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ORIGINAL ARTICLE

Epidemiology of generalized pustular psoriasis in Germany: Analyzing factors influencing prevalence estimates health insurance data

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Summary

Background and Objectives: Generalized pustular psoriasis (GPP) is a rare, chronic, potentially life-threatening skin disease. We aimed to establish criteria to accurately approximate GPP prevalence in Germany.

Methods: A retrospective analysis of the WIG2 health claims database (1/1/2016–31/12/2020) was conducted. Patients aged ≥ 12 years continuously enrolled in their statutory health insurance with one inpatient or confirmed outpatient diagnosis code for GPP (International Classification of Diseases, 10th Revision [ICD-10] L40.1) were included. Scenarios with increasingly strict criteria were used to identify the GPP population.

Results: From 2016–2020, 5,236 potential GPP cases were identified based on a recorded GPP diagnosis. The scenario of ≥ 1 GPP diagnosis yielded the highest prevalence (336–390 patients/million) followed by > 1 GPP diagnosis in ≥ 2 quarters (189–288 patients/million); scenarios resulting in the lowest prevalence were diagnosis in ≥ 2 quarters AND two independent diagnoses (17–28/million) and diagnosis in ≥ 2 quarters AND two independent diagnoses or diagnosis by a specialist AND potential flare (58–61 patients/million).

Conclusions: This study suggests that diagnosis in ≥ 2 quarters by a specialist or two independent physicians may be the most clinically robust and reliable criteria for estimating GPP prevalence; therefore, 50–100 patients/million may represent a reasonable prevalence estimate range for Germany.

KEYWORDS
Claims database study, dermatology, epidemiology, Germany, generalized pustular psoriasis, prevalence

INTRODUCTION

Generalized pustular psoriasis (GPP) is a rare, systemic, chronic skin disease characterized by flares of cutaneous and extra-cutaneous symptoms including erythema and sterile, neutrophil-filled pustules. GPP is associated with a considerable clinical burden, including fatigue, pain, and fever. GPP flares may lead to severe complications such as sepsis and cardiac or multiorgan system failure.[1,2] GPP is genetically different from plaque psoriasis and mainly driven by the IL-36 pathway. The genetic etiology of GPP has been correlated with mutations in the interleukin-36 receptor antagonist (*IL36RN*) gene that limits the body's ability to inhibit inflammatory responses.[3] Historically, GPP

has been considered in some cases to be a subtype of plaque psoriasis; however, recent evidence and advancements in the understanding of genetic markers and pathophysiology indicate that GPP and plaque psoriasis are two distinct clinical conditions.[4] Although mutations in the *IL36RN* gene have been found in some cases of acute generalized exanthematous pustulosis (AGEP), GPP diagnosis could be confirmed after ruling out any drug reaction resulting in AGEP.[5,6]

The diagnostic criteria for GPP are defined in guidelines from the *European Rare and Severe Psoriasis Expert Network* (ERASPEN) and the *Japanese Dermatological Association* (JDA), but no international consensus exists.[7] ERASPEN defines GPP as skin disease with primary, sterile, macroscopic pustules on non-acral skin, occurring with or without plaque psoriasis.[5] Diagnosis requires either a relapsing course of disease or persistent inflammation (> 3 months). The JDA definition considers that patients may develop systemic symptoms such as fever and fatigue, and takes into account certain histological features.[7] Other considerations may include mucosal and other cutaneous symptoms; laboratory abnormalities; whether the patient has a history of plaque psoriasis; and triggers such as certain medications, pregnancy, and infections.[8] In the absence of unified diagnostic criteria[9] and the close relationship or overlap of GPP with other conditions like plaque psoriasis, AGEP, psoriasis cum pustulatione, and palmoplantar pustulosis,[5,6,9,10] the possibility of misdiagnosis might be high.

Identifying patient populations is difficult for rare diseases like GPP due to lack of awareness of the respective diseases and heterogeneity of approaches in gathering data on the disease and the patient population.[11] To date, the actual prevalence of GPP remains uncertain; prevalence has been reported to range from 1.76[12] to 460[13] persons per 1 million. Prevalence estimates of GPP from secondary databases in Germany constitute the high end of that range and are substantially higher than prevalence estimates from other European countries with similar demographics in terms of ethnicity and economy, as well as compared with the rest of the world (Table 1).[11,14] Several factors may contribute to this variability of the prevalence of GPP according to claims analyses, while the full list may not be known and the impact of each factor is expected to differ depending on the setting. While it is plausible that intrinsic biological factors such as genetic inheritance, as reflected in differing prevalence in people of different ethnicities, may contribute to variable prevalence estimates, the methodologic considerations related to claims analyses are also probable. Diagnoses in claims databases depend on the accuracy of the diagnoses and validity of diagnostic codes and may also be impacted by other factors that influence recording of a diagnosis.

The objective of this study was to establish criteria to better approximate the true number of patients with GPP in German claims data and to better understand the potential factors that may contribute to comparatively high prevalence of GPP reported in Germany through a scenario analysis of different case definitions that used varying case criteria to identify patients diagnosed with GPP.

PATIENTS, MATERIALS AND METHODS

Data source

This study employed routine claims data from the WIG2 database, which is an anonymized health claims database with longitudinal data from approximately 4 million patients insured by one of several different German statutory health insurance providers (SHI). The database is representative in terms of age, sex, and morbidities, allowing extrapolation of the total German SHI (Gesetzliche Krankenversicherung [GKV]) population, which constitutes about 87% of all inhabitants of Germany. Data usage is approved by the respective health insurance companies and all patient-level data in the database are anonymized in compliance with the German data protection regulations. The dataset covered the period from January 1, 2016 to December 31, 2020 and a cross-sectional study design was employed to evaluate the prevalence in each calendar year during the study period.

Study population

The study population included patients 12 years and older who were continuously enrolled in their SHI during the calendar year within the study period, except in cases of death, and had one inpatient or confirmed outpatient diagnosis code for GPP (International Classification of Diseases, 10th Revision [ICD-10] L40.1). No exclusion criteria were applied.

GPP identification scenarios

Before conducting the analyses, a set of hypotheses was developed for how and why prevalence numbers reported for Germany were substantially higher than those for other European countries (Table 2). One hypothesis was that patients with plaque psoriasis or other forms of psoriasis may have received the diagnosis of GPP due to a coding error, since the ICD-10 code for plaque psoriasis (i.e., psoriasis vulgaris) is L40.0 and the code for GPP is L40.1. Another hypothesis was that the GPP code was correctly selected but by a provider who was inexperienced with this rare disease and mistakenly identified another condition for GPP. Six scenarios were developed to identify patients with GPP and potential drivers for higher patient numbers in Germany (Table 3). The scenarios were derived from the set of hypotheses and from criteria used in previously conducted epidemiological studies on GPP[13,15,16] and were intended to provide an overview of the range of prevalence values.

TABLE 1 Prevalence of GPP by country/region.

Country/region	Prevalence per million	Data source	Criteria used for patient identification
Brazil Duarte et al. 2022[22]	7–9	Brazilian national claims database	All patients with at least 1 procedure registered in SIA (medical visit, medication dispensing, or procedure) under the ICD-10, code L40.1 for GPP
China Feng et al. 2023[23]	14	Urban Employee Basic Medical Insurance and Urban Resident Basic Medical Insurance	Patients with either an ICD-10 diagnosis code of L40.1 or ICD-9 diagnosis code of 694.3 and medical terms in Chinese[a]
France Augey et al. 2006[12]	1.76	French survey of 121 dermatology clinics	Diagnosis of GPP was made by the dermatologists according to their own criteria. Impetigo herpetiformis, often considered as a GPP of pregnancy, was included in this survey
Germany Schäfer et al. 2011[13]	460	German administrative claims database	At least one diagnosis ICD-10 diagnosis code of L40.1 relating to ambulatory or hospital treatment or disability
Japan Kubota et al. 2015[24]	40	Japanese national claims database	At least one diagnosis of GPP according to the standardized domestic diagnosis code mapped to L40.1 of the ICD-10
Japan Feldman et al. 2021[15]	20	Japanese Medical Data Center claims database	Patients with ≥ 1 confirmed inpatient or outpatient ICD-10 diagnosis code of L40.1
Japan Feldman et al. 2021[15]	30	Medical Data Vision claims database	Patients with ≥ 1 confirmed inpatient or outpatient ICD-10 diagnosis code of L40.1
South Korea Lee et al. 2017[25]	120	National Health Institution insurance claims data	All individuals who had an outpatient visit or admission history with a primary diagnostic code of psoriasis in accordance with the KCD-6, which is modified from the ICD-10. The study population was further classified into those with plaque psoriasis (L40.0, L40.8, and L40.9), guttate psoriasis (L40.4), palmoplantar pustulosis (L40.2 and L40.3), GPP (L40.1), and psoriatic arthritis (L40.5, M07.0~M07.3, and M09.0) according to the KCD-6
Sweden Lofvendahl et al. 2022[16]	Base case: 91 *Sensitivity* Strict case 1: 38 Strict case 2: 32	NPR	All cases with a GPP (L40.1) diagnosis. For the base case, the criteria was 1 physician visit with a diagnostic code of L40.1 in specialized care. For strict case 1, the criterion was two physician visits with a diagnostic code of L40.1 (either primary or secondary). For strict case 2, the criterion was 2 physician visits with a diagnostic code of L40.1 (either primary or secondary) of which at least one of the visits was in dermatology or internal medicine
US Feldman et al. 2021[15]	Base case: 70 Strict case: 20	IBM MarketScan claims database	Patients with at least 1 inpatient or outpatient ICD-10 diagnosis code of L40.1. Enhanced sensitivity was achieved with more stringent criteria (strict case) of 1 inpatient or 2 outpatient codes (separated by 30–365 days)
US Feldman et al. 2021[15]	Base case: 90 Strict case: 30	Optum claims database	Patients with at least 1 inpatient or outpatient ICD-10 diagnosis code of L40.1. Enhanced sensitivity was achieved with more stringent criteria (strict case) of 1 inpatient or 2 outpatient codes (separated by 30–365 days)
Germany Choon et al. 2014[19] and Reich et al. 2022[20]	23.7	Electronic and manual records in Hospital Sultanah Aminah Johor Bahru, Malaysia & German GPP inpatient admission data	For flare frequency calculation[19]: Patients with GPP (L40.1), cases with well documented physical findings, and diagnosed by a dermatologist were included. Patients with localized pustular psoriasis namely acrodermatitis continua of Hallopeau (L40.2) and pustulosis palmaris et plantaris (L40.3) were excluded unless complicated by at least 1 episode of GPP. Based on flare frequency calculation[19] and inpatient admissions in Germany[20], nationwide total prevalence of GPP for Germany was calculated

Abbr.: CPRD, Clinical Practice Research Datalink; GPP, generalized pustular psoriasis; ICD-10, International Classification of Diseases, 10th Revision; KCD-6, Korean Standard Classification of Disease, Sixth Revision; NPR, National Patient Register; SIA, Sistema de Informações Ambulatoriais; UK, United Kingdom; US, United States

[a] To avoid missing patients, a fuzzy string-matching algorithm to extract potential GPP patients from the database was employed. Diagnostic text was verified by two dermatologists.

TABLE 2 Initial hypotheses regarding the higher reported prevalence of GPP in Germany and associated planned analysis.

Hypothesis	Analysis
Frequent miscoding	Examine continuity of diagnosis, i.e., patients with two diagnoses (2 physicians or 2 quarters)
Misidentification of another disease as GPP	Examine number of diagnoses by provider type

Abbr.: GPP, generalized pustular psoriasis

TABLE 3 List of scenarios for identifying patients with GPP.

Scenario	Criteria based on ICD-10 code L40.1
1	≥ 1 diagnosis of GPP[a]
2	Diagnosis in ≥ 2 quarters or an inpatient main diagnosis
3	Diagnosis in ≥ 2 quarters AND (2 independent diagnoses or diagnosis by a specialist) or an inpatient main diagnosis
4	Diagnosis in ≥ 2 quarters AND diagnosis by a specialist (e.g., dermatologist, rheumatologist) or an inpatient main diagnosis
5	Diagnosis in ≥ 2 quarters AND 2 independent diagnoses or an inpatient main diagnosis
6	(Diagnosis in ≥ 2 quarters AND (2 independent diagnoses or diagnosis by a specialist) or an inpatient main diagnosis) AND potential flare[b]

Abbr.: GPP, generalized pustular psoriasis; ICD-10, International Classification of Diseases, 10th Revision

[a]This criteria was used to identify an upper limit.

[b]Potential flares were identified by an inpatient main diagnosis for GPP or a new treatment (either topical, non-topical, steroid, non-steroid, biologic, or phototherapy) in a quarter with a diagnosis for GPP. New treatments were identified by the absence of the same treatment in the year in prior.

Note: Scenario results presented up to four quarters.

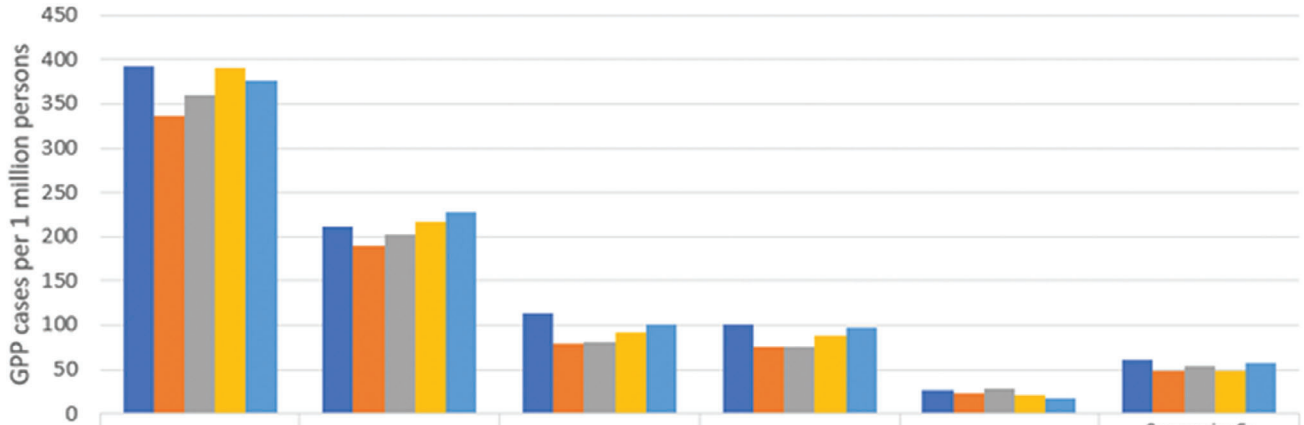
In Scenario 1, the criterion of at least one diagnosis of GPP was intended to derive an upper limit for an estimation of GPP prevalence by including any patient with a diagnosis, even those patients who received a GPP diagnosis during the index period but did not require subsequent treatment during the entire study period, similar to criteria used in Schäfer et al 2011. As such, this scenario would result in the highest prevalence, and possibly an overestimate that would also include patients who may have been misdiagnosed. Subsequent scenarios were designed to be more stringent. As GPP is a severe disease that typically requires routine visits for treatment, Scenario 2 required at least two confirmed outpatient or secondary diagnoses for GPP in two different quarters or at least one main inpatient diagnosis for GPP. In addition to the need for routine treatment, GPP is a severe disease that is generally managed by specialists. Therefore, Scenario 3 required both diagnosis in at least two different quarters as well as either two independent diagnoses or diagnosis by a specialist (e.g., a dermatologist or rheumatologist); Scenario 4 required at least two diagnoses in at least two different quarters by a specialist (e.g., a dermatologist or rheumatologist); and Scenario 5 included at least two diagnoses in at least two different quarters by two independent providers; this criteria was developed to mitigate both potential miscoding and misdiagnoses. Scenario 6 was the strictest one, as it included the restrictions of Scenario 3 with the addition of a potential flare. Potential flares were identified by an inpatient main diagnosis for GPP or a new treatment (either topical, non-topical, steroid, non-steroid, biologic, or phototherapy) in a quarter with a diagnosis for GPP. New treatments were identified by the absence of the same treatment in the year prior. The overall rationale for Scenarios 3 to 6 was that confirmatory diagnoses at varying time points and by different providers would eliminate patients who may have received a false diagnosis or patients with mild disease that did not require any interventions during the study period.

Prevalence was derived separately by age group and gender according to the predefined groups in the KM6-statistics (statistics on SHI-insured individuals by status, age, place of residence, and type of insurance).[17] To do this, first, the number of patients per cohort within the age/gender group in the study population was determined. The annual prevalence was then determined by dividing the number of patients in the age/gender group by the total number of insured persons within the respective age/gender group in the study population. Results were normalized to the number of patients per 1,000,000 insured people. In addition, frequency of diagnoses, as assessed by the number of quarters with at least one confirmed outpatient or one main or secondary diagnosis for GPP, and distribution of specialists who diagnosed GPP according to proportion of patients diagnosed was described qualitatively.

Data were analyzed using Microsoft SQL Server 2017. Statistical analyses were performed using R Version 3.4 (or a later version) and Microsoft Excel version 2016. All analyses were descriptive, and no formal statistical hypotheses were tested.

RESULTS

The number of people in the total insured population annually during the study period (2016–2020) ranged from approximately 2.8 to 2.9 million. Over 5 years, a total of 5,236 potential cases of GPP were identified on the basis of a recorded GPP diagnosis. The annual number of GPP cases per 1 million persons from 2016 to 2020 was the highest in Scenario 1 (336 to 390) and Scenario 2 (189 to 288), which were least restrictive. The lowest counts were shown in Scenario 5 (17 to 28; diagnosis in two quarters AND two independent diagnoses), followed by Scenario 6 in which counts ranged from 58 to 61 for diagnosis in at least two quarters AND two independent diagnoses or diagnosis by a specialist AND potential flare. In addition, the least restric-



	Scenario 1: ≥1 diagnosis	Scenario 2: Diagnosis in ≥2 quarters	Scenario 3: Diagnosis in ≥2 quarters AND (2 independent diagnoses or diagnosis by a specialist)	Scenario 4: Diagnosis in ≥2 quarters AND diagnosis by a specialist	Scenario 5: Diagnosis in ≥2 quarters AND 2 independent diagnoses	Scenario 6: Diagnosis in ≥2 quarters AND (2 independent diagnoses or diagnosis by a specialist) AND potential flare
2016	392	211	114	101	27	61
2017	336	189	79	75	23	48
2018	359	203	81	76	28	54
2019	390	216	92	88	22	49
2020	377	228	101	97	17	57

FIGURE 1 Number of GPP cases per 1 million persons (database) – sensitivity.
Abbr.: GPP, generalized pustular psoriasis

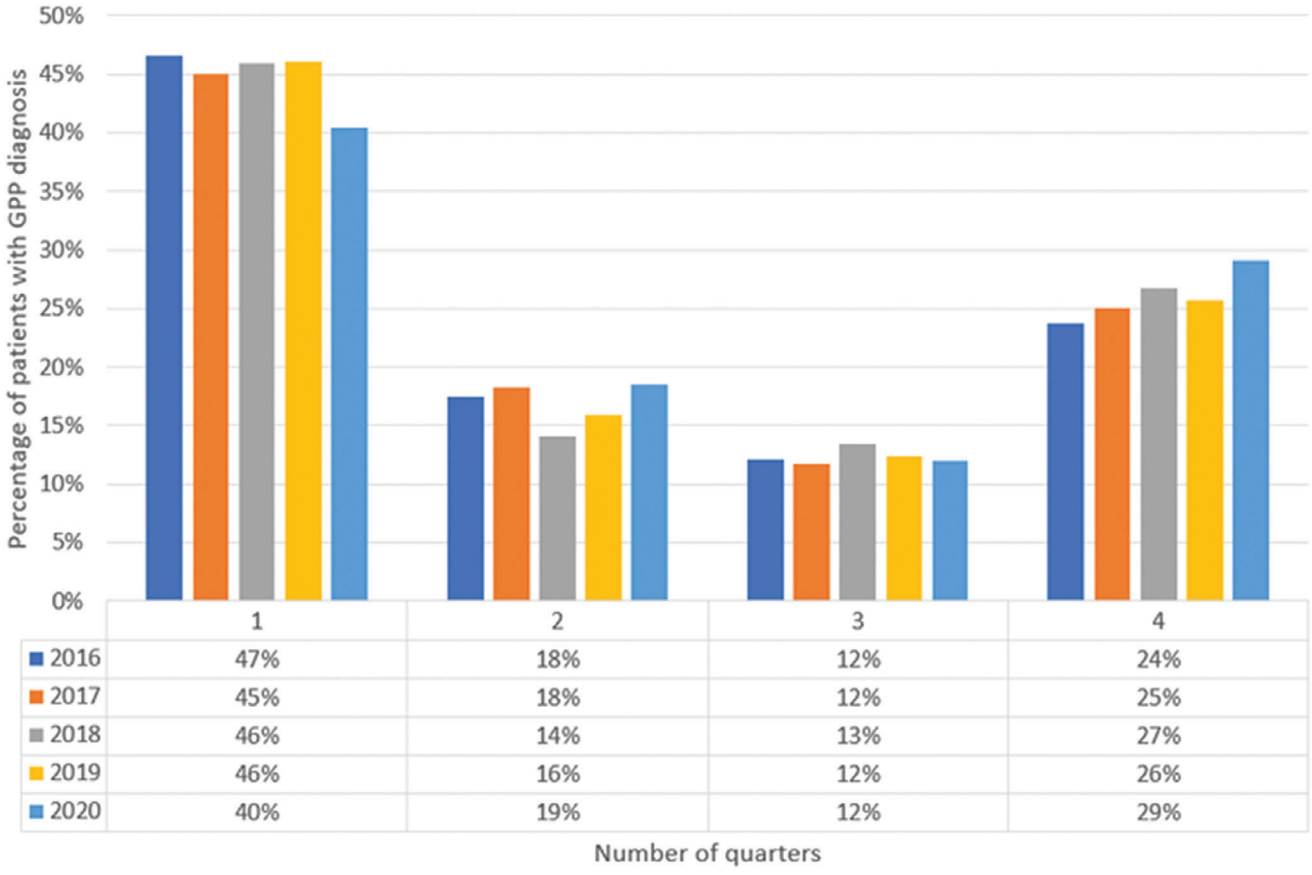
tive scenario prevalence point estimate was more than ten times higher than the most restrictive one. It is obvious that the selection of the scenario can drive the results of the main analysis, not only with respect to the epidemiological numbers, but also regarding the validity of all other numbers. Full results for the six scenarios can be found in Figure 1.

The prevalence, assessed by the number of quarters during which a patient had a GPP diagnosis, was highest for a single quarter (ranging from 40.4% to 46.6%), followed by four quarters (23.8% to 29.1%), two quarters (14.1% to 18.5%), and three quarters (11.7% to 13.4%) (Figure 2). Based on this it can be assumed that most patients have GPP-related visits on an annual or bi-annual basis.

One can also assume that due to the rarity of GPP and the similar appearance of different entities (e.g., acute generalized exanthematous pustulosis), miscoding in both ways is not unusual, but may be less likely to occur in the specialty setting where physicians are more familiar with such conditions. Therefore, we considered the number of diagnoses of GPP by different groups of physicians. The type of physician with the highest number of patient diagnoses of GPP from 2016 to 2020 was dermatologists (2,491 patients), followed by general practitioners (2,167 patients), and other specialists (i.e., other than dermatologist and rheumatologists; 495 patients) (Figure 3). Rheumatologists, surgeons, and internists provided fewer GPP diagnoses, ranging from nine to 31 patients annually. GPP diagnoses in inpatient and outpatient hospital settings ranged from six to 31 patients per year. Although rheumatologists may lack familiarity with GPP diagnosis, they might still encounter GPP patients due to suspicions of psoriatic arthritis.

DISCUSSION

Various challenges exist in the appropriate diagnosis of GPP and management of its symptoms; in some cases, patients seek treatment from different healthcare providers and in multiple settings for years before receiving an accurate diagnosis. The difficulty in diagnosing GPP may contribute to potential over- or underestimation of patient numbers due to inconsistent diagnostic criteria; lack of experience with the disease at the individual provider level or in the acute emergency setting; history or presence of concomitant plaque psoriasis in approximately two-thirds of patients,[11] which may result in misdiagnosis; and limited or no approved GPP-specific therapies depending on geography.[18] Other skin diseases that might mimic GPP to a



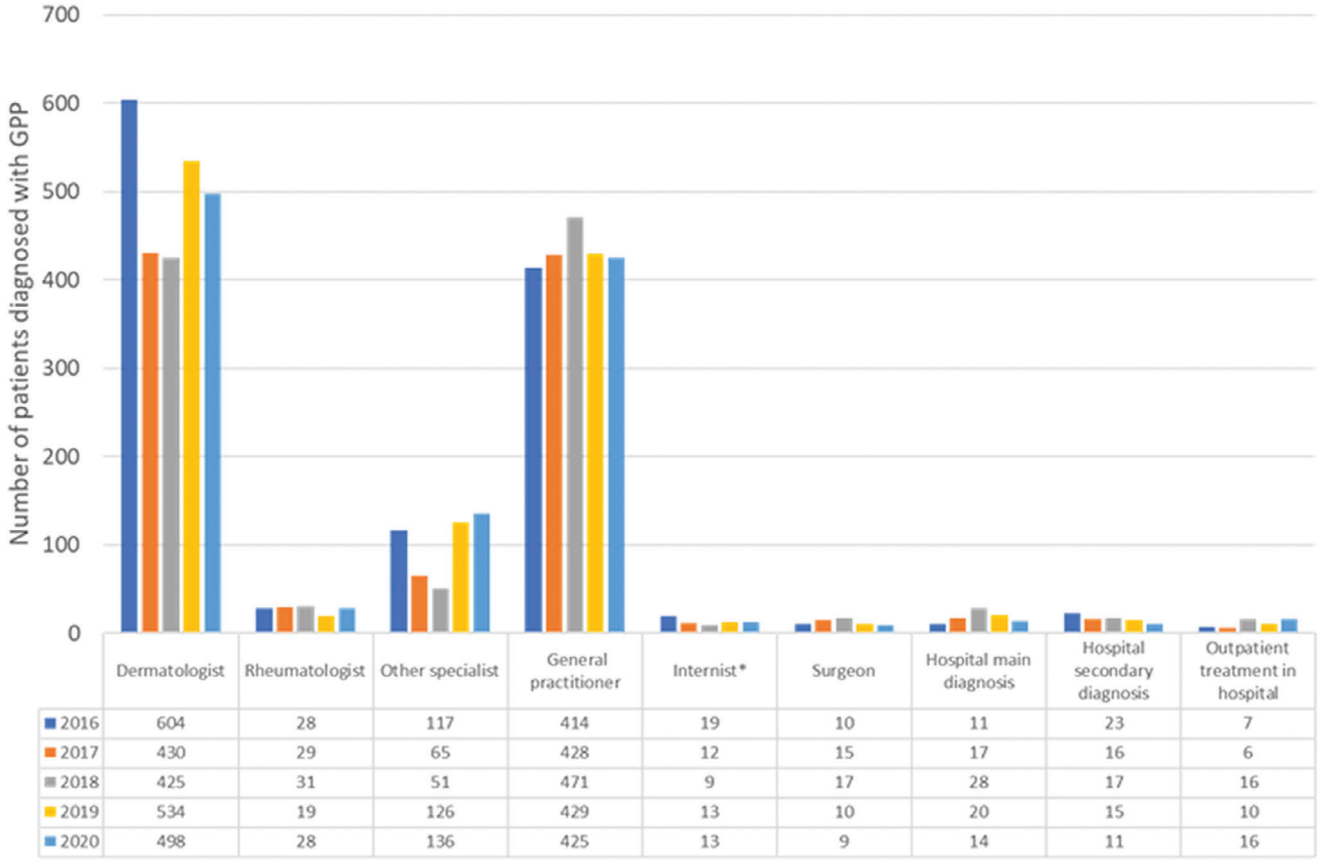
	1	2	3	4
2016	47%	18%	12%	24%
2017	45%	18%	12%	25%
2018	46%	14%	13%	27%
2019	46%	16%	12%	26%
2020	40%	19%	12%	29%

FIGURE 2 Number of quarters with GPP diagnosis.
Abbr.: GPP, generalized pustular psoriasis

certain extent, such as "psoriasis cum pustulatione", palmoplantar pustulosis, and AGEP, might be wrongly subsumed as GPP and thus could lead to overestimation.

The challenge of accurate patient identification, including potential miscoding and failure to diagnose GPP, exists for all countries. While this study aimed to establish criteria for identifying patients with GPP in Germany and to explore the high reported prevalence, it is possible that GPP has been historically underreported in other locations. However, the results of our scenario analyses demonstrated that patient population numbers decrease when using more stringent criteria; more specifically, the estimated prevalence of 50 to 100 per million in Germany was consistent with reported ranges for other countries, including an estimated base-case point prevalence of GPP in Sweden of 91 per million according to a criterion of specialist care.[16] Furthermore, based on a survey published by Choon et al. 2014,[19] Reich et al. 2022 calculated the nationwide total prevalence rate of GPP (acute and not acute) for Germany to be 23.7 patients per million in 2019 based solely on inpatient data.[20] In the current study, both inpatient and outpatient data were included. Reich et al. 2022[20] report comparable prevalence rate to the Scenario 5 discussed in this study (17 to 28 patients per million), however, Scenario 5 requires diagnosis in at least two quarters and two independent diagnoses.

Published GPP prevalence rates range from 1.76 per 1 million persons in France to 460 per 1 million in Germany (Table 1).[12,13,21] Nowadays, both rates can be considered outliers, with the reported GPP prevalence in Germany being much higher than those reported for other European countries and the rest of the world, while the prevalence number in France was derived from dermatology departments only. As there is no published consensus regarding the typical patient pathway, disease management, and treatment of acute flares for those with GPP in Germany, or demonstrated evidence supporting a mechanism for reported higher prevalence in Germany vs other European countries, this analysis was conducted to explore various scenarios to identify GPP and their impact on the estimated numbers of patients with the disease. Both Schafer et al. and Feldman et al. used the identification criteria of at least one diagnosis of GPP using the ICD-10 code for GPP (L40.1) with the justification that GPP is a chronic disease and the interval between visits may be long.[13,15] Feldman et al. also explored a more stringent criteria of one inpatient or two outpatient codes separated by 30 to 365 days.[15] For a 2022 study of GPP prevalence and incidence in Sweden,



	Dermatologist	Rheumatologist	Other specialist	General practitioner	Internist*	Surgeon	Hospital main diagnosis	Hospital secondary diagnosis	Outpatient treatment in hospital
2016	604	28	117	414	19	10	11	23	7
2017	430	29	65	428	12	15	17	16	6
2018	425	31	51	471	9	17	28	17	16
2019	534	19	126	429	13	10	20	15	10
2020	498	28	136	425	13	9	14	11	16

FIGURE 3 Number of patients diagnosed with GPP by physician, diagnosis code, and setting.
Abbr.: GPP, generalized pustular psoriasis.
*A primary care medical provider who diagnoses and treats diseases that do not require surgery

researchers used three different scenarios: at least one ICD-10 L40.1 diagnosis, at least two visits, and at least two visits including one within dermatology or internal medicine.[16]

Of the scenarios assessed, those resulting in the highest prevalence numbers were at least one diagnosis of GPP (336 to 390 cases per 1 million) and more than one GPP diagnosis in at least two quarters (189 to 288 cases per 1 million); the scenarios resulting in the lowest prevalence numbers were combination scenarios of diagnosis in at least two quarters AND two independent diagnoses (17 to 28 per 1 million) and in the other scenario of diagnosis in at least two quarters AND two independent diagnoses or diagnosis by a specialist AND potential flare (58 to 61 per 1 million). Most patients were diagnosed with GPP by a dermatologist (425 to 604) or a general practitioner (414 to 471), while the fewest diagnoses were made in hospital settings. This result was surprising, given the high burden of GPP and potential complications, as well as the prevalence of patients with a single diagnosis.

Our assessments suggest that diagnosis over at least two quarters by a specialist or by two independent physicians, in patients with or without an active flare, may be the most clinically robust and reliable criteria for estimating the prevalence of GPP because they rule out potential miscoding or misdiagnosis while still accounting for patients with milder forms of the disease; therefore, 50 to 100 per 1 million may represent a reasonable prevalence estimate range for Germany. Our findings aligned with the results and methodology used in a comparable population in Lofvendahl et al. 2022 and our most stringent scenario, which captured several important aspects of GPP. Diagnosis in a minimum of two quarters allowed for the chronic nature of the disease; the criterion for two physicians or specialists accounts for an accurate diagnosis of GPP given its rarity; and active/severe disease could be projected based on the inclusion of flare. The findings of our analyses were also consistent across time periods.

We were not able to explore all potential factors that might contribute to the high reported numbers of the ICD L40.1 in Germany, such as the possibility that an L40.1 code might be employed to facilitate reimbursement of certain treatments. However, an initial assessment revealed no evidence for this. When we compared three scenarios (at least one diagnosis, diagnoses in two quarters, and specialist diagnosis in two quarters), the rates of different types of treatment received were similar. GPP is characterized by

flares that can occur multiple years apart, therefore, it cannot be assumed that untreated patients are misdiagnosed. Instead, they could represent a population with very mild disease or flares that occurred a long time ago. It is unlikely that patients with flares remain untreated since flares can be incredibly painful, often leading to complications that require inpatient treatment or can even be life-threatening.

This study had several additional limitations that should be considered. First, it was not possible to validate the diagnoses using claims data only. The lack of approved treatments specifically for patients with GPP in Germany also limited our ability to validate our proposed selection criteria with prescribed treatments. Additionally, there were no data regarding disease severity or how less severe cases are treated or managed after diagnosis.

Our hypothesis was that applying more stringent criteria in the scenarios used for identification of GPP might be useful to evaluate if the estimated numbers produced are truly more accurate. Potential approaches for more stringent identification criteria that could be explored as further sensitivity analyses include diagnosis by an expert (e.g., dermatologist/rheumatologist or in-hospital setting) and diagnosis by at least two independent physicians (no matter which specialization, including hospital diagnoses).

As it is not possible to externally validate the selection criteria used for these scenarios, criteria representing increased interaction with health services, as assumed for moderate-or-severe cases, were used, but this may have been at the expense of covering all patients with GPP.

The main goal of this exercise was to obtain a better approximation of GPP prevalence in Germany by exploring different identification scenarios, as we suspected that the reported GPP prevalence may have been skewed historically. Our findings suggest that diagnosis over at least two quarters by a specialist or two independent physicians, in patients with or without an active flare, may be the most reliable criteria to estimate GPP prevalence; therefore, 50 to 100 per million may represent a reasonable prevalence estimate for Germany. Our approach demonstrates how an algorithm for patient identification from claims data can be developed and may lend some insight into why such an approach is important, including the possibility of more targeted and proactive treatment of a hard-to-diagnose population. Expanding the criteria could help to provide a clearer picture of the accuracy of prevalence values of GPP in Germany.

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CONFLICT OF INTEREST STATEMENT

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