Psoriasis: Targets and Therapy

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ORIGINAL RESEARCH

Utilization and Costs of Laboratory Monitoring in Biological and Non-Biological Psoriasis Treatment – Large-Scale Claims Data Analysis

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Purpose: Psoriasis vulgaris is a chronic systemic inflammatory disease that imposes a significant physical, emotional, and social burden on affected individuals. There is a growing recognition of the importance of comprehensive monitoring and management to optimize treatment outcomes, particularly with the advent of advanced systemic therapies. This study aims to characterize the prevalence of laboratory monitoring and associated costs in persons with psoriasis undergoing systemic treatment. A specific focus was placed on the differences by treatment modality, patient characteristics, and economic burden to the payers.

Patients and Methods: A retrospective longitudinal analysis was conducted using German health insurance data from the DAK-Gesundheit. The study population included persons diagnosed with psoriasis who received systemic therapies between 2016 and 2020. Laboratory service utilization and costs were assessed during the initiation and course of treatment, factoring in demographic parameters and comorbidities.

Results: Among 62,063 persons with psoriasis, 8018 (12.9%) were identified as having received systemic treatment, which of 92.5% utilized at least one laboratory service. The average annual laboratory monitoring cost per person was higher for those on biologic therapies (57.88 €) compared to systemic treatments (23.70 €). Laboratory service utilization and costs were associated with the comorbidity index (CCI) and age.

Conclusion: Biologic therapies for psoriasis induce considerably higher monitoring costs than non-biological systemic drugs. Age and CCI were main predictors for higher utilization of laboratory services, indicating a medical rationale to perform more lab screenings in risk groups for safety events. The laboratory costs add to the higher drug costs of biologicals but need to be related to the benefits from treatment. Furthermore, the monitoring costs are far lower than the drug costs and thus may not be major decision drivers.

Keywords: psoriasis, clinical monitoring, laboratory service, health care analysis, biologics, cost analysis

Introduction

Psoriasis is a chronic, multifactorial autoinflammatory skin disorder characterized by hyperproliferation of keratinocytes and inflammation, leading to a significant physical, psychosocial, and economic burden.[1,2] Given the systemic inflammatory nature of psoriasis, the term "psoriatic disease" has been invented.[3]

Approximately 1–2% of the global population[4] and 2.5% in Germany[5,6] suffer from psoriasis, with varying levels of severity and associated comorbidities, such as psoriatic arthritis, metabolic syndrome, and cardiovascular diseases.[7–9] Higher rates of comorbidity compared to non-affected persons are even observed in children with psoriasis.[10,11]

The disease has a profound impact on patients' health-related quality of life (QoL), which compares to or even exceeds other severe chronic conditions.[12–15]

Received: 6 May 2025
Accepted: 18 July 2025
Published: 5 August 2025

With advances in understanding psoriasis pathogenesis, treatment approaches have evolved from conservative topical and systemic therapies and phototherapy to targeted systemic immunomodulation. These therapies, while effective, necessitate rigorous monitoring of laboratory parameters to manage potential side effects and assess the disease's inflammatory status effectively.[16] Laboratory monitoring often includes assessments of liver and kidney function, blood cell counts, and screenings for chronic infections, all of which contribute to the overall costs of care. Zander et al[17] and Jungen et al[18] highlighted that the cumulative cost of treatment for patients with psoriasis is not only driven by the cost of medications but also affected by the requisite laboratory tests and monitoring protocols that accompany systemic therapies.

Recent analyses reveal that the treatment costs for psoriasis patients using biologic therapies are higher compared to those receiving conventional treatment.[19–21] However, there is a significant gap in data regarding the laboratory monitoring costs associated with these treatment approaches. This highlights the need for further evaluation of monitoring-related expenses alongside the overall treatment strategies to better understand their financial implications for healthcare systems.[19] Comprehensive laboratory monitoring can add considerable financial burdens to healthcare systems, underscoring the importance of evaluating monitoring-related costs alongside treatment strategies.[18]

In this study, we aimed to characterize the utilization and costs of laboratory services in persons with psoriasis undergoing systemic therapies in German routine care. In this country, 90% of the population is covered by statutory health insurance which pays for all relevant drugs and laboratory expenses in psoriasis. About 10% has a private health insurance with largely the same coverage of costs. By evaluating the claims data from a statutory health insurance, we aimed to clarify the prevalence of monitoring practices and their implications for budgetary costs in the large population, paving the way for more efficient healthcare management in psoriasis treatment. The following research questions were addressed:

1. What are the laboratory monitoring procedures conducted for persons with psoriasis at the time of treatment initiation?
2. Differ the laboratory monitoring frequency and costs by gender, age and comorbidity?
3. What are the costs of laboratory monitoring for persons with psoriasis in the follow-up of systemic treatments?

Materials and Methods

Study Design and Population

This study employed a retrospective longitudinal healthcare analysis to evaluate laboratory service utilisation and associated costs among patients diagnosed with psoriasis undergoing systemic treatment. The analysis is based on a representative 40.0% sample of insured individuals from DAK-Gesundheit, a nationwide statutory health insurance provider in Germany, covering the period between 2016 and 2020.

In order to be included in the study population, patients had to be at least 18 years old and possess a confirmed diagnosis of psoriasis, classified using the International Classification of Diseases, 10th revision (ICD-10) codes L40.0 to L40.9. They needed to have at least one confirmed outpatient or inpatient principal or secondary diagnosis. If insurees had only one L40.1, L40.2, and L40.3 diagnosis, ie, without a combination with any of the remaining L40 diagnoses, they were excluded. We included insurees who received their first new prescription (index date) of biologics or systemic conventional therapy (Table 1) in 2019 (with 180 days wash-out time). The cohort consisted of individuals who were continuously insured for at least one day per quarter, ensuring sufficient exposure to healthcare services throughout the observation period.

Data Extraction

Key data were extracted from administrative health claims records, including persons' demographics, diagnoses, prescriptions for systemic therapies (both biologic and conventional), and details of laboratory services utilized. The analysis focused on persons receiving their first new prescription (index date) of systemic treatment in 2019, allowing for an evaluation of laboratory monitoring practices before and after the initiation of therapy.

Table 1 Anatomic Therapeutic Chemical (ATC) Drug Codes Related to Systemic Treatment of Persons with Psoriasis and Psoriatic Arthritis

Drug	ATC
Systemic biologics	
Abatacept	L04AA24
Adalimumab	L04AB04
Brodalumab	L04AC12
Certolizumab pegol	L04AB05
Etanercept	L04AB01
Golimumab	L04AB06
Guselkumab	L04AC16
Infliximab	L04AB02
Ixekizumab	L04AC13
Risankizumab	L04AC18
Secukinumab	L04AC10
Tildrakizumab	L04AC17
Ustekinumab	L04AC05
Systemic non-biologics (conventional)	
Acitretin	D05BB02
Apremilast	L04AA32
Ciclosporin	L04AD01
Dimethyl fumarate	D05BX02
Fumaric acid derivatives	D05BX01
	D05BX51
Glucocorticoids	H02AB
Glucocorticoids derivatives	H02AB51
	H02AB54
	H02AB56
	H02AB58
Leflunomide*	L04AA13
Methotrexate	L01BA01
	L04AX03
	M01CX01

(*Continued*)

https://doi.org/10.2147/PTT.S531836

Table 1 (Continued).

Drug	ATC
Psoralens	D05BA03
	D05BA01
	D05BA02
Tofacitinib	L04AA29

Note: *Off-label.

Laboratory Services Assessment

We considered only outpatient care provided by office-based physicians. This group working in private practice instead of in hospitals constitutes of about 4500 dermatologists in Germany and provides approximately 95% of health care for psoriasis. By contrast, hospital-based dermatology departments make up only 105 centers and provide about 10% of health care. Since the billing of laboratory services in outpatient care of hospitals is based on fixed rates, identification of single laboratory services is not possible. Laboratory services relevant to the monitoring of systemic psoriasis therapies were identified based on the S3 guidelines for psoriasis vulgaris treatment (AWMF register no. 013–001, 2021). The assessment included both baseline laboratory tests conducted within 180 days prior and ongoing monitoring conducted within 365 days following the initiation of systemic therapy. Specifically, the laboratory tests were identified by administrative codes (Table 2). A new (incident) drug treatment was assumed when systemic treatment was started after an at least 180-day prescription-free period of this treatment-group in 2019.

Table 2 Parameters and Administrative Codes of Lab Monitoring in Systemic Drug Treatment

Parameter	Lab Tests	EBM*
Complete blood counts	Blood count Differential blood count	32120 32051
Liver function test	AP AST ALT γGT	32068 32069 32070 32071
Bilirubin, total	Bilirubin, total	32058
Amino terminal procollagen peptide (PIIINP)	Amino terminal procollagen peptide (PIIINP)	32405
Hepatitis serology	Hepatitis B and hepatitis C serology	32612; 32613; 32614; 32615; 32616; 32617; 32618; 32781; 32782
Tuberculosis test	Interferon gamma release assay	32670
Urine status	U-stix (until 31.03.2019) Urine strip test (from 01.04.2019) Uric acid levels	32030 32033 32064
Glucose	Fasting glucose (fasting blood sugar)	32094
Pregnancy test	Pregnancy detection	32132

(*Continued*)

Table 2 (Continued).

Parameter	Lab Tests	EBM*
Minerals	Potassium Sodium Magnesium	32081 32083 32248
Lipids	Total Cholesterol HDL cholesterol Fasting triglycerides	32060 32061 32063
Further serum parameters	Serum albumin Serum creatinine	32435 32066; 32067; 32197; 32124

Note: *"Einheitlicher Bewertungs-Maßstab" = Standard Billing Code.

Cost Analysis

All cost data were assessed from the perspective of the statutory health insurances. The costs associated with laboratory services were calculated by multiplying the number of services performed per person by the respective reimbursement rates according to the German Uniform Value Scale (EBM). Specific budget restrictions were considered, including limited reimbursement by quarter. Data on costs per person were summarized descriptively, using mean, median, standard deviation (SD), range, and interquartile range (IQR).

Assessment of Comorbidity Index

Comorbidity was measured by ICD-10 codes. As a marker for the severity of comorbidity, the modified Charlson Comorbidity Index (CCI) was used (Supplementary Table 1).[22]

Statistical Analysis

Descriptive statistics were employed to summarize persons' characteristics, laboratory utilization rates, and overall costs associated with laboratory services. Analyses were stratified by demographic parameters (age and gender) and comorbidity (CCI). The proportion of persons utilizing at least one laboratory service was calculated along with mean and median costs for systemic therapies. Statistical analyses were conducted using SAS Version 9.4 (SAS Institute, Cary, North Carolina, USA).

Results

Study Population

A total of 2,513,860 insured persons were included being at least 18 years old and insured at DAK-Gesundheit for at least one day between 01.01.2016 and 31.12.2020. The proportion of women was 58%.

In 2019, 62,063 of 1,954,380 (3.2%) insured people had a diagnosis of psoriasis. In total, 8018 (12.9%) had an incident systemic drug prescription. About 91.4% (n = 7330) were treated with non-biological ("conventional") and around 11.2% with biological drugs (n = 897). A large proportion (73.7%) of the persons receiving non-biological systemics was treated with systemic glucocorticosteroids (n = 5909).

Utilization of Laboratory Services per Person

About 97.7% of persons with an initial biologic and 92.0% of persons with an initial non-biological systemic drug (in total: 92.5%) used at least one laboratory service (Table 3). The average costs per person were 26.49 € for all systemics, 57.88 € for biological and 23.70 € for non-biological drugs (see Tables 3–7).

https://doi.org/10.2147/PTT.S531836

Table 3 Laboratory Costs of Persons with Psoriasis (L40 Diagnosis (N = 62,023)) and First Systemic Prescription After a Drug-Free Period of 180 Days (Biological and Non-Biological) Treatment in 2019

Treatment-Group	≥1 Rx per PE (N)	≥1 Lab Service per PE n (%)	Mean per PT (€)	SD per PE (€)	Range (€)	Median (€)	IQR [25%; 75%] (€)	Total Lab Costs (€)
Systemic biologics	897	876 (97.66)	57.88	56.66	0.50–386.55	36.60	[10.00; 96.30]	50,702.15
Systemic non-biologics	7330	6745 (92.02)	23.70	33.51	0.25–418.50	11.50	[4.40; 29.50]	159,855.95
GCS*	5909	5369 (90.86)	22.59	32.96	0.25–418.50	10.50	[3.90; 28.50]	121,270.25
Systemic therapy	8018	7415 (92.48)	26.49	36.81	0.25–418.50	12.10	[4.75; 32.25]	196,412.35

Note: *as part of non-biologic systemic drugs.
Abbreviations: Rx, prescription; PE, person; SD, Standard deviation; IQR, Interquartile range; GCS, glucocorticosteroid.

Table 4 Laboratory Costs of Persons with Psoriasis (ICD-10 L40) and First Systemic Prescription After a Drug-Free Period of 180 Days (Biological and Non-Biological) Treatment in 2019 by Gender

Gender	≥1 Rx (N)	≥1 Lab Service per PE n (%)	Mean per PE (€)	SD per PE (€)	Range (€)	Median (€)	IQR [25%; 75%] (€)	Total Lab Costs (€)
Male	3005	2712 (90.25)	28.07	38.16	0.25–386.55	13.55	[5.05; 34.53]	76,113.05
Female	5013	4703 (93.82)	25.58	35.98	0.25–418.50	11.30	[4.50; 30.85]	120,299.30
Total	8018	7415 (92.48)	26.49	36.81	0.25–418.50	12.10	[4.75; 32.25]	196,412.35

Abbreviations: Rx, prescription; PE, person; SD, Standard deviation; IQR, Interquartile range.

Table 5 Laboratory Costs of Persons with Psoriasis (ICD-10 L40) with First Systemic Prescription After a Drug-Free Period of 180 Days Systemic (Biological and Non-Biological) Treatment in 2019 by Age

Age Group	≥1 Rx (N)	≥1 Lab Service per PE n (%)	Mean per PE (€)	SD per PE (€)	Range (€)	Median (€)	IQR [25%; 75%] (€)	Total Lab Costs (€)
18 to <30	246	222 (90.24)	25.30	34.42	0.50–168.10	9.55	[3.75; 33.50]	5,616.05
30 to <40	508	445 (87.60)	28.49	40.82	0.25–237.20	9.85	[3.75; 35.00]	12,676.95
40 to <50	791	725 (91.66)	27.55	39.10	0.25–278.90	10.25	[4.00; 32.05]	19,972.60
50 to <60	1681	1549 (92.15)	27.85	40.44	0.25–376.40	10.90	[4.00; 33.15]	43,140.80
60 to <70	2075	1922 (92.63)	27.98	38.33	0.25–386.55	13.08	[5.10; 33.75]	53,783.55
70 to <80	1738	1632 (93.90)	25.24	33.60	0.25–418.50	13.40	[5.70; 31.80]	41,192.85
80 to <90	897	849 (94.65)	22.24	28.14	0.25–339.55	13.50	[5.75; 30.25]	18,881.35
≥90	82	71 (86.59)	16.17	22.03	0.50–131.50	7.50	[3.75; 21.25]	1,148.20
Total	8018	7415 (92.48)	26.49	36.81	0.25–418.50	12.10	[4.75; 32.25]	196,412.35

Table 6 Laboratory Costs of Persons with Psoriasis (ICD-10 L40) and First Systemic Prescription After a Drug-Free Period of 180 Days (Biological and Non-Biological) Treatment, Categorised According to the 4-Level Charlson Comorbidity Index in the Year 2019

CCI -Stages	≥1 Rx (N)	≥1 Lab Service per PE n (%)	Mean per PE (€)	SD per PE (€)	Range (€)	Median (€)	IQR [25%; 75%] (€)	Total Lab Costs (€)
0 points	2040	1794 (87.94)	20.44	33.96	0.25–386.55	6.75	[2.75; 18.40]	36,674.30
1–2 points	3049	2799 (91.80)	23.01	35.46	0.25–376.40	9.60	[4.00; 24.15]	64,393.55
3–4 points	1379	1321 (95.79)	27.16	33.96	0.25–315.90	15.75	[6.70; 33.00]	35,884.65
≥5 points	1550	1501 (96.84)	39.61	41.46	0.25–418.50	29.15	[13.20; 48.90]	59,459.85
Total	8018	7415 (92.48)	26.49	36.81	0.25–418.50	12.10	[4.75; 32.25]	196,412.35

Abbreviations: Rx, prescription; PE, person; SD, Standard deviation; IQR, Interquartile range.

Table 7 Average Costs for Specific Lab Procedures in Persons with Psoriasis (ICD-10 L40) with First Systemic Prescription After a Drug-Free Period of 180 Days (Biological and Non-Biological) Treatment (N = 8018)

Lab Parameters	≥1 Lab Service per PE n (%)	Mean per PE (€)	SD per PE (€)	Range (€)	Median (€)	IQR [25%; 75%] (€)	Total Lab Services (n)
Complete blood count	5752 (71.74)	1.88	2.06	0.40–27.00	1	[0.50; 2.50]	10,839.70
Liver function test	6604 (82.36)	3.66	3.94	0.25–57.50	2.5	[1.00; 5.00]	24,146.75
Bilirubin, total	2667 (33.26)	0.82	1.04	0.25–11.50	0.5	[0.25; 1.00]	2,174.00
Amino terminal procollagen peptide (PIIINP)	280 (3.49)	37.38	37.59	22.80–342.00	22.8	[22.80; 45.60]	10,465.20
Hepatitis	868 (10.83)	32.16	18.77	5.50–171.00	26.7	[21.20; 39.20]	27,917.90
Tuberculosis screening	550 (6.86)	63.59	19.16	58.00–174.00	58	[58.00; 58.00]	34,974.00
Urine status	6335 (79.01)	1.75	1.72	0.25–14.75	1.25	[0.50; 2.25]	11,078.50
Glucose	3028 (37.77)	13.43	10.66	4.00–100.00	8	[4.00; 20.00]	40,668.00
Pregnancy test	41 (0.51)	2.57	2.93	1.30–15.60	1.3	[1.30; 2.60]	105.3
Immunological tests	844 (10.53)	9.3	11.46	3.40–156.40	6.8	[3.40; 10.20]	7,850.60
Renal function tests	6885 (85.87)	1.57	1.54	0.25–17.45	1.2	[0.50; 2.00]	10,837.75
Minerals	4926 (61.44)	1.75	2.65	0.25–53.20	1	[0.50; 2.00]	8,600.90
Lipids	4413 (55.04)	1.53	1.57	0.25–37.50	1	[0.75; 2.00]	6,753.75
Total*	8018 (92.48)	26.49	36.81	0.25–418.50	12.1	[4.75; 32.25]	196,412.35

Note: *Multiple counting possible. Average costs are coloured according to their level using the traffic light scheme.
Abbreviations: Rx, prescription; PE, person; SD, Standard deviation; IQR, Interquartile range.

Discussion

Systemic therapy for psoriasis is common and is recommended by the guidelines for all patients with moderate to severe disease. The drug labels recommend a certain volume of laboratory controls before and throughout therapy and national and international guidelines for therapy of psoriasis or psoriatic arthritis set standards to ensure a good monitoring of the treatment.[16] This study provides robust data and insights into the utilization and costs of laboratory services among persons with psoriasis undergoing systemic treatment. Of the 62,063 insured persons with psoriasis diagnosis in 2019, 8018 persons with an initial systemic therapy were identified and analysed for their use of laboratory services.

In 2019, 3.2% insured people had psoriasis. This is in line with national estimates, while the sex distribution in this group, shows a higher proportion of women (58%).

Our findings reveal that approximately 12.9% of persons with psoriasis received systemic drug treatment, including about 10% being on biologic therapies, and 90% on non-biological systemics. This distribution is consistent with recent data suggesting that about 8–15% of persons with moderate to severe psoriasis in Germany are treated with biologics, underlining the external validity of the current data set.[23–25] Outliers with markedly higher costs are known from clinical experience and most probably are correct, reflecting extra diagnostic work-up for special health risks and comorbidity.

Most systemic drugs require specific laboratory testing for blood counts, renal and hepatic function, and screening for chronic infections. The total laboratory expenditure across all tests amounted to 196,412.35 €, with significant variations in costs across test types.

Men had higher mean laboratory cost per person (28.07 €) compared to women (25.58 €), and the median cost was also slightly higher in men (13.55 €) compared to women (11.30 €). The interquartile range (IQR) for men was (5.05 €; 34.53 €), whereas for women, it was slightly broader (4.50 €; 30.85 €). This can indicate that while men had slightly higher average costs, variability in laboratory expenses was relatively comparable between genders. Studies suggest that male persons with psoriasis tend to have more severe disease compared to woman[26,27] and higher rates of comorbidities.[28] Both can lead to more intensive monitoring costs. Also women of childbearing age may be less frequently prescribed certain systemic treatments (eg retinoids and methotrexate) that require more frequent and excessive laboratory testing.

While routine blood and renal function tests constituted the majority of total tests performed, more specialized and expensive diagnostics, such as tuberculosis and hepatitis screening, accounted for a disproportionate share of costs despite lower utilization. Some tests, such as the Quantiferon test for tuberculosis, are necessary only before the start of therapy, while others are regularly performed throughout treatment to detect the risk of potential side effects, such as lipid and glucose testing for patients on retinoids. Our data shows that the cost intensive laboratory tests are the quantiferon test (63.59 €) for tuberculosis screening, followed by PIINP (37.38 €) and hepatitis serology (32.16 €). The high costs associated with the initiation of systemic treatments can create a barrier for office-based dermatologists when considering the commencement of therapy. Nevertheless, these costly tests (quantiferon test and hepatitis serology) should be conducted only prior to the commencement of therapy. Conversely, laboratory tests conducted during the course of therapy are considerably more economical. The laboratory costs undergoing biologic treatment are even lower than under conventional systemic treatments, because under certain medications such as retinoids and methotrexate specific laboratory testing are necessary. During treatment with retinoids monthly laboratory controls are recommended including pregnancy tests, creatinine kinase, and blood lipids. Under methotrexate, those laboratory tests are also excessive with regularly tested PIINP, one of the cost intensive tests. In contradistinction, owing to their optimal tolerability and minimal interactions, biologics necessitate a limited number of control examinations. One potential strategy to mitigate this financial burden and ensure enhanced care with systemic therapies would be to begin the systemic treatment at specialized centers, such as university clinics, where resources and expertise are more readily available. Ongoing management and follow-up visits could then be effectively transitioned to outpatient dermatologists, allowing for continued care while mitigating the financial burden associated with the initial treatment. This approach would also enable university clinics and specialized centers to allocate more time to complex cases and patients with challenging clinical presentation, thereby optimizing the use of resources.

Besides drug monitoring, the need for early identification of comorbidity is another reason for doing laboratory analysis. Accordingly, most guidelines recommend screening for comorbidity. In Germany, a special consensus paper with screening algorithms for 12-comorbid condition of psoriasis has been published.[29] This consensus in connection with the German guideline would imply that 100% of patients receiving systemic treatment should get a blood work-up at least before treatment initiation. Thus, the proportion of about 92% lab tests in the current analysis may show a certain underprovision of laboratory screenings.

While studies on the use of systemic antipsoriatic drugs and their outcomes are abundant, little is known about the resource utilization and specific costs for drug monitoring. Persons with higher CCI scores and therefore higher burden of comorbidity tended to undergo more extensive laboratory testing and incur greater costs. This pattern may indicate

effective medical care practices, as older persons and those with comorbidities require more frequent evaluations to ensure comprehensive health management, particularly given the potential interactions between psoriasis treatments and other health conditions. The costs associated with laboratory services differ significantly based on the presence of comorbidity with costs ranging from 20.44 € per person without documented comorbidity to 39.61 € in persons with five or more comorbidities. This trend is consistent with the expected rise in healthcare utilization among persons with multiple comorbidities. The interquartile range (IQR) of laboratory costs also widened with increasing CCI scores, suggesting greater variability in testing needs among sicker persons. These findings underscore the economic impact of multimorbidity in older psoriasis persons. Regarding that 71.7% persons underwent complete blood cell count, 82.4% had liver function tests and 85.9% had renal function tests (Supplementary Table 2), comprehensive monitoring appears to be a standard component of care.

It is also remarkable that about 73% of the persons receiving non-biological systemics are treated with systemic glucocorticosteroids (sGCS). This can be seen as a hint for the lack of guideline-compliant drug treatment in a considerable proportion of persons which has been reported in earlier German health care analyses.[30] Like in the previous analyses, in the current data the vast majority of such sGCS has been prescribed by non-dermatologists, indicating the need for better dissemination of the S3-guideline.

While the need for thorough monitoring is crucial, it poses a considerable financial burden on the healthcare system. The overall costs associated with laboratory monitoring for psoriasis can be substantial, necessitating a careful evaluation of how these resources are allocated. Furthermore, an important recommendation arising from our study is the implementation of an electronic database to streamline and enhance communication among healthcare providers. Currently, patients often experience repeated blood tests due to miscommunication regarding necessary lab work among doctors. Improved coordination facilitated by an electronic tracking system could reduce unnecessary testing, lessen patient burden, and ultimately lead to cost savings for the healthcare system. Finally, the recommendations on laboratory tests in the German S3 guideline on psoriasis deserve attention since there is growing evidence from real-world studies, including patient registries, on the safety of the biological and non-biological systemic antipsoriatic drugs. Accordingly, the current update of this guideline has markedly reduced the lab monitoring intervals and extent, referring to such new data.

In conclusion, our findings emphasize that while initial laboratory costs for systemic biologics are substantially higher due to mandatory screening for infections, ongoing laboratory expenses are relatively modest. The increase in laboratory services associated with higher comorbidities reflects effective medical care aimed at monitoring vulnerable populations. However, the costs incurred highlight the importance of efficient healthcare management and the potential for electronic data management systems to optimize care delivery and reduce unnecessary expenditures. Future research should focus on the long-term implications of laboratory monitoring on patient outcomes and cost-effectiveness in psoriasis management while exploring solutions for better health information sharing among providers.

Limitations

A significant advantage of this analysis is the extensive availability of SHI data, which offers valuable insights into population coverage. Approximately 90% of the German population is covered by statutory health insurance,[31] suggesting high external validity of the data. At the same time, the evaluation conducted here is accompanied by data- and method-based limitations that must be taken into account when interpreting the results. For example, populations of different health insurers differ.[32] The study boasts a large sample size of over 8000 persons, enhancing the robustness and representativeness of the findings, and allowing for detailed statistical analyses. The retrospective design provides real-world data on laboratory service utilization and costs for 2019, reflecting actual clinical practice and complexities in managing psoriasis. Moreover, the use of the CCI enables a reliable assessment of the impact of comorbid conditions on laboratory service utilization and costs, adding important context to our understanding of patient management challenges.

The reliance on claims data means that clinical information, such as psoriasis severity, treatment response, and patient-reported outcomes, is limited, resulting in an incomplete understanding of treatment effectiveness and patient satisfaction. Furthermore, the analysis captures only a specific time frame (2016–2020), and the evolving nature of treatment modalities and guidelines may affect the applicability of the results over time. Additionally, there may be

instances of coding errors or misclassification of diagnoses and treatments, which could impact the accuracy of the analyses. Important psychosocial factors influencing treatment outcomes, such as mental health status and social support, cannot be captured in the claims data, leaving gaps in understanding the full patient care context. Finally, the potential overlap in laboratory services that are not unique to psoriasis may lead to an overestimation of costs directly associated with psoriasis treatment.

Conclusion

This study offers valuable insights into laboratory monitoring and associated costs in persons receiving systemic treatments for psoriasis. The majority of persons utilized laboratory services, highlighting the necessity of regular monitoring in managing this chronic condition. The analysis found that systemic therapies incurred notably higher monitoring costs compared to topical treatments, with both comorbidities and age affecting service utilization and costs.

These findings underscore the need for effective strategies that optimize laboratory monitoring while maintaining patient safety and managing overall healthcare costs. Future research should focus on the long-term effects of monitoring on clinical outcomes and the potential disparities in practices across different patient demographics. By enhancing monitoring frameworks tailored to the specific needs of patients with psoriasis, we can improve treatment outcomes while ensuring cost-effective healthcare delivery. The psoriasis guidelines may provide a better sense of benefits and costs from laboratory diagnostics to the clinicians.

Ethics

The ethics committee of the Medical Association of Hamburg confirmed that there was no further ethical approval necessary for the retrospective analysis of the anonymised data in accordance with the ethical standards of the responsible committees (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 1983.

Acknowledgments

We would like to thank DAK-G for their cooperation and for providing the data. We acknowledge financial support from the Open Access Publication Fund of UKE – Universitätsklinikum Hamburg-Eppendorf and DFG – German Research Foundation.

The authors would also like to thank the IVDP's scientific communication team, particularly Paula Willer, for editing the article.

Funding

The project was financially supported by BMS. This was an independent, investigator-initiated study supported by BMS. BMS had no role in the design, analysis or interpretation of the results in this study.

Disclosure

JNW has received travel grants or speaker fees from: AbbVie, Almirall, Celltrion, Johnson & Johnson and UCB. KH and KM declare no conflict of interest. BS has received honoraria and consulting fees for lectures, scientific presentations, medical advisory and/or received grants and/or participated in clinical trials including the following companies: AbbVie, Almirall Hermal, Amgen, Bayer, Beiersdorf, Biogen, Boehringer Ingelheim, Bristol-Myers Squibb, Celgene, Celltrion, Eli Lilly, Galderma, GSK, Incyte, Janssen-Cilag, LEO Pharma, Medac, Novartis, Pierre Fabre, Pfizer, Sanofi Aventis, and UCB. MA has served as a consultant, lecturer or researcher, and/or has received research grants from companies manufacturing drugs for psoriasis, including AbbVie, Almirall, Amgen, Biogen, Boehringer Ingelheim, BMS, Celgene, Centocor, Eli Lilly, Galderma, Hexal, Incyte, Janssen, Klinge, LEO, Medac, MSD, Mylan B.V., Novartis, Pfizer, Sandoz, Takeda, UCB and Viatris. RvK provides with his service company CMS3 GmbH consulting services, registry research, activities as an investigator in interventional and non-interventional studies, other services, and scientific lectures for the following companies: AbbVie, Almirall Hermal, Amgen, Biogen, BMS, Boehringer Ingelheim, Celgene, Celltrion HC, Foamix, Galderma, Heine Optotechnik, Hexal, Janssen-Cilag, Johnson & Johnson, LEO Pharma, Lilly, Meda, Medac, Menlo, MoonLake, MSD, NIA Health, Novartis, Pfizer, Regeneron, Sanofi, Stiefel GSK, Tigercut and UCB. RvK

received grants from AbbVie, Almirall Hermal, Amgen, BMS, Boehringer Ingelheim, Celltrion HC, Galderma, Johnson & Johnson, Leo Pharma, Lilly, Novartis, Pfizer, Sanofi, and UCB, outside the submitted work.

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