Abstract

Background. Large-scale surveys of complementary traditional Chinese medicine (TCM) use in pediatric cancer patients are lacking. The aim of our study was to investigate the use of TCM in pediatric cancer patients. Methods. We analyzed cancer patients younger than 18 years (n = 12,965) who were registered in the National Health Insurance Research Database in Taiwan between 2001 and 2011. Patients were categorized into TCM or non–TCM users based on their use of TCM. Results. In Taiwan, 8,086 (62.4%) children with cancer sought TCM treatment at some point. Children in older age groups, including school-aged children and adolescents, were more likely to use TCM. There was no significant difference in the distributions of gender and urbanization. The 3 most common diseases for which TCM users visited the clinic were neoplasm (33.2%), respiratory system disease (32.9%), and infectious disease (8.86%). The most commonly utilized TCM therapy was Chinese herbal remedies. Patients who had comorbid conditions such as allergic rhinitis, dyspepsia, disorders of menstruation, and disease of the musculoskeletal system and connective tissue tended to visit TCM clinics. Conclusions. Adjunctive TCM use is not low in Taiwanese children with cancer. Further studies to investigate the efficacy and safety of TCM in children with cancer are warranted.

Keywords
cancer, epidemiology, National Health Insurance Research Database, pediatrics, traditional Chinese medicine

Introduction

Childhood cancer consists of various malignancies and has become the second most frequent cause of child death in the developed world. The most common childhood cancers include leukemia, malignancies of the central nervous system, and lymphoma, accounting for 34%, 23%, and 12% of all childhood cancers, respectively.1 Despite the improved survival rate of childhood malignancy, several solid cancers remain refractory to treatment. The discomfort that occurs during the treatment course, such as nausea, vomiting, and pain, is difficult to bear for these patients. The long-term toxicity and sequelae of chemotherapy and radiotherapy continue to be concerning. The survivors may develop chronic health conditions and suffer from chronic fatigue, sleep disorders, psychological distress, neurocognitive dysfunction, and a poor health-related quality of life. Another reason for complementary and alternative medicine (CAM) use in children with cancer is the parents’ desire to do everything possible to improve their child’s health.

CAM has become popular in the past few decades. The prevalence of CAM varies across different countries, ranging from 6% to 91% in recent studies.2 CAM therapies used in pediatric cancer are mostly considered to be supportive...
therapies for relieving the symptoms of cancer, reducing pain, or alleviating the side effects of conventional cancer treatment. Some parents hope to boost the immune system of the affected child using CAM therapies. Traditional Chinese medicine (TCM) consists of Chinese herbal remedies, acupuncture, and manipulative therapies and was defined by the United States National Center for Complementary and Integrative Health as a whole medical system of CAM. TCM is one of the most common CAM therapies used in various diseases such as stroke, diabetes mellitus, rheumatoid arthritis, and cancer in Taiwan. Current studies on the use of CAM among pediatric cancer patients are mostly small-scale studies. One large-scale study of the use of CAM in pediatric oncology patients in Germany reported that half of the children with cancer had used CAM but did not report which types of CAM therapy the children had received. A large-scale nationwide survey of TCM use in pediatric cancer patients is yet to be performed in childhood cancer.

The National Health Insurance (NHI) program was instituted in Taiwan in 1995. This program is a single-payer mandatory insurance system and has covered the medical expenditures of approximately 23 million people, accounting for 99.6% of the total population. Although Western medicine is in the mainstream in Taiwan, TCM is also widely used, including in the pediatric population. The NHI program has reimbursed both Western medicine and TCM. This system also provided unbiased economic choices for cancer treatment. All registration files and original claims data for reimbursement were recorded in the National Health Research Database (NHIRD). Pediatric cancers are widely used, including in the pediatric population. The NHI program has provided reimbursement for TCM applied in pediatric cancer patients.

The aim of our study was to investigate the characteristics of TCM use in pediatric cancer patients. We enrolled every Taiwanese child with cancer who was registered as having catastrophic illness in the NHIRD. The results of this study could offer epidemiological information about TCM applied in pediatric cancer patients.

Materials and Methods

Data Source

The NHI program has provided reimbursement for TCM since 1996. Reimbursed TCM services include Chinese herbal remedies, acupuncture/moxibustion, and manipulative therapy in ambulatory clinics. All registry data in the NHIRD consist of demographic characteristics, clinical visits, hospitalizations, diagnostic codes, assessments, procedures, prescriptions, and the medical costs for reimbursement. The registry for catastrophic illnesses patient database (RCIPD) was also established in the NHIRD. Pediatric cancers are considered to be catastrophic illnesses and are registered by certificate by pathology, image study, laboratory survey, and careful review by pediatric hematologists or oncologists commissioned by the NHI Administration. These cancer patients hold catastrophic illness certificates (CICs) and are eligible for exclusion from copayments. Because the copayments are waived for admission, emergency visits, and outpatient services, this certification is only applied when the patients meet all the criteria by pathology, image, laboratory, and clinical diagnoses. The CIC is canceled if a patient dies. The accuracy of the diagnosis in the cancer population enrolled in this study was high. All the claims data in the study were from the RCIPD of the NHIRD in Taiwan.

Study Participants

We selected pediatric cancer patients from the RCIPD. First, all beneficiaries who had a diagnosis of cancer (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] codes: 140-208) and were registered in the RCIPD as having had a catastrophic illness between January 2001 and December 2011 were included in this study. Second, individuals (n = 12965) younger than 18 years of age were selected for this study cohort and included in the study. Those pediatric cancer patients who had at least 1 TCM outpatient clinical record were defined as TCM users (n = 8086), whereas children who had no TCM outpatient records were defined as non–TCM users (n = 4879). We divided the study cohort into infants and toddlers (0-2 years old), preschoolers (3-5 years old), school-aged children (6-12 years old), and adolescents (13-18 years old) to analyze the differences among various age groups.

To investigate the differences between urban and rural areas, we used the definition of urbanization of the residence area that was described in a previous study. The residence area of the Taiwan townships was divided into 4 levels of urbanization. Level 1 had the highest degree of urbanization, and level 4 had the lowest degree. These 4 levels were categorized by population density (people/km²), by the population ratio of different educational levels, the ratio of elderly people, the ratio of agricultural workers, and the number of physicians per 100,000 people. Urbanization levels 1 and 2 were defined as urban areas, and levels 3 and 4 were defined as rural areas.

Data Availability Statement

All data are deposited in a properly managed public repository. In this study, we examined and analyzed datasets released from the NHIRD (http://nhird.nhri.org.tw/en/Data_Subsets.html), which are maintained and managed by National Health Research Institutes (http://nhird.nhri.org.tw/en), Taiwan.
Statistical Analysis

All the data were analyzed by SAS software, version 9.2 (SAS Institute Inc, Cary, NC). Univariate analysis was used to compare the TCM users with the non–TCM users. The χ² test was performed to examine the relationship between the categorical variables and to examine the differences between TCM users and non–TCM users. The incidence rate ratio indicated the extent of the prevalence of disease in the TCM user group relative to the non–TCM users. A P value <.05 was defined as statistically significant.

Ethics Statement

The Research Ethics Committee of China Medical University and Hospital (CMUH104-REC2-115) approved this study. The NHIRD was provided by the NHI Administration and managed by the National Health Research Institutes, Taiwan. All the released datasets of the NHIRD were deidentified and encrypted. Therefore, it was impossible to identify individual patients and care providers at any level.

Results

A total of 12,965 children who had CICs of cancer between 2001 and 2011 were enrolled in this study. Among them, 8086 (62.4%) children with cancer were TCM users, whereas 4879 (37.6%) children with cancer were non–TCM users.

The demographic characteristics between TCM users and non–TCM users are shown in Table 1. There were significant differences in the proportional distributions of age between the TCM users and non–TCM users. The percentage of TCM use increased significantly in the older age groups, which included school-aged children and adolescents. The percentage of TCM users in the younger age groups, including infants, toddlers, and preschool children, was significantly lower than that of the non–TCM users. There was no significant difference in the distributions of sex and urbanization.

All the pediatric cancer patients were diagnosed as having catastrophic diseases by hematologists or oncologists. Therefore, they all received diagnoses and visited Western medical doctors whether they were TCM users or non–TCM users. The percentage of patients receiving chemotherapy or radiotherapy was similar between these 2 groups. We found that only 4 patients did not visit Western medical clinics after diagnosis—that is, 99.95% of the TCM users still visited Western medicine clinics. Treatment, including chemotherapy and radiotherapy, was similar between these 2 groups. The mean number of visits to the outpatient clinics in the 2 populations was similar, but the proportional distribution was not. The majority (90.3%) of the TCM users visited TCM clinics fewer than 5 times annually.

To determine the frequency distribution of clinical visits between TCM and non–TCM users in the pediatric cancer population, we analyzed the ICD-9-CM codes from the claims data (Table 2). The 3 leading diseases for which TCM users visited the clinics, including TCM or Western medicine consultations, were neoplasm (33.2%), respiratory system disease (32.9%), and infectious and parasitic diseases (8.86%), whereas non–TCM users visited Western clinics for respiratory system disease (35.2%), neoplasm (28.6%), and digestive system disease (10%). The rankings of these disease categories were identical except the category “certain conditions originating in the perinatal period” (Table 2).

To delineate the distribution of cancer categories between TCM and non–TCM users, we analyzed the ICD-9-CM codes of registry for catastrophic illnesses in these patients. The top 10 cancer types of clinical visits in the TCM and non-TCM groups among different age groups are shown in Table 3. In general, the TCM users had similar distribution (ranking) of cancer types as the non–TCM users. The 3 leading cancer types were leukemia (ICD code: 204-208), malignant neoplasm of the brain (ICD code: 191), and malignant neoplasm of the eye, nervous system, and other specified sites (ICD code: 190, 192-199). There was a higher percentage of children with leukemia (ICD code: 204-208) who chose only Western medicine (48%) rather than TCM (42.3%). Other cancer categories, such as malignant neoplasm of the brain (ICD code: 191; 13.8% to 11.9%), sarcoma (ICD code: 200, 202-203; 9.08% to 7.61%), and malignant neoplasm of the bone (ICD code: 170; 5.74% to 4%), had a higher percentage of TCM users (Table 3).

The number of clinical visits in Table 2 includes both TCM and Western medicine clinical visits for TCM users. To further understand the treatment modalities utilized in TCM clinics, we determined the frequency distribution of various TCM therapies by major disease category (Table 4). Taking as an example musculoskeletal system and connective tissue disorders, 27.79% of visits were for herbal remedies, 34.25% were for manipulative therapy, 26.04% were for acupuncture, 4.47% were for manipulative therapy combined with herbal remedies, 4.26% were for acupuncture combined with herbal remedies, 2.69% were for manipulative therapy combined with acupuncture, and 0.50% were for acupuncture, manipulative therapy, and herbal remedies.

By comparing the prevalence ratio of disease between TCM users and non–TCM users, we found 4 common diseases for which children with cancer tended to seek adjunctive TCM treatment. These diseases included allergic rhinitis, dyspepsia, disorders of menstruation, and diseases of the musculoskeletal system and connective tissue (Table 5).

Discussion

This study is the first large-scale population-based investigation of adjunctive TCM use in children with cancer. TCM was popular in this population, particularly among school-aged children and adolescents. A total of 62.4% of children...
with cancer had received complementary TCM treatment at some point, and the population number was nearly 1.7 times as large as that of non–TCM users. There was no difference between urban and rural populations, probably because TCM is highly accessible and its use is reimbursed by the NHI program.5 The most common diseases for which children with cancer visited the clinic, be they TCM users or non–TCM users, included respiratory system disease and neoplasm. TCM users visited the clinic less frequently for respiratory system disease and digestive system disease. Children with leukemia tended to seek the use of Western medicine, whereas children with sarcoma or malignant neoplasm of the brain or bone sought adjunctive TCM treatment. This result was consistent with a study conducted in British Columbia that reported that patients with a poor prognosis in childhood cancer were more willing to try CAM therapies. The most common TCM therapy used was Chinese herbal remedies. The pediatric cancer patients who had comorbidities, including allergic rhinitis, dyspepsia, disorders of menstruation, and disease of the musculoskeletal system and connective tissue, tended to visit the TCM clinic rather than a non-TCM clinic. Overall, this study offers pediatricians or oncologists epidemiological information about how TCM is being applied in pediatric cancer patients.

There were several strengths to this study. First, this is a nationwide, population-based study that enrolled all children with cancer from 2001 to 2011. The population size was larger than that of other studies. Second, the NIH program in Taiwan covers greater than 99% of the total population, and it reimbursed both Western medicine and TCM services. Therefore, none of the claims data in the NHIRD had any selection bias. Third, pediatric cancer patients with CICs were confirmed by pathology, image studies, a series of laboratory surveys, and careful review by hematologists and oncologists commissioned by the NHI Administration.

| Table 1. Demographic Characteristics Between TCM Users and Non–TCM Users Among Children With Cancer From 2001 to 2011 in Taiwan. a |
|--------------------------------------------------------|------------------------|------------------------|
| TCM User, n = 8086                                      | Non–TCM User, n = 4879 |
| n            | Percentage | n            | Percentage | P Value |
| Gender       |            |             |            |         |
| Girl         | 3570       | 44.2        | 2053       | 42.1     | .02      |
| Boy          | 4516       | 55.8        | 2826       | 57.9     |          |
| Age, years   |            |             |            | <.0001   |
| Infants and toddlers, 0-2 years | 1103       | 13.6        | 1458       | 29.9     |          |
| Preschoolers, 3-5 years     | 1230       | 15.2        | 899        | 18.4     |          |
| School-aged children, 6-12 years | 2576       | 31.9        | 1294       | 26.5     |          |
| Adolescents, 13-18 years    | 3177       | 39.3        | 1228       | 25.2     |          |
| Urbanization |            |             |            | .31      |
| Urban        | 4897       | 60.6        | 2911       | 59.7     |          |
| Rural        | 3189       | 39.4        | 1968       | 40.3     |          |
| Treatment    |            |             |            | .02      |
| Chemotherapy | 5061       | 62.6        | 3150       | 64.6     |          |
| Radiotherapy | 3533       | 43.7        | 2086       | 42.8     | .30      |
| TCM alone    | 4          | 0.05        | 0          | 0        |          |
| Annual Western medicine clinic visit               |            | <.0001     |
| <5           | 344        | 4.25        | 1076       | 22.1     |          |
| 5-9          | 802        | 9.92        | 458        | 9.39     |          |
| 10-19        | 2371       | 29.3        | 998        | 20.5     |          |
| 20+          | 4569       | 56.5        | 2347       | 48.1     |          |
| Mean (SD)    | 26.5       | (16.5)      | 25.5       | (17.4)   | .002     |
| Annual TCM clinic visit                          |            | <.0001     |
| <5           | 7303       | 90.3        | 25.5       | (17.4)   |          |
| 5-9          | 478        | 5.91        | 0          | 0        |          |
| 10-19        | 221        | 2.73        | 0          | 0        |          |
| 20+          | 84         | 1.04        | 0          | 0        |          |
| Mean (SD)    | 1.84       | (4.40)      | 0          | 0        |          |

Abbreviation: TCM, traditional Chinese medicine.

aχ² test.
The diagnosis was decidedly accurate, and the database was reliable for epidemiological study in children with cancer. We found that the high prevalence (62.4%) of TCM use by children with cancer in Taiwan was compatible with a previous small-scale study reporting 73% of CAM use in Taiwan.\(^{16}\) A previous study found that the prevalence of CAM use in pediatric cancer was 35% in Germany,\(^ {17}\) 47% in the United States,\(^ {18}\) 42% in British Columbia,\(^ {19}\) and 67% in Singapore.\(^ {20}\) Most CAM therapies used in other countries were diet and nutrition, herbal remedies, relaxation, and mind-body therapies.\(^ {2,10}\) In contrast to other countries, TCM constituted a high proportion among CAM therapies in Taiwan because TCM has been used for more than 2000 years and is widely acceptable in Asian countries. TCM also became popular for cancer care in Europe. In a large survey in Europe, acupuncture, herbal medicine, and TCM were the main CAM therapies used to reduce adverse reactions to chemoradiotherapy.\(^ {21}\)

The most common diseases for which TCM or non–TCM users among pediatric cancer patients visited clinics was respiratory system disease and neoplasm. Respiratory system disease was also the most common reason for children visiting outpatient clinics in Taiwan.\(^ {5}\) This is likely because upper- or lower-respiratory tract infection represent the most common acute illness in children, especially in cancer patients with immune compromised status. Moreover, several chemotherapeutic agents such as methotrexate, cyclophosphamide, and busulphan used in conditioning regimens for bone marrow transplantation may also affect pulmonary function.\(^ {22-24}\) We found that TCM users had lower visiting rates for respiratory system disease. Whether complementary TCM therapy can improve lung function deserves further investigations. Discomforts of the digestive system are also among the top reasons for TCM users to visit TCM clinics. Digestive disorders, including diarrhea, nausea, and vomiting, are the most common symptoms in patients undergoing chemotherapy or radiotherapy. Previous clinical trials have reported that Chinese herbal medicines may be effective in treating these side effects.\(^ {25-27}\) The efficacy and safety in pediatric cancer patients also need further investigations.

In our study, when compared with non–TCM users, pediatric cancer patients with allergic rhinitis, dyspepsia, disorders of menstruation, and musculoskeletal disease tended to use TCM. This result was similar to our previous study in the pediatric population in Taiwan.\(^ {5}\) In contrast to a previous study in an adult population with cancer in Thailand, cancer patients with pain, dyspepsia, abdominal or visceral pain, insomnia, and fatigue tended to use TCM.\(^ {28}\) Allergic rhinitis had a high prevalence rate among children in Taiwan,\(^ {29}\) and some clinical trials had observed that herbal medicines and acupuncture were effective in treating

### Table 2. Frequency Distribution of Clinical Visits by Major Disease Categories/Diagnoses Among TCM Users and Non–TCM Users.

| Disease (ICD-9-CM)                                                                 | TCM User, Number of Clinical Visits = 756541 | Non–TCM User, Number of Clinical Visits = 2131731 |
|-----------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|
| Visits, n                                                                         | Percentage                                   | Visits, n                                        | Percentage                                   | \(P\) Value |
| Respiratory system (460-519)                                                     | 249007                                       | 749241                                           | 32.9                                        | 35.2       | <.0001       |
| Neoplasms (140-239)                                                              | 251118                                       | 609166                                           | 33.2                                        | 28.6       | <.0001       |
| Digestive system (520-579)                                                       | 60927                                        | 213386                                           | 8.05                                        | 10.0       | <.0001       |
| Nervous system (320-389)                                                         | 38173                                        | 125449                                           | 5.05                                        | 5.88       | <.0001       |
| Infectious and parasitic disease (001-139)                                      | 67050                                        | 86619                                            | 8.86                                        | 4.06       | <.0001       |
| Symptoms, signs, and ill-defined conditions (780-799)                            | 19770                                        | 76578                                            | 2.61                                        | 3.59       | <.0001       |
| Skin and subcutaneous tissue (680-709)                                           | 19089                                        | 73008                                            | 2.52                                        | 3.42       | <.0001       |
| Injury and poisoning (800-999)                                                   | 12317                                        | 65351                                            | 1.63                                        | 2.98       | <.0001       |
| Endocrine, nutritional, and metabolic disease and immunity disorder (240-279)    | 7437                                         | 31260                                            | 0.98                                        | 1.47       | <.0001       |
| Genitourinary system (580-629)                                                   | 6488                                         | 31246                                            | 0.86                                        | 1.47       | <.0001       |
| Musculoskeletal system and connective tissue (710-739)                           | 5097                                         | 27762                                            | 0.67                                        | 1.30       | <.0001       |
| Mental disorder (290-319)                                                        | 7408                                         | 18460                                            | 0.98                                        | 0.87       | <.0001       |
| Congenital anomalies (740-759)                                                   | 6017                                         | 9746                                             | 0.80                                        | 0.46       | <.0001       |
| Blood and blood-forming organs (280-289)                                        | 3855                                         | 7853                                             | 0.51                                        | 0.37       | <.0001       |
| Circulatory system (390-459)                                                     | 2053                                         | 6095                                             | 0.27                                        | 0.29       | .04          |
| Complications of pregnancy, childbirth, and the puerperium (630-676)             | 108                                          | 1586                                             | 0.01                                        | 0.07       | <.0001       |
| Certain conditions originating in the perinatal period (760-779)                 | 627                                          | 745                                               | 0.08                                        | 0.03       | <.0001       |

Abbreviation: TCM, traditional Chinese medicine.
allergies of children. Some herbal TCM preparations have been shown to have benefit for functional dyspepsia. Chinese herbal remedies, such as modified Xiao-yao-san and Modified Liu-Jun-Zi decoction might be effective in the treatment of functional dyspepsia. With regard to TCM treatment for disorders of menstruation, there is some evidence supporting Chinese herbal medicine and acupuncture in treating primary dysmenorrhea. More than half of primary dysmenorrheal women in Taiwan sought TCM to treat their menstruation-related pain syndrome. Teenage girls with cancer might suffer from irregularities of menstruation as a result of stress, especially during the treatment course. TCM may provide help to regulate menstruation and reduce the side effects of iatrogenic menopause. Our previous study identified that musculoskeletal problems were one of the common reasons for adolescents and school-aged children to visit TCM clinics. Patients with cancer suffered from pain caused by cancer or its treatment such as surgery, chemotherapy, or radiotherapy. Many clinical trials have suggested that TCM may be effective at treating cancer-related pain, and the effects are similar to those of Western analgesics. In contrast to other diseases, TCM doctors prefer providing acupuncture and manipulative therapies to treat musculoskeletal problems.

There are some limitations of our study. First, some TCM services such as Chinese herbal decoctions and proprietary Chinese medicine purchased directly from TCM herbal pharmacies were not covered by NHI. This may have resulted in an underestimation of the frequency of herb use. Nevertheless, TCM services are fully reimbursed for cancer patients holding a CIC. Hence, we can be certain that the coverage of the TCM services in the study is high. The underestimation would be relatively small and acceptable. Second, all claims data were from RCIPD and collected by ICD-9-CM code numbers of pediatric cancer. We were unable to obtain information on the tumor stage to discriminate differences in TCM use in early and late stages. However, this study still provides the general concept and characteristics of TCM use among children with cancer.

**Conclusion**

In this large-scale, nationwide, population-based study, we found that complementary TCM use among children with...
Table 4. Frequency Distribution of Various TCM Therapies by Major Disease Categories/Diagnosis.

| Disease Categories (ICD-9-CM)                                                                 | Herbal Remedies | Manipulative Therapy | Acupuncture | Manipulative Therapy Combined With Herbal Remedies | Acupuncture Combined With Herbal Remedies | Manipulative Therapy Combined With Acupuncture | Acupuncture, Manipulative Therapy and Herbal Remedies |
|--------------------------------------------------------------------------------------------|----------------|----------------------|-------------|---------------------------------------------------|------------------------------------------|-----------------------------------------------|--------------------------------------------------|
| Respiratory system (460-519)                                                               | 99.61          | 0.01                 | 0.27        | 0.02                                              | 0.09                                      | 0.00                                          | 0.00                                             |
| Neoplasms (140-239)                                                                       | 92.84          | 0.30                 | 5.52        | 0.02                                              | 1.31                                      | 0.00                                          | 0.01                                             |
| Symptoms, signs, and ill-defined conditions (780-799)                                     | 99.15          | 0.11                 | 0.55        | 0.04                                              | 0.14                                      | 0.005                                         | 0.005                                            |
| Injury and poisoning (800-999)                                                             | 11.50          | 54.40                | 19.47       | 6.84                                              | 3.39                                      | 3.57                                          | 0.83                                             |
| Digestive system (520-579)                                                                 | 99.74          | 0.01                 | 0.19        | 0.02                                              | 0.04                                      | 0.00                                          | 0.00                                             |
| Musculoskeletal system and connective tissue (710-739)                                    | 27.79          | 34.25                | 26.04       | 4.47                                              | 4.26                                      | 2.69                                          | 0.50                                             |
| Skin and subcutaneous tissue (680-709)                                                    | 99.53          | 0.02                 | 0.21        | 0.06                                              | 0.18                                      | 0.00                                          | 0.00                                             |
| Genitourinary system (580-629)                                                            | 99.64          | 0.00                 | 0.10        | 0.06                                              | 0.2                                       | 0.00                                          | 0.00                                             |
| Nervous system (320-389)                                                                   | 62.00          | 3.60                 | 30.24       | 0.36                                              | 3.15                                      | 0.55                                          | 0.10                                             |
| Blood and blood-forming organs (280-289)                                                  | 98.29          | 0.00                 | 0.66        | 0.00                                              | 1.05                                      | 0.00                                          | 0.00                                             |
| Infectious and parasitic disease (001-139)                                                | 98.01          | 0.50                 | 1.00        | 0.33                                              | 0.00                                      | 0.16                                          | 0.00                                             |
| Circulatory system (390-459)                                                               | 88.69          | 0.00                 | 9.25        | 0.24                                              | 1.82                                      | 0.00                                          | 0.00                                             |
| Endocrine, nutritional and metabolic disease, and immunity disorder (240-279)              | 99.30          | 0.12                 | 0.35        | 0.00                                              | 0.23                                      | 0.00                                          | 0.00                                             |
| Mental disorder (290-319)                                                                  | 53.04          | 1.09                 | 39.00       | 0.16                                              | 6.71                                      | 0.00                                          | 0.00                                             |
| Congenital anomalies (740-759)                                                             | 64.67          | 5.33                 | 30.00       | 0.00                                              | 0.00                                      | 0.00                                          | 0.00                                             |
| Complications of pregnancy, childbirth, and the puerperium (630-676)                       | 100.00         | 0.00                 | 0.00        | 0.00                                              | 0.00                                      | 0.00                                          | 0.00                                             |

Abbreviation: TCM, traditional Chinese medicine.
cancer is high. This study provides valuable information for those concerned about health care in pediatric cancer patients. Further pharmacological investigation and clinical trials of TCM used in children with cancer are warranted.

Authors' Note
Hung-Rong Yen and Wan-Yu Lai contributed equally as co–first authors. This study was based in part on data from the National Health Insurance Research Database, provided by the National Health Insurance Administration and Ministry of Health and Welfare, and managed by National Health Research Institutes. The interpretation and conclusions contained herein do not represent those of National Health Insurance Administration, Ministry of Health and Welfare, or National Health Research Institutes.

Declaration of Conflicting Interests
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| Disease (ICD-9-CM) | TCM User | | Non–TCM User | |
|-------------------|---------|---|-------------|
|                   | n       | Percentage | n           | Percentage |
| Allergic rhinitis cause unspecified (477.9) | 4424 | 54.7 | 1527 | 31.3 | 1.85 (1.74-1.96) |
| Dyspepsia and other specified disorders of function of stomach (536.8) | 2120 | 26.2 | 596 | 12.2 | 2.26 (2.06-2.48) |
| Disorders of menstruation and other abnormal bleeding from female genital tract (626) | 1542 | 19.1 | 194 | 3.98 | 3.51 (3.05-4.09) |
| Disease of the musculoskeletal system and connective tissue (710-739) | 5414 | 67.0 | 1570 | 32.2 | 1.91 (1.80-2.02) |

Abbreviations: IRR, incidence rate ratio in Poisson regression; TCM, traditional Chinese medicine.

*IRR, adjusted for age, gender, urbanization, and number of clinical visits. All P values <.0001.
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