Does Acupuncture Treatment Affect Utilization of Other Hospital Services at an Urban Safety-Net Hospital?

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Abstract

Background: Little is known regarding the interaction between acupuncture and biomedical healthcare among vulnerable patient populations. In particular, the association between acupuncture and total cost of healthcare has not been characterized.

Methods: Total hospital system visits and associated charges were retrospectively reviewed among patients who received acupuncture at a large safety-net hospital system from 2007 to 2014. Inclusion criteria were Medicare or Medicaid insurance coverage, older than age 18 years, and one or more onsite acupuncture appointments. Patients were stratified into five groups based on the number of acupuncture visits: 1–3, 4–6, 7–9, 10–12, or 13–15 treatments. The total number of biomedical hospital visits and total associated charges were compared 6 months before and 6 months after initiation of acupuncture.

Results: A total of 329 patients met our inclusion criteria. Although not statistically significant, there appeared to be an association between acupuncture treatment and a decrease in total hospital charges. The group receiving 1–3 acupuncture treatments showed a per-patient average increase in total charges in the 6-month period after acupuncture (\$1771.34; $p=0.38$). The patients who received 7–9 treatments showed the largest average decrease in total charges (\$8967.24; $p=0.17$).

Conclusion: This study shows a previously unreported aggregate relationship between number of treatments and total healthcare charges in a single urban safety-net hospital. Given the sample size available and the heterogeneity of the patient population, no statistically significant associations could be established between initiation of acupuncture treatment and charges. However, some suggestive patterns were observed. Further prospective studies with a matched-group control are warranted to further explore this relationship. Additional study across wider locations is warranted to best guide practitioners and hospitals in designing efficacious, high-value integrative medicine programs.

Introduction

THE CHANGING ECONOMICS OF HEALTHCARE in the United States highlight the need for excellent, cost-saving integrated medical care. Integrative medicine can be defined as a patient-centered approach that combines evidence-based biomedicine and complementary and alternative medicine (CAM) approaches, such as acupuncture, yoga, and meditation. Despite growing international popularity, CAM or integrative medicine is not consistently covered by insurance.^{1–4}

Past studies on acupuncture overemphasize use by non-Hispanic whites, women with higher education levels,

persons of higher socioeconomic status, those in poorer health, those who make more frequent visits to conventional medical providers, and those who also engage in positive lifestyle changes.^{5–11} Alternative delivery methods, such as group or “community style” acupuncture clinics, reflect a similar consumer base.¹²

The acceptability of acupuncture among minority, ethnically diverse, and low-income populations is an under-represented topic in the literature. Recently, several small studies report that when the burden of out-of-pocket payment is reduced or removed, acupuncture is accessed by persons of all races and economic backgrounds, enthusiastically endorsed, and deemed efficacious.^{13,14}

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The current study appears to be the first of its kind to look at the effect of acupuncture use and its association with biomedical healthcare by Medicare and/or Medicaid patients in an urban safety-net population.

Background

Integration of acupuncture

Multiple studies comparing acupuncture to usual care for particular diseases show cost benefit. For example, the United Kingdom's National Institute for Health and Clinical Excellence guidelines on best practice now recommend that general practitioners offer a course of 10 sessions of acupuncture as a first-line treatment for persistent, nonspecific low back pain. Other studies suggest that when treated with acupuncture, allergic bronchial asthma, allergic rhinitis,^{15,16} headache,¹⁷ neck pain,¹⁸ and dysmenorrhea¹⁹ show cost-effective clinical improvement.^{20–22}

Despite widespread interest, acupuncture has not been widely integrated directly into hospital systems in the United States. This may be due to a variety of factors, not the least being inconsistent insurance reimbursement for acupuncture services. For example, research suggests that of the 59 members of the Academic Consortium for Integrative Medicine & Health that do provide these services, most operate on a fee-for-service basis and many are geographically disjointed from the main clinical sites, which may make it harder to deliver integrated and coordinated care.

Acupuncture and integrative medicine at Boston Medical Center

Boston Medical Center (BMC) is the largest safety-net hospital in New England. (A safety-net hospital as understood in the United States provides a disproportionate amount of care to vulnerable populations, including patients who are low income and underinsured.)

More than half of the patients served at BMC have an annual income below the poverty line at or below \$20,420 for a four-person family. Approximately 70% of BMC patients come from underserved and vulnerable populations, including low-income families, elderly patients, people with disabilities, minorities, and immigrants.²³

The BMC Acupuncture Program, started in 2004, is embedded in the Program for Integrative Medicine and Health Care Disparities. Acupuncture is delivered in the Departments of Family Medicine, Pediatrics (both inpatient and ambulatory clinics), and Hematology/Oncology and the Primary Care Clinic for Refugees. Services are rendered onsite by five Massachusetts-licensed acupuncturists and also by supervised students who attend a local acupuncture college and perform required clinical rotations at BMC. Length of treatment averages 45–60 minutes. All licensed acupuncturists and supervised students enter their notes into the common electronic medical records system for the hospital. Additionally, each practitioner notes a traditional Asian diagnosis, as well as a point prescription.

Patients are queried regarding current medical conditions, pain, medications, and changes noted from previous treatments. The nature of Asian medicine—perceiving each person and associated pattern of disease as unique—results in much time being spent talking to patients about the

totality of their lives; the presenting problem is merely a jumping-off point to explore their diet, exercise, stress level, and psychosocial milieu. Treatment sessions are also a time during which practitioners often make lifestyle recommendations, including incorporating exercise or meditation; assess whether a “prescription” to the BMC Food Bank would be helpful; hand out informational flyers; and make referrals to other physicians, social workers, or specialists. The electronic medical records are visible to all providers. Payment is waived for acupuncture services, but patients may make small donations if they feel able.

Referrals to the acupuncturists come from across the campus, including the integrative medicine physicians, the Department of Hematology/Radiology physicians and staff, the Pain Service of the Neurology Department, and the Departments of Rheumatology, Obstetrics and Gynecology, and Primary Care. Patients also refer family and friends. Approximately 1550 acupuncture treatments are provided yearly. Long waiting lists, and patients who request numerous and ongoing treatment, speak to the acceptability and popularity of this service.

With broad changes regarding integrated, multidisciplinary, and coordinated care affecting healthcare nationwide, this study sought to determine whether the inclusion of acupuncture into an academic medical center's ambulatory services would affect utilization or associated healthcare charges of other hospital services by Medicare and/or Medicaid patients, who are among the most expensive utilizers of care in hospitals. This study explicitly evaluated this in a demographically diverse safety-net hospital population. In two previous papers, the authors showed patient satisfaction with acupuncture delivered at BMC,^{13,24} the current study asked, Would the addition of acupuncture be of economic benefit for hospitals and, by inference, to insurance companies?

Materials and Methods

This retrospective study focused on an economically disadvantaged patient population in a single urban safety-net hospital in Massachusetts. Visits to outside hospitals, those other than BMC, were not collected. This patient population was selected to better understand the specific interaction between integrative medicine and underserved and often sicker patients. Patients met inclusion criteria if they (1) were covered by Medicare or Medicaid or were considered dual-eligible and were covered by both, (2) were older than age 18 years, and (3) received at least one acupuncture appointment at BMC from 2007 through 2014. The BMC Clinical Data Warehouse collected data on charges from the BMC main campus, which includes both specialty clinics and primary care clinics.

Because this study was conducted entirely within one healthcare system, the charge system at BMC was used for consistency. Studies attempting to obtain costs of care usually use institution-specific cost-to-charge ratios, but that was unnecessary with our single site. By using the date of patients' first acupuncture treatment as the index date, all visits to BMC were reviewed and counted, including those to the emergency department, Pain Treatment Services, the Department of Primary Care, and Department of Hematology/Oncology during the 6 months before their index date

and 6 months after the index date, as well as any charges that were noted for treatments. Although the study did not compare to a matched-group control, it collected data with respect to the number of acupuncture treatments versus total acupuncture utilization. Data were analyzed by using Microsoft Excel for Mac 2011 (Microsoft Corp., Redmond, WA). The institutional review board approved the research (H-31785).

Results

Demographic and clinical characteristics

A total of 329 patients met the inclusion criteria from a pool of 2055 individual patients who had accessed acupuncture from 2007 through 2014. Of these 329 patients, 39% ($n=130$) had Medicare listed as their insurer at the time of their index visit to acupuncture, 53% (174) had Medicaid as their insurer, and 8% ($n=25$) became Medicare or Medicaid eligible during the time frame of interest. Seventy-four percent ($n=245$) of the patients were female. Fifty-seven percent (187) were born in the United States, 17% ($n=55$) were from Caribbean countries, 12% ($n=38$) were from African countries, 2% ($n=8$) were from Asia, 5% ($n=17$) were from European countries, 3% ($n=11$) were from South America, and 4% ($n=13$) had an undetermined background. Average age at index visit was 53.1 years.

Within the dataset, the three most common primary diagnoses were malignant breast neoplasm, lumbago, and hypertension. The three most common secondary diagnoses were benign hypertension, diabetes, and lumbago. The high incidence of cancer diagnosis is likely due to the presence of the acupuncture oncology clinic, one of the most active acupuncture clinics at BMC.

Service charges before and after initial acupuncture

Comparison of the average total medical system charges 6 months before and 6 months after the initial acupuncture treatment showed that, on average, patients with more than three acupuncture visits demonstrated an average decrease in total charges (Table 1). The group with 1–3 acupuncture treatments showed a per-patient average increase in total charges in the 6-month period after acupuncture (\$1771.34; $p=0.38$). The patients who received 7–9 treatments showed the largest average decrease in total charges (\$8967.24; $p=0.17$) (Fig. 1). The standard deviations were many times greater than the average differences. Such charge/cost data

FIG. 1. Difference in total charges 6 months before to 6 months after acupuncture versus number of acupuncture treatments.

are well known to be highly skewed, and as a result large sample sizes are required to make statistically significant comparisons.

Discussion

The acupuncture clinics at BMC exist within a hospital system that has an established integrative medicine program with a 10-year history. It is one of a small number of clinics nationally that cater to a vulnerable patient population. Furthermore, it is distinct in that treatments are offered within a traditional ambulatory setting without a fee. This removes the burden of financial barriers for the patient. This may be a factor that makes this information less generalizable but may assist other urban safety-net hospitals considering adopting this type of program.

Almost no data are available on efficacious acupuncture dosing for health system resource use based on the number of acupuncture treatments. Adequate dose is often not considered, even in trials; in 47 systematic reviews of acupuncture, only 6 of those considered dose.²⁵ Clinical observations and anecdotal evidence suggest that there is individual variation, with most trials in acupuncture based on 10–12 visits weekly in order to see initial results. Although not a statistically significant finding, in the current study charges decreased among patients who had 4–10 visits (\$7835.66 decrease; $p=0.09$).

TABLE 1. AVERAGE DIFFERENCE IN TOTAL MEDICAL CHARGES PER PATIENT, AFTER – BEFORE ACUPUNCTURE PER 6 MONTHS

No. of acupuncture treatments	Patients (n)	Average difference in total charges, after – before (\$)	Standard deviation (\$)	p-Value
1–3	221	1771.34	41,373.59	NS
4–6	59	–3074.29	22,026.73	NS
7–9	18	–8967.24	12,231.90	NS
10–12	10	–4971.72	38,737.18	NS
13–15	7	–547.84	1351.5031	NS

NS, not significant.

Also important are the large standard deviations in all categories. This likely reflects the great heterogeneity among patients with respect to pathology and complexity of healthcare needs. It is well known that such data are highly skewed and kurtotic as well, complicating the identification of cost reduction gains. Patients who received more acupuncture appointments also probably have more complex underlying pathology, increasing their need for adjuvant therapy. Interestingly, among patients who receive 10–12 acupuncture appointments, the total number of hospital visits increased after acupuncture but there was a shift toward primary care and away from specialty services. In other words, it is possible that some high-utilizing patients were shifted toward appropriate preventive and less costly modalities as a result of a positive secondary consequence of medical and lifestyle counseling.

As indicated by the patient demographic characteristic, acupuncture was accessed by diverse patient populations. Attendance and popularity of the services anecdotally suggest that these modalities were both acceptable and well received cross-culturally, and, when surveyed, patients were enthusiastic about acupuncture.^{13,24} Referrals to acupuncture came from multiple departments (Rheumatology, Hematology/Oncology, Pain Management, Family Medicine, Primary Care, and Sports Medicine), the average wait time for first acupuncture visit was greater than 6 weeks, leading to a policy of limiting acupuncture treatments to 10 per 6-month period in order to place new patients into the schedule. Four patients (1.22%) received only acupuncture care at BMC; they were not seen in any other department. These patients probably were specifically referred to acupuncture by friends or family and could be receiving other medical care outside of BMC.

It is unclear how the inclusion of acupuncture into traditional biomedical settings will affect total costs to patients, hospitals, and insurance companies, particularly as CAM therapies have traditionally been offered on a fee-for-service basis rather than part of an integrated care plan. Few studies have considered the fiscal feasibility or efficacy of treatment when financial barriers to acupuncture care are removed. This study sought to assess the effect on the utilization of other, often more costly, hospital services when acupuncture is made available. This information will help in the evaluation of the financial feasibility of hospital-subsidized acupuncture programs, especially in the urban safety-net hospital environment. Compared to private practice, including acupuncture in hospital services can be cost-effective because existing examination rooms can be used, equipment cost of needles is low, and insurance reimbursement is becoming more available as Medicaid expansions and other changes made by the Affordable Care Act occur.

Although this was not studied in this work, the long-term effect of acupuncture on total healthcare costs should be studied further. This dataset does not attempt to directly appreciate the increased quality of care yielded by offering acupuncture. However, it may present a valuable commentary on the feasibility of acupuncture among vulnerable populations.

This study is limited by several factors. Total healthcare charges by patients who receive care at multiple institutions were underestimated. To this point, a group of patients received multiple acupuncture treatments and no other ser-

vices at BMC. It is possible that these patients receive their primary care at other local institutions that do not offer free acupuncture. It is also possible that a cohort of patients rely entirely on acupuncture for pain management and preventive care. Inclusion of the latter group of patients in this data collection may lead to underestimation of the fiscal benefit of offering acupuncture as a form of longitudinal outpatient pain management. However, it is likely that by exclusively considering medical services obtained at BMC, particularly among a patient population that is historically financially restricted with respect to access to multiple healthcare institutions, the study still showed relative trends in the relationship between acupuncture treatments and hospital utilization.

An additional limitation of this study was sample size, particularly among patients attending more than three acupuncture visits. Another possible limitation is that the sickest patients may have had more physical barriers to accessing acupuncture because acupuncture was offered in the outpatient setting. This bias may perpetuate a self-selected bias for greater health among the highest utilizers of acupuncture. This suggests the need for further prospective study with an appropriate matched-group control. As such, the current study was underpowered to detect statistically significant differences in this highly heterogeneous population of patients.

Additionally, charges were considered before insurance reimbursement in order to increase generalizability of the data. However, as a result, real savings were not assessed. Furthermore, the cost of acupuncture services was not considered. Finally, the study considered patients covered by Medicaid or Medicare and those who are dual-eligible in urban safety-net settings. Medicare and Medicaid are government-funded programs under which patients usually pay no part of costs for covered medical expenses. In addition, Massachusetts has a health insurance system that includes all residents, thereby eliminating self-payers by enrolling them in state-funded insurance. However, similar themes might be seen among similar vulnerable populations nationally.

Conclusion

These data, coupled with strong support for the therapeutic efficacy of acupuncture, suggest that the addition of acupuncture may have positive economic results for hospitals, especially urban safety-net hospitals, and therefore for patients and insurance companies. Although not statistically significant, a total decrease in healthcare charges in this one site was seen in all groups after acupuncture was offered. These differences may prove more significant with larger sample sizes and, when patients are stratified by diagnosis, decreasing heterogeneity of total charges. Multisite studies also would have to use institution-specific cost-charge ratios for comparison.

The U.S. healthcare system is challenged now, more than ever, to provide better coordinated care more efficiently. These results indicate that acupuncture services should be considered in the design of responsible integrative care models, not only to improve care of patients but also to more effectively use hospital resources. Further prospective studies with a matched-group control are warranted to further explore this relationship.

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Author Disclosure Statement

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