintenance” application of polymer can extend life beyond 150-200 uses
Reference

Additional Sources

- ARTA - American Reusable Textile Association
  - www.arta1.com

- TRSA – Textile Rental Services Association
  - www.trsa.org
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