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COSTS OF INTERSTITIAL CYSTITIS IN A MANAGED CARE POPULATION

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Abstract

Objective—This study assessed the direct medical costs, medication and procedure use associated with interstitial cystitis (IC) in women in the Kaiser Permanente Northwest (KPNW) managed care population.

Methods—The KPNW electronic medical record was utilized to identify women diagnosed with interstitial cystitis (n=239). Each of these cases was matched with three controls based on age and duration in the health plan. Health plan cost accounting data were used to determine inpatient, outpatient, and pharmacy costs for 1998–2003. An analysis of prescription medication use, cystoscopic and urodynamic procedures commonly associated with IC was also performed. To evaluate for comorbidities, an automated risk-adjustment model (RxRisk) linked to 28 chronic medical conditions was applied to the administrative datasets from both groups.

Results—The mean duration from the date of IC diagnosis to the end of the study period was 36.6 months (range 1.4–60). Mean yearly costs were 2.4-fold greater in cases than controls (\$7100 vs. \$2994), and median yearly costs were 3.8-fold greater (\$5000 vs. \$1304). These cost differences were predominantly due to outpatient and pharmacy expenses. Medication and procedure use were significantly greater in cases than controls. These findings were consistent across RxRisk categories, which suggest that the observed cost differences are IC-specific.

Conclusions—The direct per-person costs of IC are high, with average yearly costs approximately \$4000 greater than age-matched controls. This cost differential is an underestimate, as costs preceding the diagnosis, use of alternative therapies, indirect costs and costs of those with IC that is not diagnosed are not included.

Keywords

expenditure; resource use; epidemiology; pelvic pain; chronic

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Objective

Interstitial Cystitis (IC) is a chronic pain syndrome characterized by bladder discomfort and frequent urination in the absence of an identifiable cause.¹ Increased frequency of urination of 10-15 times per day is typical, and severely affected patients may urinate more than once per hour.² Studies have demonstrated a quality of life impact for IC equivalent to rheumatoid arthritis and end stage renal disease.^{3,4} Although many treatments for the condition exist, none have demonstrated consistent effectiveness. As a result, IC patients typically see multiple physicians and undergo numerous tests and treatments in attempts to improve their symptoms. While it is evident that IC patients utilize significant healthcare resources, the degree of economic burden attributed to the condition has been incompletely studied. The aims of this study are to quantify the direct medical costs to the healthcare system associated with a diagnosis of IC, and to examine condition-specific medication and procedure patterns in IC patients.

Methods

Study population

The study population has been described previously.⁵ Briefly, the population included members of Kaiser Permanente Northwest (KPNW), a health maintenance organization (HMO) based in Portland, Oregon. KPNW demographics reflect those of the metropolitan Portland area. In 1998 KPNW completed full implementation of the EpicCare clinical information system, a full featured electronic medical record with the ability to initiate orders, enter progress notes, review results, code visit diagnoses, provide patient instructions, and capture family and medical history. This computerized medical record automatically links with other databases—e.g., appointments, laboratory, outpatient pharmacy.

The study period was May 1, 1998 to April 30, 2003. A search of the KPNW database was performed after excluding certain subjects, namely younger than 25 or older than 80 years, those who were not current KPNW members at the time of analysis (May 2003), and those with dental coverage only. After applying these initial demographic exclusions there were 136,457 women in the study population. Men were also excluded due to the limited number of men with a diagnosis IC in the population. Institutional Review Board approval was obtained from KPNW and Northwestern University prior to study initiation.

Identification of cases and controls

Women with an ICD-9 diagnosis of 595.1 ('interstitial cystitis') (n=239) at any time during the study period were identified. Each of these 239 women was age-matched with three control women who did not have an IC diagnosis.

Cost Assessment

The Kaiser Permanente Center for Health Research has developed a system for translating services provided by KPNW into dollar costs.⁶ Using KPNW's annual Medicare Cost Report to obtain departmental costs, a standard unit costing algorithm for KPNW has been developed that allows total annual expense to be calculated for each member.

For determining outpatient costs, medical office appointments are classified by type of provider (physician vs. physician assistant/nurse practitioner) and specialty type. Outpatient visit cost coefficients were derived from total outpatient health plan costs and physician costs in 1993. Outpatient visit costs are calculated by multiplying the total number of visits per department per provider type by the appropriate department cost coefficient. An inflation factor from the

Professional Services Index is applied to the department cost coefficients so that the resulting costs are in current dollars for each study year.

Prescription costs are obtained from internal data systems, and approximate retail costs (acquisition cost plus dispensing fee).

Four inpatient utilization parameters are used to calculate inpatient costs: days in the critical care unit, days in routine care, minutes in operating room (OR), and minutes in recovery room (RR). These parameters are collected from hospital discharge abstracts. All hospital indirect costs and physician inpatient costs are allocated proportionately to the daily cost centers.

For both inpatient and outpatient utilization outside of KPNW, costs are obtained from an outside claims and referrals system, and are based on the amount KPNW actually paid to the vendor versus the amount KPNW was billed.

Cost Comparison

For cases and matched controls, costs were calculated from the date of the initial documented IC diagnosis (index date) to the end of the study period. Total, pharmacy, outpatient, and inpatient costs were compared. All costs were adjusted to 2003 \$US. Costs for the five-year study period were divided by the average follow-up interval (years) to provide an estimate of yearly costs.

Medication Use

Six different medication categories were created to reflect treatments that are commonly used for IC. The costs, number of users per year, and number of yearly fills per user were compared between cases and controls for each category. The six categories included IC-specific medications (pentosan polysulfate, dimethylsulfoxide), urinary analgesics (phenazopyridine, methenamine, methylene blue), oral antibiotics, oral narcotics, neurologic agents (tricyclic antidepressants plus gabapentin), and oral anticholinergic medications.

Procedure Use

The number of cases and controls who underwent “IC-related” procedures were compared. The procedures included cystoscopy, cystoscopy with bladder biopsy, cystoscopy with bladder dilation as treatment for IC, bladder irrigation/ instillation, and urodynamic testing.

Analysis of Medical Comorbidities

It is possible that observed cost differences between cases and controls could be due to the presence of unrelated pre-existing medical conditions in one group or the other. This was assessed by applying a risk adjustment model (RxRisk) to the datasets from both groups. The RxRisk model produces estimates of future health care cost based on an individual’s age, sex, and chronic condition profile measured by pharmacy dispenses linked to 28 chronic conditions.⁷ RxRisk has previously demonstrated the ability to predict individual cost variability in KPNW and other health care systems.⁸⁻¹¹ If observed cost differences between cases and controls were robust across levels of RxRisk-estimated severity, this would suggest that overall cost differences are attributable to IC, rather than to underlying comorbidities.

Statistical Analysis

Mean yearly costs for cases and controls were log-transformed and compared using the paired t-test. Categorical variables were compared using the chi-square test. Analyses were performed with commercially available software (SAS, Version 8, Cary, NC).

Results

Cost Comparison

The mean duration from the index date (date of initial documented IC diagnosis) to the end of the study period was 36.6 months (range 1.4-60). There were 9179 outpatient visits by the 239 IC patients recorded during the study time period, including 5379 physician visits and 3795 visits to other providers. A total of 1272 of these visits (13.9%) were assigned to urology. Table 1 presents the resource utilization comparison between cases and controls. Mean yearly costs were 2.4-fold greater in cases than controls, and median yearly costs were 3.8-fold greater. These cost differences were statistically significant. Mean yearly costs in cases were \$4106 greater per year than in controls, and median yearly costs were \$3696 greater. The cost differential was predominantly due to outpatient and pharmacy costs, as the median yearly inpatient cost for both cases and controls was \$0. Table 2 shows age-specific cost data for cases and controls. While overall medical costs in both cases and controls increased with advancing age, the case:control cost ratio decreased with age. This indicates that the IC costs were disproportionately associated with younger individuals.

Medication and Procedure Use

Medication and procedure use is summarized in Table 3. Mean yearly costs for all examined medication categories were significantly greater in cases than controls. Of those who used these medications, intensity of use (measured as mean number of fills per user) was greater in cases for all medication types except for the neurologic agents (tricyclic antidepressants and gabapentin). The examined procedures were also conducted significantly more frequently in cases than controls. Taken together, these findings imply that the observed overall cost differences between cases and controls are IC-specific.

Analysis of Medical Comorbidities

Table 4 presents mean costs for the 12 months 5/02-4/03 across quartiles of RxRisk scores based on the prior-year comorbidities of both cases and controls. Lower RxRisk scores generally indicate less comorbidity. Within three of the four RxRisk quartiles, mean costs for cases are significantly higher than for controls, and in the fourth quartile (Quartile III) there is a trend toward higher costs in cases that does not reach statistical significance. The robustness of the cost differences across RxRisk quartiles suggests that the excess costs of cases are more likely attributable to IC than to underlying comorbidities incorporated in the RxRisk model.

Discussion

These findings indicate that individuals diagnosed with IC incur substantial direct medical costs. The median cost in IC cases was approximately 4-fold greater than age-matched controls, and the yearly excess cost attributed to the condition was approximately \$4000 per person. The unadjusted mean yearly cost was \$7100 per woman with IC. Comparison cost data for other conditions in the KPNW population are not currently available. However, the cost was greater than the unadjusted mean per person costs reported for diabetes, depression, hypertension, injury/poisoning, and asthma in the Northern California Kaiser Permanente managed care population (all costs in 2003 dollars).¹² These data suggest that the overall impact of IC to the healthcare system may be greater than suggested by the relatively low prevalence of the condition.

Although the costs were greater in IC cases than controls in all examined age groups, the relative cost difference was most pronounced in the youngest individuals (25-50). Since IC symptoms commonly start in the 3rd or 4th decade of life,² this may reflect an increase in resource use related to initial diagnostic and therapeutic interventions. However, the cross-sectional nature

of this study does not provide information about IC-related costs over time. Nevertheless, this finding highlights the fact that IC has a severe effect on many individuals who are in the most productive years of life.

The results of this analysis are remarkably similar to those reported by Wu et al in a study of medical costs associated with IC in an employed population.¹³ Using administrative claims data from 16 large self-insured companies in the US, these authors identified 749 IC patients (86% female) and matched them by age and gender to 1498 controls. They found that IC was associated with a 2.3-fold increase in mean yearly direct medical costs, and an absolute direct cost difference of \$3756 per year. In contrast to our study, they limited the analysis to individuals under the age of 65, and assessed costs only for the 12 months after the IC diagnosis. The similarity of the findings in these two different healthcare environments implies that they may be broadly generalizable.

The costs presented in this analysis may underestimate the true cost of the disease for a number of reasons. First, they do not reflect IC-related costs accrued before the diagnosis. Second, they do not include services not covered by KPNW; however, KPNW is an integrated health plan providing largely comprehensive health care. Therefore, use of uncovered services by KPNW members is minimal. Third, the cost estimates do not incorporate indirect costs such as work loss due to IC symptoms. Fourth, since IC was defined by the presence of a coded diagnosis, patients with IC who were not accurately coded with the condition were excluded. This is important, because the prevalence of undiagnosed IC, although unquantified, is suspected to be substantial.¹⁴ These results underscore the need for additional research to identify more accurate diagnostic tools and more effective treatments for this debilitating condition.

Conclusions

Women diagnosed with interstitial cystitis incur costs that are 2 to 4-fold greater than costs observed in age-matched controls. The cost differential is disproportionately associated with younger individuals. These excess costs may persist for extended time periods, as no uniformly effective treatment for IC exists. Further research to better quantify the economic burden of IC needs to address indirect costs, costs accrued prior to the IC diagnosis, and estimates of the prevalence and costs of undiagnosed IC (i.e. those with the condition who are erroneously assigned another diagnosis).

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TABLE 1

Yearly Resource Use

		Prescription Costs	Prescription Fills	Outpatient Costs	Outpatient Visits	Inpatient Costs	Inpatient Stays	Total Costs
Mean	IC Cases	\$2147	35.1	\$3447	14.1	\$1506	0.17	\$7100
	Controls	\$879	15.1	\$1484	6.9	\$630	0.06	\$2994
	Ratio	2.4	2.3	2.3	2.0	2.4	2.7	2.4
Median	p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	IC Cases	\$1274	22.6	\$2579	10.2	\$0	0	\$5000
	Controls	\$290	7.9	\$719	4.6	\$0	0	\$1304
	Ratio	4.4	2.9	3.6	2.2	0	0	3.8

TABLE 2

Yearly costs by age group

	Mean			Median		
	IC Cases	Controls	Ratio	IC Cases	Controls	Ratio
25-30	\$4967	\$1680	3.0	\$2918	\$631	4.6
31-40	\$6581	\$1711	3.8	\$4860	\$806	6.0
41-50	\$7236	\$2487	2.9	\$4970	\$1060	4.7
51-60	\$6040	\$2835	2.1	\$4374	\$1292	3.4
61-70	\$8900	\$5521	1.6	\$7183	\$2230	3.3
71-80	\$8678	\$4850	1.8	\$5990	\$2878	2.1

TABLE 3

Medication and procedure use* in cases and controls.

Medication/ Procedure	IC Cases (n=239)	Controls (n=717)	p-value
IC Medications			
Mean Yearly Cost	\$1224	\$0	<.0001
Mean No. Users per year	43 (18%)	0 (0%)	<0.00001
Number of unique users	99	0	
Mean number of fills per user	9.5	--	
Oral Urinary Analgesics			
Mean Yearly Cost	\$24	\$0.62	<.0001
Mean No. Users per year	40 (17%)	10 (1%)	<0.00001
Number of unique users	115	43	
Mean number of fills per user	4.4	1.4	.001
Oral Antibiotics			
Mean Yearly Cost	\$228	\$67	<.0001
Mean No. Users per year	98 (41%)	155 (22%)	<0.00001
Number of unique users	199	421	
Mean number of fills per user	6.2	3.4	<.0001
Oral Narcotics			
Mean Yearly Cost	\$351	\$97	.0006
Mean No. Users per year	91 (38%)	132 (18%)	<0.00001
Number of unique users	195	354	
Mean number of fills per user	16.9	6.9	<.0001
Neurologic Agents			
Mean Yearly Cost	\$269	\$135	.07
Mean No. Users per year	58 (24%)	42 (6%)	<0.00001
Number of unique users	116	91	
Mean number of fills per user	12.9	11.8	0.57
Anticholinergics			
Mean Yearly Cost	\$254	\$4.95	<.0001
Mean No. Users per year	42 (18%)	7 (1%)	<0.00001
Number of unique users	108	27	
Mean number of fills per user	6.2	2.8	.0006
Cystourethroscopy, with dilation of bladder for interstitial cystitis (general anesthesia) (CPT 52260)	69 (29%)	0	<0.00001
Cystourethroscopy, with dilation of bladder for interstitial cystitis (local anesthesia) (CPT 52265)	2 (0.8%)	0	0.01
Cystourethroscopy (CPT 52000)	77 (32%)	21 (3%)	<0.00001
Bladder irrigation, simple, lavage and/or instillation (CPT 51700)	5 (2%)	0	0.0001
Cystourethroscopy, with biopsy (CPT 52204)	33 (14%)	0	<0.00001
Urodynamic^{**}	34 (14%)	12 (2%)	<0.00001

* includes individuals who underwent the selected procedures during entire the 5-year study period

** includes the following CPT codes:

- 51725 (simple cystometrogram)
- 51726 (complex cystometrogram)
- 51736 (simple uroflowmetry)
- 51741 (complex uroflowmetry)
- 51772 (urethral pressure profile studies)
- 51784 (non-needle electromyography studies of anal or urethral sphincter)
- 51785 (needle electromyography studies of anal or urethral sphincter)
- 51795 (voiding pressure studies)
- 51797 (measurement of intra-abdominal voiding pressure)
- 51798 (ultrasound measurement of post-void residual urine)

Table 4
Mean annual costs (5/02-4/03) by RxRisk quartile* (Lower quartile = fewer comorbidities)

RxRisk Quartile	Cost Category	No. Cases	Mean (\$)	No. Controls	Mean (\$)	p-value
I	Pharmacy	62	1244	238	431	<0.0001
	Outpatient		2015		950	<0.0001
	Inpatient		947		528	0.506
	Total		4206		1909	0.008
II	Pharmacy	60	1515	247	544	<0.0001
	Outpatient		2348		1212	<0.0001
	Inpatient		2496		313	0.003
	Total		6359		2070	<0.0001
III	Pharmacy	58	2074	137	1266	0.004
	Outpatient		3176		1320	<0.0001
	Inpatient		1418		1441	0.984
	Total		6667		4028	0.073
IV	Pharmacy	43	3720	95	3101	0.349
	Outpatient		4033		2655	0.030
	Inpatient		2934		1077	0.091
	Total		10,707		6832	0.023

* RxRisk score based on comorbidities in prior year.