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NEW INNOVATIONS IN RESUABLE OR TEXTILES

An overview of environmental, cost, and provider comfort issues

Abstract

US hospitals generate an inordinate amount of regulated medical waste annually with the OR contributing approximately one-third of the waste. As hospitals strive to cut costs, while providing safe and comfortable products, and reduce disposal of solid waste, the use of reusable OR textiles has emerged as a viable option. This article will provide an overview of environmental, cost, and provider comfort issues, outline steps to consider when evaluating reusable gowns and drapes, and highlight the benefits of using reusable textiles in the OR.

Introduction

America's hospitals generate 6,600 tons of waste each day. Hospitals that have chosen to use disposable products rather than reusables produce a substantially greater amount of solid and medical waste, costing them more in disposal costs. One of the common areas in the hospital where disposable products have been used as an alternative to reusables is in the operating room (OR). According to the 2005 Comparative Operating Revenues and Expense Profile for the Healthcare Textile Maintenance Industry, which included 49% of all U.S. hospital beds in its study, approximately 6.5 pounds of surgical textiles are used per bed each day in hospitals with 300 or more beds. If a 300-bed hospital chose to use disposable surgical products rather than reusables, they would incur upwards of an additional $250,000 in costs to trash the disposable products - about 35 cents per pound that should be added to the purchase price or $833.33 per bed per year. (1) The OR is the biggest user of medical supplies in a US hospital and its efficiency is crucial to the success of the entire facility. The OR is also a significant cost center. It is the leader in medical supply usage for the entire hospital, estimated to account for approximately 33 percent of all hospital supply costs, and has large cost requirements relative to energy use and waste management.(2) The Association of periOperative Registered Nurses (AORN) has been calling for the "greening" of the OR since March, 2006 when the AORN House of Delegates approved the Position Statement on Environmental Responsibility. According to the position statement, "Nurses have an ethical responsibility to actively protect the environment, promote and participate in resource conservation, and seek to understand the political, economic and public health components of environmental health".(3) This means, that for the first time, OR nursing staff is being challenged to consider making environmentally friendly decisions over those that are more conventional or convenient. One of those choices may be whether to use reusable OR gowns, mayo stand and back table covers and surgical drapes rather than the more traditional disposable products. Yet, perceptions persist that green programs and products cost more despite comprehensive evidence to the contrary. (4) However, today's reusable textiles are not those of 30 years ago. They are technologically NEW INNOVATIONS IN RESUABLE OR TEXTILES advanced, tested to meet barrier performance standards and refined to provide optimal clinical comfort and ease of use. This decision is made even easier when the impact of cost and provider comfort is also considered.

Prevalence

The operating room is critical to a hospital's success, and to its business model—bringing in between 40-60% of the organization's revenue and up to 60% of its operating margin in some instances. Some estimate that up to 80% of drapes, surgical gowns and mayo stand covers used in the US are disposable. The use of reusable surgical gowns, drapes, table and mayo stand covers can provide the opportunity for increased comfort, reduce costs and substantially reduce the environmental footprint.

Product Selection Considerations

The AORN Recommended Practice for Product Selection in Perioperative Practice Settings suggests that a multidisciplinary product evaluation and selection committee should be established. One of the responsibilities of this committee is to develop a process to guide product selection which includes selection of functional and reliable products that are safe, cost-effective and environmentally friendly. (5) There are five key factors that influence the selection of drapes and gowns used in the OR. They are:

Product Selection Considerations (continued)

- safety and performance standards for barrier protection
- comfort
- costs associated with use
- environmental impact
- an ongoing, effective evaluation process

Safety and Performance Standards for Barrier Protection
In 2003, regulatory standards were developed by the American National Standards Institute (ANSI) and the Association for the Advancement of Medical Instrumentation (AAMI). These standards were updated again in 2012.(6) AAMI PB70 Levels of Barrier Protection define the protective performance of surgical drapes and gowns as a barrier against the penetration of fluids, such as blood and other body fluids, and pathogens. Four levels of performance are designated, from Level 1 (the lowest barrier performance) to Level 4 (the highest). The protective barrier choice should be based upon anticipated exposure to fluid. There are tests required to demonstrate the barrier protection of each level. The chart below provides an overview of levels 1-4. (7)comfort for the patient. It's important to note that both single-use and reusable surgical gowns and drapes are governed by the same
regulatory standards covering performance claims, care and handling, labelling and overall safety practices.
There are not more stringent regulations for one or the other

ANSI/AAMI PB70 Barrier Performance	Anticipated Risk of Exposure to Fluid, Fluid Spray/Splash or Pressure on Gown or Drape	Examples of Procedures with Anticipated Exposure Risks
Level I	Minimal	Simple excisional biopsies, lumps and bumps, ophthalmology and ENT
Level 2	Low	Tonsils and adenoids, endoscopic GI, orthopedic procedures with tourniquet, open hernia repair, MIS, interventional radiology or cath lab
Level 3	Moderate	Mastectomies, arthroscopic orthopedic procedures, endoscopic urological procedures, open GI and GU procedures
Level 4	High	Hands in body cavity, ortho without tourniquet, open CT, trauma or C-sections

Comfort

A 2010 study, conducted by Conrardy et al., in the O.R.s of two large hospitals in the Washington, D.C. area found that most surgeons and surgical technologists found the reusable products to be preferable to the disposable products currently in use. Eighty-six percent (86%) of the surgeon participants rated the comfort of the reusable gowns as superior. The ease of use for reusables was rated superior by 87%. Only 6% of surgeon participants rated the disposable gowns as superior. (8) Overcash reports that for gown comfort, the available field data and anecdotal discussions with manufacturers and users suggest that current reusable gowns, at AAMI levels 2 and 3, used for shorter procedures, were more comfortable. For longer procedures, almost all of the O.R. personnel overwhelmingly rated the reusable level 4 gowns with breathable laminates more comfortable. (9)

Cost

There are many cost issues to examine when considering the use of reusable drapes and gowns versus disposable drapes and gowns. It is important to differentiate the cost-per-use versus the actual purchase price. Third party processing/ laundering can be very cost effective due to economies of scale, while regulated waste and disposal costs are significant with disposables. Routine disposal of unused items in disposable packs, which result in unnecessary product and disposal costs, further support the use of reusable custom packs. There are many intangible or hidden factors as well. The number of handling steps, recovering lost instruments, nondoubling of tray drapes, and savings in water and energy use are all advantages in the argument for reusables.

Cost (continued)

Today it is common practice for hospitals undertake economic analyses prior to product purchase. Unfortunately, these results are rarely published or made available. One report resulting from a 2006 study shows the cost benefit of reusables over disposables when the cost-per-use approach is taken. (10) **Cost per Use Analysis of Reusable versus Disposable Surgical Gowns:**

In addition, the environmental impact for reusable OR textiles versus disposables is significant. There are quantifiable differences in the resources required with waste management.

	Reusable Gown (50 uses)	Disposable Gown
Purchase Price	$60	$4.50
Cost per Use	$1.20	$4.50
Administrative Costs	$0.15	$0.15
Laundering	$0.50	$0.00
Packing and Sterilization	$0.40	$0.00
Waste Disposal	$0.00	$0.25
Total Cost per Use	**$2.25**	**$4.90**

Zins HM. 2006. Environmental, cost and product issues related to reusable healthcare textiles. Research Journal of Textile and Apparel.

Costs Associated with Waste Removal

One of the biggest challenges faced by hospitals regarding waste management is being compliant with State and Federal Regulating Agencies such as OSHA and DOT. State laws often define the regulations for how a hospital must handle and dispose of their regulated medical waste (RMW). Many disposable gowns and drapes are classified as RMW. The disposal cost of RMW is estimated to be 8 times that of normal solid waste ($963 v. $121 per ton). (11) Reported costs for RMW vary from $0.20 to $0.50/per pound, (12) with one study finding the average cost to be $0.28/pound. (13) There are stringent regulations, often with heavy penalties for not adhering to the regulatory process.

Incineration was once the method of choice for disposal of medical waste. Hospitals using onsite incinerators were exposing the public to emissions that included mercury, dioxins, and other highly toxic substances. By 1997, new regulations brought about the closure of several thousand onsite medical waste incinerators and today, fewer than 100 such installations are still operating. Currently, most healthcare facilities either ship their waste to large, centralized incinerators, or use technologies other than incineration to sterilize medical waste prior to disposal in the standard municipal solid waste stream. (14)

Hidden and Intangible Costs

The use of OR textiles have both direct and indirect costs associated. For reusable textiles, one must consider the higher acquisition costs, replacement costs after 50-75 uses, and laundry/sterilization costs. With disposables, the purchase price is the more obvious cost associated with use. As previously mentioned other hidden costs can be significant. Loss of instruments, primarily in the surgical drapes and table covers is common.

When discarded along with the disposable drapes and covers, they must be replaced. The University of Maryland Medical Center, which moved to reusable textiles more than 15 years ago, estimates that in 2010 it saved approximately $39,000 in returned instruments (which would have been thrown away if the hospital was using disposable gowns and drapes in its OR). (15).

In addition, commercial laundries are now far more efficient with water and energy use due to advancements in technology, volume of linen processed and economies of scale. (16) Studies support that environmental costs are significant when using disposable gowns. In 1998, the CDC hypothesized that there were no differences in life cycle impacts between reusable and disposable gowns. (17) However, Overcash reports that since 1993, there have been five life cycle studies of protective surgical gowns and none of these studies support the CDC hypothesis

Environmental Impact

In the United States, healthcare activities in 2007 contributed 8% of total US greenhouse gas emissions and 7% of total US carbon dioxide emissions. (19) Healthcare facilities in the US continue to dispose of more than 4 billion pounds of waste annually. (20) Within a hospital, ORs contribute disproportionately to healthcare waste production.(21) In fact, a routine operation at a hospital produces more waste than a family of four produces in an entire week. (22) The AORN, which has taken a stance on environmental issues for more than 20 years, has an official position statement on environmental responsibility that clearly states that perioperative practices should include "selecting reusable equipment and materials (e.g., drapes, gowns, patient positioning devices) that are of a quality equal or superior to one-time use items." (23)

Environmental Impact (continued)

The Canadian Medical Association Journal in 2012 featured a study by Stall and colleagues which estimated that total knee replacements in Canada in 2008–2009 produced the equivalent landfill waste of 2000 garbage trucks by volume and that disposable surgical linens consisting of gowns, drapes and table covers contributed disproportionately to the volume of waste. (24)

Cost Savings and Environmental Impact with Reusables

The use of reusable textiles is a green alternative to single-use disposable products that does not sacrifice performance, quality or cost, (25) and reports emerging from facilities who have converted portions of their program to reusables, clearly show cost savings and environmental benefits resulting from these changes.

- Winter Haven Hospital in Florida converted to a reusable surgical textile program in 2001 for their surgical pack program. Their analysis disclosed a $37.21 cost per procedure with single-use disposable products compared to $26.45 cost per procedure for reusable textiles. Within five years, the cost savings were found to total $625,000. (26)
- A life cycle analysis of AAMI Level 3 surgical gowns used at the University of Minnesota Medical Center- Fairview found that using reusable gowns instead of disposable gowns would save 254,000 pounds of waste per year and $360,000. (27)
- A Senior Sourcing Director for Kaiser Permanente in San Diego, reported that its "use of reusable surgical gown and basin sets reduced the organization's regulated medical waste by 30 tons, at a savings of 3.8% in 2010." (28)
- The University of Maryland Medical Center reported that in 2010, it avoided disposal of 138,748 pounds of waste as a result of using reusable supplies; using the average cost of regulated RMW of $0.28 per pound, (29) this amounts to an approximate savings of $38,800 annually in avoided waste disposal fees. (30)

Evaluation Process

When evaluating the success of any program, AORN recommends that surgical gowns, gloves and drape products for use in the perioperative setting should be evaluated for safety, efficacy and cost before purchase or use. (31) AORN, Practice Greenhealth and AAMI have suggested nine steps that will help facilities to assure the desired outcomes.(32) (33)(34) They are as follows:

1. **Establish a multidisciplinary team or a Value Analysis Committee.** This committee should include end-users such as periop nurses, surgical tech, surgeons, laundry processor, finance, facility management, infection preventionists, supply chain, and environmental services. All departments who will evaluate and be impacted by the program should have representation in the development and evaluation process.
2. **Gather information from a variety of sources.** Contact vendors for performance characteristics, processing and care or instructions for use (IFU). In-depth discussions with the laundry processor should take place to develop a clearly defined process.

Members of the committee should also conduct a literature search for reusables versus disposables to understand and learn from other conversion experiences. Conducting research of local regulatory requirements is key to understanding disposal and environmental issues. And of course, speaking with colleagues in other hospitals who have implemented a reusables program will provide valuable, first-hand experience that can be used in the conversion process.

3. **Establish consistent requirements for product evaluation and establish goals specific to your facility.** Use of a product specific evaluation tool is essential. It should include a baseline of total costs, line item costs, targets for reduction of waste, safety benchmarks, efficiency measures, ease of use, compatibility with other products, financial impact analysis, laundering process, current waste disposal issues, current OR practices and OR perspective on comfort and safety.
4. **Perform a financial impact analysis.** The analysis should reflect direct costs, staff time, acquisition costs, storage, inventory, reprocessing/laundering costs, disposal costs and requirements.
5. I**nvestigate a plan to standardize products.** This plan should detail steps and communication of how your facility will phase in the new and phase out the old when converting.
6. **Conduct an environmental impact analysis - Environmentally Preferable Purchasing (EPP)** Policies and Practices. To reduce waste, AORN, (35) the Environmental Protection Agency (EPA), and a number of states and organizations recommend adopting environmentally preferable purchasing (EPP) policies and practices. Environmentally preferable means "products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose." (36)This comparison applies to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance, and disposal. The EPA developed five guiding principles to help federal agencies purchase environmentally preferable products. (37) These broad guiding principles can be applied to the perioperative setting as well. (38) Additional EPP information can be found at following link: http://www.epa.gov/epp/pubs/about/about.htm
7. **Arrange a product trial.** This is coordinated with the vender and all departments that will participate in conducting the trial.
8. **Product selection**. Once the trial is complete, the committee will evaluate the outcomes and determine the product of choice.
9. **Review and revisit changes after a clearly specified time to improve process**. Collect input/feedback, positive and negative and review the information in committee meetings. Determine, in advance, how you will mitigate drawbacks and improve the process for success!

New Innovations in Surgical Drapes and Gowns

The use of technologically advanced surgical textiles can play a key role as hospitals strive to cut costs, while providing safe and comfortable products, that reduce disposal of solid waste. ctive surgical drapes and gowns today.

New Innovations in Surgical Drapes and Gowns (continued)

Lac-Mac's Reusable R-MOR-Tex® Barrier Drapes and Gowns help to divert some of the 4 million tons of waste produced by Health Care facilities in the United States annually. The products are lightweight, exceptionally breathable and are compliant with the AAMI PB70 Standard, offering liquid-resistant Level 3, and liquid-proof, viral resistant Level 4 barrier protection. R.MOR.Tex® surgical products can be safely re-processed and re-used 75-125 times making them particularly cost effective. Reusable surgical barrier textiles have advanced tremendously over the past 25 years. R.MOR.Tex® exemplifies the characteristics required of high-performance protective surgical drapes and gowns today.

Conclusion

In summary, the patient and perioperative team safety, comfort and environmental stewardship is a top priority when choosing surgical gowns and drapes, as the healthcare industry strives to minimize the risk of transmitting pathogens. In 2003 regulatory standards were established to assure performance claims, care & handling, labelling and overall safety practices for single-use and disposable OR gowns and drapes. Transition to sterile, disposable items in healthcare in the 1980s served its purpose at that time, however today's challenges demand that we reconsider the use of reusable items. Since the quality of materials has dramatically improved, cost benefit analysis now points back in the direction of reusables, and life cycle analyses demonstrate clear benefits to the environment in using reusable surgical textiles. In addition, studies consistently show that perioperative personnel find the gowns more comfortable, particularly for longer cases. By understanding the key characteristics and performance standards for these new textiles, all who participate in the delivery of care in this ever-changing environment can be assured of the benefits and quality of today's reusable textiles.

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