Reusable v. Single-Use Wrap Dispelling Myths

Reusables vs. Single-Use: Clinical Performance Differences & Environmental Burdens and Impacts – A Comparison of Evidenced Based Data

June 21, 2013

Annual Conference
September 8-10, 2013

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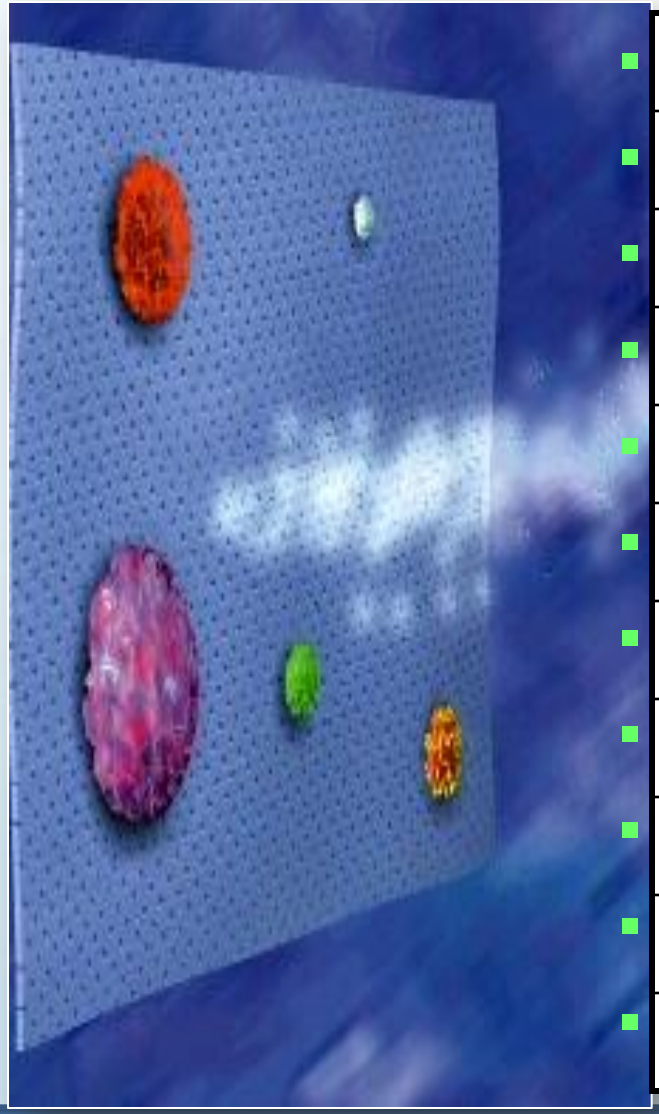
Goals of this presentation

- What are the clinical benefits of single-use Sterilization Wrap v. Reusable Textiles? The environmental impacts of each?
- Our customers' needs drive the activity of Kimberly-Clark activity regarding sustainability.
- How do single-use products address sustainable concerns?
- There is a balance between delivering the best clinical performance and minimizing sustainability impacts.

Critical Traits of Quality Barrier Fabrics



Must:

GDS	Allow sterilant to penetrate
GDS	Allow air to pass through
GD	Be ignition/fire resistant
GDS	Be static dissipative
GDS	Be low linting
GDS	Resist abrasion
GDS	Resist microbial pass through
GDS	Resist fluid penetration
G	Maintain initial temp/comfort
GDS	Be comfortable/drapable
DS	Not have excessive memory

(G: Gown) (D: Drape) (S: Sterilization Wrap)

Clinical Performance Needs – Sterilization Wrap

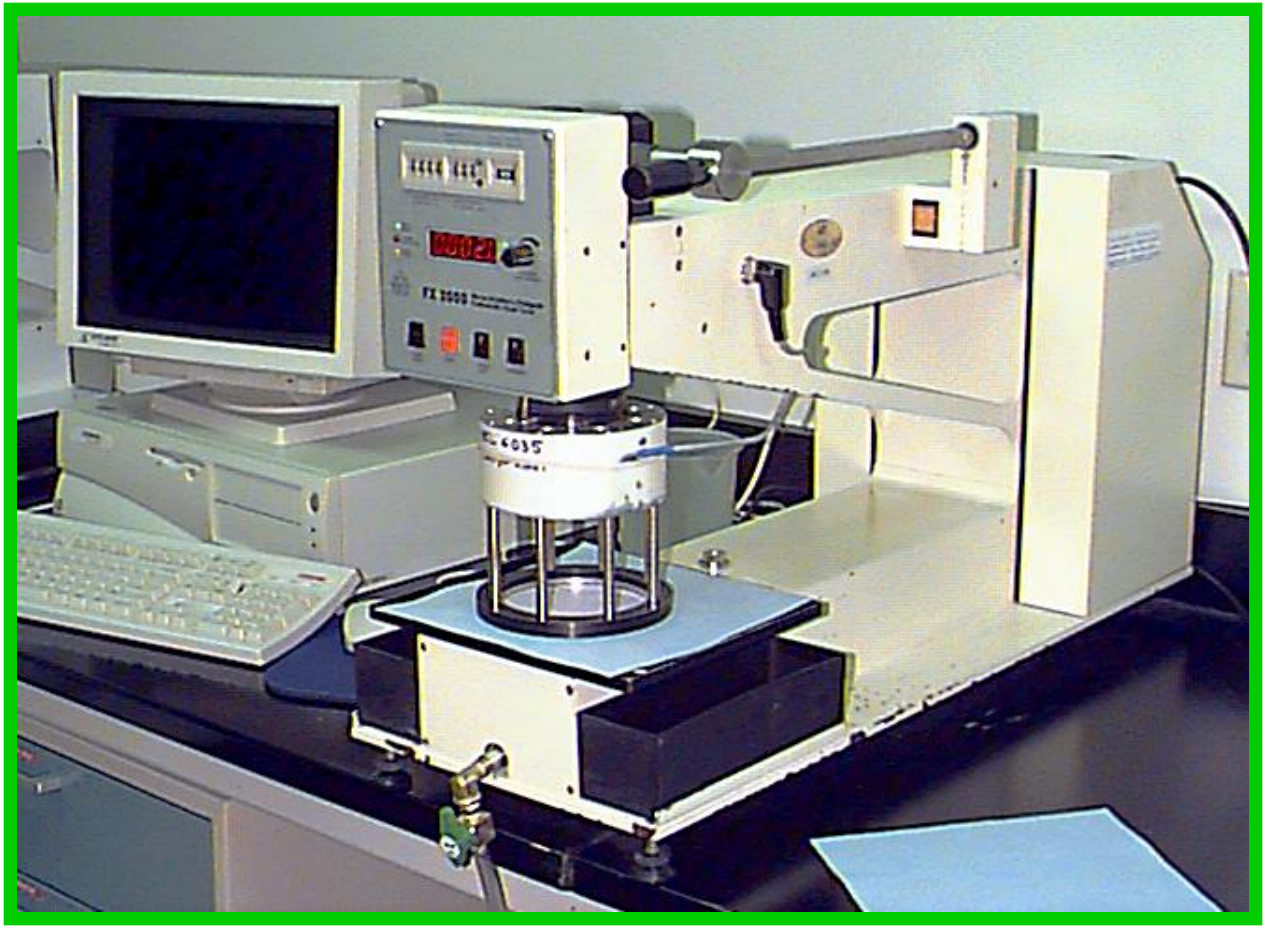
Barrier to Liquids/Microbes

- Hydrohead Repellency
- Bacterial Filtration Efficiency
- Resistance to Tearing

Low in Linting/Particulates

- Gelbo Lint
- Abrasion Resistance

Hydrostatic Head Test



AATCC – 127

Measures fabric resistance to water under pressure

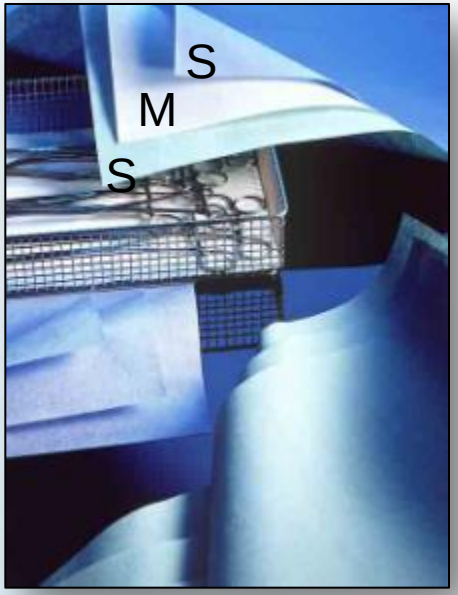
Resistance to Linting - Gelbo

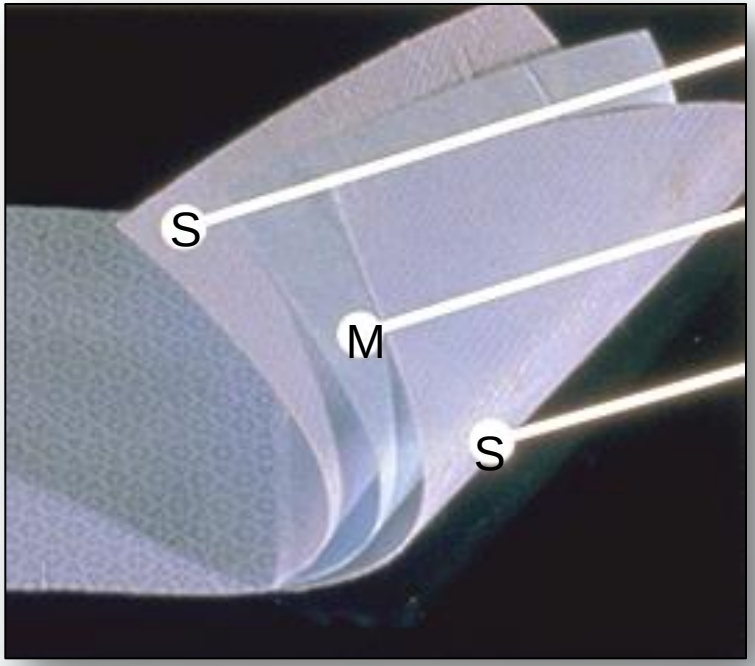
INDA Standard Test Method 160.1-92

"It is also generally accepted that the more lint that is generated in the operating room, the greater the possibility of a postoperative wound infection caused by either a microorganism transfer or by a foreign body reaction. "

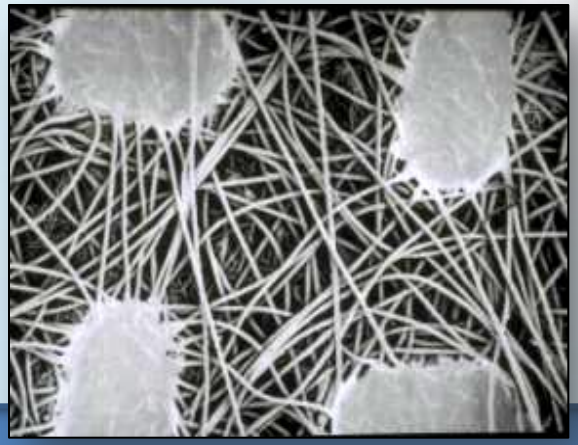
– - Scheinberg et al.,

Spunbond-Meltblown-Spunbond (SMS) 100% Polypropylene



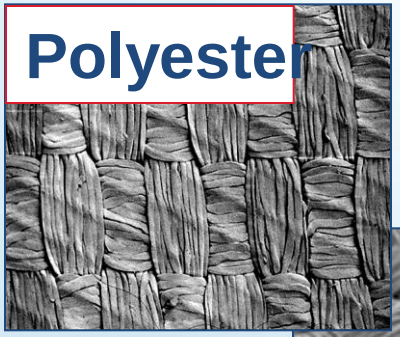


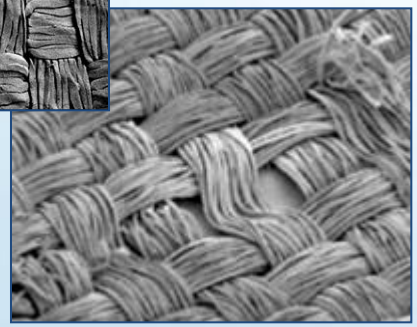
- Spunbond
  - strength
  - durability
- Meltblown
  - Microbial capture
- Spunbond
  - strength
  - durability

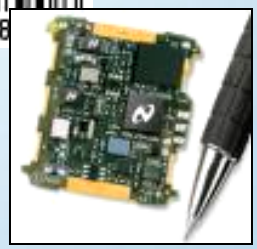


Maintenance of Re-Usable Barrier Materials

- Reprocessing instructions from manufacturer
  - Determine when properties unacceptable
    - Record times reprocessed





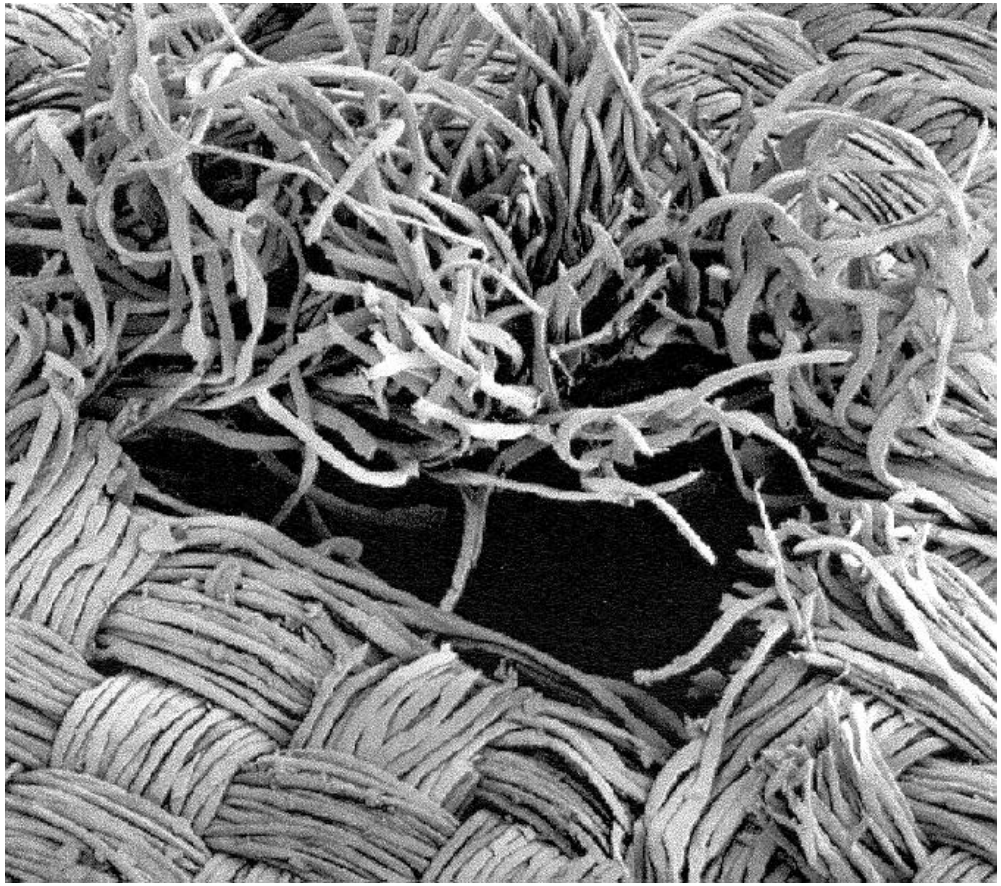


Barrier Properties Degrade with Washing

280-Count Poly/Cotton Fabric: New

280-Count Poly/Cotton Fabric - Washed

AORN on Packaging Systems



Multiple processings eventually diminish the protective barrier of the material. A method should be established to monitor, control, and determine useful life when reprocessing woven materials."

Burden is on the user, NOT the manufacturer

100% Woven Polyester Wrap

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Study of Canadian Reusable 100% Polyester Wrap

57 Wraps, Random Selection, 90% 1-5 reprocessings, 10% > 5 reprocessings

BFE	HydroHead	Weight	Grab Tensile Strength	Air Permeability	Martindale Abrasion Resistance	Static Dissipation (5000 volts)	Gelbo Lint # ≥ 10 µ	Trapezoidal Tear Strength
			Wet Dry					CD MD
70.1 %	21.9 cm	8.23 osy	> 180 lbs	12.2 scfm	5	0.17 sec	25	21 lb 18

Comparable KC SMS weight Single Use Kimguard Wrap

BFE	HydroHead	Weight	Grab Tensile Strength	Air Permeability	Martindale Abrasion Resistance	Static Dissipation (5000 volts)	Gelbo Lint # ≥ 10 µ	Trapezoidal Tear Strength
			Wet Dry					CD MD
99.9 %	120.4cm	5.18 osy	86 lbs 82	12 scfm	5	0.19 sec	3	12 lb 16

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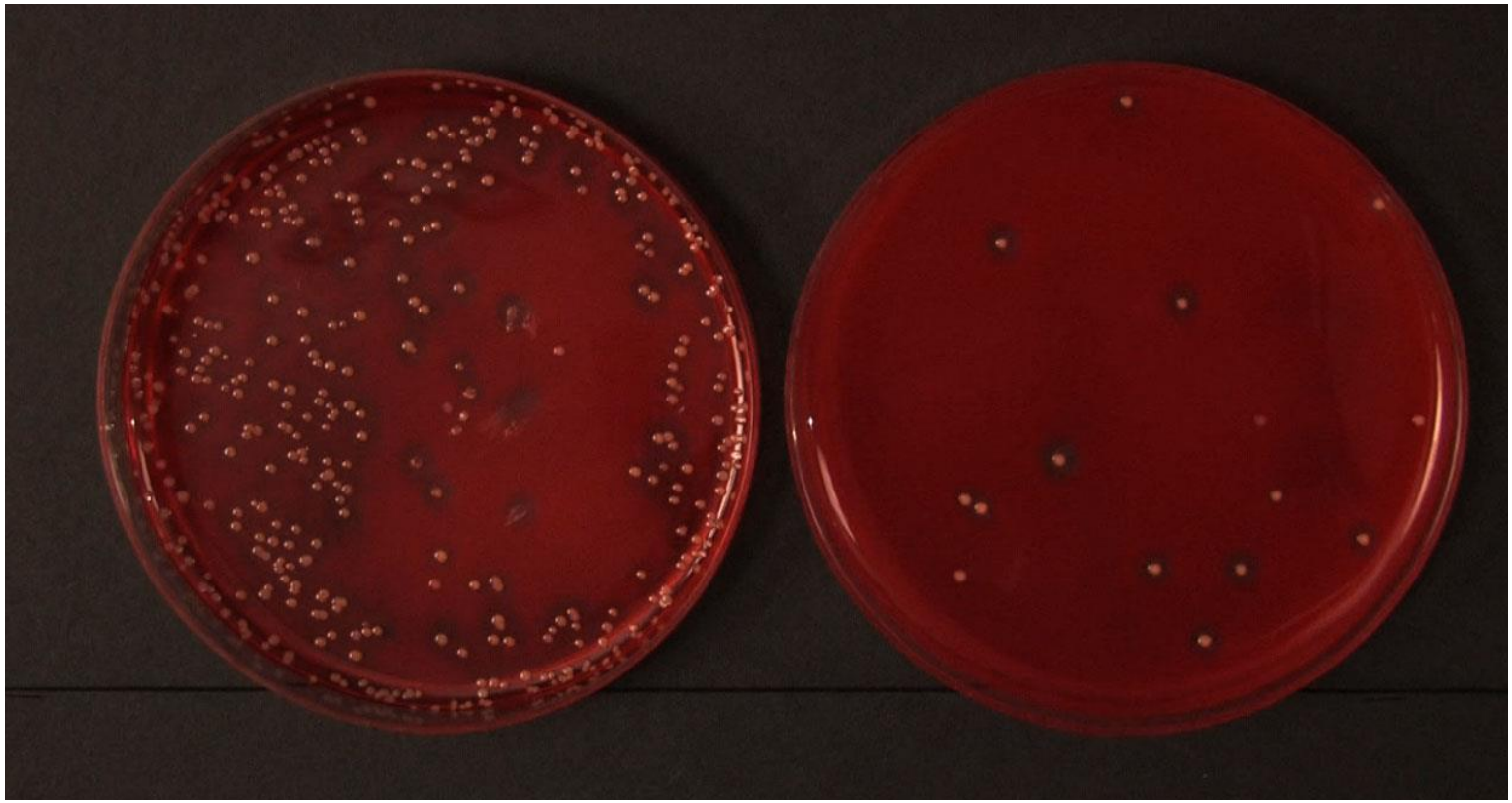
Bacterial Filtration Efficiency – Staph Aureus



Reusable Wrap
BFE 70.1%

Kimguard One-Step KC600
BFE 99.9%

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BFE in Staph Aureus Organisms Penetrating Wrap

% Filtration Efficiency	# Bacteria pass through fabric
50.0%	1,100
70.0%	660
90.0%	220
95.0%	110
96.0%	88
97.0%	66
98.0%	44
99.0%	**22**
99.9%	**2**

[1]Number of *Staphylococcus aureus* used to challenge barrier fabrics tested per ASTM F2101.

Single Use vs. Multiple Use – Environmental Impacts

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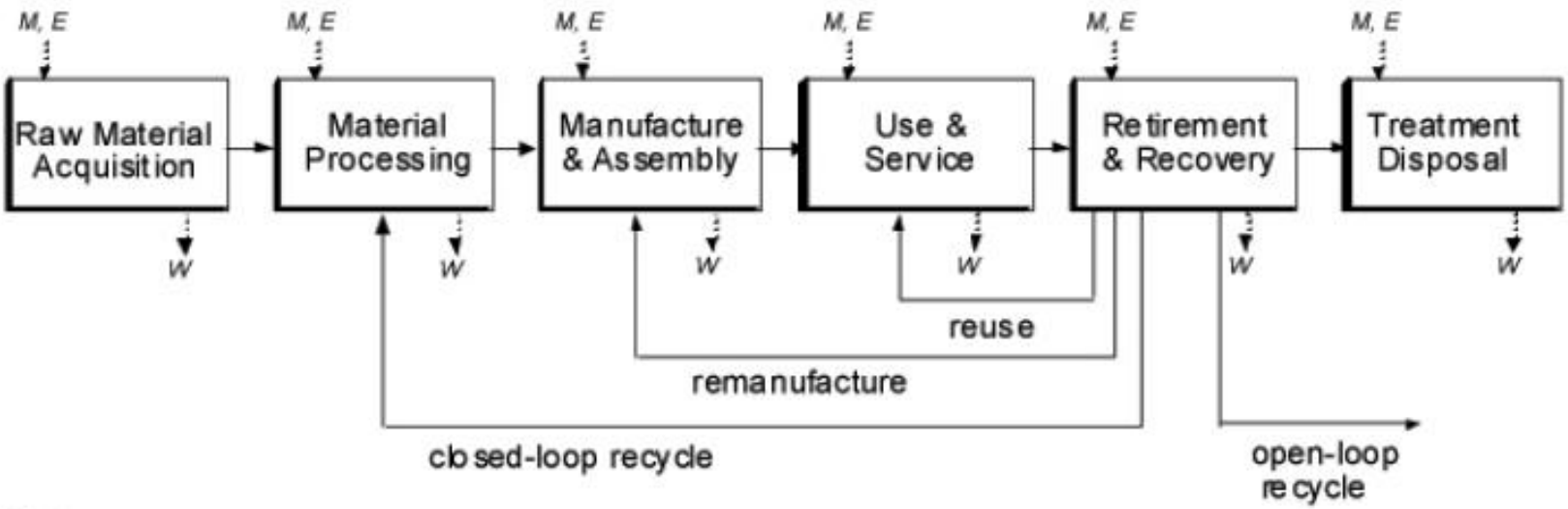
What is Life Cycle Assessment (LCA)?



M, E material and energy inputs for process and distribution

W waste (gaseous, liquid, solid) output from product, process and distribution

→ material flow of product component

Taken from Keoleian and Spitzley in *Sustainability Science and Engineering* (2006)

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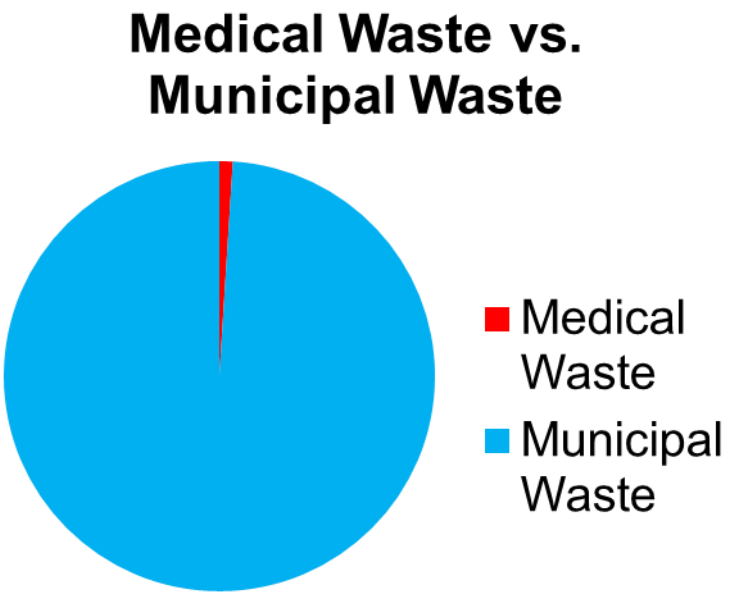
Similar Tradeoffs Seen For Wrap as with Surgical Gowns (McIlvaine Study)

- Single-use gowns/wrap offer significant reductions in freshwater consumption
- Multi-use gowns/wrap offer reductions in on-site waste management
- Most other environmental impact categories will depend on key system variables:
  - **Number of reuse cycles (Wrap 33, Gowns claim 75)**
  - **Single use gown weight (Heaviest Single-Use Wrap is 5.2 osy v 8.2 Reusable)**
  - **Sterilization and treatment process (energy use and associated emissions)**
  - **Chemicals used in laundry process (water pollution)**
  - **Heat and electricity supporting washing cycles (greenhouse gas emissions and regulated air pollutant emissions)**

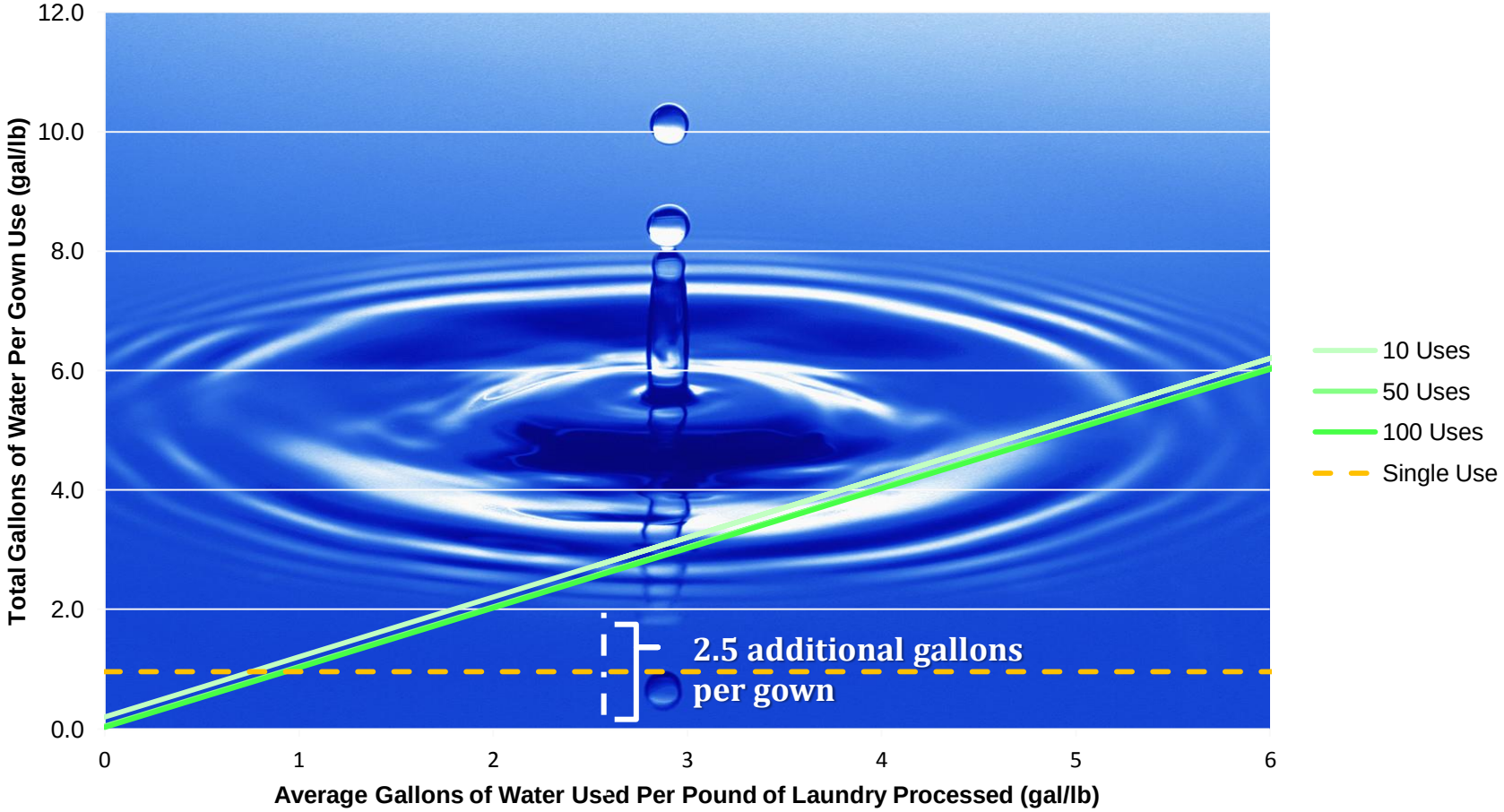
Environmental Burden – McIlvaine Study of Surgical Gowns and Drapes (2009)

- The Environmental burden is **lower for single-use products than for reusable products**.
- **Reusable garments consume approximately 4.5 times as many resources as single-use garments.** Laundering is a substantial environmental burden for reusable textiles due to the intensive use of water.



Source: "A White Paper on Performance, Cost Per Use, and Environmental Impact of Single-Use and Reusable Surgical Gowns & Drapes." McIlvaine Company Copyright© 2009 McIlvaine Company

Freshwater Use Associated with Surgical Gowns



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Not just more water use, but also…

The chemicals used in all this water, such as:

- Alkaline Solutions
- Detergents
- Water Conditioner
- Antichlor
- Bleach
- Enzymes
- Stain Treatment
- Bactericides

…Lead to pollutants, such as…

- Conventional Pollutants (BOD, TSS, etc.)
- Zinc
- Copper
- Lead
- Ethylbenzene
- Toluene
- Other Hydrocarbons

That are ultimately discharged to public treatment works

USEPA, *Technical Development Document for Proposed Pretreatment Standards for Existing and New Sources for the Industrial Laundries Point Source Category*, November 1997

Kimberly-Clark Sustainability Programs

- 58% of facilities **met goal of zero landfill** manufacturing waste.

All Kimberly-Clark Health Care manufacturing facilities have been 100% landfill-free for at least one full year.

- *KC Sterilization Wrap reclaims ALL trim and off-spec fabric back into the process through a repelletization system. FDA traceability requirements (U.S.) are currently an obstacle to using post-hospital wrap back into fabric-making process, but plans being explored with the Agency.*
- 15% annual improvement in **energy efficiency**, which resulted in enough energy savings to power more than 300,000 houses for one year.
- 12% annual improvement in tissue manufacturing **water-use efficiency** — which saved enough water to flow over Niagara falls for over three hours.
- Set a goal of 50% **reduction in wood-fiber use from natural forests** by 2025.

Exploratory programs in place with Bamboo, grass fiber – fast growing fiber sources.

KC Sustainability Programs – Products, cont.

- 22% (approximately $4.6 billion) of the Company's net sales derived from **environmentally innovative products**.
- 1.5 million pounds — the weight equivalent of more than 400 midsize cars — of sterile medical wraps diverted from landfills through the **BLUE RENEW*** KIMGUARD* Sterilization Wrap Recycling Program.
- Andrex, K-C Professional Kleenex and K-C Professional Scott towel and tissue products introduced with **bamboo and wheat straw fibers**.

Latest Global Study Results:
Importance of sustainability in healthcare

- **54%** of hospitals say ***green attributes*** are very important in their purchasing decisions
- **40%** of hospitals expect their ***future RFPs*** to include questions/criteria regarding green attributes of products
- **85%** of hospitals ***rate being free*** **of heavy metals and latex, end of life solutions and energy efficiency** as important attributes
- **35%** of hospitals ***switched suppliers*** due to additional green/sustainable product offerings.

The Growing Importance of More Sustainable Products in the Global Health Care Industry, (2012, Johnson & Johnson) research study report executive summary.

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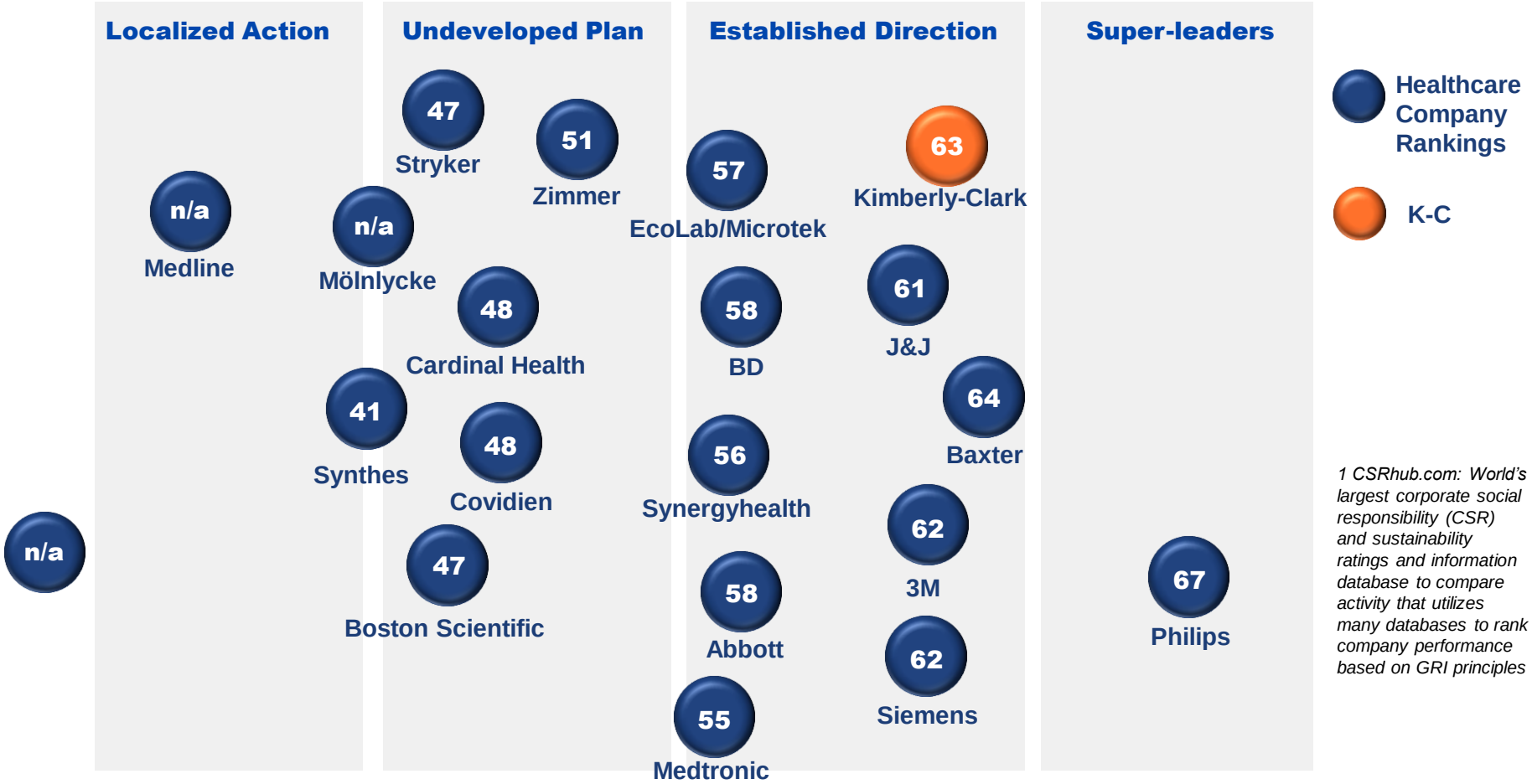
The Big Picture

What it looks like – CSRhub[1] ranking/interpretation



1 CSRhub.com: World's largest corporate social responsibility (CSR) and sustainability ratings and information database to compare activity that utilizes many databases to rank company performance based on GRI principles

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A look to the Future—Today

Sterilization Wrap Recycling

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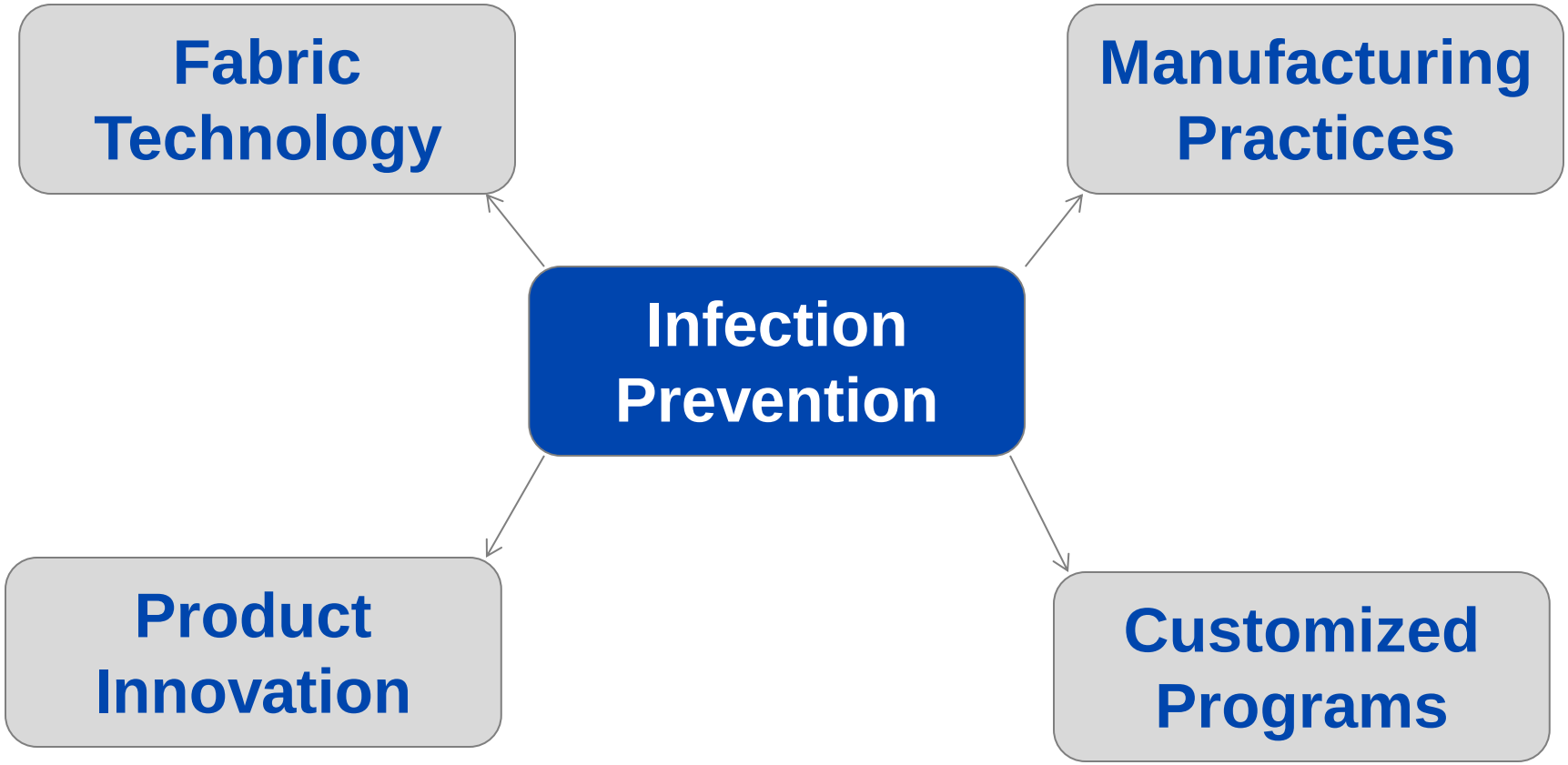
2013 Blue ReNew Wrap Recycling Stats

- **243 hospitals currently engaged** in Blue ReNew *(203 engaged in the first 6 months)*
- **64 hospitals currently recycling** *(June 2013)* Estimated 2.45MM lbs. diverted annually.
- Once the infrastructure is in place, we **estimate 3-4 times** the number of hospitals (generally smaller ones) are recycling their own wrap through the recycler that is in place in the area.
- Estimate **10+% of all hospitals** in the US are recycling wrap – including those independent of the Blue ReNew program.
- Set up system with Turtle Island for 2 **Canadian Hospital programs** *(New York General, Chatham Kent)*

K-C Healthcare Commitment: Infection Prevention



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A Delicate Balance

Protecting Healthcare Workers and Patients

- **Protecting the Environment**

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What is Sustainability 2015?

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QUESTIONS?

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