Use of Acupuncture Among Patients with Prostate Cancer Covered by National Health Insurance in Taiwan: A Retrospective Population-Based Study

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ABSTRACT

Background: National Health Insurance (NHI) covers acupuncture in Taiwan.

Objective: To explore the prevalence and characteristics of acupuncture use among patients with prostate cancer who are covered under NHI.

Design, Setting, and Participants: A retrospective study was conducted using a representative NHI database. A total of 2413 patients with prostate cancer who used ambulatory services during 2002–2008 were identified.

Intervention: Claims of these patients with prostate cancer were analyzed.

Main Outcome Measures: Prevalence of acupuncture use.

Results: The prevalence of acupuncture use was 7.8%, 8.7%, 7.5%, 7.7%, 8.1%, 8.0%, and 8.6% in each cross-sectional year during 2002–2008, respectively. Overall, 353 patients (14.6%) had used acupuncture, with 2179 visits (average 6.2 visits per user). More than half of acupuncture users (56.1%) had <3 visits for acupuncture; 10.2% had more than 12 visits. Most patients received acupuncture at private clinics (72.6%). The most frequent principal diagnosis by visits was “musculoskeletal diseases” (51.2%), followed by “injury” (29.1%), “diseases of the circulatory system” (9.2%), and “neoplasms” (4.3%).

Conclusions: A certain portion of patients with prostate cancer used acupuncture with NHI coverage in Taiwan. Acute and chronic diseases were the most commonly treated conditions other than prostate cancer.

Key Words: Prostate Cancer, Traditional Chinese Medicine, Acupuncture, Complementary Medicine, Health Insurance

INTRODUCTION

USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) has become increasingly popular, both in the general population^{1–3} and among patients with cancer.^{4–6} It is estimated that approximately one third of patients with prostate cancer have used CAM.^{7–19} CAM comprises a diverse set of healing philosophies, therapies, and products.

Acupuncture is one of the most popular CAMs worldwide. Acupuncture has been used in the Chinese population for thousands of years and is well-accepted in the West. However, there is limited information on acupuncture use among patients with prostate cancer.

Taiwan implemented National Health Insurance (NHI) in 1995, covering Western medicine and Chinese medicine, including acupuncture. The coverage rate was >99% of 23

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million residents. Beneficiaries were free to choose medical services. The National Health Insurance Research Database (NHIRD) provides registration and claim datasets for research. This study used NHIRD to explore the prevalence and pattern of acupuncture use among patients with prostate cancer covered by NHI in Taiwan.

MATERIALS AND METHODS

Data Sources

This cross-sectional retrospective study used the Longitudinal Health Insurance Database 2000 (LHID2000), which was obtained from the NHIRD. The LHID2000 contains all the original claim data of 1,000,000 individuals randomly sampled from the 23 million beneficiaries of the NHIRD. There is no significant difference in the distribution of age, gender, and insured amount between the patients in the LHID2000 and the original NHIRD. For Chinese medicine and acupuncture, only outpatient services are covered by NHI. Files of ambulatory services from 2002 to 2008 were used for analysis. Files of registry for beneficiaries were also used to obtain demographic data. Institutional review board approval was exempted because this study used de-identified public-use data.

Study Samples

Under NHI regulation, each claim for reimbursement is required to record up to three items of diagnosis code in the format of the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)*. Patients with prostate cancer were identified with ICD-9-CM code 185 from the files of ambulatory services from 2002 to 2008 in the LHID2000. Claims and corresponding prescriptions of these patients with prostate cancer were selected for analysis.

Statistics

The database software ASIQ 12.5.7 (Sybase Inc, Dublin, CA) was used for data linking and processing. The data

were analyzed using SPSS for Windows Version 13.0 (SPSS Inc, Chicago, IL). The distribution and frequency of each category of variables were examined by *Chi-square* tests. A *p*-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 2413 patients with prostate cancer were identified in the files of ambulatory services from 2002 to 2008 in the LHID2000. The prevalence of acupuncture use was 7.8%, 8.7%, 7.5%, 7.7%, 8.1%, 8.0%, and 8.6% in each cross-sectional year during 2002–2008 respectively (Table 1). Overall, 353 patients (14.6%) had used acupuncture, with 2179 visits (average 6.2 visits per user).

Patient Demographics

The demographics are presented in Table 2. The median age was 71.9 in acupuncture users and 72.8 in non-users. There were a higher proportion of acupuncture users between 50 and 79 years old than non-users ($p = 0.045$).

In terms of income (insured payroll-related amounts), a higher proportion of acupuncture users had lower income (<US\$609) than non-users ($p = 0.004$).

Concerning insured regions, a higher proportion of acupuncture users were registered in central Taiwan than non-users ($p = 0.002$).

With regard to insured units, a higher proportion of acupuncture users were employees of government, school, enterprises, or institutions; were low-income households; were veterans; or were in other regional populations, which included veterans ($p = 0.004$).

Frequency of Acupuncture Use

More than half of acupuncture users (56.1%) had <3 visits for acupuncture, 33.7% had 3–12 visits, and 10.2% had >12 visits.

TABLE 1. PREVALENCE OF ACUPUNCTURE USE AMONG PATIENTS WITH PROSTATE CANCER DURING 2002–2008

Year	All patients with prostate cancer			Acupuncture users				
	Patients	Visits	Average visits per user	Patients	% of all patients	Visits	% of all visits	Average visits per user
2002	650	6329	9.7	51	7.8	223	3.5	4.4
2003	665	6471	9.7	58	8.7	307	4.7	5.3
2004	811	8298	10.2	61	7.5	312	3.8	5.1
2005	872	9536	10.9	67	7.7	272	2.9	4.1
2006	917	10805	11.8	74	8.1	307	2.8	4.1
2007	972	11613	11.9	78	8.0	329	2.8	4.2
2008	1057	13185	12.5	91	8.6	429	3.3	4.7
Total	2413*	66237	27.5	353*	14.6	2179	3.3	6.2

*Every patient was accounted for once only during 2002–2008.

TABLE 2. PATIENT CHARACTERISTICS OF USERS AND NON-USERS OF ACUPUNCTURE AMONG PATIENTS WITH PROSTATE CANCER*

<i>Characteristic</i>	<i>Non-users</i>		<i>Users</i>		<i>p-Value</i>
	<i>Total</i>	<i>%</i>	<i>Total</i>	<i>%</i>	
No. of patients	2060		353		
Age					0.045
Median (years)	72.8		71.9		
<50	112	5.5	13	3.7	
50s	256	12.5	47	13.4	
60s	481	23.4	87	24.7	
70s	780	38.0	153	43.5	
>80	424	20.7	52	14.8	
Insured amount (US\$/month)					0.004
0	522	25.4	105	29.8	
\$1–608	1014	49.4	187	53.1	
\$609–\$1,218	261	12.7	24	6.8	
>\$1,218	256	12.5	36	10.2	
Insured region					0.002
Northern Taiwan	1294	63.2	212	60.2	
Central Taiwan	268	13.1	72	20.5	
Southern Taiwan	422	20.6	61	17.3	
Eastern Taiwan & offshore islands	63	3.1	7	2.0	
Insured unit					0.004
Employees of government, school, enterprises, or institutions	632	30.8	119	33.8	
Members of occupational unions, alien sea personnel	153	7.5	15	4.3	
Farmers, fishers	489	23.8	66	18.8	
Low-income households	7	0.3	4	1.1	
Veterans, other regional population	611	29.8	126	35.8	
Dependent	161	7.8	22	6.3	

*Demographic data were presented at first visit during 2002–2008; the data for age, insured amount, and insured unit in 7 of all patients with prostate cancer and 1 of acupuncture users were missing; the data for insured region in 13 of all patients with prostate cancer and 1 for acupuncture users were missing.

Medical Institutes

Most patients received acupuncture at private clinics (72.6%), followed by private hospitals (13.8%), public hospitals (11.5%), private hospitals of Chinese medicine (1.9%), and public hospitals of Chinese medicine (0.2%) See Figure 1.

Diagnosis at Visits for Acupuncture

In each visit covered by NHI, up to three items of diagnosis in ICD-9-CM format were recorded. The principal diagnosis found during acupuncture visits are presented in Table 3. The most frequently recorded principal diagnosis during these visits was “diseases of the musculoskeletal system and connective tissue” (51.2%), followed by “injury” (29.1%), “diseases of the circulatory system” (9.2%), and “neoplasms” (4.3%). Visits with diagnosis of prostate cancer in any three items of diagnosis accounted for 5.4%.

DISCUSSION

Acupuncture is one of the most popular CAMs worldwide. Yet, there is little information readily available on

acupuncture used by patients with prostate cancer. This study is the first population-based study focusing on acupuncture use among patients with prostate cancer. Given that the NHI covered 99% of Taiwan’s 23-million residents and >90% of the medical institutes, the NHIRD records are representative of the general population. The NHIRD provides clear and reliable records of insurance-covered acupuncture and avoids recall bias in answering survey questions on past utilization. The current study’s results showed that, overall, 14.6% of patients with prostate cancer used acupuncture. Most patients who used acupuncture used it for acute and chronic diseases/symptoms other than prostate cancer.

In Taiwan, practice of acupuncture is regulated by the government. Only licensed Chinese medicine physicians and medical doctors who completed acupuncture training courses are qualified to practice acupuncture. NHI covered acupuncture, including moxibustion and electro-acupuncture. Only licensed Chinese medicine physicians are qualified for reimbursement by NHI. At the end of 2007, 3069 Chinese medicine clinics and 23 hospitals provided Chinese medicine, including acupuncture. Among them, 2772 (90.3%) Chinese medicine clinics and 22 (95.7%) hospitals

FIG. 1. Service providers of acupuncture visited by patients with prostate cancer.

contracted with NHI. With this high contracted rate, this study covered almost all the acupuncture records.

Traditional Chinese Medicine (TCM) is the traditional medicine used by the Chinese population and was brought to Taiwan hundreds of years ago. Chinese medicine still plays an important role in the modern health system of Taiwan. Chinese medicine and acupuncture were popular in Taiwan. Thus, the characteristics of acupuncture use in Taiwan may differ widely from those in Western countries. The prevalence of acupuncture use among the general population in Taiwan is much higher than that in Western countries. Chen et al. reported that 1,362,351 beneficiaries (6.2%) used acupuncture in 2002, and 4,948,464 beneficiaries (22.6%) had used acupuncture covered by NHI in Taiwan between 1996 and 2002.²⁰ Previous studies in Western countries showed the prevalence of acupuncture in the general population ranged from 0.4% to 1.6%.^{1-3,21} For patients with prostate cancer, the prevalence of acupuncture was 1%–2% in the United States and 2% in Japan.^{9,18,22} The current authors' previous cross-sectional study found the most frequently used Chinese medicine therapies among

patients with prostate cancer were Chinese herbal medication (93.6% as shown by visits), followed by acupuncture/traumatology manipulative therapies (7.0% as shown by visits).²³ However, the prevalence of acupuncture was not available because of data limitation. In this study, the prevalence of acupuncture use was much higher, ranging from 7.5% to 8.6% in each cross-sectional year and, overall, was 14.6% during 2002–2008.

The reasons that patients with prostate cancer use acupuncture are heterogeneous. Acupuncture had been used for more than 2000 years in the Chinese population. Recent studies in acupuncture suggest that acupuncture may provide clinical benefit for patients who have cancer with treatment-related side-effects, such as nausea and vomiting,²⁴ postoperative pain,^{25,26} cancer-related pain,²⁷ chemotherapy-induced leukopenia,²⁸ postchemotherapy fatigue,²⁹ possibly insomnia,³⁰ anxiety,²⁵ and reduced quality of life.³¹ The current study found only a minority of patients with prostate cancer used acupuncture specifically for prostate cancer. Most patients used acupuncture for acute or chronic diseases/symptoms. The diseases for which acupuncture was used most frequently were “diseases of the musculoskeletal system and connective tissue” (51.2%). Although the diagnosis of TCM is different from Western medicine, Chinese medicine physicians are requested to give one to three items of diagnosis in ICD-9-CM format for reimbursements from NHI. Because no claims were recorded with the diagnosis of “pain” (ICD code 338) in this study, it is probable that some patients presented with cancer pain were recorded as “diseases of the musculoskeletal system and connective tissue.” The efficacy of acupuncture for addressing cancer-related pain needs further investigation.

The current study found that acupuncture users tended to be in their 50s–70s with lower income (<US\$609); living in central Taiwan; employees of government, schools, enterprises, or institutions; live in low-income households; veterans; and in other regional populations. NHI covered only outpatient but not inpatient services for Chinese medicine. For elderly patients over 80 years old, poor performance status

TABLE 3. TOP 10 MOST COMMON PRINCIPAL DIAGNOSES AT VISITS FOR ACUPUNCTURE

Dignosis	ICD* code	Visits	%
Diseases of the musculoskeletal system and connective tissue	710–739	1115	51.2
Injury and poisoning	800–999	635	29.1
Diseases of the circulatory system	390–459	200	9.2
Neoplasms	140–239	94	4.3
Diseases of the nervous system and sense organs	320–389	65	3.0
Symptoms, signs, and ill-defined conditions	780–799	31	1.4
Endocrine, nutritional and metabolic diseases, and immunity disorders	240–279	12	0.6
Diseases of the digestive system	520–579	10	0.5
Diseases of the respiratory system	460–519	5	0.2
Diseases of the genitourinary system	580–629	5	0.2
Congenital anomalies	740–759	4	0.2

*International Classification of Diseases, Ninth Revision, Clinical modification.

and difficulty in accessing outpatient services might be an explanation for their limited use of acupuncture. In addition, Chinese medicine physicians may prescribe Chinese herbal medicine rather than acupuncture for very elderly patients because of safety concerns. The results showed that a higher proportion of acupuncture users lived in central Taiwan. This is consistent with the finding that patients in central Taiwan prefer TCM.³² A previous study showed that “usable resources” is an important factor in influencing purchasing behavior.³³ The density of Chinese medicine institutes was the highest in central Taiwan. With respect to insured units, there was a lower proportion of acupuncture users who were members of occupational unions, alien sea personnel, farmers, fishers, and dependents.

More than half of acupuncture users had <3 visits for acupuncture during 2002–2008. For most conditions, it takes at least 3–6 visits to complete a course of acupuncture. Therefore, most patients with prostate cancer might use acupuncture on an experimental basis—“just to try it.” However, 10.2% users had >12 visits for acupuncture. Many factors affect visit frequency. This group of patients might reflect a group that has satisfaction with acupuncture or perhaps show the nature of their diseases as needing more visits.

There are several limitations in this claims-based study. The definition of “patients with prostate cancer” was based on the diagnosis code. Patients with prostate cancer may have been overestimated. The NHIRD was established primarily for administrative purposes. Clinical characteristics, including staging and biochemical data, were not available. The outcome and side-effects of acupuncture use were not assessed in this study.

CONCLUSIONS

A certain portion of patients with prostate cancer used acupuncture are covered by NHI in Taiwan. Acute and chronic diseases were the most commonly treated conditions rather than prostate cancer.

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DISCLOSURE STATEMENT

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REFERENCES

1. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990–1997: results of a follow-up national survey. *JAMA*. 1998;280(18):1569–1575.
2. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. *Natl Health Stat Report*. 2008(12):1–23.
3. Barnes PM, Powell-Griner E, McFann K, Nahin RL. Complementary and alternative medicine use among adults: United States, 2002. *Adv Data*. 2004(343):1–19.
4. Molassiotis A, Fernandez-Ortega P, Pud D, et al. Use of complementary and alternative medicine in cancer patients: a European survey. *Ann Oncol*. 2005;16(4):655–663.
5. Cassileth BR, Schraub S, Robinson E, Vickers A. Alternative medicine use worldwide: the International Union Against Cancer survey. *Cancer*. 2001;91(7):1390–1393.
6. Ernst E, Cassileth BR. The prevalence of complementary/alternative medicine in cancer: a systematic review. *Cancer*. 1998;83(4):777–782.
7. Boon H, Westlake K, Stewart M, et al. Use of complementary/alternative medicine by men diagnosed with prostate cancer: prevalence and characteristics. *Urology*. 2003;62(5):849–853.
8. Chan JM, Elkin EP, Silva SJ, Broering JM, Latini DM, Carroll PR. Total and specific complementary and alternative medicine use in a large cohort of men with prostate cancer. *Urology*. 2005;66(6):1223–1228.
9. Diefenbach MA, Hamrick N, Uzzo R, et al. Clinical, demographic and psychosocial correlates of complementary and alternative medicine use by men diagnosed with localized prostate cancer. *J Urol*. 2003;170(1):166–169.
10. Fair WR, Whitore WF Jr. Lecture: back to the future—the role of complementary medicine in urology. *J Urol*. 1999;162(2):411–420.
11. Hall JD, Bissonette EA, Boyd JC, Theodorescu D. Motivations and influences on the use of complementary medicine in patients with localized prostate cancer treated with curative intent: results of a pilot study. *Br J Urol Int*. 2003;91(7):603–607.
12. Jones HA, Metz JM, Devine P, Hahn SM, Whittington R. Rates of unconventional medical therapy use in patients with prostate cancer: standard history versus directed questions. *Urology*. 2002;59(2):272–276.
13. Kao GD, Devine P. Use of complementary health practices by prostate carcinoma patients undergoing radiation therapy. *Cancer*. 2000;88(3):615–619.
14. Lippert MC, McClain R, Boyd JC, Theodorescu D. Alternative medicine use in patients with localized prostate carcinoma treated with curative intent. *Cancer*. 1999;86(12):2642–2648.
15. Nam RK, Fleshner N, Rakovitch E, et al. Prevalence and patterns of the use of complementary therapies among prostate cancer patients: an epidemiological analysis. *J Urol*. 1999;161(5):1521–1524.
16. Ponholzer A, Struhlar G, Madersbacher S. Frequent use of complementary medicine by prostate cancer patients. *Eur Urol*. 2003;43(6):604–608.
17. Wilkinson S, Chodak GW. Critical review of complementary therapies for prostate cancer. *J Clin Oncol*. 2003;21(11):2199–2210.

18. Yoshimura K, Ichioka K, Terada N, Terai A, Arai Y. Use of complementary and alternative medicine by patients with localized prostate carcinoma: study at a single institute in Japan. *Int J Clin Oncol*. 2003;8(1):26–30.
19. Yoshimura K, Ueda N, Ichioka K, Matsui Y, Terai A, Arai Y. Use of complementary and alternative medicine by patients with urologic cancer: a prospective study at a single Japanese institution. *Support Care Cancer*. 2005;13(9):685–690.
20. Chen FP, Kung YY, Chen TJ, Hwang SJ. Demographics and patterns of acupuncture use in the Chinese population: the Taiwan experience. *J Altern Complement Med*. 2006;12(4):379–387.
21. Thomas KJ, Nicholl JP, Coleman P. Use and expenditure on complementary medicine in England: a population based survey. *Complement Ther Med*. 2001;9(1):2–11.
22. Lee MM, Chang JS, Jacobs B, Wrensch MR. Complementary and alternative medicine use among men with prostate cancer in 4 ethnic populations. *Am J Public Health*. 2002;92(10):1606–1609.
23. Lin YH, Chen KK, Chiu JH. Prevalence, patterns, and costs of Chinese medicine use among prostate cancer patients: a population-based study in Taiwan. *Integr Cancer Ther*. 2010;9(1):16–23.
24. Shen J, Wenger N, Glaspy J, et al. Electroacupuncture for control of myeloablative chemotherapy-induced emesis: A randomized controlled trial. *JAMA*. 2000;284(21):2755–2761.
25. Mehling WE, Jacobs B, Acree M, et al. Symptom management with massage and acupuncture in postoperative cancer patients: a randomized controlled trial. *J Pain Symptom Manage*. 2007;33(3):258–266.
26. Wong RH, Lee TW, Sihoe AD, et al. Analgesic effect of electroacupuncture in postthoracotomy pain: a prospective randomized trial. *Ann Thorac Surg*. 2006;81(6):2031–2036.
27. Alimi D, Rubino C, Pichard-Leandri E, Fermand-Brule S, Dubreuil-Lemaire ML, Hill C. Analgesic effect of auricular acupuncture for cancer pain: a randomized, blinded, controlled trial. *J Clin Oncol*. 2003;21(22):4120–4126.
28. Lu W, Hu D, Dean-Clower E, et al. Acupuncture for chemotherapy-induced leukopenia: exploratory meta-analysis of randomized controlled trials. *J Soc Integr Oncol*. 2007;5(1):1–10.
29. Vickers AJ, Straus DJ, Fearon B, Cassileth BR. Acupuncture for postchemotherapy fatigue: a phase II study. *J Clin Oncol*. 2004;22(9):1731–1735.
30. Spence DW, Kayumov L, Chen A, et al. Acupuncture increases nocturnal melatonin secretion and reduces insomnia and anxiety: a preliminary report. *J Neuropsychiatry Clin Neurosci*. 2004;16(1):19–28.
31. Cho JH, Chung WK, Kang W, Choi SM, Cho CK, Son CG. Manual acupuncture improved quality of life in cancer patients with radiation-induced xerostomia. *J Altern Complement Med*. 2008;14(5):523–526.
32. Pu CY, Lan VM, Lan CF, Lang HC. The determinants of Traditional Chinese Medicine and acupuncture utilization for cancer patients with simultaneous conventional treatment. *Eur J Cancer Care (Engl)*. 2008;17(4):340–349.
33. Liao HL, Ma TC, Chiu YL, Chen JT, Chang YS. Factors influencing the purchasing behavior of TCM outpatients in Taiwan. *J Altern Complement Med*. 2008;14(6):741–748.

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