Textiles in the Surgical Theater: An Actor-Network-Theory Approach

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How to map the larger context?

PPE:
Gown, gloves, face mask & head covering

Implications for protection? health care costs? the environment?
Personal Protective Equipment (PPE)

Disposable gown

Reusable gown (made with Gore components)
Woven textiles (Reusable)

Nonwoven textiles (Single use)
Strategic entanglements
To develop and explore new ways of thinking that move beyond the dichotomy of reusable versus single-use, encouraging critical and creative ways to bridge the single-use/reusable divide.
Objectives

• To examine producer/user perceptions of surgical textiles.

• To understand the factors and forces influencing perceptions of surgical textiles.

• To interpret scientific, economic and cultural discourses associated with medical textiles.

• To examine and include all perspectives, from historical reflection to current viewpoints and future possibilities.
Methods

• Discourse analysis of literature, standards, reports
• Observations at laundry and waste facilities
• Interviews with healthcare professionals, members of professional/trade associations, manufacturers, launderers, hospital waste management personnel, and academic and industry researchers. Interviews were conducted in the U.S. and in the European Union.
• Outreach
1. Actor Network Theory (ANT)

2. Historical overview

3. Strategic entanglements through the "circuit of culture"
Actor-Network-Theory (ANT)

Bruno Latour

Based upon ethnographic studies in laboratory settings
(beginning in the late 1970s)
Finding:

Interplay between social and physical realities

“Social” networks are more than human; they include non-human materials, tools, instruments, etc.

{In surgical theater: materials that are “bundled,” disposed, or sterilized}
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Adapted from du Gay and Hall
The “actors” in networks are not only human, but also non-human.

The task of ANT is to trace:

"a trail of association between heterogeneous elements," or the connections among "things that are not themselves social" (Latour, p. 5).
This “trail of association” in terms of sustainability can include:

• the natural resources required for materials (in relation to human choices)

• the making or manufacture of materials (including the labor, know-how, etc.)

• physical properties and their implications for human use

• management of laundry or material waste
ANT metaphor

ant: “a blind, myopic, workaholic, trail-sniffing, and collective traveler” (Latour, 2005, p. 9)

ANT accounts: like travel guides that suggests trails to pursue further...
The ANT task is to:

• "deploy the many controversies about associations w/out restricting in advance to the social to a specific domain"

• figure out (trace) what enables "actors to stabilize controversies"

• allow to "unfold their own differing cosmos"

1. Actor Network Theory (ANT)

2. Historical overview (1930s to present)

3. Strategic entanglements through the “circuit of culture”
False Faith: “A wet drape is a contaminated drape.”

Association for the Advancement of Medical Instrumentation (AAMI) is founded.

1958-1972
A collection of new materials research emerges to address the problem of permeable surgical textiles. Much of this research was funded by corporations, such as 3M, Kaycel (now Kimberly-Clark), Tyvek (Dupont), Johnson & John-

1970
Moylan et. al publish an article that claimed a 50% decrease in hospital infection rates when disposables were used.

1980
American Reusable Textile Association (ARTA) is founded by Dr. Belkin. Bellkin and others refute Moylan’s study, and begin to actively defend reusables.

1982-1992
Rising concerns over HIV/AIDS and Hepatitis B & C results in increased protection in the OR. Focus shifts from protecting the patient to protecting surgical staff from the patient. Greater focus on “strikethrough” during procedures.

1990
Two article address environmental concerns related to OR waste. Both determine that disposable gowns and drapes are more costly to the environment and hospital budgets.

1992-1998
A series of comparative studies, funded by both reusables and disposables, identify the cotton, muslin gown as the “common enemy.”

2003-present
Environmental concerns spur changes in health care facilities. Articles in academia and the popular press bring attention to environmental impact.
Rising Concerns: Initial Questioning of Surgical Textiles (1939-1952)

• 1939, 1948: Scientists realized that infection could be transmitted from doctor to patient through the wet dressing, and thus was not providing the barrier necessary for protection.
  - 1939, “Control of Staph in an Operating Room Theatre,” (The Lancet)
  - 1948, “Infection Control Through Wet Dressings,” (The Lancet)

Focus on Materials and Emergence of Single-Use PPE 1952-1972

• 1952, Aeroplast produced by Protective Treatments Inc. produces what the New York Times describes as a product that could replace gauze.

• 1959 & 1960 articles in the American Journal of Nursing and American Journal of Surgery, respectively, promote Vi-Drape by Aeroplast.


1967-70, 3M produces the single-use Steri-Drape (Which is promoted by articles appearing in the American Journal of Surgery and American Journal of Nursing).
Early Debates and Development of a Dichotomous Relationship

1972 - 1982

- 1972, “Dispose of Nondisposables,” *(AORN)*
  This is one of the first articles to debate the issue of single-use versus reusable medical textiles.
- 1981, “Evaluating Surgical Gowning, Draping Fabrics,” *(AORN)* N. Belkin emphasized the materials research on the reusables side. This article initiated a *new discourse about reusables.*
Protecting the OR
late 1980s - present

• With the **awareness of HIV/AIDS** gave way to growing concern over the **protection of healthcare workers** from blood borne pathogens. Nathan Belkin, in a 1994 letter to the editor, wrote that, “The emergence of HIV changed the purpose of the surgical gown. Healthcare professionals began to expect gowns to protect them from patients.”

• 1993, “Methods for Determining the Barrier Efficacy of Surgical Gowns,” (AJIC) Elizabeth McCullough wrote that, “More recently, medical personnel have become concerned about possible exposure to hepatitis B virus, HIV, and other blood-borne pathogens from the patient.”

• This represents a shift in the discourse from an emphasis on protecting the patient, to protecting the OR staff from the patient.
Protecting the Environment
1988 – Present

• 1988, United States Congress ratifies the Medical Waste Tracking Act
• 1992, “A Quantitative, Qualitative, and Critical Assessment of Surgical Waste” (JAMA) and “Cost Containment in the Operating Room: Use of Reusable Versus Disposable Clothing,” (The American Surgeon). These two articles highlight the amount of waste (and associated cost) that comes from the OR.
• “Disposable linen accounted for 53% of the volume of surgical waste.” (Myers, et. al.)
Protecting the Environment

• 2001, “The Ecological Footprint of Lions Gate Hospital,” (Hospital Quarterly). Susan German conducts the first ecological footprint analysis of a hospital in North America.


• Associations form to promote environmental awareness in hospitals, such as Heath Care Without Harm and Hospitals for a Healthy Environment (H2E)
According to Lausten, the increase in medical waste over the past 30 years has become a significant environmental concern, and his article discusses methods for reducing and managing waste.

In this article, he has encouraged nurses and managers to “moderate negative environmental effects by promoting reduction, recycling and reuse of materials in perioperative setting.”
Watching your hospital’s **burgeoning waste line**

Environment

Only 73 healthcare facilities of (American Hospital Association’s) or roughly 1.5 percent, have achieved Leadership in Energy and Environmental Design certification.

10 Years ago, according to the EPA, there were 2,400 medical waste incinerators in the US with a goal to reduce the number 50 to 80 percent by 2010. Progress had been made in the result of shutting down hundreds of on-site hospital incinerators a dozen more pending shut down.

Using some reprocessed devices is a standard practice in 70 percent of U.S. hospitals. Over 3,000 hospitals currently have a reprocessing programs and 95% of the *U.S. News (& World Report)*’s ‘Honor Roll’ Hospitals use reprocessed devices.
1. Actor Network Theory (ANT)

2. Historical overview

3. Strategic entanglements through the “circuit of culture”
strategic entanglements

--the ways in which materials, stories, and actors assert agency as interests alternately coincide, overlap, and diverge, while reconnecting as necessary; the multiple, emergent dynamics that work through materialized and interactive networks
strategic entanglements

Actor-network-theory reminds us that we all care about the same things:

Infection control (protection)
Health care costs
The environment
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Woven textiles (Reusable)

Nonwoven textiles (Single use)
Identity work and representation: lead to some “strategic opposition”
“Now remember, we’re up against a huge marketing and communication machine… [T]here is this myth of new equals good, equals quality, equals all these good aspects.”

(Trade association representative)
“We kind of have our own vested interest…We really do want to help however we can…[to] make sure whatever facts we can help provide, maybe help prevent other slants—other points of view that are not necessarily factual—from being written into the final report as a kind of the gospel” (industry representative).
“I think that single use will continue to grow. And it’s primarily based upon the concept that it’s a brand new product when you open the package...that’s reassuring to people. If I were going to ask you to go clean up a toxic waste spill and ‘Oh, by the way I have this garment here that has been used an undetermined number of times, but it will take care of you.’ Or, you can have a brand new garment that just came out of the package...which would you choose?” (Industry representative)
A Cultural Studies Approach: The Circuit of Culture

** Representation

** Materials

** Regulation

** Identity

** Consumption

** Production
Regulatory agencies

- CDC (Centers for Disease Control and Prevention)
- FDA (U.S. Food and Drug Administration)
- AAMI (Association for the Advancement of Medical Instrumentation)
- OSHA (Occupational Safety and Health Administration)
Associations and Standards

1967 - 1982

• 1967, AAMI (Association for the Advancement of Medical Instrumentation) is founded.
• 1968, “The Disposables Association,” is founded, and becomes INDA (International Nonwovens and Disposables Association) in 1972
• 1971, OSHA founded
• 1975, AORN Standards
• 1976, FDA approves Proctor & Gamble’s boundary single-use reinforced surgical gown
• 1982, ARTA (American Reusable Textile Association) is founded by Nathan Belkin
regulation: strategic standardization

“The FDA got involved in the development of PB70 during one of the first meetings. They had two or three people at one of the first meetings. They made it clear then that they didn’t think that all the products that were on the market really met the needs of the end users—that the system was somewhat flawed in that it allowed these grandfather[ed] products to be continued to be sold. And because of the concern over, you know, post-operative wound infection and protecting the healthcare worker, they really thought the industry more or less needed to do a better job of policing itself and that the [AAMI PB-70] standard would provide the industry an opportunity to do that. And you know, they more or less gave us a veiled threat that if we didn’t police ourselves they were going to have to do it...Producers are pushing, end users are pulling [and] PB-70 fills the gap. I think it’s going to become the best practice, and I think if any producer is really serious about staying in the game the long term, they’re going to have to provide products that are compliant with PB-70, even though it is not mandatory” (industry representative)
strategic standardization

the players with the most powerful system of allies in the surgical textiles field work together to develop standards, approve test methods, and identify the appropriate barrier properties for the classification of materials for different types of surgeries.
Actor-network-theory (Latour 2005):

"Whereas subjects easily behave like matters of fact, material objects never do." (p. 128)

"In following the stabilization of controversies, we are greatly helped if we bring to the foreground the crucial notion of standards" (p. 227)...."Standards that define for everyone's benefit what the social itself is made of might be tenuous, but they are powerful all the same" (p. 230).
Ongoing Challenges

Materials

representation

regulation

consumption

production

identity
Table 1. Nosocomial Infections in the United States.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1975</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of admissions ($\times 10^{-6}$)</td>
<td>37.7</td>
<td>35.9</td>
</tr>
<tr>
<td>No. of patient-days ($\times 10^{-6}$)</td>
<td>299.0</td>
<td>190.0</td>
</tr>
<tr>
<td>Average length of stay (days)</td>
<td>7.9</td>
<td>5.3</td>
</tr>
<tr>
<td>No. of inpatient surgical procedures ($\times 10^{-6}$)</td>
<td>18.3</td>
<td>13.3</td>
</tr>
<tr>
<td>No. of nosocomial infections ($\times 10^{-6}$)</td>
<td>2.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Incidence of nosocomial infections (no. per 1000 patient-days)</td>
<td>7.2</td>
<td>9.8</td>
</tr>
</tbody>
</table>

*Data are from Weinstein⁴ and Jarvis.⁵
“Standards committees are a collection of competitors trying to write a standard for performance that doesn’t eliminate their product from the marketplace. When you go to a standards committee, on an international level, you are actually supposed to go representing your country. Probably three out of ten people I know represent their country; they represent their company most of the time... [W]e wrote a global standard for medical packaging that was rigorous...but doesn’t discount any one material from use.” (industry representative)
Environmental Controversies

Recent resurgence of interest in “green,” “sustainable” hospitals. Newly developed organizations address these sentiments:

- Hospitals for a Healthy Environment (H2E)
- Health Care Without Harm
- Practice Greenhealth

Controversies around waste management in the hospital setting

- Important class issues revolving around the circulation of waste
- Who creates the (biohazardous) waste versus who handles the waste
Handling of waste: Protection of Workers and the Environment

In-Hospital Waste Processing
Sacramento, California
Sterilized Biohazardous Waste
Local Landfill    Davis, California
Energy and Water Use

Reusable Laundry and Surgical Instrument Reprocessing Center
Stockton, California
Group Purchasing Organization (GPO)

• Product Bundling

Who pays the bill?

• Hospital owned, rental, or billed to patient

• Decentralized hospitals—savings in one department does not translate to another
Contractual Entanglements: Level Playing Field?

“I can provide a product at a lower price, but because I’m not on the GPO contract they [the hospital] may not want to buy from me… That’s the cost of doing business for us. We’re learning the hard way. We figured, ahhh, we’ll save them money, we won’t worry about the GPO… So if you participate in a GPO contract, the rebates the hospital gets are basically fees that we have to pay to the GPO. It’s a racket.” (industry representative)
Ongoing Innovation?

“Ever since I’ve been in the business, and that’s been a couple of years now [since 1979], I’ve seen some major changes, like the invention of spunbonding, that didn’t exist thirty years ago…That’s 40 per cent of all nonwoven production in the world, so it is really important. Then we saw the invention of water [hydro] entanglement…I’d say it’s 10 years old, 12 years old…since these two technologies, I haven’t seen anything…I’m not sure that we will see anything like a new spunbonding or another addition of water entanglement…I’m not sure that there’s much to invent in the nonwoven field.” (trade association representative)
Strategic entanglements, meaningful dialogue...