

Allergic disorders of the respiratory tract – findings from a large patient sample in the German statutory health insurance system

JANINE BIERMANN¹, HANS F. MERK², WOLFGANG WEHRMANN³, LUDGER KLIMEK⁴, JÜRGEN WASEM¹

¹Institute for Health Care Management and Research, University of Duisburg-Essen, Campus Essen, Essen, Germany; ² Department of Dermatology and Allergology, University Hospital RWTH Aachen, Aachen, Germany; ³Dermatology Practice, Muenster, Germany; ⁴Rhinology and Allergology Center, Wiesbaden, Germany

Allergische Erkrankungen der Atemwege – Ergebnisse einer umfassenden Patientenkohorte in der deutschen gesetzlichen Krankenversicherung

Key words

Allergy – asthma – claims data – rhinitis – specific immunotherapy

Schlüsselwörter

Allergie – Asthma – Abrechnungsdaten – Rhinitis – spezifische Immuntherapie

Submitted/Eingang

2013 July 24

Accepted/Annahme

2013 July 31

Summary

Background: Worldwide, the number of patients with allergic diseases is global increasing, especially in the industrialized nations. Experts estimate that only about 10 % of allergic patients are treated according to the latest guidelines. The aim of this study is to map the medical care situation of patients with allergic respiratory diseases under the German statutory health insurance system and to investigate the impact on patient care since January 1, 2009, when ceilings for service volumes in allergology were implemented.

Therefore, we analyzed the diagnostic and therapeutic behaviour of physicians between 2007 and 2010 by using claims data from the National Association of Statutory Health Insurance Physicians.

Methods: The claims data was from the national four-birthday sample, including more than 9 million patients (13 % of the population). From this, the study cohort was extracted, including 725,000 patients with allergic rhinitis and 260,000 patients with allergic asthma. Analyzes refer to diagnostic codes and fee schedule items, e. g., as for specific immunotherapy.

Results: The average number of total coded diagnoses per patient and per physician's office has generally increased, while the number of physician's offices encoding allergological diagnoses is decreasing. In contrast, the number of claimed allergological fee schedule items (especially specific immunotherapy) diminished. 7 % of patients with rhinitis and 5 % of patients with allergic asthma receive specific immunotherapy, mostly performed by specialists.

Conclusion: The analysis shows an increase in the total number of allergic patients in the studied cohort. In contrast, the ratio of patients receiving specific immunotherapy seems disproportionately low. One consequence could be additional health care costs arising from the progression of these diseases, e. g., by an increase of allergic asthma.

Abbreviations

EBM	Uniform Value Scale (Einheitlicher Bewertungsmaßstab)
GOP	Fee schedule item (Gebührenordnungsposition)
GKV	Statutory health insurance (Gesetzliche Krankenversicherung)
ICD	International Classification of Diseases
ICD J 30.0	Vasomotor rhinitis
ICD J 30.1	Allergic rhinitis due to pollen
ICD J 30.2	Other seasonal allergic rhinitis
ICD J 30.3	Other allergic rhinitis
ICD J 30.4	Unspecified allergic rhinitis
ICD J 45.0	Predominantly allergic asthma
ICD J 45.8	Mixed asthma
KBV	National Association of Statutory Health Insurance Physicians (Kassenärztliche Bundesvereinigung)
SIT	Specific immunotherapy
SCIT	Subcutaneous immunotherapy
SLIT	Sublingual immunotherapy

Zusammenfassung

Hintergrund: Die Zahl der Patienten mit allergischen Erkrankungen nimmt weltweit, vor allem in den Industrienationen, zu. Experten schätzen, dass nur etwa 10 % der allergischen Patienten entsprechend den aktuellen Leitlinien behandelt werden. Das Ziel der vorliegenden Studie ist es, die Versorgungssituation von gesetzlich versicherten Patienten mit allergischen Atemwegserkrankungen abzubilden und diese im Hinblick auf potenzielle Einflüsse zu untersuchen, die durch die zum 1. Januar 2009 eingeführten Regelleistungsvolumina entstanden sind. Hierzu wurde das Diagnose- und Therapieverhalten allergologisch tätiger Ärzte anhand der Abrechnungsdaten der Kassenärztlichen Bundesvereinigung von 2007 bis 2010 analysiert.

Methoden: Die Datengrundlage stellt die nationale Vier-Geburtsstichprobe dar, die mehr als 9 Millionen Patienten (13 % der Bevölkerung) einschließt. Aus dieser wurde die Studienkohorte extrahiert, welche 725.000 Patienten mit allergischer Rhinitis und 260.000 Patienten mit allergischem Asthma umfasst. Die Analysen beziehen sich auf Diagnose-

und Abrechnungskodes, z. B. für die spezifische Immuntherapie.

Ergebnisse: Die durchschnittliche Gesamtzahl der kodierten Diagnosen pro Patient und pro Arztpraxis hat insgesamt zugenommen, während die Zahl der Arztpraxen abnimmt, die allergologische Diagnosen kodieren. Im Gegensatz dazu sinkt die Zahl der abgerechneten allergologischen Gebührenordnungsziffern (insbesondere die spezifische Immuntherapie). 7 % der Patienten mit Rhinitis und 5 % der Patienten mit allergischem Asthma erhalten eine spezifische Immuntherapie, welche meist von Fachärzten durchgeführt wird.

Schlussfolgerung: Die Analyse zeigt einen Anstieg der Gesamtzahl von allergischen Patienten in der untersuchten Kohorte. Im Gegensatz dazu scheint der Anteil der Patienten, die eine spezifische Immuntherapie erhalten, unterproportional. Infolge dessen könnten zusätzliche Kosten im Gesundheitswesen durch die Progredienz der Erkrankungen entstehen, z. B. durch eine Zunahme des allergischen Asthmas.

Introduction

The number of people with allergic diseases is generally increasing, especially in the industrialized countries [1, 2]. In Germany, today one of three people suffer from at least one allergic disease [3, 4]. In Europe, allergic rhinitis is undertreated [5] and this may lead to more severe allergic diseases (e. g., allergic asthma, food allergies) [6].

Under certain circumstances, patients with allergic diseases have many variable signs and symptoms, including shock reactions which may be life-threatening. More often, chronic allergic disorders rise, resulting in increased morbidity and a significant reduction in the quality of life for patients and their families [7]. Atopic diseases such as hay fever, neurodermatitis, and asthma are particularly widespread [4, 8, 9]. Early medical management is essential since many untreated allergic disorders that manifest in childhood or adolescence may lead to additional future sensitization [10]. Inadequately treated patients with allergic rhinitis are at greater risk of developing allergic asthma [11–13].

The primary approach to treatment of allergic rhinitis is the identification and avoidance of the allergens, which however is hardly achievable for pollen. The goal of pharmacotherapy is to prevent or reduce allergy symptoms, both in terms of severity and duration [13]. The most commonly used medications are antihistamines, corticosteroid nasal sprays, and eye drops [13, 14].

Background

Specific Immunotherapy

Specific immunotherapy (SIT) is considered to be the only potentially causal therapy for allergic rhinitis and is mainly administered by two routes, namely subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT). A Cochrane review and meta-analysis of immunotherapy (SLIT vs. placebo) has demonstrated the efficacy of SLIT by decreased rhinitis symptoms and subsequent medication requirements in the first season [15]. Furthermore, beneficial and sustained preventive effects with SIT have been shown [11, 16–18]. Thus, allergen-specific immunotherapy is recommended by the World Health Organization (WHO) as causal standard therapy [14] and it is recommended to perform SIT over a prolonged period of time, e. g., three years wherein the patients' compliance is essential for the effectiveness [19–21].

Undertreatment increases socio-economic costs

The socio-economic costs of respiratory allergy due to impaired work in Europe are estimated to be between € 36.7 and € 385.1 billion per year [22]. Advanced diseases are more difficult to treat and associated with higher treatment costs. Thus, the total annual costs for a patient with mild asthma are about € 1,670 and for a patient with severe asthma about € 6,008 [23]. Due to the rising costs with progressed diseases and the ability of SIT to avoid these progressions, several studies have shown the cost-

Original

effectiveness of SIT [24–27]. Schramm et al. demonstrated that the overall annual costs per patient increase according to the severity of atopic asthma and to atopic asthma in association with allergic rhinitis [28]. The average annual costs of allergic rhinitis were € 1,089 per child/adolescent and € 1,543 per adult. Annual costs of severe asthma plus allergic rhinitis increased to € 7,928 per child/adolescent and to € 9,287 per adult. For third party payers, the main cost drivers were medication, hospitalization and rehabilitation [28]. Therefore, if performed over three years in patients being compliant with the standard protocols, immunotherapy is a highly efficacious and cost-effective modality [19–21, 24–27].

Effect of remuneration and incentive structures on diagnostic and therapeutic behavior

It is estimated that only 10 % of allergic persons have access to adequate treatment and, in consequence, an increasing incidence of allergies seems likely [3, 29]. Against the background of economic stresses in the health care system it is of social interest to identify and assess the incentives for treatment management that are determined by the remuneration system. Health services research uses techniques that can demonstrate potential pitfalls and possible solutions when based on adequate and reliable data. Thus, changes in the compensation system will likely impact the quality and quantity of diagnostic and therapeutic measurements which can be determined.

The aim of this study was to assess the manner in which changes in the remuneration and incentive structures affect the diagnostic and therapeutic behavior of allergologists and to determine how this impacts the care quality of patients with allergic diseases. This analysis evaluated the situation of patients with statutory health insurance (gesetzliche Krankenversicherung, GKV) in Germany based on the claims data of the National Association of Statutory Health Insurance Physicians (Kassenärztliche Bundesvereinigung, KBV). We assessed the remuneration system e. g., by studying ceilings for service volumes claimed against the health insurance system, established in 2009 including fee schedule items in the area of allergology.

Methods

Database and sample

Claims data from the KBV (2007–2010) were selected to be studied. A four-birthday sample (which correlates with 48 birthdays in a year or 13 % of all patients) was chosen from the KBV claims database. Afterwards, the four-birthday sample (2007–2010) containing more than 9 million GKV-insured patients, served as a basis to select the allergy sample.

Therefore, allergy-associated fee schedule items (Gebührenordnungsposition, GOP) defined as Uniform Value Scale (Einheitlicher Bewertungsmaßstab, EBM) and diagnostic codes as defined by the International Classification of Diseases (ICD 10) were used as selection criteria. Allergological GOPs refer to allergological basic diagnostic procedures, e. g., skin prick test and special provocation tests (rhinomanometric, subcutaneous, bronchial, oral). Furthermore laboratory tests to determine allergen-specific immunoglobulin and total immunoglobulin E (IgE) as well as the GOP for subcutaneous specific immunotherapy were measured. ICD codes selected were J30.0 (vasomotor rhinitis), J30.1 (allergic rhinitis due to pollen), J30.2 (other seasonal allergic rhinitis), J30.3 (other allergic rhinitis), J30.4 (unspecified allergic rhinitis), J45.0 (predominantly allergic asthma), and J45.8 (mixed asthma).

Analyses refer to patients with allergic rhinitis, defined by the ICD codes J30.0–J30.4, and/or those with allergic asthma, defined by codes J45.0 and J45.8. The data only contain GKV-insured people with use of services from GKV-authorized physicians during the time period (no “non-users”).

The birthday sample records encompass the vast majority of physician offices, but these offices comprise only patients that were part of the birthday sample. This means that diagnoses and GOPs are collected completely with regard to patients but not with regard to the physicians' offices. The diagnoses are distinct for each Association of Statutory Health Insurance Physicians (Kassenärztliche Vereinigung, KV), quarter, case-ID, physician office-ID, and patient pseudonym.

The data include the four-birthday sample, characteristics of the filtered four-birthday sample (allergy sample), allergy-specific diagnosis codes, claimed allergy specific GOP, and the number of physicians' offices that submitted claims for allergological services. Care settings included primary care, specialist care, and comprehensive care.

Statistical analysis

Statistical analysis was performed by using the statistical package SAS (SAS Institute Inc., Cary, NC, USA). Descriptive statistics are presented as means. T-tests for dependent samples (significance level $\alpha = 0.05$, two-sided hypothesis) were employed to identify the statistical significance of the comparison between the years 2007/2008, 2008/2009, and 2009/2010.

Results

Population

The filtered sample of rhinitis patients includes 722,390, 727,791, 741,526, and 725,063 patient pseudonyms annually between 2007 and 2010. The

Table 1

Cohort characteristics	2007	2008	2009	2010
Four-birthday sample				
Patient pseudonyms (n)	9,930,441	10,162,162	10,117,395	9,927,955
Age (mean ± SD)	42.8 ± 23.4	43.2 ± 23.5	43.6 ± 23.5	43.8 ± 23.5
Male (female) (%)*	43.5 (54.7)	43.3 (54.9)	43.4 (54.9)	43.4 (55.0)
Rhinitis sample				
Patient pseudonyms (n)	722,390 (7.3 %)	727,791 (7.2 %)	741,526 (7.3 %)	725,063 (7.3 %)
Age (mean ± SD)	36.6 ± 20.1	37.1 ± 20.1	37.7 ± 20.2	38.2 ± 20.3
Male (female) (%)*	43.2 (54.8)	43.1 (55.0)	43.0 (55.3)	42.9 (55.5)
Additional asthma diagnosis (n)	117,091 (16.2 %)	116,166 (16.0 %)	126,856 (17.1 %)	126,000 (17.4 %)
Asthma sample				
Patient pseudonyms (n)	244,109 (2.5 %)	245,381 (2.4 %)	263,882 (2.6 %)	265,300 (2.7 %)
Age (mean ± SD)	37.6 ± 20.8	38.2 ± 21.1	38.7 ± 21.0	39.2 ± 21.2
Male (female) (%)*	44.2 (53.8)	43.6 (54.5)	43.5 (54.8)	43.2 (55.2)
Additional rhinitis diagnosis (n)	117,091 (48.0 %)	116,166 (47.3 %)	126,856 (48.1 %)	126,000 (47.5 %)

*Difference is attributable to unknown gender

average age in each cohort was 36.6, 37.1, 37.7, and 38.2 years and the percentage of women was 54.8 %, 55.0 %, 55.3 % and 55.5 %. The share of patients suffering from asthma in the rhinitis sample was 16.2 %, 16.0 %, 17.1 % and 17.4 % over these four years. The selected sample of asthma patients includes 244,109, 245,381, 263,882, and 265,300 pseudonyms annually between 2007 and 2010. The average age in each cohort was 37.6, 38.2, 38.7, and 39.2 years. The share of women was 53.8 %, 54.5 %, 54.8 %, and 55.2 %. The share of patients suffering from rhinitis in the asthma sample was 48.0 %, 47.3 %, 48.1 %, and 47.5 % over these four years.

Therefore, the share of rhinitis patients of the four-birthday sample was 7.3 % in 2007, 7.2 % in 2008, 7.3 % in 2009, and 7.3 % in 2010. The share of asthma patients in the four-birthday sample was 2.5 % in 2007, 2.4 % in 2008, 2.6 % in 2009, and 2.7 % in 2010. Between 2007 and 2010, the number of rhinitis and asthma patients increased by 0.4 % and 8.7 %, respectively (Tab. 1).

Prevalence of rhinitis and asthma patients (coded diagnoses)

Overall, the average number of coded allergy diagnoses per physician's office increased from 2007 to 2010. This increase approximated 18 % for the mean number of coded rhinitis diagnoses and 23 % for the mean number of asthma diagnoses per physician's office respectively. The average number of coded allergy diagnoses of rhinitis patients per physician's office (31.5 / 34.3 / 35.5 / 37.1; $p < 0.0001$ / $= 0.0035$ / < 0.0001) is higher than that of coded allergy diagnosis of asthma patients (16.8 / 18.4 / 19.4 / 20.7; $p = 0.0488$ / < 0.0001 / < 0.0001). The percentage increase per physician's office of rhinitis patients was

8.9 % from 2007 to 2008, 3.5 % from 2008 to 2009, and 4.5 % from 2009 to 2010. The percentage increase per physician's office of asthma patients was 9.5 % from 2007 to 2008, 5.4 % from 2008 to 2009, and 6.7 % from 2009 to 2010. Medical specialists coded the highest number of diagnoses per physician office.

Overall, the average number of coded allergy diagnoses per rhinitis patient (2.7 / 2.8 / 2.9 / 2.9; $p < 0.0001$ / < 0.0001 / $= 0.0018$) and per asthma patient (3.2 / 3.4 / 3.4 / 3.5; $p < 0.0001$ / $= 0.1757$ / < 0.0001) increased over the years. The average number of coded allergy diagnosis per rhinitis patients is higher than that of coded allergy diagnosis per asthma patients. The most common code for rhinitis patients was allergic rhinitis due to pollen (J30.1), followed by allergic asthma (J45.0) and mixed asthma (J45.8). The most common code for asthma patients was allergic asthma (J45.0) followed by mixed asthma (J45.8) and rhinitis due to pollen (J30.1). Most diagnoses per patient were coded in the primary care setting.

GOP per physician's office and patient

The number of claimed GOPs per physician's office fluctuated between 2007 and 2010. This applies to rhinitis patients (43.9 / 57.8 / 50.4 / 55.0; $p < 0.0001$ / < 0.0001) as well as asthma patients (29.7 / 37.4 / 30.5 / 33.6; $p = 0.8257$ / $= 0.0270$ / $= 0.0005$). On average, less GOPs per physician's office were claimed for asthma patients as compared to rhinitis patients. Between 2007 and 2010 the absolute number of physician offices providing these services (and claims submitted for the fee schedule items) declined (rhinitis: 20,021 / 15,571 / 15,635 / 13,903; asthma: 8,018 / 6,459 / 6,637 / 5,892) (Fig. 1). With

Original

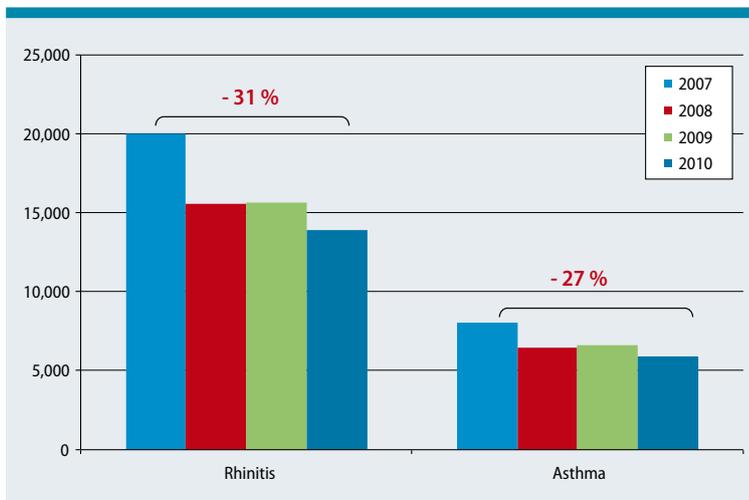


Fig. 1: Number of practices claiming allergological fee schedule items

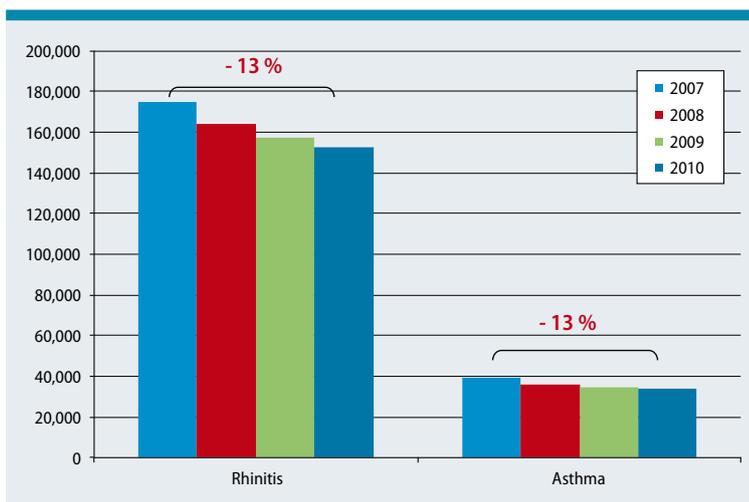


Fig. 2: Number of patients with allergological fee schedule items

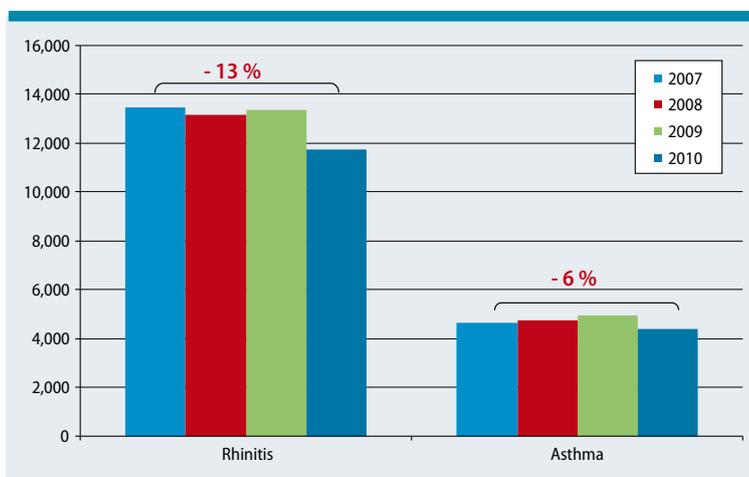


Fig. 3: Number of practices claiming SIT

special regard to the comparison of the years 2009 and 2010, the number of physician offices decreases for rhinitis by 11.1 % overall and across specialized practices, e.g., as follows: 13.2% dermatology (2,759 vs. 2,396), 13.2% otolaryngologist (3,100 vs. 2,691) and 19.8% pneumology (824 vs. 661). For asthma and the same period, the numbers decline as follows: 11.2% overall, 16.6% dermatology (1,65 vs. 1,139), 11.5% otolaryngologist (843 vs. 746) and 21.4% pneumology (829 vs. 652) (Fig. 1).

Provocation tests also decreased for both diseases between 2007 and 2009 per physician office. However, the average number of some fee schedule items increased slightly in 2008. In 2010, the number of almost all provocation tests increased.

For both groups of patients the number of GOPs per patient increased significantly between 2007 and 2008. Furthermore, a significant decline was found from 2008 to 2009. This trend continued in 2010, but was only statistically significant for rhinitis in the year 2010 (rhinitis: 5.0 / 5.5 / 5.0 / 5.0; $p < 0.0001$ / < 0.0001 / < 0.0001 / < 0.0001 ; and asthma: 6.1 / 6.8 / 5.8 / 5.8; $p < 0.0001$ / < 0.0001 / $= 0.0062$). Here, the distinction among specialist groups managing asthma patients indicated an increase for otolaryngologists over all years. In rhinitis patients, provocation tests are mainly performed by primary care physicians, particularly general practitioners. This also applies to a large extent of asthma patients, whereas the bronchial provocation test is especially performed by specialists.

A declining billing per patient is shown in the laboratory area over the years. In total, the absolute number of patients with allergological services has declined between 2007 and 2010 (rhinitis: 174,460 / 164,139 / 157,159 / 152,563; asthma: 38,980 / 35,594 / 34,805 / 34,060) (Fig. 2).

Special focus on specific immunotherapy (SIT)

The fee schedule for specific immunotherapy remains relatively stable with a slight increase in 2008 and 2010 (asthma: 20.3 / 21.6 / 20.7 / 22.3; $p = 0.2062$ / $= 0.6819$ / < 0.0001 ; and rhinitis 33.6 / 35.9 / 34.5 / 37.0; $p < 0.0001$ / < 0.0001 / < 0.0001) per physician office. Overall, the absolute numbers of physician offices who claimed the fee schedule item for SIT in the cohort declined over the years (rhinitis: 13,479 / 13,158 / 13,346 / 11,753; asthma: 4,664 / 4,763 / 4,955 / 4,398) (Fig. 3). With special focus on the years 2009 and 2010 the number of these physician offices decreases for rhinitis by overall 11.9% and across specialized practices e.g., as follows: 14.0% dermatology (2,361 vs. 2,031), 12.2% otolaryngologist (2,453 vs. 2,154) and 20.9% pneumology (703 vs. 556). For asthma and the same period, the numbers are the following: 11.2% overall, 17.0% dermatology (857 vs. 711), 8.0% otolaryngologist (537 vs. 494) and 19.5% pneumology (661 vs. 532) (Fig. 3).

Within the period of investigation, SIT was most commonly claimed by medical specialists. When SIT was performed in the comprehensive care setting, GOP claims were reduced by about half compared to claims from medical specialists. Primary care physicians utilized only one third of the amount claimed by the medical specialists per physician's office. Differentiated by medical specialties, pneumologists had the highest average number of GOPs per physician's office for both rhinitis and asthma patients.

Between the years 2007 and 2008, the fee schedule item for SIT showed a statistically significant increase of average claims per patient for each patient group. A (statistically significant) decline for this GOP was shown for both disease groups between 2008 and 2009 and between 2009 and 2010 for rhinitis patients only (rhinitis: 8.7 / 8.8 / 8.6 / 8.3; $p < 0.0001$ / < 0.0001 / < 0.0001 ; and asthma: 8.0 / 8.4 / 8.0 / 7.8; $p < 0.0001$ / < 0.0001 / $= 0.0097$). Overall, the number of claimed SIT per patient was higher for rhinitis patients compared to asthma patients. The GOP was mainly utilized in the setting of specialist care. Looking at the absolute numbers of rhinitis patients, this fee schedule item was most frequently claimed by dermatologists, otolaryngologists, and general practitioners. For the asthma patients common groups are dermatologists, general practitioners and pulmonologists.

In 2007, 52,027 (7.2 %) of 722,390 rhinitis patients and in 2008, 53,493 (7.4 %) of 727,791 rhinitis patients received SIT. In 2009, 53,843 (7.3 %) of 741,526 rhinitis patients and in 2010, 52,047 (7.2 %) of 725,063 rhinitis patients received SIT.

In 2007, 11,843 (4.9 %) of 244,109 asthma patients and in 2008, 12,282 (5.0 %) of 245,381 asthma patients received SIT. In 2009, 12,839 (4.9 %) of 263,882 asthma patients were treated with SIT. In 2010, 4.7 % (12,476) of the asthma patients (265,300) gained a SIT. Therefore, a general reduction in rhinitis and asthma patients who receive SIT established over the years (Fig. 4).

Discussion

The analyses reveal an increase in the number of patients suffering from rhinitis and asthma. The data also show that the average number of coded diagnoses per physician's office (admittedly with a declining number of physician's offices) and per patient increased during the time of observation. Since 2008, the claimed allergological fee schedule items decreased in general and especially in case of SIT despite an increasing number of patients with rhinitis and asthma. The proportion of patients with rhinitis and asthma who received SIT treatment appeared low (rhinitis 7 %, asthma 5 %). However, similar low numbers were as well found in the USA [30].

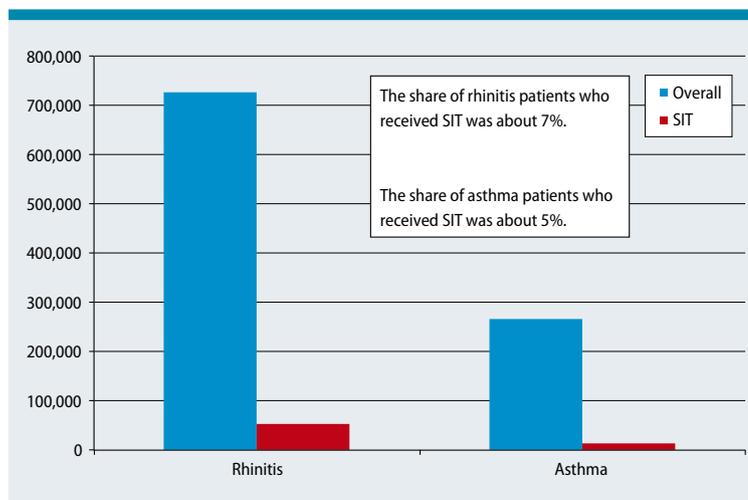


Fig. 4: Number of patients – overall and with specific immunotherapy (SIT) in 2010

The authors evaluated the percentage of those receiving SIT ($n = 8,370$) from the total number of patients with allergic rhinitis ($n = 436,373$) to be 1.92 %. Their data base was analyzed from Florida Medicaid claims data in regard to compare health services use and costs between patients with newly diagnosed allergic rhinitis who subsequently received SIT vs. matched control subjects who not received SIT [30]. Under these conditions, the authors could demonstrate significantly lower 18-month mean health care costs in the SIT group. Thus, costs in Florida Medicaid patients were \$ 6,637 for patients receiving SIT vs. \$ 10,644 for control subjects (-38 %; $p < 0.0001$). Moreover, there were no differences between SIT-treated adults (30 % reduction: \$ 10,457 SIT vs. \$ 14,854 controls; $p < 0.0001$) and children (42 % reduction; \$ 5,253 SIT vs. \$ 9,118 controls, $p < 0.0001$).

The allergen-specific immunotherapy in our study is mainly performed in the setting of specialist care, whereas diagnostic services are generally performed in primary care settings. The total number of physician's offices performing allergological services has decreased, but this can be seen as a result of a stronger concentration in group practices and ambulatory healthcare centers (Medizinische Versorgungszentren, MVZ).

Overall, statistically significant reductions in the average number of fee schedule items were observed between 2008 and 2009. Since ceilings for service volumes in allergology were established by the health insurance system in 2009, it can be seen that changes in the remuneration structure have had an impact on the practice patterns of physicians in the field of allergology. This is particularly evident when comparing the number of practices providing aller-

Original

gy services from 2009 and 2010 with the number of immunotherapies that were performed in these two years. This is especially the case for the services in specialized practices such as otolaryngology, dermatology and pneumology.

A limitation of this analysis relates to the collected data (services required, diagnoses, fee schedule items, etc.) which is complete for the insured (here patients) in the birthday sample but not for the physician's offices. The birthday sample recorded almost all physician offices, but the offices have only complete data for patients from the birthday sample. Therefore, data referring to physician's offices is only complete for the selected population and their diagnoses as well as fee schedule items. An estimation of the resulting, practice-based error of distribution in the sample has not been performed. Nevertheless, the distribution of parameters and key data of the sample seems to be transferable to the general population. The same does not apply to the situation of the present physician's offices: they are only representative for the underlying filtered population.

However, the analysis seems still reliable due to the representative data of outpatient claims covered by GKV (2007–2010), containing about 9 million insured people. Therefore, the present analysis of claims data allows a statement about the medical care (especially about allergological services as SIT) of a large national cohort of statutory health insured patients with allergic disorders of the upper airways.

Conclusions

Allergic diseases are a major cause of morbidity in the German population and their prevalence is increasing. In contrast, the number of physician offices providing allergological services is decreasing. The management of patients with SIT remains low and is decreasing significantly. In consequence, it is likely that there will be additional costs to the health care system due to the progression of allergic disorders in the medium and long term, e. g., stemming from an increase in allergic asthma incidence. An early SIT can lead to a significant reduction of allergy-related morbidity and associated health-care expenditures. A performance-based remuneration of physicians delivering allergological services according to EBM (outside the ceilings for service volumes) may be a possible solution to improve the quality of care for patients suffering from allergic diseases.

Janine Biermann, M. A.

Institute for Health Care Management and Research
University of Duisburg-Essen
Schützenbahn 70
45127 Essen
E-Mail: janine.biermann@medman.uni-due.de

Conflict of interest

This work was funded by the Medical Association of German Allergists e. V. (Ärzteverband Deutscher Allergologen e. V., AeDA).

Acknowledgements

The authors are grateful to the members of the National Association of Statutory Health Insurance Physicians (KBV) for their support, in particular, Elena Merins, Patricia Klein, Andreas Ryll, and Deniz Tümer as well as fruitful discussions and comments of the results, in particular: Kirsten Jung, Uta Rabe, Wolfgang Czech, Thomas Fuchs, Wolfgang Leupold, Norbert Mülleneisen, and Wolfgang Schlenker.

References

1. Asher M, Montefort S, Björkstén B, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC phases one and three repeat multicountry cross-sectional surveys. *Lancet* 2006; 368: 733–43
2. Björkstén, B, Clayton T, Ellwood P, et al. Worldwide time trends for symptoms of rhinitis and conjunctivitis: Phase III of the International Study of Asthma and Allergies in Childhood. *Pediatr Allergy Immunol* 2008; 19: 110–24
3. Ring J, Bachert C, Bauer CP, Czech W (Hrsg). *Weißbuch Allergie in Deutschland*. 3. Aufl. Urban & Vogel, München 2010
4. Wahn U, Wichmann HE (Ed.). *Special Report on Allergies*. Metzler-Poeschel, Stuttgart 2000
5. Maurer M, Zuberbier T. Undertreatment of rhinitis symptoms in Europe: findings from a cross-sectional questionnaire survey. *Allergy* 2007; 62: 1057–63
6. Gordon BR. The allergic march: can we prevent allergies and asthma? *Otolaryngol Clin North Am* 2011; 44: 765–77
7. Rat von Sachverständigen für Umweltfragen: Sondergutachten „Umwelt und Gesundheit“ Risiken richtig einschätzen. Kurzfassung. 1999. http://www.umweltrat.de/cae/servlet/contentblob/467530/publication-File/34333/1999_SG_UmweltundGesundheit.pdf
8. Sachverständigenrat zur Begutachtung der Entwicklung im Gesundheitswesen: Koordination und Integration – Gesundheitsversorgung in einer Gesellschaft des längeren Lebens. Sondergutachten 2009. http://www.svr-gesundheit.de/fileadmin/user_upload/Gutachten/2009/Kurzfassung-2009.pdf
9. Classen M, Diehl V, Kochsiek K. *Innere Medizin*. Urban & Fischer Verlag, München 2009
10. Schlaud M, Atzpodien K, Thierfelder W. Allergic diseases. Results from the German Health Interview and Examination Survey for Children and Adolescents (KiGGS). *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2007; 50: 701–10
11. Durham SR, Walker SM, Varga EM, et al. Long-term clinical efficacy of grass-pollen immunotherapy. *N Engl J Med* 1999; 341: 468–75
12. Niggemann B, Jacobsen L, Dreborg S, et al. Five-year follow-up on the PAT study: specific immunotherapy and long-term prevention of asthma in children. *Allergy* 2006; 61: 855–9
13. Bousquet J, Lockey R, Malling HJ, et al. Allergen immunotherapy: therapeutic vaccines for allergic diseases. World Health Organization. American Academy of Allergy, Asthma and Immunology. *Ann Allergy Asthma Immunol* 1998; 81: 401–5.
14. Bousquet J, Khaltaev N, Cruz AA, et al. Allergic Rhinitis and its Impact on Asthma (ARIA) 2008 update (in collaboration with the World Health Organization, GA(2)LEN and AllerGen). *Allergy* 2008; 63: 8–160

15. Wilson DR, Torres Lima M, Durham SR. Sublingual immunotherapy for allergic rhinitis (Cochrane Review). *The Cochrane Library* 2004; 4
16. Valovirta E, Jacobsen L, Niggemann B, et al. A 3-year course of subcutaneous specific immunotherapy results in long-term prevention of asthma in children. Ten year follow-up on the PAT-study. *J Allergy Clin Immunol* 2006; 117: 721
17. Marogna M, Spadolini I, Massolo A, et al. Long-lasting effects of sublingual immunotherapy according to its duration: a 15-year prospective study. *J Allergy Clin Immunol* 2010; 126: 969–75
18. Mosbech H, Osterballe O. Does the effect of immunotherapy last after termination of treatment? Follow-up study in patients with grass pollen rhinitis. *Allergy* 1988; 43: 523–9
19. Gillissen A, Bergmann K-C, Kleine-Tebbe J, et al. Die spezifische Immuntherapie bei allergischem Asthma. *Dtsch Med Wochenschr* 2003; 128: 204–9
20. Cristoforo Incorvaia C, Mauro M, Ridolo E, et al. Patient's compliance with allergen immunotherapy. *Patient Preference and Adherence* 2008; 2: 247–51
21. Senna G, Ridolo E, Calderon M, et al. Evidence of adherence to allergen-specific immunotherapy. *Current Opinion in Allergy and Clinical Immunology* 2009; 9: 544–8
22. Zuberbier T, Lötval J. Allergies have a socioeconomic impact: a model calculation. *Allergy* 2008; 63: 612–21
23. Schulenburg JM von der, Greiner W, Molitor S, Kielhorn A. Kosten der Asthmatherapie nach Schweregrad: Eine empirische Untersuchung. *Medizinische Klinik* 1996; 91: 670–6
24. Brügggenjürgen B, Reinhold T, Brehler R, et al. Cost-effectiveness of specific subcutaneous immunotherapy in patients with allergic rhinitis and allergic asthma. *Annals of Allergy, Asthma and Immunology* 2008; 101: 316–24
25. Greiner W, Schulenburg JM von der, Gillissen A. Cost and benefits of specific immune therapy (SIT) of polling allergy patients with asthma and/or rhinitis. *Gesundh ökon Qual manag* 2002; 7: 179–86
26. Keiding H, Jorgensen KP. A cost-effectiveness analysis of immunotherapy with SQ allergen extract for patients with seasonal allergic rhinoconjunctivitis in selected European countries. *Current Medical Research and Opinion* 2007; 23: 1113–20
27. Märtens P, Lobermeyer K. Cost of disease analysis and cost effectiveness analysis of specific immunotherapy in asthma. *Allergo J* 2001; 10: 341–7
28. Schramm B, Ehlken B, Smala A, et al. Cost of illness of atopic asthma and seasonal allergic rhinitis in Germany: 1-yr retrospective study. *Eur Respir J* 2003; 21: 116–22
29. Claes C, Mittendorf T, Graf von der Schulenburg JM. Persistence and frequency of prescriptions of subcutaneous allergen-specific immunotherapy (SCIT) prescribed within the German statutory health insurance. *Med Klin* 2009; 104: 536–42
30. Hankin CS, Cox L, Bronstone A, Wang Z. Allergy immunotherapy: Reduced health care costs in adults and children with allergic rhinitis. *J Allergy Clin Immunol* 2013; 131: 1084–91