

# A Wealth of Ways to Enhance Cost-effectiveness

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Hospitals can save a great deal of money by optimizing their surgical drape and gown systems. A study of three hospitals (referred to as "A", "B" and "C", for anonymity) has shown that costs for surgical drapes can be reduced by up to 54 percent. The same study, which considered a total of 6,282 operations performed in 1999, has also revealed that disposable drape products are both economically and hygienically superior to their reusable counterparts.

The new study, carried out by the Prof. Riegl Institute, has had a direct impact: hospital A learned that it could save EUR 48,573, or 38 percent, annually by substituting disposable-product systems for its existing reusable-product and mixed systems, and it has switched to a disposable-drape system. Hospital B has also begun using disposable products, and hospital C has been able to obtain comparable price reductions from its reusable-system suppliers (Fig. 1).

A straightforward cost comparison clearly speaks in favor of substituting disposable-product systems for reusable-product systems. But hospitals should carefully consider the advantages and disadvantages of both types of systems – in addition to their prices – before making their own decisions.

An earlier study by Professor Werner on hygiene quality and functionality showed that the quality of reusable surgical drapes suffers when drapes are washed and re-sterilized – and that thus disposable

drapes are hygienically superior. Gradual quality losses incurred in use and washing/resterilizing of reusable products should not be underestimated, since (unfortunately) there are no effective quality controls for reconditioning.

The system-based environmental impacts of the two systems – disposable and reusable – are comparable when seen in terms of the systems' entire life cycles.

The new CEN standard for surgical drapes and surgical gowns will require consistently high quality levels and high production safety standards. It will be difficult to meet these basic requirements with conventional materials such as cotton and mixed fabrics. As a result, laminates will take on greater market importance – although only in connection with careful washing /resterilization. The costs for reusable articles will grow, since the new standard will require extensive quality controls (Fig. 2)

Savings			
achieved by switching from reusable/mixed drape systems (including surgical gowns) to disposable surgical drapes (including surgical gowns) in the hospitals studied			
Representative hospitals	Hospital		
	A	B	C
Number of procedures studied	3.075	2.387	820*)
Actual costs for leasing / reusable / mixed systems (including surgical gowns)	EUR 128.344 (EUR 41,72)	EUR 70.047 (EUR 29,35)	EUR 27.098 (EUR 33,03)
Costs for comparable disposable-drape systems (including surgical gowns)	EUR 79.250 (EUR 25,77)	EUR 65.445 (EUR 27,41)	EUR 17.895 (EUR 21,83)
Hospital's savings through substitution by disposable-drape systems, in EUR	EUR 48.573 (EUR 15,95)	EUR 4.602 (EUR 0,41)	EUR 9.203 (EUR 11,20)
Savings for substitution by disposable-drape systems, in percent	38%	7%	33%
*) Extrapolation of six months' worth of cases (410) to 12 months (820)			
(EUR...) = theoretical average value for surgical drapes, per procedure. All EUR amounts without VAT			
The costs for disposable-drape systems include relevant specific waste-management costs.			
Source: Cost-effectiveness analysis of use of disposable surgical drapes. Institut Prof. Riegl & Partner GmbH, PR&P, Augsburg, Germany			

Fig. 1

To choose a surgical draping system and to make the necessary conversion users should both compare prices and consider relevant systems' organizational efficiency, i.e. process management, in light of applicable surgical drape standards. Current trends are leaning toward innovative materials and customized clinical packs, including packs that contain all necessary products for

Advantage and disadvantages of disposable and reusable (leasing) systems	
<b>Advantages of disposable-drape systems</b> <ul style="list-style-type: none"> <li>  Greater agreement flexibility</li> <li>  Greater price transparency</li> <li>  Flexible response to changes in the market or in products</li> <li>  Clear allocation of costs</li> <li>  Most manufacturers of disposable-drape systems can offer broader ranges of products – this reduces number of required suppliers</li> <li>  Larger product ranges</li> <li>  Entire drape is placed in waste container – no sorting required, simpler handling</li> <li>  Following surgery, an instrument table drape can be used as a waste bag – this eliminates costs for waste bags for surgical drapes</li> <li>  Easy disposal together with regular waste</li> <li>  All liability is with the manufacturer</li> </ul>	<b>Advantages of reusable/leasing systems</b> <ul style="list-style-type: none"> <li>  Product ranges cover all relevant fabrics</li> <li>  Provision of rolling containers for delivery / pick-up of surgical drapes and, in some cases, for intermediate storage of packs</li> <li>  Complete suppliers: surgical laundry can be "supported" / cross-subsidized in mixed calculation</li> <li>  The hospital incurs no direct listed waste-management costs for leased surgical drapes – it incurs such costs only for any additional disposable material that, along with swabs, etc. is placed in waste bags</li> <li>  Laundry-service drivers pick up soiled surgical drapes directly from the surgical ward</li> </ul>
<b>Disadvantages of disposable-drape systems</b> <ul style="list-style-type: none"> <li>  Only surgical supply possible, no ward linens</li> <li>  Hospital incurs waste-management costs for household waste, category B</li> <li>  Additional personnel assignments/costs for pick-up and delivery services, due to increased waste production; transports to household-waste container</li> </ul>	<b>Disadvantages of reusable / leased systems</b> <ul style="list-style-type: none"> <li>  Multi-year agreements required</li> <li>  Poor price transparency</li> <li>  Often contain hidden costs that emerge only much later</li> <li>  Limited product variety</li> <li>  Disposable materials cannot be completely eliminated</li> <li>  Surgical personnel have to sort used surgical drapes into different laundry bags, since cotton and laminate fabrics have to be separated for washing</li> <li>  Instrument-table drapes cannot be used as waste bags</li> <li>  Costs for additional disposable articles</li> <li>  If the hospital carries out washing and sterility recovery for surgical drape materials, it bears liability (operator regulation)</li> </ul>
<small>Source: Cost-effectiveness analysis of use of disposable surgical drapes. Institut Prof. Riegl &amp; Partner GmbH, PR&amp;P, Augsburg, Germany</small>	

Fig. 2

Basic facts and figures for representative hospitals A, B, and C			
Hospitals studied	Hospital A	Hospital B	Hospital C
Total number of beds	320	811	195
Of these, beds in surgical wards	211	574	86
Surgical theatres, including delivery-room surgery	7	19	3
Total numbers of procedures per year	3.498	17.256	2.690
Number of procedures analyzed	3.075	2.387 (surgery only)	820 (Six months' worth of procedures extrapolated to the entire year)
The study began in 1998 and was completed in the second half of 1999. The comparative prices and costs are based on 1997/1998.			
<small>Source: Cost-effectiveness analysis of use of disposable surgical drapes. Institut Prof. Riegl &amp; Partner GmbH, PR&amp;P, Augsburg, Germany</small>			

Fig. 3

Generations of surgical drape systems
<b>Generation 1:</b>
Conventional reusable-product systems (with no disposable solutions)
Conventional systems, in some cases with disposable products
<b>Generation 2:</b>
Reusable systems with no disposable products (= leased surgical drapes/laundry rental)
Reusable mixed systems
<b>Generation 3:</b>
Innovative disposable-drape systems

Fig. 4

relevant procedures. Such careful consideration by users has a positive "side effect":

Announcement and execution of an individualized clinical analysis can tap unexpected cost-effectiveness reserves – reserves that, in light of budget constraints, benefit doctors, care personnel and clinical management.

### Selection of the three representative hospitals

To be selected for the study, hospitals had to meet the following criteria:

- | Used rented or leased products (did not have their own laundry)
- | Used leased linens made of laminates, microfilaments or mixed woven fabrics
- | Differed in size from other selected hospitals

On the basis of these criteria, the study selected representative hospitals in Germany with reusable-product systems that would permit suitable comparison. When approached, the hospitals showed great interest in the relevant detailed survey and model calculations. More clinics had to be turned down than it later proved possible to study (Fig. 3).

Representativeness of model calculations for hospital procedures
In representative hospital A, for example, the study is representative for
100 percent of all stationary surgical procedures
99.6 percent of all gynaecological surgery cases
85 percent of all pediatric surgery cases
83.3 percent of all plastic surgery cases
76 percent of all trauma surgery cases
74 percent of all general surgery cases
61 percent of all vascular surgery cases

### The different draping systems can be categorized

A wide range of different draping systems are used in operating rooms of modern hospitals – often in combination. This great variety can be grouped into three basic types or generations of surgical drapes (Fig. 4).

**The practical test: rented linens versus disposable products**

This study compared a) the use of rented linens made of laminate fabrics, microfilaments or mixed weaves, used partly in combination with disposable-drape systems, with b) the use of (substitution by) disposable-product systems only.

Generation 1 consists of conventional cotton drapes – partly from hospitals' own laundries. Such surgical drapes are now mixed with disposable drapes.

Generation 2 consists of reusable-product systems with refined (laminated) fabrics with fluid and bacterial barriers. Such products are well-known and can be rented or leased. This generation also includes mixed systems: rental linen systems can include both laminated fabrics and conventional materials, such as cotton and mixed weaves, that do not provide reliable bacterial barriers.

Generation 3 consists of disposable-drape systems (including surgical gowns) using innovative fleece materials and featuring clinic-specific surgical packs with all the products required for specific procedures. Generation 3 contains two drape systems: system 1, with single or double-layer laminates, and system 2, with triple-layer laminates.

This study only compared a) reusable-product systems, with textile laminate/microfilament/mixed fabrics (in some cases, mixed with conventional

textiles), with b) disposable-drape systems, primarily system 2 types.

**Surgical drapes and gowns: method and procedure for cost-effectiveness analysis of a specific hospital**

1. Analysis of the given hospital's surgical spectrum, based on statistics at types and numbers of surgical procedures per year (original source: surgical log).

2. Analysis of the relevant clinic's specific drape standards and of its existing surgical drape systems, including surgical gowns (status quo for surgical drapes).

3. Analysis of effective total costs of surgical drapes in use, including surgical gowns (reusable, disposable and mixed systems). This study identified – or subsequently calculated – the actual costs for each instance of surgery, for the hospitals being compared.

The standard sources for information about costs of surgical drapes: suppliers' end prices and actual prices, agreements regarding price lists/invoices/inquiries, information provided by the hospital's central pharmacy or accounting department.

4. Analysis of the comparative costs of substitution by disposable-drape systems, on the basis of suppliers' offers. (This study used the average market costs of the leading providers.)

5. Comparison of the advantages and disadvantages of existing systems and substitute systems, on the basis of process analysis and model calculations (especially taking waste management into account – see Fig. 5).

**Reasons for the limited generalization of cost-effectiveness analysis of surgical drapes (including surgical gowns)**

Different hospitals have different terms for purchasing and supply. Existing suppliers provided mixed calculations if they supplied not only surgical drapes (including surgical gowns), but also ward linens. Some hospitals have their own mixed systems that draw from all three generations of surgical drapes, including systems incorporating hospitals' own laundry service or mixed systems for surgery (for example, Sectio). In some cases, internal-sterilization or reusable-product systems are combined with hospitals' own laundry services and leased surgical drapes. Clinics differ in their drape standards and in the numbers of surgical gowns they require per procedure.

Process scheme for cost-effectiveness analysis of surgical drapes (including surgical gowns, Fig. 6).

Four different process models can be differentiated in the area of surgical drapes:

- 1. Own laundry service (reusable)
- 2. External laundry service (reusable)
- 3. Leased/rented linens (reusable)
- 4. Disposable systems.

The present study compares only processes 3 and 4.

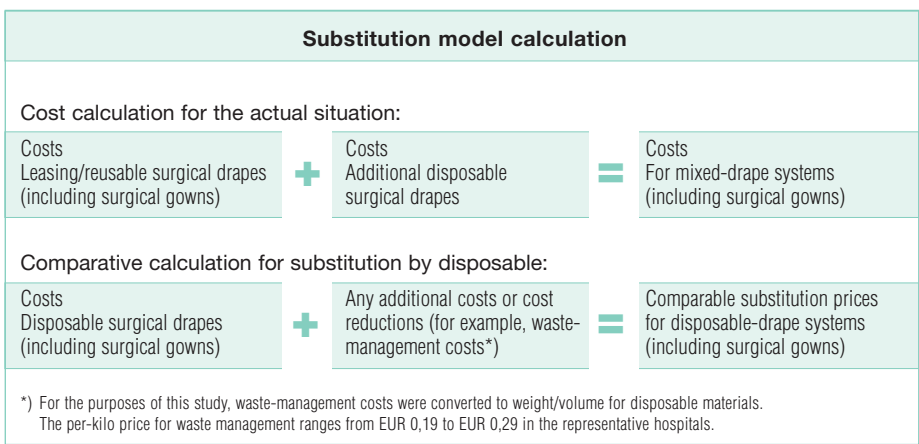


Fig. 5

## Rented linens and disposable-drape systems facilitate processes

The figure illustrates the significant outsourcing and simplification effects of both linen-rental systems and disposable-drape systems. Experience has shown that switching from cotton/mixed fabrics to laminates, via a leasing system, provides no cost advantages, even though it simplifies processes. When the conversion is to disposable surgical drapes, however, the process simplification is also reflected in changes in the cost structure.

## Cost categories for different surgical drapes (including surgical gowns)

When the process models are allocated to the relevant hospital costs, one phenomenon emerges for both leased drapes (rented linens) and dis-

posable drapes: the clinic's internal costs are compensated for by suppliers' prices.

In light of these findings (and without regard to additional benefits), then, straightforward cost analysis for "reusable" vs. "disposable" can concentrate on comparing effective suppliers' prices for processes 3 and 4, plus the waste-management costs for "disposable".

## Potential savings from optimizing surgical drapes

Overall, this benchmarking on the basis of cost comparisons in the three representative hospitals is based on 6,282 cases of surgery. In hospital C, the analyzed half-year figures for 410 procedures were extrapolated to an entire year (820 procedures).

The savings for certain procedures (case benchmarking), and the savings

for hospitals overall (clinic benchmarking), are both relevant to application of these study findings to specific hospitals.

The three types of procedures most frequently encountered in this cost-effectiveness study were as follows:

1. Inguinal hernias (894 cases, of which 385 were operated laparoscopically)
2. Thyroid-gland operations (676 cases)
3. Gall-bladder operations, laparoscopic (318 cases).

The benchmarking analysis (comparison in accordance with the best-case method, Fig. 7), reveals potential savings, including costs for gowns, of up to 50 percent for certain types of operations (gall bladder, laparoscopic), when reusable and mixed systems are replaced by "disposable" systems.

Fig. 6

Hypothetical process model for various surgical drape systems, from the perspective of clinics			
Own laundry service:	External laundry service:	Leasing (rented linens):	Disposable drapes:
Procurement/handling of textile surgical drapes/baled goods (supplementary linens)	Procurement of textile surgical drapes/baled goods (supplementary linens)	Agreement /procurement of rented linens	Contracting for / procurement of disposable surgical drapes
Delivery of goods	Delivery of goods		Central storage
Central storage	Central storage		Delivery of goods
	Pick-up by external laundry		
	Delivery of washed textile surgical drapes		
Laundry/sewing room/check for damage/individual distribution of baled goods/laundry storage	Laundry/sewing room/check for damage/individual distribution of baled goods/laundry storage		
Sterilization	Sterilization		
Transport to operating rooms (surgery storage/sterile room)	Transport to operating rooms (surgery storage/sterile room)	Delivery (to incoming goods department) of rented surgical drapes; transfer to surgical storage	Transport to operating rooms (surgical storage/sterile room)
<b>Surgery</b> Placement of textile surgical drapes	Placement of textile surgical drapes	Placement of textile surgical drapes	Placement of disposable surgical drapes
Removal of textile surgical drapes / sorting / packing in laundry bags / placing in containers / storage in non-sterile room	Removal of textile surgical drapes / sorting / packing in laundry bags / placing in containers / storage in non-sterile room	Removal of textile surgical drapes / sorting / packing in laundry bags / placing in containers / storage in non-sterile room	Removal of disposable surgical drapes / packing in laundry bags / placing in containers / storage in non-sterile room
Transport of used textile surgical drapes to the laundry	Transport to central pick-up location within hospital / interim storage		Transport to waste-collection location within the hospital
Laundry	Pick-up by external laundry	Pick-up by laundry service	Disposal (incineration/pick-up)

Source: Cost-effectiveness analysis of use of disposable surgical drapes. Institut Prof. Riegl & Partner GmbH, PR&P, Augsburg, Germany

### Benchmarking and "hit list" of savings for switching to disposable surgical drapes (including surgical gowns), by surgical procedures

Surgical procedures	Highest costs leasing / reusable mixed systems, per surgical procedure (including surgical gowns)	Lowest costs, disposable surgical drapes (including surgical gowns), per procedure	Maximum savings in a single hospital	Number of operations studied
Thyroid-gland operations	61,61	26,56	49%	676 operations
Inguinal hernias	30,91	21,14	32%	509 operations
Inguinal hernia surgery, laparoscopic	44,19	28,31	23%	385 operations
Gall-bladder surgery, laparoscopic	48,98	24,42	50%	318 operations
Appendectomies, open, surgical	32,86	21,14	36%	228 operations
Appendectomies, laparoscopic	44,19	21,03	27%	201 operations

Costs do not include VAT

For the purposes of this comparative calculation, the waste management costs for disposable-drape systems were set at EUR 0,24 per kilogram, for all cases

Source: Cost-effectiveness analysis of use of disposable surgical drapes. Institut Prof. Riegl & Partner GmbH, PR&, Augsburg, Germany

Fig. 7

### The main areas for cost-saving through conversion to disposable surgical drape systems

There are various reasons why the disposable-product costs for the same operation can differ from clinic to clinic:

1. Differences in drape standards
2. Differences in numbers of necessary surgical gowns
3. Different ways of using surgical packs.

This benchmarking takes into account not only supplier prices, but also the best cases for the various relevant drape standards. The calculations for case-specific benchmarking are based not only on substitution of disposable for leasing/reusable for individual operations, but also on such substitution for all operations, regardless of indications.

List of literature available from the author.

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