

The Burden and Cost in Urinary Incontinence

Üriner İnkontinansın Hastalık Yükü ve Maliyeti

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Özet

Üriner inkontinans (Üİ) fiziksel, ruhsal, sosyal ve ekonomik yönden tüm bireyleri olumsuz etkileyen bir sağlık sorunudur. Üİ görülme sıklığı %5-70 arasında değişmektedir. Üİ birey, aile, toplum üzerinde ve sağlık sisteminde ciddi ekonomik yük oluşturmaktadır. Üİ ekonomik yükünün belirlenmesinde hastalık yükü önemli bir parametre olup, sıklıkla Kaliteye Ayarlanmış Yaşam Yılı (KAYY- tedavilerin maliyet etkinliğini değerlendirmek için geliştirilmiş bir araçtır) kullanılmaktadır. Üİ toplam maliyeti kullanılan ve kaybedilen tüm maliyetleri kapsamakta olup, doğrudan ve dolaylı maliyetleri içermektedir. Doğrudan maliyetler; tanı, tedavi, rutin bakım ve Üİ sonuç maliyetleri içermekte olup rutin bakım maliyetleri Üİ maliyetlerinin büyük bir bölümünü oluşturmaktadır. Dolaylı maliyetler Üİ ekonomik yükünün görünmeyen yüzü olup hesaplanması oldukça zordur ve doğrudan maliyetlerden daha büyük bir paya sahip olduğu düşünülmektedir. Türkiye'de Üİ'nin hastalık ve ekonomik yüküne ilişkin bir kayıt sistemi veya araştırmaya rastlanmamış olup veriler Sağlık Uygulama Tebliği (SUT) kapsamında belirtilen tanı ve tedavi maliyetleri ile sınırlıdır. Bu derlemede stres (SÜİ), urgency (UÜİ) ve miks üriner inkontinansın (MÜİ) hastalık yükü ve maliyetinin literatür doğrultusunda incelenerek mevcut durumu belirlenmiştir. Yapılan çalışmalar doğrultusunda Üİ'nin birey ve sağlık sistemi üzerinde ciddi ekonomik yük oluşturduğu, birinci basamak sağlık hizmetlerinin bu maliyeti azaltmada önemli bir güç olacağı belirtilmektedir. Ülkemizde de Üİ'nin ulusal düzeydeki ekonomik yükünün belirlenmesi, doğrudan ve dolaylı maliyetlerin açığa çıkarılması, kaynakların doğru ve etkin şekilde kullanılması, maliyet-etkin inkontinans yönetimi açısından oldukça önemlidir.

Anahtar Kelimeler: üriner inkontinans, hastalık yükü, maliyet

Abstract

Urinary incontinence (UI) is a health problem that affects all individuals physically, mentally, socially and economically. The prevalence of UI ranges between 5-70%. UI creates a serious economic burden on the individual, family, community, and health services. Disease burden is an important parameter in determining the economic burden of UI and often uses Quality Adjusted Life Years (QALY-a tool developed to evaluate the cost-effectiveness of treatments). UI total cost cover all the costs used, lost and include direct and indirect costs. Direct costs consist of costs related to diagnosis, treatment, routine care, and UI outcome costs while routine care costs make up a large portion of UI costs. Indirect costs are the invisible portion of the economic burden of UI, which is very difficult to calculate and is assumed to have a larger share than direct costs. In Turkey, there is no registration system or research yet concerning the UI and its economic burden, and available data is limited to the costs of diagnosis and treatment specified in the Healthcare Implementation Communiqué (SUT). In this review, the disease burden and cost of stress (SUI), urgency (UUI), and mixed urinary incontinence (MUI) have been investigated according to the literature and its current status was determined. Our study has revealed that UI creates a serious economic burden on the individual and the healthcare system, and that first-line healthcare services are key in reducing this burden. For the cost-effective management of UI in Turkey, it is important to determine the economic burden of the disease at the national level, to expose relevant direct and indirect costs, and to employ resources accurately and effectively.

Keywords: urinary incontinence, disease burden, cost

INTRODUCTION

Urinary incontinence (UI) is defined by the International Continence Society (ICS) as involuntary loss of urine in the bladder storage phase (1). UI ranged from approximately 5% to 70%, with most studies reporting a prevalence of any UI in the range of 25–45% (2). Approximately 25% of women of reproductive age, 44-57% of women in middle age and postmenopausal period, and 75% of women over 65 years of age have urinary incontinence (3). Urinary incontinence affects 14-86% of women in Turkey (4-6). UI is a health problem that creates a serious economic burden on the individual, family, community, and healthcare services. The economic burden of a disease is the total cost of all resources used or lost by patients and society as a result of the disease (7). Estimating healthcare costs for urinary incontinence is quite difficult because most of the affected individuals do not apply (for reasons such as embarrassment and disregard) to the healthcare services (8). Therefore, the actual number of individuals with urinary incontinence and the actual burden of the disease are thought to be much higher than the current estimates. Among the reasons why individuals with UI do not present to healthcare institutions are feelings of embarrassment, disbelief in effective treatment of the disease, lack of information, assumption that the disease is a natural phenomenon with advanced age, and unawareness about treatment options (9). The aim of this review is to investigate the disease burden and cost of urinary incontinence according to the literature, with an intent to present its current state.

Disease Burden

The concept of disease burden allows making estimations on risk factors related to particular diseases, health problems, injuries and comparing countries according to standard parameters. In addition, it provides evidence-based data for decision-makers and evaluates of the impact of interventions on public health and of cost-related data (10).

The criteria developed under the disease burden, which is a criterion of public health, are as follows:

- Disability-Free Life Expectancy - DFLE
- Healthy Life Expectancy - HALE

- Disability-Adjusted Life Years - DALY
- Healthy Life Year - HeaLY
- Disability-Adjusted Life Expectancy - DALE
- Quality-Adjusted Life Years - QALY (10).

In order to calculate the economic burden of UI, the disease burden must be determined (11). In studies, the most commonly used criterion for determining the disease burden of UI is the Quality-Adjusted Life Years (QALY) (10). In analyses regarding the distribution of limited healthcare resources among healthcare programs, QALY enables decision-makers to measure the impact of relevant improvements on life expectancy and quality of life (10). QALY is a numeric representation of how much and how long one's quality of life improves after treatment (12). This concept, which is used in economic evaluations, involves calculation of Incremental Cost-Effectiveness Ratio (ICER). ICER is a statistic used in cost-effectiveness analysis to summarise the cost-effectiveness of a health care intervention. It is defined by the difference in cost between two or more (behavioral treatment, drug treatment, surgical treatment) possible interventions, divided by the difference in their effect (13).

Determination of Direct Costs Related to Urinary Incontinence

Urinary incontinence creates a serious economic burden on individuals and the health system. Economic burden can be measured by treatment and cost per patient. Total cost related to UI can be divided into two as direct and indirect costs (Table 1). Standardised diagnostic and treatment procedures costs can be used to determine direct costs (8). Direct costs related to UI can be divided into four as diagnosis, treatment, routine care and UI outcome costs (costs of health-related consequences; e.g., falls, skin conditions, urinary tract infections). The cost of incontinence includes both direct use of resources for incontinence care and treatment, and indirect economic effects resulting from incontinence (e.g. morbidity or loss of productivity due to disability). The economic costs of incontinence are equal to the sum of resources used or lost by patients, healthcare professionals, government agencies or other segments of society as a direct or indirect result of

Table 1. Direct and indirect costs associated with urinary incontinence (11)

Direct costs	
Diagnostic costs	Laboratory tests Physician consultations Physical examinations Urodynamic evaluations
Treatment costs	Behavioral therapy Medication Surgery Devices
Routine care costs	Incontinence pads and briefs Landry, dry cleaning Hygiene and odor control products New clothing to replace those worn from frequent laundering Cleaning/replacing carpet and/or furniture Nursing care time Disposable bed pads Indwelling urinary catheters
Consequence costs	Treatment for falls Treatment for skin infections due to incontinence Treatment of urinary tract infections Lengthened hospital stay Nursing home admission
Indirect costs	
	Loss of labor Decreased productivity Mental health problems

incontinence. The resources used in treatment such as medical staff, equipment, materials, clinical facilities, etc. vary widely. Therefore, it is easier to estimate direct costs by identifying the types of treatment services, measuring the units of these treatment services, and multiplying them with the cost. Meanwhile, the financial burden of UI can also be determined by calculating individual expenditures in direct proportion with the prevalence (11). While most of the total cost includes direct costs (e.g. diagnostic tests, inpatient and outpatient care, laundry, drug treatment, behavioral treatment, etc.) and indirect costs (expenditure for paid or unpaid caregivers) constitute only 4% of the total UI cost (8). The majority of the studies conducted worldwide focus on costs related to overactive bladder and urgency incontinence problems (7, 14, 15).

According to the 2010 Deloitte report, It was estimated total cost of incontinence 67 billion Australian dollars in Australia (16). In a systematic review, it is indicated that the total national cost of urgency incontinence in the United States of America (USA) was 65.9 billion USD in 2007, 76.2 billion USD in 2015, and it is estimated to be 82.6 billion USD in 2020, with direct costs being the main portion of the overall cost of urgency incontinence. It is stated that this will increase gradually in the following years (14). The most comprehensive study in the USA was conducted in 1995, and the cost of direct care of UI was calculated as 16.3 billion USD. In the USA, annual direct costs of urinary incontinence are reported to be higher in women in nursing homes (8.6 billion USD) than in women in hospitals (3.8 billion USD). Similarly, the cost for wom-

en over 65 years of age is more than twice the cost for women under 65 (7.6 and 3.6 billion USD, respectively), the largest cost category being routine care costs (70%), followed by nursing home admissions (14%), treatment (9%), complications (6%), and diagnosis and examinations (1%) (17). In a study conducted to determine the use of medical resources and direct treatment costs for women with UI in European countries (Germany, Spain, United Kingdom (UK)/Ireland), direct costs were calculated as annual costs per patient

according to type of UI. Data on these costs are given in Table 2. In the study, it was determined that mixed UI (MUI) was the UI type with the highest costs (18).

In Turkey, there is no registration system or research yet concerning the disease burden of UI, and available data is limited to the costs of diagnosis and treatment specified in the Annex-2B of Healthcare Implementation Communiqué (SUT) (19). Diagnosis and treatment costs per patient indicated in the SUT are given in Table 3.

Table 2. Direct costs of urinary incontinence by country

	Country	Year	Direct cost by UI type	Total direct costs
Hu et al. (11)	USA	2000	-	803,7 USD
Tediosi et al. (20)	Italy	2000	-	1618 USD
The Canadian Continence Foundation (37)	Canada	2014	-	10,409 USD
Continence Foundation of Australia (16)	Australia	2010	-	67,000 AUD
Papanicolaou et al. (18)	Germany	2004	SUI: 349 Euro	537,2 Euro
			UUI: 398 Euro	
			MUI: 498 Euro	
Papanicolaou et al. (18)	Spain	2004	SUI: 464 Euro	673 Euro
			UUI: 615 Euro	
			MUI: 600 Euro	
Papanicolaou et al. (18)	England/ Ireland	2004	SUI: 271 Euro	375 Euro
			UUI: 300 Euro	
			MUI: 365 Euro	

UI: Urinary incontinence; UUI: Urgency urinary incontinence; SUI: Stress urinary incontinence;

MUI: Mixed urinary incontinence; AUD: Australian dollar; USD: American dollar

Diagnostic Costs of Urinary Incontinence

Laboratory tests, physical examination, consultations and urodynamic evaluations are used in the diagnostic process of urinary incontinence. The rate of use of diagnostic tests is significant in determining the costs related to UI diagnosis.

In a study, it was determined that urinalysis, urogenital examination and ultrasound are the most widely used diagnostic procedures in Germany, Spain, and England/Ireland, respectively (18). In the study in which direct costs of urinary incontinence were esti-

imated based on the data of the Italian National Health Service, it was stated that consultation cost constitutes 20% of the total, diagnostic tests 36%, and hospital admissions for diagnostic procedures 44% (20). Hu et al. (11) reported the annual diagnosis costs per case as 26 USD for hospitalized individuals and 24.5 USD for individuals in the community. In their study, Papanicolaou et al. (18) reported that the diagnostic costs were 48 Euro in Germany, 177 Euro in Spain and 24 Euro in UK/Ireland.

Table 3. Diagnosis and treatment costs for urinary incontinence in Turkey, 2018 (19)

Diagnostic procedures*	Costs (TL)
Boney and Q-tip tests	4,80
Cystometry	14,90
Cystometry and electromyography	44,50
Cystometry and uroflowmetry	17,85
Urine analysis	3,8
Urodynamic testing	31,20
Uroflowmetry	8,93
Voiding cystometry	44,55
Treatment procedures*	
Abdominal ve combined entorocele repair	405,84
Artificial sphincter removal	711,25
Augmentation cystoplasty	1333,75
Bladder neck resection	296,63
Bladder suspension, laparoscopic	741,63
Burch operation	405,84
Cystocele operation	111,30
Cystorectocele operation	133,50
Incontinence injection into the bladder neck	320,25
Insertion of an artificial sphincter	888,75
Le Forte operation (Colpoplexis)	350,11
Marshall-Marchetti Kranz operation	356,00
Paravaginal repair	270,52
Pereyra operation	356,00
Perinoplasty	111,30
Postoperative cuff prolapse repair (Abdominal facial suspension and colpoplexy)	356,00
Raz operation	445,00
Rectocele	133,50
Rectovaginal fistula	667,38
Shortening of the uterosacral ligament	202,92
Sling operation (Including Transvaginal Tape and Intravaginal slingoplasty)	333,75
Transobturator tape	338,24
Urethral fistula repair	270,52
Urethroplasty	648,66
Urethrovaginal fistula operation	608,65
Vaginal hysterectomy and cystocele operation	441,79
Vaginal hysterectomy and rectocele operation	433,93
Vaginal sacrospinous ligamenttopexy	356,00
Vesicocervical fistula repair	800,00
Vesicorectal fistula repair	860,91
Vesicovaginal fistula repair	800,00

*Alphabetical order

Treatment Costs of Urinary Incontinence

The management of UI symptoms involves a multifaceted and complex treatment process. In UI, it is recommended to plan and implement conservative treatment before surgery (21). Conservative treatment includes lifestyle changes such as losing weight, smoking cessation, reducing caffeine and alcohol consumption, and management of comorbid diseases such as chronic obstructive pulmonary disease and diabetes. The cost of medical optimization and lifestyle changes (e.g. walking three times a week) do not include any additional costs or may involve fees such as monthly membership in a gym, whereas the cost can vary up to thousands of USD per year for complex medical optimization (22).

Behavioral therapy and pharmacotherapy together are necessary within the scope of treatment, and it is stated that these combinations cannot be evaluated in terms of cost-effectiveness (23). Pharmacological agents frequently used in UI treatment are anticholinergics, alpha-adrenergic agonists, Beta adrenergic agonists (mirabegron), duloxetine and estrogen (24). The costs of these pharmacological agents range between 1140-3480 USD per year (23). In their study, Hu et al. (11) stated that annual pharmacological treatment cost per case was 6 USD for hospitalized individuals and 14.4 USD for individuals in the community. In a study by Papanicolaou et al. (18), the annual cost of pharmacological treatment per patient was reported to be 77 Euro in Germany, 41 Euro in Spain and 81 Euro in UK/Ireland. The first step in treatment of UI is the implementation of pelvic floor muscle training (PFMT), which strengthens urethral sphincter tone, thus decreasing urine leakage during episodes of increased intraabdominal pressure. When used alone, the method is essentially free. PFMT can be combined with other treatments such as biofeedback, electrical stimulation, and vaginal cones, but they come with additional costs. For basic level PFMT, the average

cost of a three-month treatment cycle is 189 Euro, for biofeedback combination 224 Euro, and for electrical stimulation combination 398 Euro (12). In a study conducted in the UK in 2010, the estimated prices for the three-month basic PFMT, PFMT and biofeedback, and PFMT and electrical stimulation were determined as 291 USD, 345 USD and 612 USD, respectively (22). In the study by Simpson et al. (25), the results of cost-effectiveness analysis indicated that PFMT was the most cost-effective non-surgical treatment option for stress urinary incontinence.

The two surgical treatment options applied in UI are colposuspension and retropubic tape (RT). In a 10-year screening study conducted in the USA, RT (8651 USD) was found to be a cost-effective treatment compared to colposuspension (10545 USD) (26). According to the UK National Health Service reference costs, average RT and Transobturator tape (TOT) costs are reported to be 1135 Euro (741-1357 Euro) for an average two-day hospital stay and 629 Euro (456-828 Euro) for same-day surgical treatment. Average colposuspension costs for an average two-day hospital stay are €1396 (1011-2013 Euro) (27). Another study has shown that TOT is cost effective compared with RT in the treatment of stress urinary incontinence (28).

In a systematic review, the estimated total cost of treatment procedures is reported to be 1114 Euro for RT, 1317 Euro for colposuspension, 1340 Euro for traditional sling, 1317 Euro for laparoscopic colposuspension and 1305 Euro for injectable pharmacological agents. RT is cost-effective compared to other surgical procedures that are assumed to be equally effective as a traditional sling and open colposuspension. RT more costly than laparoscopic colposuspension is equally effective as or less effective than open colposuspension with similar costs, and injectable agents are less effective but also more costly than RT (29). In a systematic review (30), costs related to surgical procedures were classified on Table 4.

Table 4. Surgical treatment costs in urinary incontinence (30)

Treatment procedures	Sweden (2003)	America (2007)	England (2013)	America (2013)	Canada (2013)	Brazil (2018)
Burch colposuspension		9320 USD	-	-	-	1815,72 USD
Laparoscopic Burch colposuspension	2118-2310 Euro		-	-	5393 CAD	-
Transvaginal tape	1366 Euro	8081 USD	1277 USD	9579 USD	-	-
Transobturator tape	-	-	-	9017 USD	2547 CAD	-
Mini sling	-	-	1277 GBP	-	--	5674 USD

(USD: American dollar; CAD: Canadian dollar; GBP: Pound)

Routine Care Costs in Urinary Incontinence

Routine care costs include various items such as pads, menstruation pads, incontinence pads, disposable or reusable underwear, laundry, dry-cleaning, skin care and odor control products. Laundry costs related to incontinence include cleaning the bed sheets, bed pads and clothes. It is quite difficult to find data specifying the indirect costs associated with the symptomatic treatment of UI. Many adults who prefer to treat their condition personally to trust pads, diapers, and changing clothes frequently (23). Routine care costs are difficult to calculate. A majority (50-75%) of the cost of incontinence includes the costs of routine care, including absorbent pads, protection, and laundry (28). Adults with UI often use pads and diapers as incontinence support products. Since pads are disposable, they require high costs. Adult diapers can be disposed of or reused after use. Washable diapers are more expensive initially, but their cost is reduced over time due to their reusability. Bed and chair underpads can be disposable or reusable, with varying costs according to the feature (23). The Australian Institute of Health and Welfare (AIHW) estimates that the expenditure on incontinence products was 101 million Australian Dollars in 2003. This amount does not include other personal expenses such as laundry or government expenditures for incontinence support programs (31).

UI patients need constant care to change their incontinence pads, underwear and clothing and to ensure proper skin care. In the community, this routine

care is usually performed by the individual, while in the nursing home or in case of a disability, by caregivers. The two environments being different, the cost of routine care is different in the community and in the nursing home. In addition, the accuracy of data collection varies in the community and in the nursing home. Data collection regarding routine care costs is easier and more accurate in nursing homes than in the community. The reported costs in the community are largely based on the statement of the individual, and the types of products used vary, making it difficult to calculate the cost (11). In a study in which the cost of pads, diapers, laundry and dry-cleaning for women living in nursing home was calculated, it was found that an average of 3.91 ± 11.11 USD per week was spent for women with SUI, and this expenditure was 204 ± 578 USD annually. Women with UI living in the community have been found to have lower treatment and care costs than those with more comorbidities living in nursing home (32).

In a study conducted in the USA (2006) with 273 women with UI in order to determine the costs of routine care, 90% of the women reported costs related to UI, and the average weekly cost rose to 0.37 USD with mild UI, and 10.98 USD with severe UI, meaning that costs increased with the severity of the disease. In addition, it was found that approximately 75% used pads (minipad being the most common), more than half reported laundry burden, and 18% had additional dry-cleaning costs per week due to UI (33) (Table 5).

Table 5. Routine weekly care costs of urinary incontinence (33)

	Usage rate (%)	Approximate costs
	USA (33)	USA (33)
Total pad usage	62	3,54 ± 3,53 USD
Mini pad	45	2,40 ± 1,88 USD
Big pad	11	3,78 ± 2,61 USD
Incontinence pad	11	6,25 ± 5,25 USD
Diapers	1	14,50 ± 10,89 USD
Washing	22	-
Dry cleaner	6	10,53 ± 8,37 USD
Other expenses	13	4,12 ± 4,32 USD

(USD: American dollar)

One of the parameters of routine care is the nursing workforce. Incontinence nurses work in many health institutions, including inpatient services, community clinics, continence helpline and rehabilitation services (34). It was also reported that women without incontinence received an average of 5.9 hours of care per week, women with incontinence not using pads 7.6 hours, and women with incontinence using pads 10.7 hours. Annual informal costs of care associated with incontinence were reported to be 1700 USD and 4000 USD for men with incontinence not using pads and using pads, respectively, while 700 USD and 2,000 USD per year for women in these groups, with a total national cost of over 6 USD billion per year for care associated with incontinence (34). In a study, it was shown that incontinence nurses in first-line healthcare services had an important role in reducing the costs of UI (35). In another study, it was found that more patients were detected by a continence nurse specialists than other health professionals because of the questioning of incontinence, and more treatment and improvement was achieved. The increased percentages of successfully treated and improved patients have been found to reduce the costs of formal home care, informal care and containment products (36).

Outcome Costs Caused by Urinary Incontinence

UI directly cause to many secondary diagnoses, including skin lesions, urinary tract infections (UTI), depression, falls, and fractures (9). Skin irritation and falls are assumed to occur in 50% of the elderly. It is indicated that 1% of patients with UTI in nursing homes require rehospitalization. It is reckoned that 5% of nursing home admissions primarily result from incontinence and that incontinence is effective in determining the place of residence of the elderly (17). There are no present data on costs of secondary health problems associated with urinary incontinence.

Indirect Costs Related to Urinary Incontinence

It is known that UI seriously affects the quality of life and causes various comorbidities and functional limitations. Individuals with UI experience unemployment or early retirement due to mental problems such as depression, isolation and lack of confidence, and expenses related to these constitute indirect costs. In addition, the employment status of family members or

friends who help the patient with UI care are also included in indirect costs (8, 23). It is stated that, in Canada, 7% of the female working population and 3.5% of the male population had UI complaints and that the disease caused an average of 11 days of workforce loss and \$182.27 of financial loss per day for employers (37). Low employment rates in individuals with incontinence may present an additional cost to the economy due to loss in productivity and income (38). Indirect costs of UI cannot be scientifically calculated, but indirect costs are estimated to constitute a greater share than direct costs (15). In a study, it was determined that employees with UUI had statistically significantly higher medical costs (131%), drug costs (52%), sick leave (30%) and short-term disability (74%). It was found that employees with UUI had 117% more medical and drug costs, 47% higher total absenteeism cost in daily activities and 63% more absenteeism at work than employees without UUI (15).

CONCLUSION

Urinary incontinence is a major health problem that affects both genders in all ages. There are many areas of expenditure for individuals with UI ranging between the use of auxiliary support products such as pads and diapers, and the processes of diagnosis and treatment upon presentation to health institutions. In addition to these direct costs, the inability or interruption of participation in work life due to UI, as well as other costs related to similar problems experienced by the caregivers are also direct costs, but it is not possible to calculate these costs accurately. In Turkey, there are currently no data or studies related to the cost of UI. For the cost-effective management of UI in Turkey, it is important to determine the economic burden of the disease at national level through studies, to uncover direct and indirect costs, and to employ resources accurately and effectively. This should be a priority, given the demographic change towards an aging population and the increasing costs of healthcare provision and technology.

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