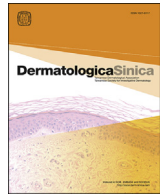


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## ORIGINAL ARTICLE

## Skin care services and disease prevalence in Taiwan: A nationwide study

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## ABSTRACT

**Background/Objective:** Numerous studies have suggested that dermatologists are superior to non-dermatologists in managing skin diseases. However, it is still not known whether the public are convinced that dermatologists should be the primary caretakers for the skin. This study sought to characterize the delivery of skin care services, with a particular focus on the epidemiology of skin diseases and the distributions of patients and their visits to dermatologists and nondermatologists.

**Methods:** The cohort datasets were drawn from Taiwan's National Health Insurance Research Database (NHIRD) and contained all the original claims data for one million beneficiaries enrolled in 2010. We analyzed the epidemiologic profiles of this population-based cohort for 2013. Descriptive statistics were applied to examine the epidemiology of skin diseases and the distributions of visits and patients according to physician specialty.

**Results:** We identified 989,039 persons who remained in the cohort in 2013. Of those, 351,330 (or 35.5%) had skin diseases, and made 989,514 ambulatory care visits in 2013. Visits to dermatologists accounted for 62.2% of these visits. Among the patients with skin diseases, 52.6% of patients made visits to dermatologists, compared with 32.6% who visited nondermatologists and 14.8% who visited both in 2013. In this cohort, dermatitis and eczema had the highest prevalence (16.2%), followed by fungal infections (6.3%) and pruritus (5.5%).

**Conclusion:** Dermatologists play major roles in providing skin care services in Taiwan. This finding might be partially explained by the weak role of primary care physicians and the perceptions of patients toward dermatologists and nondermatologists in Taiwan.

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## Introduction

Dermatologists have been shown to be superior to non-dermatologists in the diagnosis and treatment of skin diseases.<sup>1,2</sup> During the past few decades, the demand for surgical and cosmetic procedures has increased continuously. Given this long-term growth in surgical and cosmetic dermatology, present day dermatologists, in addition to providing conventional skin care, also serve as dermatologic surgeons and cosmetologists, playing a leading role in innovating and developing treatments in these

fields.<sup>3</sup> Prior studies have shown that primary care physicians recognize dermatologists as the specialists most qualified to perform a variety of cutaneous cosmetic and surgical procedures.<sup>4</sup> However, it is still not known whether members of the public have been convinced that dermatologists should be the primary caretakers for the skin. In a previous study of the United States (US), 36.5% of patients presenting to primary care physicians had at least one skin problem, with said skin problem being the chief complaint of 58.7% of those patients. Among patients with skin conditions, however, dermatologists managed only 40% of the outpatient visits.<sup>5,6</sup> Taiwan has a single payer system for healthcare.<sup>7</sup> Taiwanese citizens with skin problems are able to choose their healthcare providers without a referral, including dermatologists at any level of medical facility. Patients with skin problems are usually cared for by dermatologists, as well as internists and family physicians.

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Although there were reports that examined skin care services in the US and other countries (Table 1), studies comparing the skin care services provided by dermatologists and nondermatologists are lacking in Taiwan.<sup>5,6,8–12</sup> The aim of this study was to characterize the delivery of skin care services, with a particular focus on the epidemiology of skin diseases and the distributions of patients and their visits to dermatologists and nondermatologists.

## Materials and methods

### Data collection

The National Health Insurance Administration of the Ministry of Health and Welfare has released all de-identified claims data dating back to 1999 for the purposes of academic research. The National Health Insurance Research Database (NHIRD) of Taiwan contains the original medical claims data submitted by all service providers throughout the nation. In this study, data from the NHIRD was analyzed in order to examine the pattern of care for skin diseases in Taiwan. More specifically, this study used reimbursement claims data from the Longitudinal Health Insurance Database 2010 (LHID 2010), which is the “cohort dataset” containing all of the original claims data of one million beneficiaries enrolled in the year 2010. These one million persons were randomly sampled from the entire 23.74 million-person population of NHI beneficiaries. Furthermore, we assessed NHIRD files sampled from those for the aforementioned cohort for the year 2013, namely, the R\_CD2013.DAT and R\_ID2013.DAT files. The term “CD” refers to the ambulatory visit files in the cohort dataset, while the term “R” refers to the registry data for the beneficiaries. The purpose of the analysis was to follow up on this cohort by observing the epidemiologic profiles of the population-based cohort in 2013. It should be noted that new claims data for the cohort are released every year, although not every person originally included in the cohort has remained insured since then as a result of death and emigration. In this study, disease categories based on the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) classifications were used to analyze the diagnoses indicated for the ambulatory visits.

### Study design

Among all the ambulatory visit records for 2013, we only considered ambulatory care visits to physicians, excluding any visits to dentists, traditional Chinese medicine practitioners, and emergency clinics or departments. Prescription refill visits, home care visits provided by nurses, and preventive services without a physician consultation were also excluded from the analysis. With only the primary diagnoses of each claim being considered, we analyzed the distributions of persons and ambulatory care visits to dermatologists and nondermatologists in each diagnostic group. In

**Table 2** Skin disease categories and classification codes.

Diagnostic group	ICD-9-CM
Acne and related disorders	695.3, 706.0, 706.1, 705.82, 705.83
Bacterial infections	680, 681, 682, 684, 034, 035
Benign skin growths	216, 685, 702.1, 706.2
Bullous diseases	694
Burn	948
Diseases of hair and nails	703, 704
Eczema/dermatitis	690, 691, 692, 693
Fungal infections	110, 111, 112
Other disorders of skin and subcutaneous tissue	683, 700, 701, 702.0, 702.8, 705.0–705.2, 705.9, 706.3, 706.3–706.9, 709.1–709.9
Other inflammatory dermatoses	695.0–695.2, 695.4–695.9, 697
Other local infections of skin and subcutaneous tissue	686
Parasitic infections	132, 133
Pigmentary disorders	270.2, 709.0
Pruritus and related conditions	698
Psoriasis and similar disorders	696
Sexually Transmitted Diseases	042-044, 090-099
Skin malignancy	
Malignant melanoma of skin	172
Other malignant neoplasm of skin	173
Carcinoma in situ of skin	232
Skin ulcer	707
Urticaria	708
Viral infections	
Herpes zoster	053
Herpes simplex	054
Other viral exanthemata	057
Specific diseases due to coxsackie virus	074
Other diseases due to viruses and chlamydiae	078

the analyses of skin disease prevalence, we factored in all the diagnoses for each claim to estimate the one-year prevalence rates of the various skin diseases. In this study, skin diseases were defined according to the ICD-9-CM codes shown in Table 2. The distributions of the various skin disease groups were computed according to patient age and gender, as well as physician specialty.

### Statistical analysis

The data were analyzed using the programming software Perl version 5.20.2 (Perl, Walnut, CA, USA) for data processing and using the statistical software SPSS version 22.0 (IBM, Armonk, NY, USA) for statistical analysis. Descriptive statistics were applied to assess the epidemiology of the skin diseases and the distributions of visits and patients according to physician specialty. The study was approved by institutional review board of Taipei Veterans General Hospital according to the laws of the Republic of China (VGHIRB No.: 2013-10-001CE).

**Table 1** Comparison of prior studies of skin care services.

	Publication year	Data source	Aims to determine
Winston-Salem, USA <sup>11</sup>	1994	Nationwide (NAMCS)	Patterns of services provided by dermatologists
Winston-Salem, USA <sup>6</sup>	1997	Nationwide (NAMCS)	Patterns of services provided by dermatologists and nondermatologists
Truro, UK <sup>10</sup>	1999	Hospital-based	Patterns of skin care services in general practice
Miami, USA <sup>5</sup>	2001	Hospital-based	Patterns of skin care services in general practice
Boston, USA <sup>9</sup>	2004	Nationwide (NAMCS)	Patterns of services provided by dermatologists and nondermatologists
Edinburgh, UK <sup>8</sup>	2008	City region-based	Patterns of skin diseases encountered in skin care services
Tokyo, Japan <sup>12</sup>	2011	Nationwide, multicenter, hospital-based	Patterns of skin diseases in dermatology practice
Taipei, Taiwan	this study	Nationwide (NHIRD)	Prevalence of skin diseases
			Patterns of skin care services provided by dermatologists and nondermatologists
			One year prevalence of skin diseases

NAMCS = National Ambulatory Medical Care Survey; NHIRD = National Health Insurance Research Database.

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