Research article

General Practitioners' and Trainees' Knowledge of the Asthma Guidelines in Germany: a cross-sectional Survey

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ABSTRACT

Background: Asthma treatment in Germany does not always comply with German treatment guidelines (AG) even though great importance is attached to medical guidelines worldwide. Suboptimal asthma management can lead to poor health outcomes. Barriers to guideline implementation and adherence must therefore be identified and analyzed. As 90% of asthma patients initially contact the German health system via a general practitioner (GP), GPs are pivotal to asthma care.

Objectives: As a determinant of compliance with AG, we investigated GPs' and GP trainees' knowledge of AG recommendations.

Methods: As part of a larger study, a cross-sectional survey on guideline knowledge was conducted in Lower Saxony and Bavaria, Germany. All GP trainees and a sample of GPs from both regions were invited to complete a questionnaire concerning asthma definition, clinical findings, diagnostic tests, differential diagnostics, treatment and prevention. Responses were analysed using descriptive and comparative statistics.

Results: Fifty percent of 585 GPs and GP trainees participated. Trainees attained a mean score of 57%. (Bavarian trainees scored 58% and Lower Saxon trainees 55%). GPs obtained 58%, without significant regional differences. Significant differences between GPs' and trainees' scores were observed in the areas of asthma definition, clinical findings and diagnostic tests. Both trainees and GPs performed best in differential diagnostics but least well in the fields of prevention and clinical findings.

Conclusion: Our results suggest suboptimal knowledge of all areas of the AG. More efforts should be made to implement the guidelines and improve the knowledge of GPs and GP trainees.

Keywords: Asthma, primary health care, public health

How this fits with quality in primary care

What do we know?

Despite the existence of international asthma guidelines, asthma treatment often does not follow guideline recommendations, resulting in insufficient asthma control and poor health outcomes.

What does this paper add?
We analyze and discuss the particularly problematic areas of asthma guideline knowledge in a population of fully qualified and trainee general practitioners in Germany. Deduced from our results we recommend further training to improve asthma guideline implementation, which could also be useful in other international healthcare systems.

BACKGROUND

Bronchial asthma is a common chronic inflammatory disease of the airways, characterized by airway hyper-responsiveness and variable and reversible airway obstruction.[1] According to the Global Initiative for Asthma (GINA) there are approximately 300 million asthmatics worldwide, with an additional 100 million predicted by 2025. Prevalence in Germany is approximately five and ten percent of the adult and pediatric populations, respectively.[2] As 90% of asthma patients initially consult a GP, GPs play key roles in asthma diagnosis and treatment.[3]

To improve asthma care, the American National Heart, Lung and Blood Institute and the WHO initiated GINA in 1993. The regularly updated asthma guidelines (AG) in Germany refer to international guidelines.[1]

Studies from several countries show that despite broad dissemination of guidelines, GPs' knowledge of asthma and its management is far from optimal.[4,5] To diagnose and treat asthma in line with guideline recommendations, GPs must be familiar with their content. This study therefore assesses GPs' and trainees' knowledge of asthma guidelines. The study design and some preliminary results were previously described in German by Lingner et al.[6]

Here, we detail GPs' and trainees' knowledge in key areas relating to asthma patient care.

Methods

A cross-sectional survey was conducted between August 2009 and December 2010 among GPs and GP trainees in Lower Saxony and Bavaria, Germany. An outline of the study method has been previously described[6].

Participants:

In Lower Saxony GPs were recruited via "quality circles" (GP groups meeting regularly to audit and discuss care quality) and in Bavaria via a continuous professional development event at the Institute of General Practice of the Technical University of Munich. Postgraduate trainees in general practice were recruited from the regional Association of Statutory Health Insurance Physicians' lists.

Instrument:

The survey was developed in several steps based on national and international questionnaires[5–7]

A selection of questions was checked in a pretest with three GPs and two medical students. The "Think aloud" technique was used to examine content and linguistic implications.[8] The difficulty of questions and the response distribution were determined and the questionnaire revised accordingly to achieve a medium difficulty level. The question sequence was tested by GPs in order to minimize the contextual influence of thought

processes on responses. The revised questionnaire was finally amended and approved by experts from the German Respiratory League (Atemwegsliga).

The questionnaire contained a demographic and an asthma specific section, comprising 15 separate questions and three practical case studies, each including two further questions. The following areas were covered: asthma definition, clinical findings, diagnostic tests, differential diagnostics, treatment and prevention. The questions were multiple choice with an undisclosed number of correct answers. The 127 available points were credited for correct answers and subtracted for incorrect or unmarked correct answers.

Non-Responder-Questionnaire:

In December 2010, all GP trainees in Lower Saxony were contacted again and asked to complete a non-responder questionnaire concerning demography and reasons for non-participation if they had not participated in the study.

Statistical analysis:

The responses obtained were entered into an EVASis database and analyzed by SPSS 16.0 (statistical package for the Social Sciences) for Windows using chi-square tests for categorical variables and t-tests and Mann-Whitney-U-tests for continuous variables. The statistical level of significance was set at 0.05.

RESULTS

All 157 Lower Saxon and 373 Bavarian GP trainees working in general practice between August 2009 and December 2010 were invited to participate in the study. The response rate was 46% in Lower Saxony and 45% in Bavaria (total 240). Thirty-six Lower Saxon GPs and 19 Bavarian GPs were also recruited. Demographic characteristics of participants are shown in Table 1. Thirty-seven percent of the 85 Lower Saxon trainees who declined to fill in the questionnaire returned the non-responder questionnaire.

The trainees achieved between 20% and 83% of the maximum score with an average of 57%. GPs scored similarly, with an average of 58%, ranging from 27% to 81% (p= 0.403, 95% CI -4.61 – 1.86) (Table 2)[6]

The Bavarian trainees scored significantly better (58%) than Saxon trainees (54%); p = 0.008, 95% CI -1.09 – -7.07) due to better scores in "definition" (p = 0.001), "findings" (p = 0.018) and "diagnosis" (p = 0.023) subsections (Table 3). While in Lower Saxony 37.5% of the participating trainees had worked in primary care for less than one year, 40.3% for one to two years and 19.2% for more than three years, the corresponding percentages for Bavarian trainees were 48.8%. 43.5% and 6.5% (p = 0.008) revealing significant differences in demography.

There were no significant demographic differences between GPs from the two areas. Moreover they achieved similar scores (Saxons 57% and Bavarians 61%). This difference is not

Table 1: Sociodemographic characteristics of GP trainees and GP participants.

	GPts (n=240)		GPs (n=55)	
	n	%	n	%
Location				
Bavaria	168	70.0%	19	34.5%
Lower Saxony	72	30.0%	36	65.5%
Gender				
Male	62	25.8%	41	74.5%
Female	178	74.2%	14	25.5%
Qualified				
< 5 Years	78	32.5%		
5 – 10 Years	116	48.3%		
> 10 Years	40	16.7%		
Missing	6	2.5%		
In practice				
< 3 Years			5	9.1%
3 – 7 Years			11	20.0%
8 – 14 Years			17	30.9%
> 14 Years			22	40.0%
Missing			0	0.0%
Training in general practice since …				
< 1 Year	109	45.5%		
1 – 2 Years	102	42.5%		
> 2 Years	25	10.4%		
Missing	4	1.7%		
Working currently in a …				
Individual practice	100	41.7%	19	34.5%
Group practice with other GPs	107	44.6%	28	50.9%
Other forms of practices	10	4.2%	5	9.1%
Interdisciplinary group practice	9	3.8%	2	3.6%
MVZ (outpatient clinic)	5	2.1%	0	0.0%
Missing	9	3.8%	1	1.8%

Table 2: GP trainees´ and GPs´ knowledge of different areas of the AG.

	GPts (n=240)			GPs (n=55)			p-Value	95% CI
%	Mean	SD	Median	Mean	SD	Median		
Total score	**56.65**	10.91	57.48	**58.02**	11.29	60.63	0.403	[-4.61;1.86]
Definition	**71.81**	27.04	66.67	**68.49**	28.27	66.67	0.435	*
Clinical findings	**50.42**	27.69	50.00	**46.36**	27.35	50.00	0.327	[-4.08;12.18]
Diagnostics	**52.83**	16.52	52.94	**50.54**	17.79	52.94	0.360	[-2.64;7.23]
Treatment	**57.55**	10.64	58.06	**58.68**	10.80	61.29	0.481	[-4.27;2.01]
Prevention	**44.90**	23.38	50.00	**49.09**	23.55	50.00	0.301	*
Differential diagnostics	**89.75**	26.83	100.00	**95.27**	19.99	100.00	0.130	*

For all variables marked with an asterisk (*), a t-Test was not carried out, but a Mann-Whitney-U-Test was conducted instead. There is, therefore, no entry for CI. Adapted from (11).

significant overall (p = 0.182, 95% CI -10.67 – 2.08), or for individual subject areas (Table 4). GPs established for less than three years achieved significantly better overall results (9.51% higher (p = 0.033)) than those practicing for more than 15 years,

Table 3: Knowledge of Lower Saxon versus Bavarian GP trainees.

%	GPts Lower Saxony (n=72)			GPts Bavaria (n=168)			p-Value	95% CI
	Mean	SD	Median	Mean	SD	Median		
Total score	**53.80**	12.48	54.33	**57.87**	9.96	58.67	0.008	[-7.07;-1.09]
Definition	**62.50**	29.57	66.67	**75.79**	24.93	66.67	0.001	*
Clinical findings	**43.98**	25.99	50.00	**53.17**	28.02	50.00	0.018	[-16.80;-1.58]
Diagnostics	**49.14**	18.32	52.94	**54.51**	15.47	52.94	0.023	[-9.81;-0.73]
Treatment	**56.43**	12.24	58.87	**58.04**	9.88	58.06	0.285	[-4.56;1.35]
Prevention	**42.36**	27.72	50.00	**45.98**	21.25	50.00	0.290	*
Differential diagnostics	**88.06**	28.81	100.00	**90.48**	25.99	100.00	0.476	*

For all variables marked with an asterisk (*), a t-Test was not carried out, but a Mann-Whitney-U-Test was conducted instead. There is, therefore, no entry for CI.

but the type of practice (individual, group or health care centre) had no effect (p = 0.548).

When asked to define asthma, trainees attained a mean of 72% and GPs 68% of possible points. Fifty-eight percent of GPs and 59% of trainees correctly indicated that asthma is a chronic inflammatory disease.

In questions concerning patient history and clinical findings, trainees obtained a mean of 50% and GPs 46% (p = 0.327, 95% CI -4.08 - 12.18). Symptoms generally omitted were faint or lack of breathing sounds during a severe asthma attack (not marked by 61.2% of trainees and 74.5 % of GPs); 39% of trainees and 51% of GPs wrongly expected to hear constant very loud wheezing during severe asthma attacks.

In the diagnostic procedures section trainees and GPs achieved means of 53% and 51% (p = 0.36, 95% CI -2.64 - 7.23). When suspecting asthma, over 90% of physicians correctly stated that spirometry and a reversibility test with a rapidly acting β2-agonist should be performed. Measuring circadian peak expiratory flow (PEF) variability or changes in forced expiratory volume (FEV_1) before and after exercise to confirm the diagnosis was, however, unknown to more than 50% of the GPs, and almost 92% of doctors did not indicate that a reversibility test with corticosteroids can also be used. A skin prick test with instant allergens was correctly identified as part of the allergy workup by 76% of trainees and 69% of GPs, but only 13% of all doctors knew that bronchial and conjunctival provocation tests can be additional components of allergy investigations.

The therapy section included questions on medication and alternative asthma treatments. Trainees achieved a mean of 58% and GPs 59% (p = 0.481, 95% CI -4.27 - 2.01) of the total. Most (96%) participating physicians correctly recognised that nicotine abstinence and patient education could improve symptoms. A similar number knew that asthma treatment should be individually adapted. Only 23% of trainees and 35% of GPs would, however, provide a written treatment plan to patients. When asked about maintenance therapy, almost all doctors correctly indicated that short-acting β2-agonists could be used for acute symptoms, and 96% of doctors would also utilize them for a mild to moderate asthma attack. For a moderate asthma attack, only 36% of the participating doctors knew that a systemic steroid (prednisolone equivalent) should be administered orally as quickly as possible.

Sixty percent of all participating doctors would prescribe antibiotics for asthma exacerbations even without clear evidence of an infection; 69% would incorrectly use mucolytics for long-term asthma treatment. Scores of less than 50% were achieved by both GPs and trainees when asked about tertiary prevention measures. Twenty-nine percent of responders believed incorrectly that short-acting β2-agonists reduce the number of asthma exacerbations. Only 34% recognized the possible administration of leukotriene receptor agonists such as Montelukast as correct.

Differentiating between asthma and COPD, trainees and GPs achieved means of almost 90% and 95% of the maximum score respectively.

Non-Responders

The GP trainees from Lower Saxony who completed the non-responder questionnaire (NR-GPts) and those who participated in the survey differed significantly in several demographic parameters. NR-GPts were more likely to be male (55% vs. 41%, p 0.009) and to stay as trainees for longer. Compared to the surveyed trainees, only 13.8% (vs 25.0%) and 31.0% (vs 52.8%) of the NR-GPts had graduated less than five or ten years previously, respectively, and 48.3% (vs 20.8%) had graduated 11 or more years ago (p = 0.012). Additionally, 51.7% of the NR-GPts, (vs 19.4% of those surveyed) had already worked for two or more years in a general practice, (p = 0.000).

CONCLUSIONS

Given the high individual and societal burden of asthma, attaining and maintaining optimal asthma control must be the goal of all asthma therapies, but has still not been sufficiently achieved.[1,9] The first point of contact for most asthma patients is the GP. As substantive knowledge of guidelines is one of the most important requirements for appropriate treatment, the aim of this study was to assess GPs' and trainees' knowledge regarding current national asthma guidelines.

Main findings

In our study GPs and trainees scored similar averages of 58% and 57% respectively when their knowledge of AG was assessed. The lowest scoring topics were prevention, clinical findings and diagnostics. The overall results indicate a need for

Table 4: Knowledge of Lower Saxon versus Bavarian GPs.

%	GPs Lower Saxony (n=36)			GPs Bavaria (n=19)			p-Value	95% CI
	Mean	SD	Median	Mean	SD	Median		
Total score	56.54	11.63	59.06	60.84	10.33	61.42	0.182	[-10.67;2.08]
Definition	70.37	26.16	66.67	64.91	32.34	66.67	0.699	*
Clinical findings	50.93	27.59	50.00	37.72	25.36	33.33	0.089	[-2.07;28.48]
Diagnostics	48.04	18.60	50.00	55.26	15.52	58.82	0.154	[-17.24;2.80]
Treatment	59.01	11.29	61.29	58.06	10.06	58.06	0.762	[-5.25;7.13]
Prevention	47.92	26.31	50.00	51.32	17.63	50.00	0.665	*
Differential diagnostics	97.78	13.33	100.00	90.53	28.57	100.00	0.225	*

For all variables marked with an asterisk (*), a t-Test was not carried out, but a Mann-Whitney-U-Test was conducted instead. There is, therefore, no entry for CI.

training or refresher training in almost all AG- areas.

Strengths and limitations of this study

The participating GPs all volunteered. As GPs from Lower Saxony were active in improving health care and those from Bavaria were recruited from a non-mandatory training course they may represent a subgroup with a particular interest in training and thus a comparatively high level of professionalism and knowledge. The relatively low number of participating GPs may restrict the generalizability of the findings to the wider GP population and also the validity of the regional comparison. Nevertheless the main body of participants in our study consists of the future GPs: the trainees. All GP trainees from Lower Saxony and Bavaria were invited to participate and a high proportion responded. Some selection bias, though, is suggested by demographic differences between survey participants and those who returned the non-responder questionnaire (5% of all trainees initially contacted). Nevertheless given the limitations described, our results seem most likely to overestimate the knowledge of GPs and trainees.

Interpretation of findings in relation to previously published work

Our findings are consistent with those from other countries. In a study from the USA, 720 doctors took a multiple-choice (MC) test on asthma pathophysiology, diagnosis and management before and after completing a training module. Before training, respondents achieved on average 54.2% of the maximum with lowest scores in the diagnostic section[4], which corresponds to our results. Dörschug et al. studied the AG knowledge of 108 hospital doctors, using MC tests. The physicians achieved a median score of 60%.[10] Pinnock et al. examined the asthma knowledge of 96 GPs in the UK. Over 11 questions, they achieved an average of 42%.[5] In another UK study with 1041 GPs, 70% of questions were answered correctly before the GPs participated in guideline-based training.[11] This study, however, was limited to occupational asthma guidelines.

Although the inflammatory origin of asthma has been known for two decades, in our survey more than 40% of doctors did not recognise asthma as a chronic inflammatory disease of the airways. This broadly agrees with a study from Pakistan in which approximately a third of respondents were unaware of this fact.[12]

One insufficiently implemented recommendation is the provision of a written medication plan to patients. In our survey slightly less than half of trainees and a little over half of GPs would provide such a plan. Although further improvement is needed, these results were better than in studies from Korea and Italy showing that only 5% and 26% of patients respectively were supplied with written asthma medication plans.[13,14]

Why is guideline knowledge not better? Lack of time to consult the guidelines during the working day has been identified as important.[15] Haque et al. found that physicians with less than 10 years' professional experience were most knowledgeable on AG.[12] This is consistent with the results of our study and can possibly be explained by the recent inclusion of guideline usage and evidence-based medicine in medical curricula. The uptake of recent recommendations by GPs who have been licensed to practice for 20 years or longer seems to be limited.[12] Doctors may tend to rely on knowledge gained during training and daily practice in their early professional years.

In addition to the age, sex and experience of the doctors, cooperation and professional relationships within a practice may also influence guideline implementation.[16] According to De Jong et al. GPs consulting guidelines tend to work in individual practices.[17] In our study, however, the type of practice did not affect the outcome.

Implications for future research, policy and practice

It is striking that all published studies on asthma knowledge show similar trends, although with differing samples, questionnaires and focuses. Our results and those of the L.I.S.A. study[7] suggest that GPs' asthma knowledge is not yet optimal in Germany, as seen in other countries.[4,5,10,12,131411] Similar results have also been found for guidelines in different medical specialisations e.g. for hypertension, heart failure and coronary heart disease.[18] General practitioners are expected to familiarise themselves with a plethora of different disease guidelines for their patients' management, which is not trivial. In the busy environment of a typical general practice, treatment decisions must often be rapid with little opportunity for reflection, and the value of consulting guidelines may not be recognised. Additionally, it should be noted that guidelines developed for clinical settings are not always directly applicable to a general practice. Schneider et al.[19] showed that coughing was less often associated with asthma in general practice compared with hospital and pneumologist practice settings.

Increased guideline adherence doubtless leads to improved treatment, as has been shown for other lung conditions.[20,21] Further efforts are therefore needed to identify effective guideline training, implementation and information management strategies.

To our belief, this is the only German survey assessing GPs' and trainees' knowledge of asthma guidelines.

The GPs' and trainees' knowledge is comparable to international standards. Given that theoretical knowledge of AG is likely to influence patient care, it can be anticipated that improving GPs' and trainees' knowledge in this area will be beneficial for patients.

Regular use of the guidelines requires familiarity with the use of evidence based medicine and readiness to critically question one's own diagnostic skills and treatment decisions. Although this behavior can be challenging and time consuming, particularly in light of the high number of different disease specific guidelines currently available, it is highly desirable.

Even considering that decisions made by GPs and trainees may differ from those predicted by their knowledge of the AG as assessed in this study, there is a need for improvement as sound knowledge forms the basis for skilled medical diagnosis and treatment of asthma in patients in the primary care setting.

DECLARATIONS

Ethical Approval:

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Conflict of Interest

There are no conflicts of interest.

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