



## Reusable versus disposable surgical drapes: A cost-benefit analysis

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### Abstract

Surgical drapes are frequently used in operating rooms and clinics where interventional procedures are performed. In hospitals, surgical drapes can be preferred as disposable or reusable. The choice of surgical drapes stands out as an important issue for hospitals, considering the costs. The objective of the study is to compare disposable and reusable surgical drapes in terms of their costs and benefits and choose the best alternative for the subject hospital. The study was carried out in a training and research hospital with more than 1000 patient beds in Ankara, Türkiye. Cost analysis of 27 reusable surgical drape sets was conducted using procurement, tailoring, sterilization, washing, and drying costs. Cost analysis of disposable surgical drape sets was conducted using purchase unit cost and waste disposal costs. The benefits of surgical drapes were compared using the Analytical Hierarchy Process method, weighted by field experts within the scope of some criteria. At last, the analysis was completed by taking the ratio of findings from both cost and benefit analysis for reusable and disposable surgical drapes. Reusable surgical drapes were found to be less costly and more beneficial when compared to disposables. However, it is not possible to reach a generally accepted conclusion as results may vary from hospital to hospital. Cost savings can be achieved by using reusables as primary surgical drapes in some, if not all surgeries. These results may be useful for decision-makers.

**Keywords:** analytical hierarchy process (AHP), cost-benefit analysis, disposable equipment, reusable equipment, surgical drapes

### 1. Introduction

The cost-effective use of resources in hospitals helps to reduce the overall cost of healthcare, which is beneficial for both patients and healthcare providers. By using resources efficiently, hospitals can save money on supplies, energy, and labor, which can be used to provide better care to patients or invest in other areas of the hospital. Additionally, cost-effective resource use can also improve patient outcomes by ensuring that hospitals have the necessary resources available to provide high-quality care. For example, having an adequate supply of medication and equipment can ensure that patients receive timely treatment, which can lead to better health outcomes. Cost-effective resource use can also improve the sustainability of healthcare systems by reducing waste and minimizing the environmental impact of hospitals. For instance, using reusable medical supplies sparingly and recycling the disposables whenever possible can help to reduce

the amount of waste generated by hospitals.

Surgical drapes have been used by healthcare professionals in operating rooms and clinics where interventional procedures have been performed for more than a hundred years to eliminate or reduce the transfer of microorganisms to sterile environments during invasive interventions, to protect patients and healthcare professionals and to eliminate the risk of infection (1, 2). Surgical drapes are expected to be resistant to liquids with barrier properties, resistant to moisture and bacterial penetration, resistant to puncture, tearing, and abrasion, not leaving hair, air and dust, resistant to antistatic and flame, free from toxic substances, small porous and tightly woven, maintaining body temperature, compatible with sterilization processes, ergonomic, suitable for dimensions and positions, positive cost and benefit ratio (3, 4).

Surgical drapes are used to protect the patient during the surgical operation. All these drapes are produced using nonwoven surfaces and woven fabrics for single-use (disposable) and multi-use (reusable). Reusable surgical drapes are made of woven fabric and are subjected to washing and sterilization between repeated uses. Disposable surgical drapes, on the other hand, are designed to be used once and are produced from nonwoven surface fabrics. Disposable surgical drapes are materials used on a patient during a single procedure and then disposed of according to certain rules and standards (5, 6).

Each of the two basic product types used in surgical drapes has its own advantages and disadvantages. In addition to the cost required for certain surgical procedures, there are significant differences in fabric features (breathability, moisture transmission, hardness/softness, comfort, noise level), functionality (protection and safety, readiness for use, continuity of quality), environmental factors (waste disposal, impact on natural resources). Therefore, it is important to compare the costs and benefits of different surgical drape alternatives in order to conclude an effective decision. Surgical drapes create a significant cost burden on hospitals (7). In this regard, it is thought that the implementation of cost-benefit analysis, which is a financial evaluation method that measures the costs and benefits of the service and shows the user whether the cost of the service provided is valuable, will guide decision-makers in the management of limited budget resources (1). Along with this information, the aim of the study is to create a cost-benefit analysis model based on the Analytical Hierarchy Process (AHP) for disposable and reusable surgical drapes and to demonstrate the application of this model with a case study.

## 2. Materials and Methods

This study was carried out in a tertiary hospital with more than a thousand hospital beds in Ankara, Türkiye. The use of both disposable and reusable surgical drapes in the hospital was an important factor in choosing this hospital. There are 27 different surgical drape sets used in different areas in the hospital, especially in operating rooms and examination rooms where interventional procedures are performed.

Ethical approval was obtained from the Ankara University Ethics Committee (Protocol Number: 56786525-050.04.04/82748) in the first stage of the study, and then administrative permissions were obtained from the hospital. After obtaining the necessary permissions, the literature was searched for the creation of data collection forms. In order to finalize the data collection forms created after the literature review, an expert team consisting of health and administrative personnel who used disposable and reusable surgical drape sets or worked on these sets was formed in the hospital. In line with the feedback of this team and a senior author who is an expert in the field, a data collection form to be used in the cost-benefit analysis was created. Both cost and benefit data were analyzed using Microsoft Excel.

### 2.1. Cost Analysis

27 different surgical drape sets were included in the cost analysis. Data for cost analysis were collected through face-to-face interviews with the administrative and financial affairs directorate, purchasing commission members, laundry and sterilization department supervisors, and operating room staff. Cost calculation of disposable and reusable surgical drapes has been made by considering different cost items, and details are given below. The data used to calculate the costs of reusable surgical drapes are listed in Table 1.

For calculating the costs of reusable surgical drapes; expenses incurred during the procurement phase, lighting, heating, and water expenses of business units, medical waste costs (the record of how much of the surgical drapes were recycled could not be reached), and storage and transportation costs are excluded. The steps followed for the analysis are as follows; firstly, the average cost per kg was calculated for each cost item using the relevant formulas. The total cost per kg was calculated by summing each cost item mentioned in Table 1. Subsequently, the actual weights of the surgical drape sets were multiplied by the total cost per kg; thereby, the cost of each set was calculated. The total cost per set and per usage was determined by taking into account the number of cycles determined. According to the literature, surgical drapes can be used between 40 to 75 cycles (1, 8-10). In order to calculate the cost per use within the scope of the hospital where the study was conducted, it was determined that the life cycle of the surgical drapes was approximately 40, and calculations were made accordingly. The data used to calculate the costs of disposable surgical drapes are listed in Table 1.

For calculating the costs of disposable surgical drapes; expenses incurred during the market research process during the procurement phase, labor costs within medical waste disposal and storage, and transportation costs are excluded. The steps followed for the analysis are as follows: firstly, the weights of each disposable drape set were multiplied by unit waste cost (per kg), and the total cost of the disposable surgical drapes was found by adding the purchase cost of each drape set. It was determined that the hospital management received bids from two different companies (company A and company B) during the procurement of disposable surgical drapes, and therefore cost calculations were made separately for both companies. A discount rate is used to convert expected future expenses to the present value but since the comparison is made within the same year this approach was not used.

### 2.2. Benefit Analysis - AHP

Some decision-making criteria were taken into account while determining the benefits of surgical drape sets. These decision-making criteria were determined based on the European standard EN 13795, publications prepared by INDA, literature review (2, 5, 8, 11) and face-to-face interviews with experts as mentioned earlier. The details about these criteria are given below and in Table 1 and Fig. 1.

**Table 1.** Cost-benefit analysis measures for reusable surgical drapes

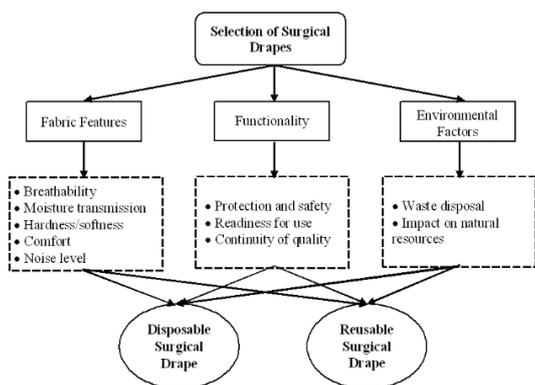
Cost Analysis Measures	Description
Procurement cost	The procurement of green surgical drape material for the reusable surgical drapes is carried out as a result of a tender organized by the hospital procurement commission.
Tailoring costs	The reusable surgical drapes are sewn by the tailoring unit that provides services within the hospital. Tailoring costs consist of labor and raw material and supply costs.
Sterilization costs	These consist of labor, raw material and supply, depreciation, maintenance-repair, electricity and water costs.
Washing costs	These consist of labor, raw material and supply, depreciation, maintenance-repair, electricity and water costs.
Drying costs	These consist of labor, electricity and depreciation costs.
Benefit Analysis Measures	
c1. Fabric Features	This criterion covers the evaluation of the fabric features of surgical drapes. It contains five sub-criteria.
c1.1. Breathability	It refers to the fabric feature that will minimize the sweating of the user by allowing the passage of water vapor.
c1.2. Moisture transmission	It refers to the performance regarding the transmission of moisture through the gaps in the fabric.
c1.3. Hardness/softness	It refers to the hardness/softness level of the fabric.
c1.4. Comfort	It refers to the lightness of the fabric, ease of movement and fit the body.
c1.5. Noise level	It refers to the level of noise that occur during use, such as rustling.
c2. Functionality	Functionality consists of four sub-criteria: protection and safety, readiness for use and continuity of quality.
c2.1. Protection and safety	It refers to the barrier effect and the performance of protection from infection.
c2.2. Readiness for use	It refers to keeping surgical drape sets sterilized and bundled in case of need.
c2.3. Continuity of quality	It refers to the fact that the barrier effect of surgical drape sets is continuous means that the quality has been standardized without any decrease in the quality after use.
c3. Environmental Factors	There are two sub-criteria for environmental factors. These are waste disposal and its impact on natural resources.
c3.1. Waste disposal	Disposal of reusable and disposable surgical drapes can be different from each other and may affect nature in different ways.
c3.2. Impact on natural resources	The production of single and reusable packs and the sterilization of reusable packs can affect natural resources. For example; while disposable surgical drapes consume more energy and raw materials during the production phase, reusable surgical drapes consume more water and chemicals, causing more air and water pollution.

In order to determine which of these criteria is more important, the members of the expert team were asked to compare the criteria and sub-criteria. Afterward, they were asked to compare disposable and reusable surgical drapes within the scope of these criteria using AHP. AHP is a method that incorporates both rational and intuitive factors into the process to choose the best one among a series of alternatives evaluated according to various criteria (12) and provides a comprehensive framework to the decision maker in solving multi-criteria and multi-actor problems (13). Expert opinions are taken by using a scoring scale developed by Saaty to determine the relative importance levels for the criteria (13).

The use of AHP is a well-established approach in criteria weighting, therefore, in the evaluation of the benefits. Although there are several methods exist for criteria weighting, AHP is one of the most preferred methods, especially in healthcare institutions. Among the reasons why the AHP method is preferred more in applications in hospitals, and therefore it is preferred in this study, can be counted as the ease

of application of the method, the inclusion of different decision makers or stakeholders in one model, evaluation of qualitative criteria as well as quantitative criteria and that it can be easily integrated into other methods (14).

The first step in AHP was forming the hierarchical structure. In the hierarchical structure of AHP, the purpose is at the top of the hierarchical structure. While the criteria are at the middle level of the hierarchical structure, there are alternatives at the lowest level of the hierarchical structure (Fig. 1). The hierarchical structure shows the relationships between criteria and purpose. The criteria in the present study were determined based on the literature review and expert opinions.



**Fig. 1.** Hierarchical decision structure. Fig 1 a three-level hierarchical decision structure showing the purpose (oval), criteria (rectangle), sub-criteria (dashed rectangle) and alternatives (circle)

After the hierarchical structure is established, in the second stage, the expert team consisting of health and administrative personnel evaluated the criteria at each level compared to each other. Pairwise comparisons start from the top of the hierarchical structure and are compared with the criteria at each level. In the AHP method, a scale of 1-9 developed by Saaty is used (Table 2). A brief description and set of examples of how to fill out the form were given in the AHP questionnaire. Of the 46 questionnaires, 4 were excluded because they were filled out incompletely or incorrectly, and as a result, a total of 42 of them were used for the analysis.

**Table 2.** An example of the AHP questionnaire

	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
Fabric Features			X															Functionality
Breathability									X									Comfort
<b>In terms of hardness/softness:</b>																		
Disposable										X								Reusable

After the comparisons of the criteria at each level are made, in the third stage, the square matrices are normalized. The sum of each column is taken, and the row values are divided separately by the column totals. Relative importance weights are obtained by taking the average of each row in the normalized matrix.

In the last stage of the method, consistency analysis and sensitivity analysis are performed to confirm the decision made with the AHP method. For consistency analysis, the Consistency Index (CI) and Consistency Ratio (CR) were calculated. The CI is found to be 0.02, and if the value is less than 0.1, it indicates that the comparisons are correct. The CR of the present study is found as 3.06%, and if the value is smaller or equal to 10%, the inconsistency is acceptable. In the sensitivity analysis, the importance of the pairwise comparison matrices consists of the judgments given by the expert on the subject, and therefore, these judgments may differ from person to person, and since it is possible for people to change their thoughts over time, it is possible for different possible situations to occur for the resulting decision. Sensitivity analysis is a method developed to analyze the flexibility of the final decision based on these assumptions, and it is a guide to see how a change in the examined criteria affects the whole system. After some changes were applied to the comparisons and criteria weights, no major difference was found in the resulting decision. After the completion of cost and benefit analysis separately, data on both costs and benefits were normalized in order to calculate the cost-benefit ratio to compare disposable and reusable surgical drapes.

### 3. Results

#### 3.1. Cost Analysis Results

The cost per kg of a set was calculated by considering different cost items. Table 3 shows the total cost per kg of reusable surgical drapes. The total cost of reusable surgical drapes per kg was 26.495 TRY (1.422 USD- As of 2022, 1 USD=18.63 TRY).

**Table 3.** Cost items for reusable surgical drapes (per kg)

Cost	Cost (kg/TRY)
Procurement	13.131
Tailoring	1.629
Sterilization	3.723
Washing	7.997
Drying	0.015
<b>Total</b>	<b>26.495</b>

Table 4 shows the unit and total costs of disposable and reusable surgical drapes. For reusable surgical drapes, information about the weight of each set was obtained from the hospital. The total cost per set and the actual weight of the set were multiplied, and the actual cost per set was calculated for 40 cycles. The average cost of reusable surgical drape sets to the hospital per use was calculated as 57.307 TRY. The total cost of each disposable surgical set was calculated by multiplying the weight of the set by the unit waste price and adding the result with the purchase unit cost. Accordingly, the average cost of disposable surgical drapes to the hospital was calculated as 261.009 TRY for company A and 378.242 TRY for company B. It was determined that in 26 of the 27 surgical drape sets the reusable surgical drape set was at a lower cost, and only the "head and neck" surgical drape set was at a lower cost when procured as a disposable from company B.

**Table 4.** Comparison of disposable and reusable surgical drapes costs

Surgical Drape Sets	Cost of Disposable Surgical Drape Sets							Cost of Reusable Surgical Drape Sets	
	Purchase unit cost (company A) (a)	Purchase unit cost (company B) (b)	Weight (c)	Unit waste cost (d)	Total waste cost (e=c*d)	Total cost (company A) (a+e)	Total cost (company B) (b+e)	Unit cost (f)	Total cost (c*f)
Minor Surgical Set	37.15	25.00	0.200	5.78	1.16	38.306	26.156	26.495	5.299
Pediatric Circumcision	125.00	390.00	0.890	5.78	5.14	130.144	395.144	26.495	23.581
Pediatric Cystoscopy	143.50	360.00	1.254	5.78	7.25	150.748	367.248	26.495	33.225
Pediatric Neurosurgery	160.00	540.00	2.120	5.78	12.25	172.254	552.254	26.495	56.169
Vertebra	177.00	550.00	1.620	5.78	9.36	186.364	559.364	26.495	42.922
T.U.R. (Urology)	191.00	410.00	1.450	5.78	8.38	199.381	418.381	26.495	38.418
Pediatric Laparotomy (Hernia-Appendicitis)	188.00	330.00	0.870	5.78	5.03	193.029	335.029	26.495	23.051
Pediatric Thyroid	255.00	360.00	1.304	5.78	7.54	262.537	367.537	26.495	34.549
General Surgical Set	185.75	290.00	3.230	5.78	18.67	204.419	308.669	26.495	85.579
Abdominal Cover Set	277.70	320.00	1.130	5.78	6.53	284.231	326.531	26.495	29.939
Abdominal Perineal	210.00	300.00	1.130	5.78	6.53	216.531	306.531	26.495	29.939
Thyroid	223.90	320.00	1.150	5.78	6.65	230.547	326.647	26.495	30.469
Breast Surgical Set	200.00	300.00	2.560	5.78	14.80	214.797	314.797	26.495	67.827
Cesarean	230.00	450.00	1.980	5.78	11.44	241.444	461.444	26.495	52.460
Limb	362.00	490.00	3.640	5.78	21.04	383.039	511.039	26.495	96.442
Percutaneous	272.00	450.00	2.150	5.78	12.43	284.427	462.427	26.495	56.964
Hip	309.60	490.00	4.120	5.78	23.81	333.414	513.814	26.495	109.159
Spinal Vertebra	332.00	600.00	3.430	5.78	19.83	351.825	619.825	26.495	90.878
Arthroscopy	375.00	490.00	3.540	5.78	20.46	395.461	510.461	26.495	93.792
Craniotomy	357.00	600.00	2.740	5.78	15.84	372.837	615.837	26.495	72.596
Shoulder Arthroscopy	384.00	450.00	4.520	5.78	26.13	410.126	476.126	26.495	119.757
Heart Valve	523.00	600.00	3.864	5.78	22.33	545.334	622.334	26.495	102.377
Coronary	792.00	600.00	4.862	5.78	28.10	820.102	628.102	26.495	128.819
Tools Table	42.10	30.00	0.254	5.78	1.47	43.568	31.468	26.495	6.730
Moon Table	48.00	45.00	0.263	5.78	1.52	49.521	46.521	26.495	6.968
Tools Table (cardiovascular surgery)	35.00	40.00	0.254	5.78	1.47	36.468	41.468	26.495	6.730
Head and Neck	274.00	45.00	3.874	5.78	22.39	296.392	67.392	26.495	102.642

\* Decimal numbers have been rounded.

### 3.2. AHP Results

As a result of AHP analysis, weights of criterion and both local and global weights of sub-criteria were calculated. As a result of the evaluations of the expert team, the criteria are listed in order of importance as functionality, fabric features, and environmental factors. It was determined that the most important sub-criteria under the fabric features criterion was moisture transmission, the most important sub-criterion was protection and safety under the functionality criterion, and the most important sub-criteria under the environmental factors criterion was the effect on natural resources (local weights). When the global weights of the sub-criteria are examined, it has been determined that the first three most important sub-criteria are protection and safety, continuity of quality, and moisture transmission (Table 5).

The weights of each criterion and sub-criteria were used to compare the disposable and reusable surgical drapes. After the

completion of cost and benefit analysis separately, data on both costs and benefits were normalized in order to calculate the cost-benefit ratio to compare disposable and reusable surgical drapes (Table 6). It is apparent from Table 6 that reusable surgical drapes were for company A approximately five times more, for company B approximately six times more cost beneficial when compared to disposable ones. The present study concludes that reusable surgical drapes outweigh disposable surgical drapes in terms of both benefit and cost.

For sensitivity analysis, different life cycles were used for the calculation to check for any major difference in the result. The calculations were repeated for five different life cycles (75, 60, 50, 40, 30) and reusable surgical drapes were found to be more cost-beneficial in all calculations and no major difference was spotted (Table 7). The sensitivity analysis reveals that a plausible increase or decrease in the life cycles would not have a significant effect on the outcome (9).

**Table 5.** Local and global weight rankings of criteria

Criterion	Weight Ranking	Sub-criteria	Local weight ranking of sub-criteria	Global weight ranking of sub-criteria
c.1. Fabric Features	2	c.1.1. Breathability	2	5
		c.1.2. Moisture transmission	1	3
		c.1.3. Hardness/softness	4	7
		c.1.4. Comfort	3	6
		c.1.5. Noise level	5	9
c.2. Functionality	1	c.2.1. Protection and safety	1	1
		c.2.2. Readiness for use	3	4
		c.2.3. Continuity of quality	2	2
c.3. Environmental Factors	3	c.3.1. Waste disposal	2	10
		c.3.2. Impact on natural resources	1	8

**Table 6.** Cost-benefit analysis result

	Normalized Benefits	Normalized Costs	Benefit/Cost
<b>Reusable Drapes</b>	0.831	0.180	4.613
<b>Disposable Drapes (A)</b>	0.169	0.820	0.207
<b>Reusable Drapes</b>	0.831	0.132	6.313
<b>Disposable Drapes (B)</b>	0.169	0.868	0.195

**Table 7.** Sensitivity analysis for cost-benefit analysis

Number of Cycles	Unit cost of reusables	Average cost per reusable sets	Average cost per disposable sets (company A)	Benefit/Cost (Reusable/Disposable-Company A)	Average cost per disposable sets (company B)	Benefit/Cost (Reusable/Disposable-Company B)
75	14.131	30.564	261.009	7.923	378.242	11.109
				0.189		0.183
60	17.663	38.204	261.009	6.505	378.242	9.054
				0.194		0.187
50	21.196	45.845	261.009	5.559	378.242	7.683
				0.199		0.190
40	26.495	57.307	261.009	4.613	378.242	6.313
				0.207		0.195
30	35.327	76.410	261.009	3.668	378.242	4.942
				0.219		0.204

#### 4. Discussion

Within the context of cost pressure on the healthcare system, it is necessary to identify and implement alternatives to increase the effectiveness and efficiency of health services and to ensure the sustainability of the healthcare system (15). In hospitals within the healthcare system, cost-benefit analysis on surgical drapes can be a guide in purchasing decisions. The main motivation for this purchase decision is to maximize savings by purchasing surgical drapes that offer the lowest cost and the most benefit and support more efficient use of limited resources. Accordingly, this study aimed to conduct a cost-benefit analysis to guide the decision-makers of the hospital to purchase surgical drapes. It was concluded that the cost-benefit ratio of reusable surgical drapes was better and that reusable surgical drapes should be preferred. As predicted prior to the study, it was determined that the total cost increased as the number of uses of reusable surgical drapes decreased. Surgical drapes should be cycled as much as possible to ensure efficient use. In order to ensure this, it is recommended to track the cycles of the surgical drapes. In order to track the cycle of surgical drapes more accurately and to manage the process correctly, it is recommended to use a barcode or RFID system.

Considering that the costs to be incurred during the installation and use of the RFID system will be high, it is recommended to conduct a cost study for the use of the RFID system, as it will increase the costs of reusable surgical drapes. If financial resources cannot be allocated to these systems, manual control is recommended.

The main limitation of the study is the inability to include some cost items as mentioned in the method section in detail. A more comprehensive cost analysis can be made by including the missing cost items. Further studies, which take these variables such as waste disposal for reusable surgical drapes into account, will need to be undertaken. Another limitation of the study is that only one hospital was included in the analysis.

It has been determined that the majority of the cost of reusable surgical drapes consists of procurement and labor costs. Although it cannot be included in the cost analysis in this study, considering that medical waste costs constitute a significant part of the total cost, controlled separation of medical wastes related to reusable surgical drapes is recommended. It is recommended that all personnel using surgical drapes in the hospital be informed about the costs of

surgical drapes, especially medical waste costs and usage habits, and that awareness be raised.

It has been concluded that surgical drape sets used in more complicated surgeries are more costly than surgical drape sets used in interventional procedures. For instance, it has been determined that the top three surgical drape sets at the most cost are coronary, shoulder arthroscopy and hip drape sets. At this point, reusable surgical drapes can be preferred for higher-cost and frequent surgeries. The use of reusable surgical drapes for some surgeries and single-use surgical drapes for other surgeries in the same hospital will be able to provide more cost-beneficial results. In this respect, it is recommended to conduct more specific cost-benefit analyses based on surgical drape sets.

There is a limited number of studies on the cost-benefit analysis of surgical drapes and diverse results have been found when assessing it. A study by the University of Münster's CHM has shown that most hospital managers in Germany tended to make their procurement decisions based solely on the purchase price. As a result of the study, it is stated that reusables are preferable in terms of tensile strength, liquid absorption, and bacterial barrier protection while disposables are preferred mostly based on price alone (16). Two studies aimed to perform an AHP-based cost-benefit analysis on the selection of surgical gowns and drapes in a university hospital found that disposable surgical drapes and gowns provide higher benefits, but their costs are still high to replace reusable ones (7, 8, 10).

There are also some studies measuring and comparing only the costs or only benefits of disposable versus reusable surgical drapes or gowns. A recent study carried out in a medical center of a university hospital aimed to compare the costs of disposable and reusable surgical drapes and found that reusable surgical drapes were less costly than disposables, supporting our findings (1). Another cost analysis per use basis for 50 processing cycles conducted by the American Reusable Textile Association concluded that disposable surgical gowns were two times more expensive than reusables (17). A study comparing the costs of disposable and reusable surgical drapes found that the average cost of the minor disposable pack is less than the reusable one and concluded that using disposable drapes is not more expensive than using reusables (18). Another study conducted in a hospital found that the cost of reusable drapes was higher than disposables and preferring disposables would result in a cost-cutting of 9% per year (19). A cost analysis of surgical drapes used in 304 randomly selected surgeries in a training and research hospital was made and although the medical waste cost of disposable surgical drapes is higher than reusable surgical drapes it was determined that disposable surgical drapes were cost-effective since there is no cost of washing, sterilization, water and electricity (20).

Beyond their costs, surgical drapes are compared in terms

of their benefits and effects on the environment. An environmental life cycle assessment revealed that reusable surgical drapes cause much less environmental pollution than disposables (21). According to a review study, compared to disposables, reusable surgical textiles are more beneficial in terms of energy, water, carbon footprint, volatile organics, solid wastes, and instrument recovery (22). Another study aimed to compare disposable and reusable surgical gowns in terms of their comfort and it was concluded that the comfort performance of disposable surgical gowns was lower. The study also stated that when surgeons wear disposable surgical gowns they perceive it as a 'papery' feeling (5). As a result of a study evaluating the bacterial permeability of disposable and reusable surgical drapes, it was recommended to use a disposable drape in surgeries lasting more than two hours. For surgeries lasting for two hours or less, it was recommended to use disposable drapes in surgeries where the surgical field is wet and infected, and reusable drapes for uninfected cases where the surgical field is not wet. In addition, it was suggested that the surgical drapes should be monitored and recorded after the washing, drying and sterilization processes, the number of uses should be marked, and each institution should monitor and control its own corrosion process (3).

Considering the findings of different studies, one clearly can state that there is no common knowledge about whether disposable or reusable surgical drapes are more cost beneficial. There are several reasons for this. In terms of cost calculations, there will be hidden or indirect costs such as the cost of lost hours for surgery due to the lack of an inadequate number of surgical drapes available which may affect the results of the cost analysis. Another issue is that costs and cost savings vary for not only each hospital but also for each surgical center within the same hospital since there are different procedures and usage and waste disposal habits for each surgery.

In terms of benefit calculations, since the contents and quality of disposable surgical drapes vary from provider to provider, it is not easy to compare the results. It should also be noted that surgeons' preferences play an important role in surgical drape selection. Also, the surgical experience of the operating room personnel, the attitude of the hospital managers, physicians and surgeons towards surgical drape use, whether the laundry and sterilization are outsourced, and whether the surgical drapes used are imported or domestically produced (affects the procurement cost), and organizational culture may have a significant impact on the result of cost-benefit analysis. Therefore, more comprehensive studies can be carried out by adding these out-of-scope cost items and considering some of these institutional factors.

#### **Conflict of interest**

The authors declared no conflict of interest.

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**Ethical statement**

Ethical approval was obtained from the Ankara University Ethics Committee (Protocol Number: 56786525-050.04.04/82748).

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**Authors' contributions**

Concept: E.E., G.Y.U., Ç.E.A., S.A., Design: E.E., G.Y.U., Ç.E.A., S.A., Data Collection or Processing: E.E., G.Y.U., Analysis or Interpretation: E.E., G.Y.U., Ç.E.A., Literature Search: E.E., G.Y.U., Writing: E.E., G.Y.U., Ç.E.A.

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