The Burden of Skin Disease in the United States and Canada

Sunil Kalia, MD, MHSc, FRCPC[a,b,*],
Marius Laurentiu Haiducu, BSc[a,b]

KEYWORDS

• Skin disease • Disease burden • Skin disease classification
• Health care costs

Skin conditions are frequently cited among the most common health problems in the United States and Canada,[1–3] and US collective prevalence estimates surpass those of obesity, hypertension, and cancer.[1] Yet, the national burden of skin disease has avoided accurate estimation for decades. Studies that have sought to estimate it have relied on endpoints of health, social, and economic consequences of disease but such parameters have not displayed consistent measurement. Morbidity and mortality from skin conditions are both expected to increase, and prevalence and health care spending related to skin disease are considered among the fastest growing of any medical condition.[1,4,5] As such, accurate assessments of the skin disease burden become essential for efficient allocation of research and health care resources as well as for public awareness and intervention. Guided by the World Health Organization (WHO) breakdown of disease burden into components of epidemiology (incidence, prevalence, and mortality), costs, and quality of life (QOL) impact,[6] the literature was surveyed in an attempt to quantify these parameters of skin disease in the United States and Canada.

SKIN DISEASE CLASSIFICATION

There are more than 3000 defined varieties of skin disease described in the medical literature, and symptomatology may range from physical discomfort to psychological and emotional toil to death.[7] Given the great diversity of diagnostic possibilities, principles for skin disease nomenclature have become equally expansive, and categorization can be based on symptoms, physical appearance, anatomic distribution, pathologic or histologic examination, immunologic staining pattern, causative agent or resultant disability, and genetic derivation of the disease.[8,9] In addition, many general terms, such as *eczema* and *dermatitis*, are ambiguous in their diagnostic intent because they may encompass a diverse array of pathologies and may be differently interpreted by various specialists.[10,11] Thus, part of the difficulty in acquiring an overall impression of national disease burden has derived from the inconsistent assumptions and limitations that researchers apply when investigating skin disease.

Various investigatory bodies have established their own interpretations skin disease, ranging from the narrow consideration of only conditions treated by dermatologists to all-inclusive appreciation of any disease or condition that affects the skin.[10,12–14] The latter, broad definition scheme is well-suited to capture morbidity and mortality from skin conditions that never bring patients into contact with the medical system, yet it also necessitates more elaborate classification systems of skin disease. Both Canada and the United States make use of the *International*

[a] Department of Dermatology and Skin Science, University of British Columbia, 835 West 10th Avenue, Vancouver, BC, Canada V5Z 4E8
[b] Vancouver Coastal Health Research Institute, 835 West 10th Avenue, Vancouver, BC, Canada V5Z 4E8
* Corresponding author. 835 West 10th Avenue, Vancouver, BC, Canada V5Z 4E8.
E-mail address: sunil.kalia@vch.ca

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Classification for Diseases (ICD), Ninth Revision, coding scheme to classify skin disease; many past studies attempting to quantify disease burden have relied on this system. The diagnostic codes frequently group together distinct diagnoses and these fail to incorporate skin infections and skin tumors, which together make up a significant portion of dermatologic case loads. Newer iterations, such as *ICD-10*, fail to address such shortcomings of previous versions. Thus, many early studies that relied on these classification schemes cannot be used to accurately determine trends in burden of skin disease.[7,8,15]

Although past *ICD* systems have been disappointing, the eleventh iteration, which is set to enter general use in 2015, is proving to mitigate previous inadequacies. Through the joint effort between different national dermatology organizations and the International League of Dermatological Societies, dermatology has become the first specialty to have substantial revisions accepted by the WHO into the *ICD-11* draft, and the changes demonstrate strides toward more comprehensive accounts of skin disease for the first time since 1948. With the use of an electronic platform, listed diseases will be elaborated on with textual definitions, diagnostic criteria, etiology, and targeted body sites. Nomenclature preferences will also shift away from eponyms, which are frequent within the field of dermatology, toward categorizations based on pathophysiology. Both the expansion from 4-digit to 6-digit coding schemes and the elaboration of hierarchical patterns to allow for one category to be in multiple locations add to the specificity of a diagnosis. Moreover, diagnostic subcategories will be available to better capture various disease subtypes, such as those of basal cell and squamous cell carcinoma.[8,16] Such a broadened diagnostic scope renders *ICD-11* more suitable for statistical investigations.

EPIDEMIOLOGY

Prevalence and Incidence of Skin Disease

The United States

Although conducted between 1971 and 1974, the first US Health and Nutrition Examination Survey (HANES) remains one of the most comprehensive reports on skin pathology and health-seeking behavior. With 20,749 subjects evaluated from 65 samplings of individuals aged 1 to 74, this large-scale study determined that, on dermatologist consultation, approximately 1 in 3 Americans (312.4 per 1000 population or 60 million individuals at the time of the study) had at least one skin condition that merited medical examination.[17,18] The changing demographic vista of the United States and advancements in technology and medical care, however, render extrapolations from such outdated studies insufficient to predict current disease burdens.[18]

Recent literature reviews have identified 21 databases with information relating to US skin disease prevalence or incidence.[15] Many of these data sources, however, have methodologic inadequacies. For example, a 1999–2000 analysis of office visits to dermatologists in the United States determined that acne and actinic keratosis represented the two most common presentations, with both conditions resulting in 5.2 million visits and 15% of total visits per year (benign growths were only slightly behind in visit count at 4.6 million and 14% of total visits per year).[4] The storage of such data through *ICD-9, Clinical Modification*, diagnostic codes, however, results in an inability to separate new from recurrent or chronic disease within the given time frame. Only 8 databases do not use this coding scheme and thus have the potential to distinguish incidence from prevalence. Of these 8 databases, 6 relied on surveys to collect patient information: the Bureau of Labor Statistics (Annual Survey of Occupational Injuries and Illnesses); the Medical Expenditure Panel Survey, Household Component; the National Health and Nutrition Examination Survey (NHANES); the National Health Interview Survey; the National Home and Hospice Care Survey; and the National Nursing Home Survey. Most of these surveys contain self-reported measurements and are, therefore, limited in accuracy by the layperson's ability to recognize and categorize skin disease. Furthermore, because the surveys have differences in their sample populations and in the classification systems for skin disease that they rely on, the accuracy of prevalence and incidence measurements cannot be expected to remain consistent among the different databases. The Surveillance, Epidemiology and End Results (SEER) Program is considered one of the most reliable databases for skin cancer incidence and prevalence and may be used in combination with other data sources in an attempt to provide the most current and accurate estimate of skin disease impact on the population.[7,15]

Database storage modalities, as discussed previously, often impede the calculation of incidence rates, even when considering specific skin conditions individually. Enough literature has been published, however, on the most common US skin diseases in order for recent studies to provide estimates of their prevalence, primarily through databases created by the National Center for Health Statistics. **Table 1** lists the 10 most common skin conditions in the United States