FROM THE DERMATOLOGY FOUNDATION

The inpatient burden of psoriasis in the United States

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Background: Although psoriasis has been linked to increased inpatient cardiovascular mortality, little is known about hospitalization for psoriasis and its inpatient burden in the United States in terms of frequency and cost.

Objective: We sought to determine risk factors for hospitalization for psoriasis and quantify cost of care, length of stay, and in-hospital mortality.

Methods: We conducted a cross-sectional study of the Nationwide Inpatient Sample from 2002 to 2012, containing a representative 20% sample of all US hospitalizations.

Results: Hospitalization for psoriasis was associated with nonwhite race (Asian odds ratio [OR] 2.08, 95% confidence interval [CI] 1.55-2.78; black OR 1.65, 95% CI 1.43-1.89; and multiracial/other OR 1.54, 95% CI 1.13-2.11) and insurance status (Medicare OR 1.33, 95% CI 1.26-1.40; Medicaid OR 1.32, 95% CI 1.25-1.40; and uninsured OR 1.94, 95% CI 1.64-2.30). Mean cost of care was lower for a primary diagnosis of psoriasis in comparison with patients without psoriasis ($7433 ± $254 vs $9956 ± $76; $P = .002$). Length of stay was significantly prolonged for patients with a primary diagnosis of psoriasis compared with no psoriasis (5.4 ± 0.2 vs 4.6 ± 0.02 days; $P < .0001$). Mean adjusted in-hospital mortality was 0.4% and 1.8% for a primary or no diagnosis of psoriasis, respectively.

Limitations: We were unable to look at medication usage and its impact on hospitalization. Information regarding the severity of psoriasis and how this may have affected in-hospital procedures was not available.

Conclusion: There are racial and health care disparities in hospitalization for psoriasis, stressing the need for improved access to dermatologic care for all patients. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2016.03.048.)

Key words: burden; cost of care; hospitalization; inpatient; length of stay; mortality; psoriasis; racial disparities.

Psoriasis is a chronic inflammatory skin disorder affecting over 7 million adults in the United States and is associated with substantial morbidity and even mortality.[1] There are significant regional variations of the incidence and prevalence of psoriasis. A systematic review showed prevalences of psoriasis in adult patients from 0.91% to 8.5%, with the highest rates in European countries such as Norway; in contrast, overall prevalence rates

Abbreviations used:

CI:	confidence interval
DRG:	Diagnoses-Related Group
HCUP:	Healthcare Cost and Utilization Project
ICD-9-CM:	*International Classification of Diseases, Ninth Revision, Clinical Modification*
LOS:	length of stay
NIS:	Nationwide Inpatient Sample
OR:	odds ratio

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in Latin America, Africa, and Asia ranged from no cases to 0.5%.[2] The economic burden of psoriasis in terms of direct medication costs, physician visits, and indirect costs as a result of productivity costs is also substantial and may exceed over $100 billion annually.[3]

Previous studies demonstrated associations between psoriasis and a number of other health comorbidities, including infections,[4,5] diabetes,[6] cardiovascular risk factors and disease,[7] and chronic kidney disease.[8] All of these contribute to disease-related morbidity and may potentially increase hospitalization rates and costs of care. Inpatient care for psoriasis is an important aspect of treating patients with moderate to severe psoriasis and those with associated comorbidities. Moreover, adequate access to outpatient dermatologic care may be needed to avoid hospitalization for psoriasis. However, few studies to date have analyzed the inpatient burden of patients with psoriasis, or the predictors and cost for hospitalization in the United States. In addition, little is known how psoriasis affects in-hospital mortality, although severe psoriasis is associated with increased mortality, especially from cardiovascular disease.[9,10] We hypothesized that there is a substantial inpatient burden of psoriasis in the United States. Moreover, we hypothesized that there are racial/ethnic and health care disparities with respect to hospitalization for psoriasis. In the current study, we sought to elucidate these points in a representative database of US hospitalizations.

CAPSULE SUMMARY

- Little is known about the inpatient burden of psoriasis in the United States.
- There are racial and socioeconomic disparities in hospitalization for psoriasis, such that non-white race and nonprivately insured patients have higher odds of hospitalization for psoriasis.
- This study highlights the necessity for regular dermatologic care for all patients with psoriasis.

METHODS

Data source

The 2002 through 2012 Nationwide Inpatient Sample (NIS) was analyzed. The NIS is sponsored by the Healthcare Cost and Utilization Project (HCUP) of the Agency for Healthcare Research and Quality.[11] Each year of the NIS contains an approximately 20% stratified representative sample of all hospitalizations in the United States. Sample weights were created by NIS that factored the sampling design of hospitals. These sample weights were needed to provide representative estimates of hospital discharges across the United States. All data were deidentified and no attempts were made to identify any of the individuals in the database. Patient consent was not obtained as the databases were received deidentified. All parties with access to the HCUP were compliant to the HCUP formal data use agreement. The study was approved by the institutional review board at Northwestern University.

Selection of psoriasis and psoriatic arthritis

The databases were searched for a primary diagnosis of psoriasis and psoriatic arthritis using *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) codes. The primary diagnosis is defined in the NIS as the condition chiefly responsible for admission to the hospital. An *ICD-9-CM* code of 696.1 corresponds to psoriasis and 696.0 corresponds to psoriatic arthritis, respectively. *ICD-9-CM* codes for psoriasis and psoriatic arthritis have been previously validated.[12,13]

Procedures, disease severity, mortality, and discharge status

ICD-9-CM procedure codes were used to determine procedures such as dialysis or ventilation. Mortality risk and loss of function severity were determined by the All Patient Refined Diagnosis-Related Group (DRG), which includes severity of illness and risk of mortality subclasses. The All Patient Refined DRG is assigned by software developed by 3M Health Information Systems (St Paul, MN) based on patient DRG. Discharge status is provided by the participating hospitals and coded by HCUP into 6 different discharge statuses (routine; transfer to short-term hospital; transfer to subacute nursing facility, intermediate care facility, or other facility; home health care; left against medical advice; died). Annual inpatient mortality was calculated for patients with no or a primary diagnosis of psoriasis. Mortality was adjusted for sex and race based on the US population composition according to the US Census Bureau.[14]

Data processing and statistical analysis

All analyses were performed using SURVEY procedures that adjusted for survey weighting and sampling clusters and strata (SAS, Version 9.4, SAS Institute, Cary, NC). Weighted prevalences of