NSF MUSES PROJECT
Materials Use: Science, Engineering, and Society

Health Protective Textiles: Bridging the Disposable/Reusable Divide
ARTA, INDA, American Association of Textile Chemists and Colorists, American Society for Testing and Materials, American Hospital Association, National Textile Center, NIOSH, USEPA, etc.
General Research Objectives

- To determine the most effective materials for different medical applications
- To quantitatively assess the economic, environmental, and health risks associated with use of various materials for different medical applications
- To determine the social and psychological factors affecting acceptance of disposable and reusable textile products in healthcare settings
Past and Ongoing Projects: Rucker’s Laboratory

Variables Affecting Selection of Medical Textiles: Voices from the Hospitals
Data Collection and Analysis

- Mail questionnaires and interviews with infection control professionals, hospital purchasing agents, doctors, nurses, etc.
- Observations
Attitudes toward Medical Textiles: Purchasing Agents and Doctors

Yifan Lu and Margaret Rucker
University of California, Davis
Preliminary Study

- Questionnaires were mailed to a nationwide sample of 200 purchasing agents and doctors – 4 from each state. The return rate was close to 50%.

- One goal of the preliminary study was to select a small number of important medical textile properties from a large number of potentially important properties.

- Another goal was to determine extent of switching from one type of product to another and reasons for switching.
Frequency of Use of Reusable and Disposable Products

- 72% used all disposable surgical gowns, 4% used all reusable gowns
- 71% used all disposable drapes, 4% used all reusable drapes
- 81% used all reusable scrubs, 13% used all disposable scrubs
- 88% used all reusable bed linens, 5% used all disposable bed linen
Switching Behavior

- For surgical gowns, 8% switched to more disposables and 5% switched to more reusables.
- The reason given for switching to disposable gowns was cost.
- Cost was also mentioned as a reason for switching to reusables along with concern about strikethrough problems with disposables.
How Are Purchasing Decisions Made?

- 25% made by a committee
- 22% made by unit supervisors
- 21% made by unit supervisors with user input
- 32% other responses
Main Study Sample

- A sample of 800 purchasing agents and 800 surgeons were randomly selected from the American Hospital Association Directory.
- A total of 195 questionnaires were returned from purchasing agents and 174 from surgeons.
Demographic Profiles of Hospital Purchasing Agents (n=195) and Health Care Workers (n=174).

<table>
<thead>
<tr>
<th>Size of Hospital</th>
<th>Hospital purchasing agents sample</th>
<th>Health care workers sample</th>
<th>Location of Hospital</th>
<th>Hospital purchasing agents sample</th>
<th>Health care workers sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small hospitals (beds&lt;=50)</td>
<td>33%</td>
<td>43.1%</td>
<td>Midwest</td>
<td>26.4%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Medium hospitals (50&lt;bed&lt;=250)</td>
<td>39.3%</td>
<td>33.5%</td>
<td>North</td>
<td>20.2%</td>
<td>19.9%</td>
</tr>
<tr>
<td>Large hospitals (bed&gt;250)</td>
<td>27.7%</td>
<td>23.4%</td>
<td>West</td>
<td>29.0%</td>
<td>26.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>South</td>
<td>24.4%</td>
<td>20.5%</td>
</tr>
</tbody>
</table>
Importance of Price in Previous Research

Previous research has found price to be a dominant factor in sales of surgical apparel.
# Cross Tabulation of Levels of Willingness to Pay for a New Biocidal Medical Textile by Profession of Respondent

<table>
<thead>
<tr>
<th>Willingness to Pay</th>
<th>Hospital purchasing agents</th>
<th>Health care workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t want to pay more</td>
<td>58.5%</td>
<td>36.1%</td>
</tr>
<tr>
<td>Willing to pay 0%-5% more</td>
<td>2.3%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Willing to pay 5% more</td>
<td>23.4%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Willing to pay 10% more</td>
<td>7.6%</td>
<td>22.4%</td>
</tr>
<tr>
<td>Willing to pay 10%-15% more</td>
<td>1.2%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Willing to pay 15% more</td>
<td>7.0%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>
### Mean Importance Rankings of Selected Properties of Medical Textiles from the Main Study

<table>
<thead>
<tr>
<th>Rank</th>
<th>Purchasing agent</th>
<th>Mean</th>
<th>Health care workers</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality</td>
<td>6.00</td>
<td>Barrier protection</td>
<td>6.60</td>
</tr>
<tr>
<td>2</td>
<td>Compliance with regulations</td>
<td>5.63</td>
<td>Comfort</td>
<td>5.88</td>
</tr>
<tr>
<td>3</td>
<td>Comfort</td>
<td>5.61</td>
<td>Quality</td>
<td>4.97</td>
</tr>
<tr>
<td>4</td>
<td>Price</td>
<td>5.03</td>
<td>Compliance with regulations</td>
<td>4.51</td>
</tr>
<tr>
<td>5</td>
<td>Barrier protection</td>
<td>4.77</td>
<td>Price</td>
<td>4.31</td>
</tr>
<tr>
<td>6</td>
<td>Antimicrobial properties</td>
<td>3.26</td>
<td>Antimicrobial properties</td>
<td>3.72</td>
</tr>
</tbody>
</table>
Analysis of Variance for Effect of Hospital Size on Willingness to Pay for Biocidal Medical Textiles (medium sized hospitals were willing to pay more)

<table>
<thead>
<tr>
<th>Source</th>
<th>Mean Square</th>
<th>df</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>6.48E-03</td>
<td>2</td>
<td>3.175</td>
<td>.043</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Satisfaction with Current Medical Textiles

<table>
<thead>
<tr>
<th>Level of Satisfaction</th>
<th>Purchasing Agents</th>
<th>Doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied</td>
<td>80.0%</td>
<td>73.6%</td>
</tr>
<tr>
<td>Neutral</td>
<td>15.4%</td>
<td>20.1%</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>4.1%</td>
<td>6.3%</td>
</tr>
</tbody>
</table>
Some Sources of Dissatisfaction

- Quality, cost too high for the quality
- Staining, off white (yellow) color
- Durability, some items are torn, products start to fray after one washing
- Sizing
- Delivery problems
Factors Related to Intention to Purchase a New Medical Textile Product

Intention

- Attitudes, product
- Attitudes, switching
- Subjective norms
- Innovativeness
Predictors of Intention to Purchase New Product

- Purchasing agents – Attitude toward switching and subjective norms were found to be significant
- Doctors – None of the variables were found to be significant predictors
Attitudes toward Medical Textiles: Nurses

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Objectives

- To assess nurses’ perceptions concerning transmission of infections in hospitals
- To examine their willingness to take various types of preventive action to reduce their level of risk
Sample Selection

- Nurse managers at a major western university were asked to distribute questionnaires to registered nurses in their units for completion and mailing back to the researcher.
- Of the 129 questionnaires that were distributed, 55 were returned for a response rate of 41%.
Demographic Data

- Years in specialty ranged from 1 to 34 with a mean of 14.1
- The most common specialties were medical/surgical (33%), intensive care (33%), and transplantation (11%)
Attitudes toward Nosocomial Infection and Protective Clothing

- The majority (58%) indicated their level of knowledge about nosocomial infection to be moderate.
- About half (49%) felt that the type of protective clothing currently available to them in the workplace was adequate to protect them from all unhealthy job conditions.
Attitudes toward Nosocomial Infection and Protective Clothing

- Textile products, including nurses’ uniforms and patients’ gowns, scored relatively low in terms of perceived infection transmission.
- Hands scored the highest in terms of perceived infection transmission.
Factors Influencing Decisions about Use of Protective Clothing (scored above 3 on 4-point scale)

- Patient safety: 3.43
- Inservice/health education: 3.36
- Hospital protocol: 3.35
- Fear of contamination: 3.25