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## Original

### Top dermatologic diagnoses by age

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## Abstract

**Background:** Although some skin conditions predominate in patients of certain ages, little data exists about the relative prevalence of dermatologic conditions by age.

**Objectives:** To determine the common skin conditions by age group in the United States, both in dermatologist samples and for all specialties.

**Methods:** The National Ambulatory Medical Care Survey (NAMCS) was queried for top diagnoses at dermatologist and all skin disease visits from 1993-2010. ICD-9 coding was used for diagnoses.

**Results:** There were 588 million estimated visits to dermatologists in the US from 1993-2010. Atopic dermatitis, acne, and actinic keratosis were the top diagnoses in all age groups. Common diagnoses in all groups included contact dermatitis and benign neoplasm. There were 740 million estimated skin disease visits to all physicians; more of these were acute or infectious. The percent of skin diseases seen by dermatologists gradually increased with age to a maximum of 55% in the 75-84 year age group.

**Conclusion:** Dermatologic conditions seen in different age groups and between dermatologists and non-dermatologists vary. With advancing age, Americans increasingly seek a dermatologist rather than a non-dermatologist physician for skin conditions.

**Keywords:** age distribution, atopic dermatitis, acne, actinic keratosis, diagnosis, skin disease, epidemiology

## Introduction

The post World War II “baby boom” is reshaping the age distribution of healthcare consumers in the U.S. and other developed nations. Approximately 79 million Americans were born between 1946 and 1964, such that those over 65 years of age are projected to increase from 39 million in 2010 to 69 million, or one-fifth of Americans, by 2030 [1,2]. In conjunction with increased life expectancy, this trend is expected to yield a five-fold increase in those over age 85 by the year 2050 [2].

The aging population is anticipated to increase the need for medical care overall, and the prevalence of specific disease conditions known to affect the elderly. Changes in dermatologic epidemiology are already evident. The treatment of skin cancer, a condition well known to be more common in the elderly, increased by 53% between 1996 and 2008 with corresponding increased costs to Medicare [3]. The majority of skin cancer treatments were performed by dermatologists [3].

Although conditions such as acne, atopic dermatitis and skin cancer occur more frequently in certain age groups, there is little literature about the relative prevalence of various dermatologic diseases across the age spectrum; still less information is derived from nationally representative data [4,5,6]. The purpose of the present study is to analyze data from the National Ambulatory Medical Care Survey (NAMCS) to provide a nationally representative analysis of the most common dermatologic diagnoses seen in the United States stratified by patient age and by both dermatologists and other physicians. Knowledge of the conditions most prevalent in specific age groups can inform dermatologists, primary care physicians, and health policy workers about impending changes in the prevalence of skin conditions and patient care needs.

## Methods

The National Ambulatory Medical Care Survey (NAMCS) is a survey of non-federally funded outpatient physicians, which has been conducted annually since 1989 by the National Center for Health Statistics (NCHS). The data arises from physicians who log demographic data from a subset of or all their patient visits during a randomly assigned one week period. Variables recorded include patient demographics, visit diagnoses, and medications, among others. The resulting data is then weighted according to known geographic variables to approximate overall values for the entire U.S. population [7].

NAMCS data from 1993-2010 were analyzed for this study. The data were stratified by age range for top diagnoses. The first part of the analysis was limited to visits to dermatologists only. However, because other physicians are known to see many patients for skin disease, the secondary data analysis focused on patients with a sole diagnosis of a skin condition presenting to any specialty [8,9]. Each age group in this skin disease sample was analyzed for physician specialty. The data from the 2000 U.S. Census were used to calculate visits per 100,000 population for each age group. All data analysis was performed using SAS 9.2 (SAS Institute, Cary, NC) and the study was declared exempt by the Wake Forest Baptist Hospital Institutional Review Board.

## Results

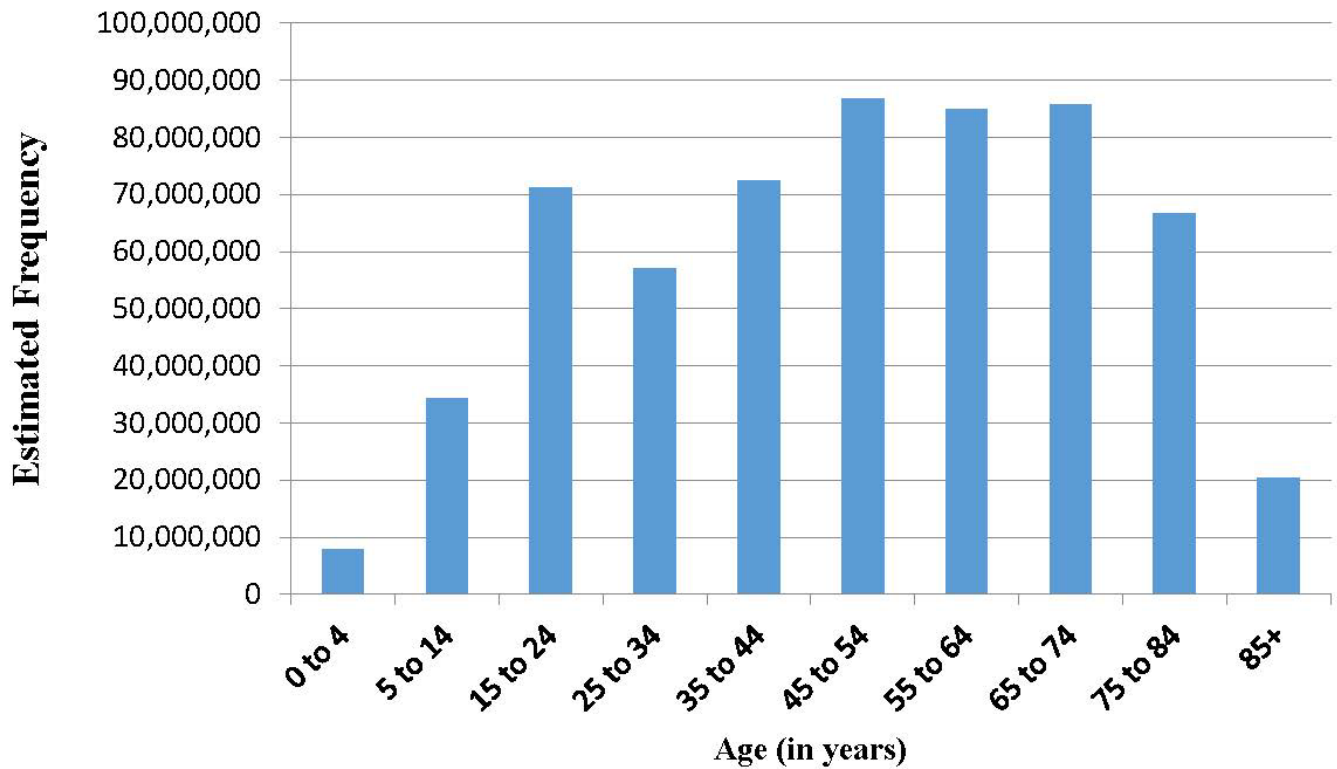
There were a total of 588 million estimated visits to dermatologists in the US from 1993-2010. Most visits were by adults, ages 35-75 (Figure 1). The lowest proportion of annual visits per 100,000 U.S. population to dermatologists was for 0-4 year olds, with 2,300 visits per 100,000. Visits per 100,000 to dermatologists generally increased with age, to a maximum of 30,000 per 100,000 for patients aged 75-84 (Table 1).

Despite significant diagnostic variation between age groups in this study, a number of conditions were prevalent in more than one age group. Atopic dermatitis was the most frequent diagnosis for the age 0-4 age group, whereas acne was the top diagnosis for age 5-44 and actinic keratosis was the most common diagnosis among those age 45 and older (Table 2). Diagnoses among the top ten for all age groups included contact dermatitis and eczema, and benign neoplasm of the skin; sebaceous cyst was present in all age groups except age 0-4. Malignant neoplasm of the skin was a frequent diagnosis for the 45-54 year old age group and all older age groups (Table 2).

In secondary analyses, all visits for a single diagnosis of skin disease, regardless of specialty, were analyzed for patient age. There were 740 million estimated total skin disease visits. The number of visits per 100,000 population generally increased to a maximum of 25,000 for the 75-84 year age group. Zero to 4-year-old patients also had a significant number of skin disease visits, with 16,000 visits per 100,000 population (Table 1).

Although many of the common diagnoses such as atopic dermatitis, acne, contact dermatitis, and actinic keratosis were in the top ten diagnoses for both dermatologists and overall skin disease visits, there were also a number of differences. In the youngest age groups, diagnoses such as nonspecific skin eruption, candidiasis, impetigo, insect bite, diaper rash, ingrowing nail, abscess, and herpes simplex infection appeared in the top diagnoses for skin disease visits, but not for dermatologist visits. Contact dermatitis occupied the top diagnosis for multiple middle age groups, holding a higher position than in the dermatologist specific sample. In the oldest age groups, herpes zoster, chronic ulcer of the lower limb, and blepharitis appeared high in the skin disease visits but not in the dermatologist sample.

Skin disease visits were more commonly attended by dermatologists with increasing patient age. Only 9.5% of skin disease visits in 0-4 year olds were attended by dermatologists. The majority of skin disease in this age group was taken care of by pediatricians, whereas 55.0% of skin disease visits were attended by dermatologists for the 75-84-year-olds. For the remaining age groups, the percentage of skin disease visits to dermatologists were between these values, with 26.8% of skin disease visits in 5-14 year olds, 47.9% of visits in 15-24 year olds, 41.2% of visits in 25-34 year olds, 39.6% of visits in 35-44 year olds, 44.2% of visits in 45-54 year olds, 48.2% of visits in 55-64 year olds, 51.4% of visits in 65-74 year olds, and 51.4% of visits in patients over 80 years old (Figure 2). For patients above age 25, dermatology was the specialty most likely to see skin disease visits, followed by general and family practice, and then internal medicine (Figure 2).



**Figure 1.** Visits to dermatologists by age group, 1993-2010

**Table 1.** Annual number of visits per 100,000 population

Age group	Visits to dermatologists	Visits for skin disease (sole diagnosis, all specialties)*
0-4	2,300	16,000
5-14	4,600	11,000
15-24	10,000	15,000
25-34	8,000	11,000
35-44	8,900	11,000
45-54	13,000	14,000
55-64	19,000	18,000
65-74	26,000	23,000
75-84	30,000	25,000
85+	27,000	21,000

These visit numbers were calculated by dividing the NAMCS generated visit numbers over the eighteen year period studied, divided by 18, and then adjusted for data from the 2000 U.S. Census of the total US population by age.

\*Number of the visits for skin disease in this column are limited to patients with a single documented visit diagnosis of skin disease, excluding patients with multiple dermatologic diagnoses or a dermatologic diagnosis with some other visit diagnosis. It is for this reason that visits to dermatologists may exceed skin disease visits in this table.

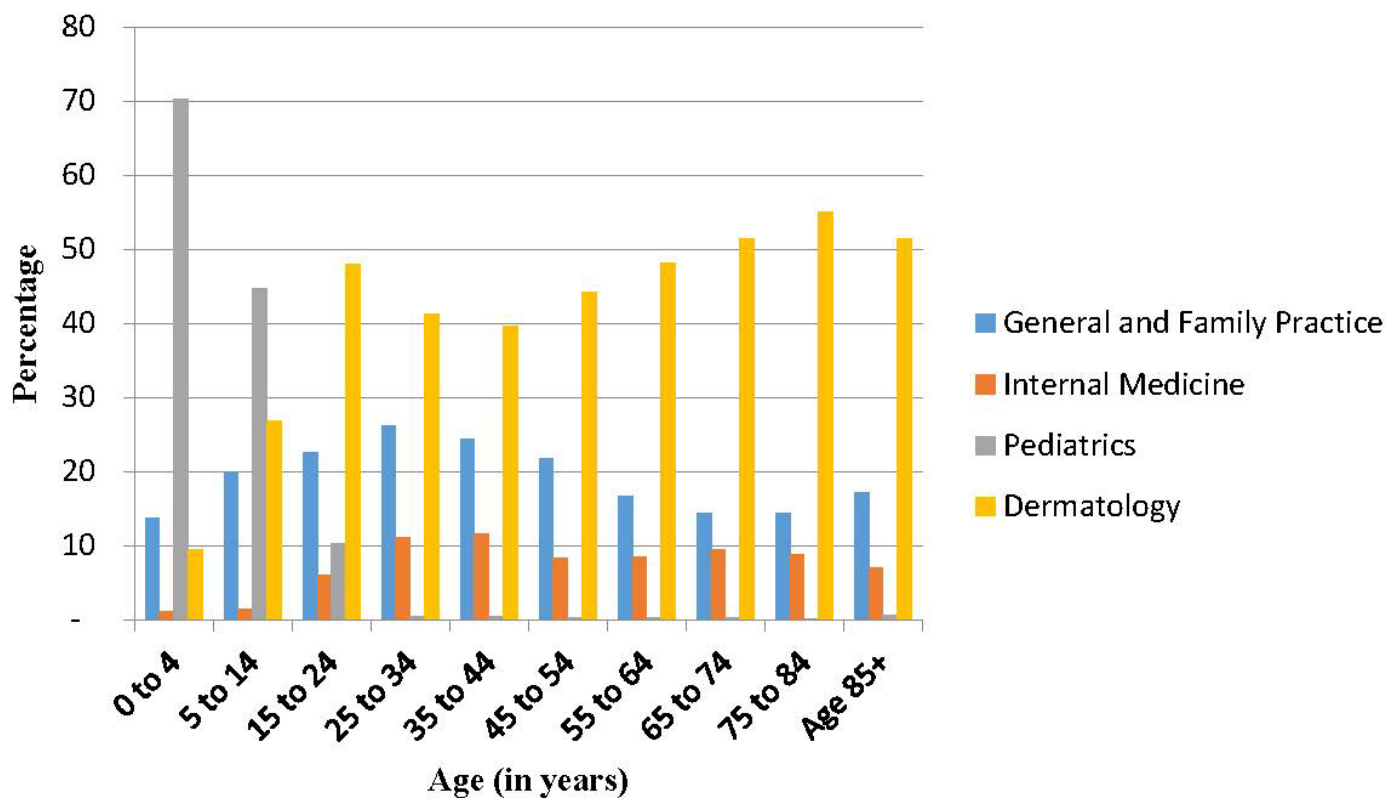
**Table 2. Top dermatologic diagnoses for all age groups at dermatologists visits in the US from 1993-2010**

Age (Years)	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	Age 85+
Diagnosis (ICD-9 code) Number of visits (% of visits)	Atopic dermatitis (691.8) 1,430,000 (18.4)	Acne (706.1) 10,470,000 (30.5)	Acne (706.1) 42,610,000 (59.8)	Acne (706.1) 16,600,000 (29.1)	Acne (706.1) 10,280,000 (14.2)	Actinic keratosis (702.0) 10,290,000 (11.9)	Actinic keratosis (702.0) 16,880,000 (19.9)	Actinic keratosis (702.0) 24,960,000 (29.1)	Actinic keratosis (702.0) 22,450,000 (33.7)	Actinic keratosis (702.0) 6,670,000 (32.6)
	Contact dermatitis, NOS(692.9) 1,250,000 (16.1)	Viral warts NOS (78.10) 7,550,000 (22.0)	Viral warts NOS (78.10) 6,350,000 (8.9)	Benign neoplasm of skin, USS (216.9) 7,030,000 (12.3)	Benign neoplasm of skin, USS (216.9) 9,090,000 (12.5)	Benign neoplasm of skin, USS (216.9) 9,320,000 (10.7)	Seborrheic keratosis NOS (702.19) 10,020,000 (11.8)	NMSC, NOS (173.9) 10,610,000 (12.4)	NMSC, NOS (173.9) 10,190,000 (15.3)	NMSC, NOS (173.9) 3,450,000 (16.8)
	Molluscum contagiosum (078.00) 860,000 (11.1)	Benign neoplasm of skin, USS (216.9) 3,390,000 (9.9)	Benign neoplasm of skin, USS (216.9) 5,030,000 (7.1)	Contact dermatitis, NOS (692.9) 5,290,000 (9.3)	Contact dermatitis, NOS (692.9) 6,640,000 (9.2)	Contact dermatitis, NOS (692.9) 7,310,000 (8.4)	Contact dermatitis, NOS (692.9) 7,420,000 (8.7)	Seborrheic keratosis NOS (702.19) 8,590,000 (10.0)	Seborrheic keratosis NOS (702.19) 6,790,000 (10.2)	Seborrheic keratosis NOS(702.19) 1,960,000 (9.6)
	Benign neoplasm of skin, USS (216.9) ***	Contact dermatitis, NOS(692.9) 2,580,000 (7.5)	Contact dermatitis, NOS (692.9) 4,260,000 (6.0)	Viral warts, NOS (078.10) 4,120,000 (7.2)	Viral warts, NOS (078.10) 4,370,000 (6.0)	Seborrheic keratosis, NOS (702.19) 7,010,000 (8.1)	Benign neoplasm of skin, USS (216.9) 6,640,000 (7.8)	Contact dermatitis, NOS(692.9) 6,920,000 (8.1)	Contact dermatitis, NOS (692.9) 5,120,000 (7.7)	Contact dermatitis, NOS (692.9) 1,750,000 (8.6)
	Viral warts NOS(078.10) ***	Atopic dermatitis (691.8) 1,810,000 (5.3)	Sebaceous cyst (706.2) 2,080,000 (2.9)	Psoriasis (696.1) 2,800,000 (4.9)	Rosacea (695.3) 4,220,000 (5.8)	Rosacea (695.3) 5,970,000 (6.9)	NMSC, NOS (173.9) 5,930,000 (7.0)	Benign neoplasm of skin, USS (216.9) 4,290,000 (5.0)	NMSC of the face (173.3) 2,080,000 (3.1)	NMSC of face (173.3) 1,010,000 (4.9)
	Acne (706.1) ***	Molluscum contagiosum (078.0) 1,790,000 (5.2)	Other specified diseases of hair and hair follicles (704.8) 1,430,000 (2.0)	Sebaceous cyst (706.2) 2,590,000 (4.5)	Psoriasis (696.1) 4,220,000 (5.8)	Psoriasis (696.1) 5,420,000 (6.2)	Rosacea (695.3) 4,330,000 (5.1)	Psoriasis (696.1) 3,780,000(4.4)	Sebaceous cyst (706.2) 2,040,000 (3.1)	Sebaceous cyst (706.2) 640,000 (3.1)
	Other specified diseases of sebaceous glands (706.8) ***	Psoriasis (696.1) 930,000 (2.7)	Psoriasis (696.1) 1,260,000 (1.8)	Rosacea (695.3) 2,020,000 (3.5)	Actinic keratosis (702.0) 3,343,209 (4.6)	Acne (706.1) 4,980,000 (5.7)	Psoriasis (696.1) 4,300,000 (5.1)	Rosacea (695.3) 3,450,000 (4.0)	Psoriasis (696.1) 1,840,000 (2.8)	Benign neoplasm of skin, USS (216.9) ***
	Other specified congenital anomalies of the integument (757.39) ***	Other specified anomalies of skin (757.39) 10,470,000 (2.0)	Atopic dermatitis NOS (691.8) 1,240,000 (1.7)	Seborrheic dermatitis, NOS(690.10) 1,900,000 (3.3)	Sebaceous cyst (706.2) 3,203,638 (4.4)	NMSC, NOS (173.9) 4,520,000 (5.2)	Viral warts, NOS(078.10) 3,640,000 (4.3)	Sebaceous cyst (706.2) 2,790,000 (3.2)	Benign neoplasm of skin, USS (216.9) 1,720,000 (2.6)	Neoplasm of uncertain behavior, USS (238.2) ***
	Seborrheic dermatitis, NOS (690.10) ***	Other specified viral warts (078.19) 7,550,000 (2.0)	Seborrheic dermatitis, NOS (690.10) 970,000 (1.4)	Other specified diseases of hair and hair follicles (704.8) 1,570,000 (2.7)	Seborrheic keratosis NOS (702.19) 2,647,247 (3.7)	Viral warts, NOS (078.10) 4,350,000 (5.0)	Sebaceous cyst (706.2) 2,750,000 (3.2)	Inflamed seborrheic keratosis (702.11) 2,470,000 (2.9)	Rosacea (695.3) 1,720,000 (2.6)	Other specified diseases of sebaceous glands (706.8) ***
	Hemangioma (228.00) ***	Sebaceous cyst (706.2) 3,390,000 (1.7)	Keloid scar (701.4) 870,000 (1.2)	Dyschromia (709.09) 1,250,000 (2.2)	Dyschromia (709.09) 2,412,366 (3.3)	Sebaceous cyst (706.2) 3,950,000 (4.5)	Dyschromia (709.09) 2,400,000 (2.8)	Acquired keratoderma (701.1) 2,400,000 (2.8)	Acquired keratoderma (701.1) 1,690,000 (2.5)	Inflamed seborrheic keratosis (702.11) ***

The percent of visits was calculated by dividing the frequency of diagnosis by the frequency of visits to dermatologists in the same age group for the years 1993-2010.

NOS, Not otherwise specified; NMSC, Non-melanoma skin cancer; USS, Unspecified sites of skin

\*\*\*These diagnoses were based on less than 30 unweighted samples in NAMCS database. For this reason, values for the frequency and percent of visits in the marked areas of the table would be considered unreliable.



**Figure 2.** Frequency of skin-related visits to leading specialties by age group

## Discussion

There were significant differences between the diagnoses at dermatologist visits versus those for all specialties. In particular, infectious causes of skin disease such as oral candidiasis, impetigo, viral exanthem, cellulitis and abscess, herpes simplex, and herpes zoster appeared in the top 10 diagnoses for skin disease regardless of specialty in at least one age group, but not in the top 10 diagnoses seen by dermatologists for any age group. The potentially acute nature of these conditions in the context of long wait times at dermatology offices may explain this phenomenon.

The distribution of skin disease visits by specialty revealed a number of trends. Pediatricians saw the majority of skin disease for the 0-4 age group and were the most likely specialty to see skin disease in patients age 5-14. General and Family Practice was the specialty that saw the second largest percentage of skin disease visits in all age groups except age 5-14. From age 15 and older, dermatologists saw a larger percentage of skin disease patients than any other specialty and saw a gradually increasing percentage of skin disease with rising patient age from age 35 to 84. The possible explanations for this are numerous, but may include increased patient, family, or primary provider concern about skin cancer. Another consideration is that patients with Medicare may be more likely to seek care for skin disease than those under Medicaid or without insurance. This was borne out in one psoriasis study showing that over 88% of patients seeking care had either private insurance or Medicare [10]. Telephone studies of American adults reveal that elderly Medicare patients reported fewer issues in accessing medical care owing to healthcare cost than the adults with private insurance, reported less economic hardship owing to medical bills, and reported more satisfaction with their insurance coverage [11,12].

Although our study suggests a growing tendency with increasing age to see a dermatologist for skin disease, evidence suggests a potential shortage of dermatologists to meet these needs. One study found an average 33-day wait time for patients to see a dermatologist, with one-out-of-three practices seeking to hire dermatologists [13]. Medicare patients appeared in one study to have equal access to dermatologist visits as those who are privately insured [14]. Nevertheless, wait times appear to have resulted in much of skin disease treatment being shifted to more numerous, non-dermatology practitioners [15]. This phenomenon partially explains why the present study found a maximum rate of 55% of skin disease visits attended by dermatologists for any age group.

The limitations of this study largely resulted from the limitations of our data set, the NAMCS. For the purpose of this study, data from an eighteen year period was pooled, potentially hiding year-to-year variability in diagnoses that may have been present. Additionally, whereas the NAMCS seeks to estimate values for the entire US population, the data nevertheless arises from a sample and may therefore have inherent, yet unavoidable bias. One potential bias in this study is that different providers may code the same diagnosis in slightly different ways. A skin cancer of the face may be coded as “other malignant neoplasm of skin, site unspecified” (173.9) versus “other malignant neoplasm of skin of other and unspecified parts of face” (173.3). An additional limitation in this study is that the unit of analysis is patient visits rather than the count of individuals with specific diagnoses in the population. It is therefore possible that the top visit diagnoses in this sample may not correspond exactly with overall skin disease prevalence. Nevertheless, the data are informative about health care utilization for the skin disease diagnoses studied.

This study demonstrates the significant variety in dermatologic diagnoses by age groups, as well as among dermatologist and non-dermatologist samples. Knowledge of typical presenting diagnoses across the age spectrum and the current trends in the age distribution of the United States may give dermatologists, other physicians, and health policy makers a preview of conditions which may be on the rise with the aging of the baby boom generation. Although the largest percentage of skin disease seen by dermatologists in any age group was only 55% in this study, older patients were increasingly likely to seek care from a dermatologist for their skin disease as opposed to another specialty. As the U.S. population continues to age, increased access to the specialty will be needed to meet the demand of our growing elderly population.

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