

Economic Cost and Epidemiological Characteristics of Patients with Fibromyalgia Claims

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ABSTRACT. *Objective.* Fibromyalgia (FM) is characterized by widespread pain that can lead to significant patient disability, complex management decisions for physicians, and economic burden on society. We investigated the total costs of FM in an employer population.

Methods. Administrative claims data of a Fortune 100 manufacturer were used to quantify direct (i.e., medical and pharmaceutical claims) and indirect (i.e., disability claims and imputed absenteeism) costs associated with FM. A total of 4699 patients with at least one FM claim between 1996 and 1998 were contrasted with a 10% random sample of the overall beneficiary population. Employee-only subsets of both samples also were drawn.

Results. Medical utilization, receipt of prescription drugs, and annual total costs were proportionately similar yet significantly greater among FM claimants than the overall sample (all $p < 0.0001$). Total annual costs for FM claimants were \$5945 versus \$2486 for the typical beneficiary ($p < 0.0001$). Six percent of these costs were attributable to FM-specific claims. The prevalence of disability was twice as high among FM employees than overall employees ($p < 0.0001$). For every dollar spent on FM-specific claims, the employer spent another \$57 to \$143 on additional direct and indirect costs.

Conclusion. Hidden costs of disability and comorbidities greatly increase the true burden of FM. Regardless of the clinical understanding of FM, when a claim for FM is present, considerable costs are involved. Findings suggest that within the management of FM there may be large cost-offset opportunities for reductions in patient, physician, and employer burdens. (*J Rheumatol* 2003;30:1318–25)

Key Indexing Terms:

FIBROMYALGIA
RESOURCES

COMORBIDITY
DISABILITY

HEALTH CARE COSTS
DEPRESSION

Fibromyalgia (FM) is a debilitating, chronic syndrome of unknown etiology characterized by widespread musculoskeletal pain, fatigue, and tenderness in localized areas of the neck, spine, shoulders, and hips¹. The prevalence of FM has been estimated at 2%² and in 1995 it affected 3.7 million Americans³. Most patients with FM are women (up to 85%), typically of childbearing age or older⁴.

Medical care for patients with FM generates considerable diagnostic and treatment challenges for physicians. Characterized by severe pain in diffuse areas, FM raises controversy in evidence-based medicine practices where debates over the acceptance of universal diagnostic and treatment guidelines for FM still linger. Consequently, the recognition and management of FM may be costly and time consuming to patients, physicians, and employers. While literature on the epidemiology and treatment of FM has

grown in recent years, there is little information on the economic burden.

Although there are no published studies of the total economic costs of FM, 2 studies estimated the direct medical care costs of FM^{5,6}. The first study screened a representative community sample from Ontario, Canada. Participants included 3 groups: (1) patients with FM as confirmed by rheumatologists, (2) patients with widespread pain but not FM, or (3) patients with no pain⁵. The study found that annual costs, medications, and health services among FM patients were twice those of the 2 control groups.

The second study identified 500 FM rheumatology patients who self-reported utilization of direct treatment costs of FM. Average annual health services costs, including medications, were \$2274 per FM patient in 1996 dollars⁶. These data were converted to dollars using assigned costs per day, per visit, or per prescription assumptions, in contrast to actual cost data. Elsewhere, the same authors reported that over 16% of a sample of roughly 1600 FM rheumatology patients received United States Social Security disability payments compared to 2% of the US population⁷. Disability specific to FM has been reported to occur in 9 to 24% of FM patients; however, no cost analyses of these results exist⁴.

From Eli Lilly and Company, Indianapolis, Indiana, and Analysis Group Economics, Cambridge, Massachusetts, USA.

Supported by Eli Lilly and Company.

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Submitted July 15, 2002; revision accepted November 28, 2002.

The objective of this research was to determine the economic burden of FM by assessing the employer payments for direct costs (i.e., medical and pharmaceutical claims) and indirect costs (i.e., disability claims and imputed partial absenteeism). In addition, a basic description of FM patient demographics, treatment patterns, and medical characteristics is provided.

MATERIALS AND METHODS

Dataset. The study sample was derived from administrative claims of a large, national US Fortune 100 manufacturer with a predominantly unionized, male dominated workforce. Data consist of health care (i.e., medical and prescription) claims for employees, spouses, dependents, and retirees (under age 65) and disability claims for employees during a 3 year study period 1996 through 1998. In 1998, over 100,000 such beneficiaries were enrolled nationwide in this company's managed indemnity insurance plans. Data on patients in health maintenance organizations (who accounted for about 20% of enrollees) are not available, and thus excluded from these analyses. Because medical claims for patients over age 65 are incomplete in the employer database (due to payments by Medicare), patients are excluded if they were over age 65 in 1998. To capture data for only those patients that were continuously insured and eligible for benefits, individuals had to be identified in each of the 3 years 1996 through 1998. Demographic information for each beneficiary included sex, job classification (if an employee), patient type within the health care plan, and year of birth.

FM sample. An individual was classified as a FM claimant if the person had one or more FM medical or disability claims [International Classification of Diseases, 9th revision (ICD-9) code 729.1] at any time during the study period. This approach reflects the chronicity of FM by recognizing that persons with FM may not make a claim for FM each year, yet the influence of FM symptoms still affects health care utilization indirectly.

Additional descriptors of FM claimants and indicators of their health care utilization were explored to characterize these patients. Claims data included information on physician specialty, therapeutic class of any prescribed medications (using the National Drug Code), detailed diagnostic type of medical or disability claims (using ICD-9 and Current Procedural Terminology codes), and type of service (inpatient, outpatient, office visits, and other). Outpatient visits included any outpatient hospital; hospital-based or freestanding ambulatory surgical facility, dialysis facility, or ambulatory medical facility; outpatient psychiatric facility; and psychiatric day-care facility. Other visits included care at the patient's home, nursing or extended care facility, psychiatric day-care facility, substance abuse treatment facility, and independent clinical laboratory tests.

To quantify the percentage of patients with conditions commonly comorbid with FM, 18 specific classifications, derived from the literature, were constructed from the diagnostic information within the medical claims^{2,5,8-12}. These conditions include: abdominal pain (789.0), allergic rhinitis (477.x), anxiety (300.0x), back disorders (307.89, 724.x, 839.x, 846.x-847.x), chronic fatigue syndrome (780.7x), chronic sinusitis (473.x), depression (296.2x, 296.3x, 300.4x, 309.0x, 309.1x, 311.x), hypertension (401.x), irritable bowel syndrome (564.1), migraine (346.x), osteoarthritis (715.x), rheumatoid arthritis (714.x), sleep disturbances (307.4x, 780.5x), symptoms involving head and neck (784.0x-784.3x), symptoms involving the respiratory system (786.x), ulcer or stomach problem (531.x-536.x), other diseases of the musculoskeletal and connective tissue (ICD codes 710.x-713.x, 716.x-723.x, 725.x-729.0, 729.2x-739.x; not including FM, or other disorders listed above), and other mental disorders (290.x-295.x, 296.0x-296.1x, 296.4x-299.x, 300.1x-300.3x, 300.5x-300.80, 300.83-306.8x, 307.0x-307.3x, 307.5x-307.80, 307.82-307.88, 307.9-308.x, 309.2x-310.x, 312.x-319.x). Disorders that were present in the literature, but that occurred in less than 1% of this sample and were excluded from this category, included temporomandibular joint (524.60), chronic tension

headache (307.81), Raynaud's syndrome (443.0x), multi-somatiform disorder (300.8), and somatic reaction (306.9x).

Prescription drugs. Prescription drug therapies play a prominent role in the treatment of FM, yet there is no specific drug indicated for the treatment of FM. Therefore, medications investigated in this study are described as "FM-related" prescription medications if they are referenced in the literature as a treatment for FM and "all other prescription medications"^{10,12-17}. The "FM-related" medications include all drugs classified under the therapeutic classes of nonsteroidal antiinflammatory drugs (NSAID), salicylates, analgesics, anticonvulsants, antianxiety agents, antidepressants, antipsychotics, skeletal muscle relaxants, proton pump inhibitors/H2 antagonists, adrenal cortical steroids, asthma drugs, anxiolytics, sedatives, hypnotics, antimigraine agents, antirheumatics, and anti-allergy drugs.

To address the main objective, the economic burden of FM is calculated using the actual cash payments by the employer for medical and pharmaceutical costs (direct costs) in addition to disability payments and imputed absenteeism costs (indirect costs) for 1998. Although the study sample is drawn from 3 years of data, cost estimates are based on the most currently available annual data.

Indirect costs were imputed using methods similar to the approach taken by Burton and Conti^{18,19}. While the current study lacks measures of on-the-job productivity, it does include periods of disability and daily payments received by the employee. Data on sporadic illness-related absences are imputed in part based on days when medical care was provided. If an employee was not on disability and medical care was received during work days, these days are counted as illness-related work loss days in the case of hospital care or as a half-day work loss in the case of an office visit. Since disability claims cover missed work days due to illness for periods of 6 or more consecutive days for eligible workers, patients with disability claims also are assigned 5 illness-related work loss days. Work loss costs refer here to employer payments for the sum of disability plus imputed sporadic illness-related absences. Barnett, *et al* have reported a complete description of these data²⁰.

All demographic and health care utilization information is reported across 2 cohorts. The first cohort, an overall sample, includes employees, spouses, and dependents. All beneficiaries with at least one FM claim ("FM Sample") are contrasted with data from a 10% random sample of the employer's overall beneficiary sample including FM patients ("Employer Overall Sample").

The second cohort, an employee sample, consisted of all employees in occupational categories enrolled in the disability program, which includes about 90% of all employees. This sample also allows comparison of data among all employees with a FM claim ("FM Employees") to a 10% random sample of employees including FM patients ("Employees"). In addition to epidemiologic comparisons, disability costs are estimated for the employed subsample.

Student t tests were used to assess each resource and costs associated with the FM sample and overall sample, for the overall and employee-only subset. Proportions were tested using chi-square tests.

RESULTS

Table 1 reports the descriptive characteristics of 4699 FM claimants, 1819 FM employees, and their respective comparator samples from the Employer Overall Samples. Consistent with population estimates^{1,2}, the prevalence of FM in these data was 2.8%, and 60.6% of FM claimants were women. FM claimants had a median age of 46 years and 54% were a spouse or dependent of an employee.

Health care utilization. As shown in Figure 1A, FM claimants have 2.6 times more medical claims, among total services, than the average beneficiary in this sample. Higher rates of claims occurred in both the type of services provided and the number of each type of service. First, as

Table 1. Demographic characteristics, 1996–1998*.

	Overall Sample		Employee Sample	
	Fibromyalgia Sample	Employer Overall Sample	Employees in Fibromyalgia Sample	Employees in Employer Overall Sample
Sample size	4699	10% of sample	1819	10% of sample
Female, %	60.6	48.9	28.3	15.1
Patient status, %				
Employees	38.7	34.5	100.0	100.0
Retired	7.6	6.5	0.0	0.0
Spouses/dependants	53.7	59.1	0.0	0.0
Age, yrs				
Mean	43.3	38.1	44.6	46.4
Median	46.0	44.0	46.0	48.0
Mode	50.0	51.0	51.0	51.0
< 18, %	6.6	21.4	0.0	0.0
18–35, %	16.8	15.1	19.4	14.5
36–45, %	24.2	17.5	28.7	25.5
46–55, %	36.0	28.7	40.0	43.5
56–64, %	16.4	17.3	11.9	16.4

* With the exception of age 56–64 ($p = 0.1470$), differences between Employer Overall Sample and FM samples for both patients and employee subgroups were statistically significant ($p < 0.0001$).

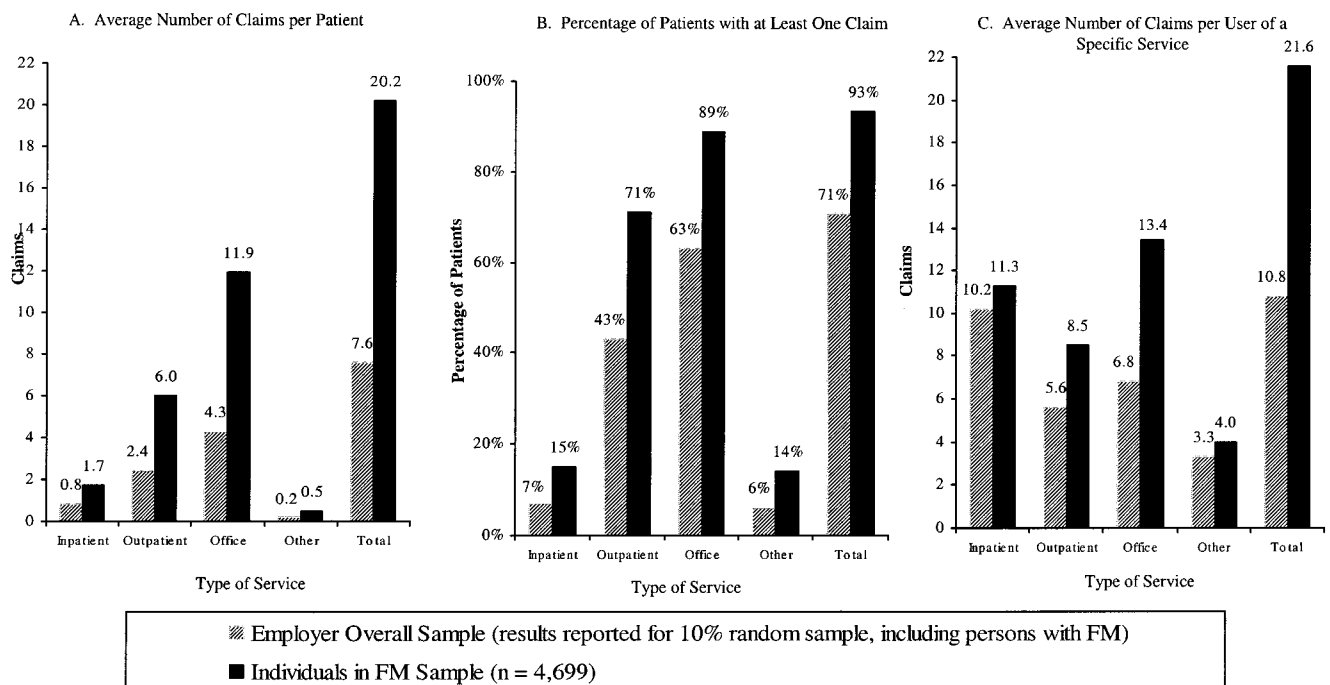


Figure 1. 1998 medical claims per patient, by type of service. Differences between Employer Overall Sample and FM samples: all $p < 0.0001$, with the exceptions of Inpatient in Chart C ($p = 0.2011$) and Other in Chart C ($p = 0.0180$).

shown in Figure 1B, a greater percentage of FM claimants with at least one visit among the total type of services substantially exceeds that for the Employer Overall Sample (93% vs 71%; $p < 0.0001$). This pattern of higher use of services by FM claimants is generally present across all places of service.

Second, the number of claims per FM claimants (\pm SD)

is higher compared to the average medical care user (21.6 ± 25.2 vs 10.8 ± 15.8 claims per user; $p < 0.0001$) (Figure 1C). However, fewer than 1 in 100 claims are for FM-specific services (i.e., claims with FM diagnoses). While 93% of FM claimants have at least one claim in 1998 for medical services, only 39% of FM claimants have a claim for a FM-specific service.

Selected conditions that coexist among claimants with a FM claim are illustrated in Table 2. Forty-five percent of patients in the FM sample have at least one claim for “other diseases of the musculoskeletal and connective tissue” compared to 16% of the employer sample ($p < 0.0001$). In addition, FM claimants have an average of 2.8 ± 7.0 claims per patient for this comorbid condition, while patients in the Employer Overall Sample have an average of 0.6 ± 3.0 claims per patient ($p < 0.0001$). While there is wide variation in utilization in the treatment for “other diseases of the musculoskeletal and connective tissue,” on average, the number of claims for the treatment of this condition is greater among FM claimants. Additionally, FM claimants have a much higher average number of claims per patient than patients in the overall sample for several other selected conditions including symptoms involving respiratory and other chest symptoms (1.0 vs 0.4 ; $p < 0.0001$), back disorders (1.5 vs 0.3 ; $p < 0.0001$), abdominal pain (0.6 vs 0.2 ; $p < 0.0001$), and depression (0.8 vs 0.3 ; $p < 0.0001$). Overall, FM claimants experience 2.4 times as many of the selected comorbidities as the average beneficiary.

Of these medical claims, the FM sample has an annual average of 6.3 claims for visits to general practitioners compared to 2.3 claims per patient in the Employer Overall Sample ($p < 0.0001$). These FM claimants also have an average of 2.1 claims per patient for radiology and 1.3 claims per patient for mental health services compared to 0.9 claims per patient for radiology and 0.4 claims per patient for mental health services in the overall sample. On

average, only 0.06 ± 0.49 claims per FM patient were by rheumatologists, with only 2% of FM claimants seeing a rheumatologist in 1998.

Prescription medications. Receipt of prescription drug therapies frequently referenced in the FM literature is reported in Table 3 for the FM Sample. The most widely prescribed types of medication for this FM Sample include NSAID and analgesics, which are used by 50.8% and 44.0% of the FM group, respectively. Pharmaceutical treatments for mental illnesses (including antidepressants that may also be used to treat persistent pain and other mental illness agents) are used by 43% of the sample. In this employer’s data, the average FM patient used more of the selected prescription therapies than the average beneficiary (84% vs 52%; $p < 0.0001$). This pattern holds for each of the prescription therapies examined. For example, while half the FM claimants filled prescriptions for NSAID, only one-fifth of the Employer Overall Sample did so. Similarly, patients in the FM sample take almost 3 times the number of selected prescription therapies than beneficiaries in the Employer Overall Sample. Nearly 4 times as many claimants in the Employer Overall Sample than the FM sample were prescription-free in 1998 (26% vs 7%; $p < 0.0001$).

Cost measures. Total employer costs in 1998 per FM patient (including spouses, dependents, and retirees under age 65) for medical, pharmaceutical, and work loss expenditures were \$5945 (or \$7776 per FM employee). These per-capita

Table 2. 1998 average number of medical claims per patient, for selected comorbidities*.

Selected Comorbidities	FM Patients, n = 4699		Employer Overall Sample	
	Average Number of Claims (a)	Patients with One Claim, % (b)	Average Number of Claims (c)	Patients with One Claim, % (d)
Other Diseases of the musculoskeletal system and connective tissue (not including FM, other unspecified disorders of the back, osteoarthritis, and rheumatoid arthritis)	2.80	45.4	0.63	16.3
Symptoms involving respiratory and other chest symptoms	1.05	28.2	0.38	12.8
Abdominal pain	0.56	15.7	0.17	6.2
Back disorders	1.52	29.4	0.27	7.9
Hypertension	0.48	17.3	0.26	9.9
Symptoms involving head and neck	0.23	10.0	0.05	2.8
Chronic sinusitis	0.20	9.3	0.06	3.3
Ulcer or stomach problems	0.15	7.9	0.05	2.4
Other mental disorders (not including depression, anxiety, or multi-somatoform disorder)	0.54	9.0	0.29	5.1
Osteoarthritis	0.27	7.9	0.06	2.3
Depression	0.85	9.2	0.25	3.4
Chronic fatigue syndrome	0.14	6.6	0.05	2.4
Allergic rhinitis	0.25	6.7	0.14	3.4
Migraine headache	0.15	4.6	0.02	0.9
Irritable bowel syndrome	0.04	2.4	0.01	0.6
Sleep disturbances	0.06	2.4	0.02	0.8
Anxiety	0.11	2.0	0.03	0.8
Rheumatoid arthritis	0.07	1.8	0.02	0.4

* All differences between Employer and FM samples comparing columns a versus c as well as b versus d: $p \leq 0.05$.

Table 3. Selected prescription therapies taken by FM patients compared to Employer Overall Sample, for 1998*.

Prescription Product	Percentage of FM Sample, n = 4699	Percentage of Employer Overall Sample
NSAID and salicylates	50.8	21.9
Narcotic analgesics	44.0	20.5
Antiallergy agents	30.9	15.3
Skeletal muscle relaxants	28.6	6.5
Proton pump inhibitors/H2 antagonists	26.7	11.6
Antianxiety agents	21.6	8.0
Adrenal corticosteroids	18.8	8.7
SSRI antidepressants	17.6	6.3
Other antidepressants	15.7	5.7
Asthma drugs	12.8	7.4
Non-narcotic analgesics	13.5	3.2
TCA antidepressants	12.5	3.1
Anxiolytics, sedatives, and hypnotics	11.3	3.9
Anticonvulsants	5.4	1.6
Antimigraine agents	5.2	1.5
Other mental illness agents	5.2	2.1
Antirheumatics	1.3	0.5
Total	321.9	127.8
Unique individuals using selected drugs	83.7	52.3
Unique individuals not using any drugs	7.3	26.0

* All differences between Employer and FM samples: $p \leq 0.05$

costs (Figure 2) are roughly twice those of the Employer Overall Sample (i.e., \$2486; $p < 0.001$) and the subgroup of all employees (i.e., \$4045; $p < 0.0001$). This doubling of costs occurs both for total costs and for the separate categories of health care, disability, and absenteeism.

Figure 2 also shows a significant cost burden on the employer due to disability claims in the FM sample, since FM employees were significantly more likely than the average employee to file a disability claim for any reason in 1998 (45% vs 22%; $p < 0.0001$). Only 1% of FM employees

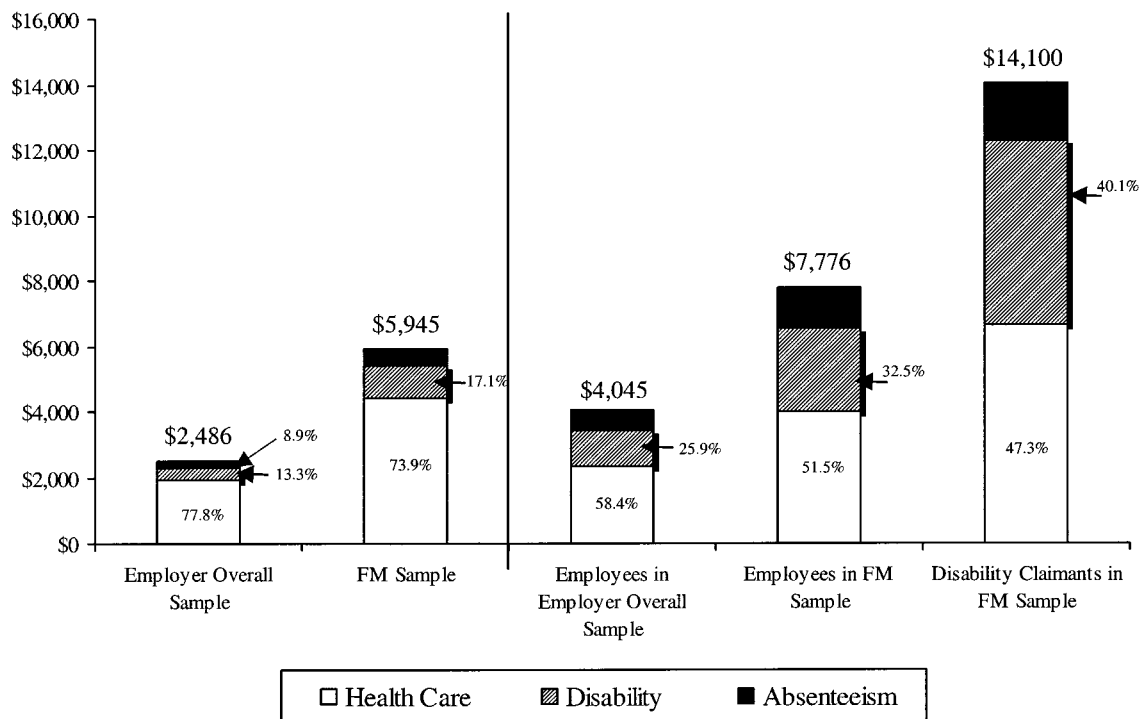


Figure 2. 1998 employer payments for treated FM patients: health care, disability, and absenteeism. Differences between Employer Overall Sample and FM samples (for both patients and employee subgroups): $p < 0.0001$.

filed a disability claim specifically for FM. The percentage of disability claimants among FM employees was stable (44–45%) over the 3 year study period. Back disorders and other diseases of the musculoskeletal system and connective tissue were most frequently listed as the source of disability. The estimated annual cost in 1998 per disabled patient with FM was \$14,100.

In light of the low use of FM-specific services, an overwhelming portion of the incremental costs imposed by FM claimants on this employer consisted of treatment associated with non-FM diagnoses. Considering employees only, 2% of this employer's total costs for its workers are related to treatments tied to FM diagnoses. However, 48% of total costs are tied to the 18 selected comorbid conditions related to FM. The remaining 49% of costs are associated with other conditions.

Figure 3 presents the components of costs for beneficiaries in the Employer Overall Sample and for those with FM. Notably, while FM claimants cost this employer more than twice the cost of the average beneficiary, both groups have a similar distribution of costs. Medical care accounts for more than half the costs, while the remaining costs are split almost equally between work loss and prescription drugs. The cost for FM-related medications for the average FM claimant is \$621 and \$189 for the Employer Overall Sample. Considering employees only, work loss was a greater proportion of the cost since costs are split almost equally between work loss (49% vs 42%, for FM and Employer Overall Sample, respectively) and health care costs (51% vs 58%, for FM and Employer Overall Sample, respectively), where the later category is the sum of medical and prescription drug costs.

DISCUSSION

This analysis illustrates the significant financial burden associated with FM. This burden is shown by using overall beneficiary and employee-only samples from an employer dataset. Total annual costs for FM claimants were \$5945 versus \$2486 for typical beneficiaries. These estimates are more inclusive than those provided in previous reports, where 1993 Ontario costs for medical services were \$1028⁵ and 1996 US costs for medical services and medications were \$2274⁶ (dollars not adjusted for inflation). The present study includes all the health care costs of treating patients with FM compared with the overall beneficiary sample, including all comorbid conditions, as the costs of treatment explicitly for FM. Additionally, this research includes work loss costs to the employer. Together, the high prevalence rate of disability among FM employees and high cost of disabled FM claimants creates a significant cost burden on the employer.

Within this study, all the components of total annual cost (i.e., medical utilization, receipt of prescription drugs, work loss) were each proportionately similar, yet of significantly greater magnitude among FM claimants than the overall sample. Hidden costs of disability and comorbidity greatly increased the true burden of FM. The prevalence of disability was twice as high among FM employees than overall employees. While medical resource utilization by FM claimants is substantial, less than 6% of these costs were attributable to FM-specific claims. This analysis highlights the wide range of illnesses and services that affect FM claimants beyond a specific diagnosis of FM.

Consistent with previous reports, FM was associated

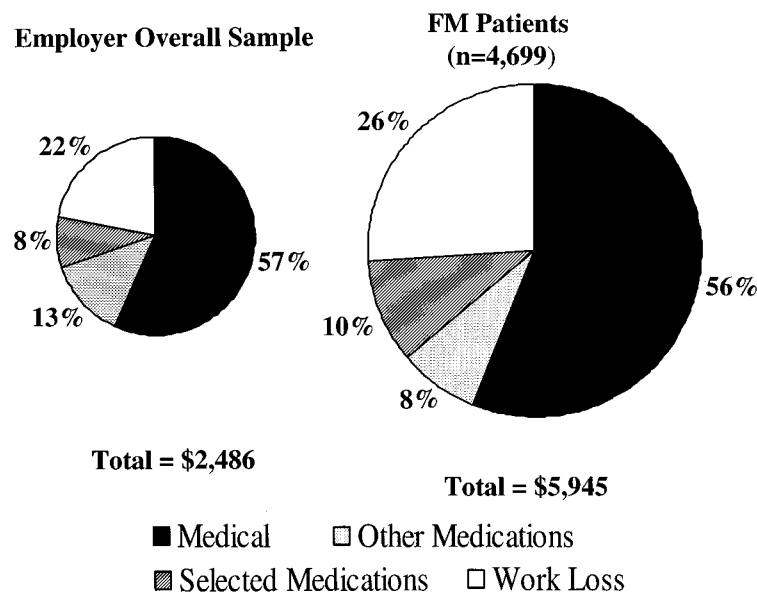


Figure 3. 1998 employer payments: employer overall sample compared to treated FM patients.

with high rates of many selected comorbid illnesses^{2,5,8-11,13,21,22}. On average, FM claimants had claims for 4.2 distinct selected comorbid conditions per year (out of a possible 18 categories). The high rates of comorbid conditions correspond with a recent study that found that FM claimants appraise their health as including more medical symptoms, and they value each symptom with greater importance than patients with other rheumatic conditions²³. These comorbid conditions may be characterized as existing upon a continuum of painful conditions, sharing key symptoms, or simply co-occurring with FM. The most commonly indicated comorbid category included "other diseases of the musculoskeletal and connective tissue," where 45% of FM claimants had at least one claim. This pattern may be related to the hypothesis that FM is a more advanced clinical stage of the widespread musculoskeletal pain continuum²⁴. The FM sample also had a much higher average number of claims per patient than patients in the overall sample for several other selected conditions, including symptoms involving respiratory and other chest symptoms, back disorders, abdominal pain, and depression. Some of the prevalent diagnoses share common symptoms such as sleep irregularities, pain, and depressed mood, where certain neurotransmitters such as serotonin and norepinephrine play a role^{25,26}. Within the literature, depressed mood is one of the most commonly cited conditions comorbid with FM^{8,21,22,27-30}. Similar to depression, prevailing pathophysiological theories now invoke central nervous system mechanisms that play a role in the development and persistence of FM^{26,31}. As often debated, mood disorders may aggravate and complicate the management of FM. Indeed, there is a high level of lifetime co-occurrence of FM with depression, but the nature of the causal relationship between these 2 conditions is unclear. Further analysis distinguishing health care utilization and epidemiologic characteristics of FM from those of depression is needed.

The high levels of comorbidities and resource utilization of FM claimants are spread across a wide spectrum of physician specialties and include frequent receipt of prescriptions for a broad range of medications. Roughly 76% of FM claimants were seen at least once in 1998 by a general practitioner, a rate 1.6 times that of overall beneficiaries. FM claimants have an annual average of 6.3 claims for visits to general practitioners compared to 2.3 claims per patient in the overall sample. This pattern reflects both the high utilization of medical care in general by FM claimants and the high utilization of treatment provided by a general practitioner. Other commonly visited practitioners include radiologists and mental health practitioners. The high utilization of radiologists may reflect the FM patient sample's need for diagnostic services. The high average number of claims for mental health services may reflect the mind-body phenomenon of psychological and psychosocial distress influencing

symptoms of FM. Surprisingly, only 2% of patients with FM claims visited rheumatologists in 1998.

These findings substantially increase our understanding of the costs and characteristics of FM claimants. Nevertheless, these findings are limited by the available data. First, because this study relies on insurance claims data, the findings are subject to the usual limitations of administrative datasets. Such limitations include possibly inaccurate diagnoses and incomplete assembly of claims (e.g., missing bills, multiple plan coverage)³². Moreover, the data here reflect treatment of patients not in health maintenance organizations, whose patterns of utilization may differ from sample patients in managed indemnity plans.

Second, FM is very difficult to diagnose and there is no information on the accuracy of the diagnostic indications and the severity of the underlying illnesses. It is unclear whether the complexity and controversy of FM influence the breadth of comorbid conditions associated with FM. Illnesses may reflect misdiagnosis or delay in the diagnosis of FM because of the many symptoms that mimic or overlap other diseases. Given the chronicity and complexity of this illness, the FM sample was identified on the basis of at least one FM claim over a 3 year period. Along with estimates of prevalence comparable to the literature, a sensitivity analysis resulted in consistent results when the sample was limited to employees with FM claims in just 1998. In this instance, per-capita total costs rise modestly (by 9%) to \$8477, but still only amount to 6% of total per-employee costs in 1998. Regardless of the controversy surrounding the disorder or the accuracy of medical records to identify FM, when patients have at least one claim for FM in a 3 year period, they are more likely to be a distinct and costly cohort. Thus this population is worthy of further analysis.

Finally, although this study expands knowledge on the cost of FM, the estimated costs of FM presented here most likely still underestimate the true burden of FM on society. For instance, sick time at home and productivity when at work were not fully measured. Only that part of work loss due to illness that was associated with disability or medical treatment was taken into account. Similarly, the payments for disability reported here reflect only a fraction of the employer's total opportunity cost for workforce disruptions due to disability. Other likely workplace costs include reduced productivity, administrative and training expenses for replacement workers, and days missed for sick time. The results did imply that for every dollar spent on FM-specific health care costs for employees (i.e., medical plus prescription), the employer spends \$57 to \$143 on additional direct and indirect costs. In other words, treatment for FM-diagnosed conditions per se is virtually undetectable. Consequently, failure to properly account for the broader consequences of FM in terms of comorbid conditions, at least to the level accounted for here, would result in a significant under-assessment of the cost of FM to this employer.

Thus the hidden costs of disability and comorbidities greatly increase the burden of FM.

In spite of these limitations, the results have important implications for employers seeking to develop strategies to manage the costs of patients with FM. Given the magnitude of costs that are not directly related to FM, there may be large cost-offset opportunities. A better understanding of the temporal patterns of comorbidity among FM claimants would permit a more thorough assessment of the likely cost savings of more aggressive treatment of FM claimants. Finally, since an FM employee's disability in any given year is associated with a history of FM, early identification of workers treated for FM may be especially important, as such workers would be most at risk for subsequent manifestation of impairment. Forward-looking employers could use this information to make more accurate projections of future costs.

In summary, regardless of the clinical understanding of FM, when a FM claim is present, considerable costs are involved. Within the management of FM there may be large cost-offset opportunities for reductions in patient, physician, and employer burden.

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