**Patients and Methods**

*Study Population*

The Corrona Psoriasis Registry (NCT02707341) is an independent, prospective, observational cohort launched in April 2015 in collaboration with the National Psoriasis Foundation [9].Patients are enrolled in the registry if they meet the following inclusion criteria: have psoriasis diagnosed by a dermatologist, are aged ≥18 years, and have initiated or switched to and continued a US Food and Drug Administration-approved systemic or biologic treatment for psoriasis within the previous 12 months.Follow-up data collection occurs approximately every 6 months using questionnaires from patients and their treating dermatologists.As of May 10, 2018, Corrona had enrolled 4,864 patients and had data on 11,562 patient visits and approximately 3,890.8 patient-years of follow-up observation.The mean patient follow-up was 1.4 years (median, 1.3 years). This study included all patients aged ≥18 years with psoriasis who initiated a biologic therapy at enrollment in the Corrona Psoriasis Registry.

*Study Assessments*

Data collected at enrollment included patient demographics (age, sex, race, body mass index, smoking status, education level, insurance type, employment status, and geographic region), disease characteristics (psoriasis disease duration, Investigator’s Global Assessment, percentage of affected body surface area, Psoriasis Area and Severity Index, history of psoriasis morphology, and history of comorbidities), treatment history, and patient-reported outcome measures (pain, fatigue, itch, problems sleeping, and health state today as assessed by the EuroQol visual analog scale, Dermatology Life Quality Index, and Work Productivity and Activity Impairment questionnaire).

*Statistical Analysis*

Patient demographics, disease characteristics, treatment history, and patient-reported outcome measures at registry enrollment (baseline) were compared between patients with scalp, nail, or palmoplantar psoriasis (nonmutually exclusive groups) and patients with psoriasis without challenging-to-treat (CTT) areas using nonparametric Kruskal-Wallis tests for continuous variables and χ2 or Fisher exact tests for categorical variables. Generalized linear regression models were used to estimate differences in outcomes between patients with and those without scalp psoriasis, with and without nail psoriasis, and with and without palmoplantar psoriasis, adjusted for age, sex, race, Hispanic ethnicity, body mass index, smoking status, geographic region, psoriasis duration, presence of psoriatic arthritis, number of comorbidities, and prior biologic experience using a 2-stage zero-inflated gamma model. A generalized linear model with gamma family distribution was selected to address the nonnormal, positively skewed data and to avoid bias from applying a log-normal transformation; the 2-stage approach was used to incorporate zero outcomes into the model. The first stage was to estimate the probability of a nonzero outcome (e.g., having psoriasis in a CTT area) using logistic regression, and the second stage was to fit a generalized linear regression model that estimated the probability of disease activity outcomes. The second-stage model used gamma distribution with a log link [31, 32]; the expected values of the outcomes were then calculated by multiplying the predictions from both models. Then the recycled predictions method [33] was used to assess the marginal adjusted effects of scalp psoriasis, nail psoriasis, and palmoplantar psoriasis separately on the outcomes (adjusted for covariates). This method involved assessing the predictions of the model with all observations of each binary variable coded as 1 (presence of CTT area) and comparing those with the predictions of the model with all observations of each binary variable coded as 0 (absence of CTT area). Ninety-five percent CIs were derived from 2,000 bootstrap replications for each marginal mean. Standardized differences between the mean recycled predictions for each outcome were calculated to assess the impact of each CTT area. A |standardized difference| <0.1 has been taken to indicate a negligible difference in the mean or prevalence of a covariate between groups [34].