



## Are there differences in the treatment information received to support guided self-management between asthma and allergy patients?: A community pharmacy survey in Finland



Juha Markus Heikkilä<sup>a,\*</sup>, Paula Bergman<sup>b</sup>, Juha Jantunen<sup>c</sup>, Johanna Salimäki<sup>d</sup>, Paula Kauppi<sup>e</sup>, Marika Pohjanoksa-Mäntylä<sup>a</sup>

<sup>a</sup> Division of Pharmacology and Pharmacotherapy, Faculty of Pharmacy, University of Helsinki, Helsinki, Finland

<sup>b</sup> Biostatistics Unit, University of Helsinki, Helsinki University Hospital, Helsinki, Finland

<sup>c</sup> South Karelia Allergy and Environment Institute, Imatra, Finland

<sup>d</sup> The Association of Finnish Pharmacies, Helsinki, Finland

<sup>e</sup> Skin and Allergy Hospital, Helsinki University Central Hospital, Helsinki, Finland

### ARTICLE INFO

#### Article history:

Received 18 January 2021

Received in revised form 22 June 2021

Accepted 22 June 2021

#### Keywords:

Asthma  
Allergy  
Anaphylaxis  
Allergic rhinitis  
Patient education  
Drug information

### ABSTRACT

**Background:** Guided self-management of asthma supported by health care professionals is a well-established approach. For allergy patients, there is less guidelines and evidence for guided self-management than for asthma patients.

**Objective:** The objective of this study was to find out how commonly asthma and allergy patients receive written action plans, how much and from which sources they receive treatment information to support their self-management, and to identify associated factors that may influence the support of guided self-management, and if there are any differences between these patients.

**Methods:** A nationwide survey was conducted in Finnish community pharmacies ( $n = 785$ ) in September 2016 targeting patients buying prescription medicines for asthma or allergies.

**Results:** Responses were received from 46% of targeted pharmacies. Around 73% of the asthma patients, 61% of patients at risk of anaphylaxis, and less than 50% of the other allergy patients had received a written action plan. The most common source of treatment information for both patient groups was pharmacists. Allergy patients sought information more from written sources than asthma patients. Older males and patients with lower education received less treatment information. About 10% of both asthma and allergy patients did not report receiving any treatment information.

**Conclusion:** The majority of asthma patients and allergy patients at risk of anaphylaxis had received a written action plan, while fewer than half of other allergy patients had received a written action plan. For both asthma and allergy patients, community pharmacists are the most common source of treatment information. Allergy patients seek more information from written sources than asthma patients. Pharmacists have a crucial role in the support of self-management for these patients.

### 1. Introduction

In asthma, with its varying symptoms, guided self-management supported by health care professionals is a well-established approach, which is recommended in clinical practice guidelines and strategies.<sup>1,2</sup> Guidelines recommend that asthma patients should be offered self-management education, skills and a written action plan supported by regular professional reviews.<sup>1,2</sup> A written action plan should be individual, help the patient to recognize symptoms and worsening of the disease, and include instructions for medication use and when and how to access medical help.<sup>1</sup> It is known that guided self-management of asthma can reduce hospitalization,

emergency room visits and unscheduled consultations and may lead to improved patient outcomes.<sup>3</sup>

There are relatively less self-management guidelines and recommendations for allergic diseases.<sup>4</sup> However, guided self-management supported by written action plans is recognized as important for allergy patients, and for example, there have been education programs for atopic dermatitis patients to support their self-management.<sup>5,6</sup> Additionally, the European Academy of Allergy and Clinical Immunology (EAACI) has established a Food Allergy and Anaphylaxis guideline to educate patients with a food allergy at risk of anaphylaxis and recommends providing them with an individual written action plan.<sup>7</sup>

\* Corresponding author.

E-mail address: [juha.markus.heikkila@gmail.com](mailto:juha.markus.heikkila@gmail.com) (J.M. Heikkilä).

There are plenty of studies reporting how often asthma patients receive written action plans.<sup>8–12</sup> Among allergy patients receipt of written action plans has been studied only in minor study settings.<sup>13,14</sup> To our knowledge, there are no previous studies comparing the receipt of written action plans of these two patient groups.

In Finland, since 1994 when the National Asthma Program began<sup>15,16</sup> which was later developed and continued by the National Allergy Program until 2018,<sup>17,18</sup> asthma patients and more recently allergy patients, have been particular concern and focus by health care professionals. The emphasis of these programs was on self-management guided by physicians, nurses and pharmacists.<sup>15–19</sup> Previous studies from Finland shows that at the population level, physicians and pharmacists are the main sources for treatment information.<sup>20</sup> Among asthma patients pharmacists<sup>21</sup> and primary care physicians and nurses<sup>22</sup> have been recognized as important sources for treatment information, while little is known about this among allergy patients.

The objectives of this study were to find out: how commonly asthma and allergy patients receive written action plans, how much and from which sources they receive treatment information to support their self-management, and to identify associated factors that may influence the amount and sources of treatment information. Another study objective was also to identify if there are differences between asthma and allergy patients.

## 2. Material and methods

### 2.1. Study design, population and data collection

The present study was part of a nationwide allergy and asthma survey targeting 5–75 -years old asthma and allergy patients buying prescription medicines from community pharmacies for their diseases during one week in September 2016. The survey was sent to all private pharmacies and to all subsidiaries of the University Pharmacy, in total 785 pharmacies. A non-binding recommendation was to receive a minimum of three responses per pharmacy.

The survey was developed by pulmonologists in the Skin and Allergy Hospital of Helsinki University. Survey included a verbatim translation of the validated RHINASTMA health-related quality of life questionnaire of 31 questions.<sup>23</sup> The survey and its prior versions were conducted earlier by Skin and Allergy Hospital of Helsinki University and Association of Finnish pharmacies in 1998, 2001, 2004 and 2010.<sup>15–19,24–26</sup>

In this study, the following questions were utilized 1) whether the patient had a physician-made diagnosis of asthma and/or rhinitis, atopic eczema, food allergy, anaphylaxis, 2) how often 31 specific asthma or allergy related symptoms disturb patients' regular lives (scale 1–5, 1 = not at all, 5 = very often), 3) whether a patient had received a written action plan for asthma or allergic disease 4) from which sources (a physician, a nurse, a pharmacist, a patient organization, courses, books and magazines, internet) the patient had received information to support self-management of the disease and to what extent (scale 0–3, 0 = not at all, 3 = a lot). Participants' demographic information (year of birth, sex, level of education, occupational status in the labour market, smoking status) was also collected.

### 2.2. Data analysis

The data were analyzed by using the Statistical Package for Social Sciences (SPSS for Windows Version 24.0, IBM Corporation, Armonk, NY, USA). Descriptive statistics were computed to show how many participants had physician diagnosed asthma or allergy.

An explorative factor analysis was conducted on 31 self-reported RHINASTMA questions in order to classify the patients into two groups: to those with mostly asthmatic symptoms and to those with mostly allergic symptoms. Factor scores obtained from the analysis were used to divide the

patients into current asthma and current allergy patients, according to whether the asthmatic symptom scores or allergic symptom scores were higher in the factor analysis. The procedure is described in more detail in Appendix A.

Descriptive statistics were computed to show how many asthma and allergy patients with a physician-made diagnosis had received a written action plan and from which sources, and to what extent current asthma and current allergy patients had received treatment information. More detailed descriptive statistics were computed to show how many patients with current asthma or allergy had not received treatment information, information only from other sources than health care professionals and information from health care professionals, divided by demographic variables. Group comparisons were made by using the Chi square test or Fisher's exact test for categorical variables and Mann-Whitney *U*-test or Kruskal-Wallis test for ordinal variables.

Multiple linear regression models were conducted to show if the demographic variables influenced the amount of treatment information received. A sum variable was created for current asthma patients and current allergy patients separately based on the amount of information received from different sources. The effects of these variables were tested with simple linear regression, Mann-Whitney *U*-test and Kruskal-Wallis -test when appropriate. Variables that had statistically significant associations with the amount of treatment information were further tested for the multiple linear regression model. Final models were based on the adjusted  $R^2$  and were then adjusted for age and sex. *P*-values < 0,05 were considered as statistically significant for all analyses.

### 2.3. Ethical consideration

The study was conducted in accordance with the Finnish National Advisory Board on Research Integrity guidelines and ethical approval (153/13/03/01/2010) for the survey was granted by the Ethical Committee of Helsinki University Hospital. Participants gave their consent to participate verbally to a pharmacist while visiting in a community pharmacy and answering the survey. All data were collected and analyzed anonymously.

## 3. Results

### 3.1. Participants

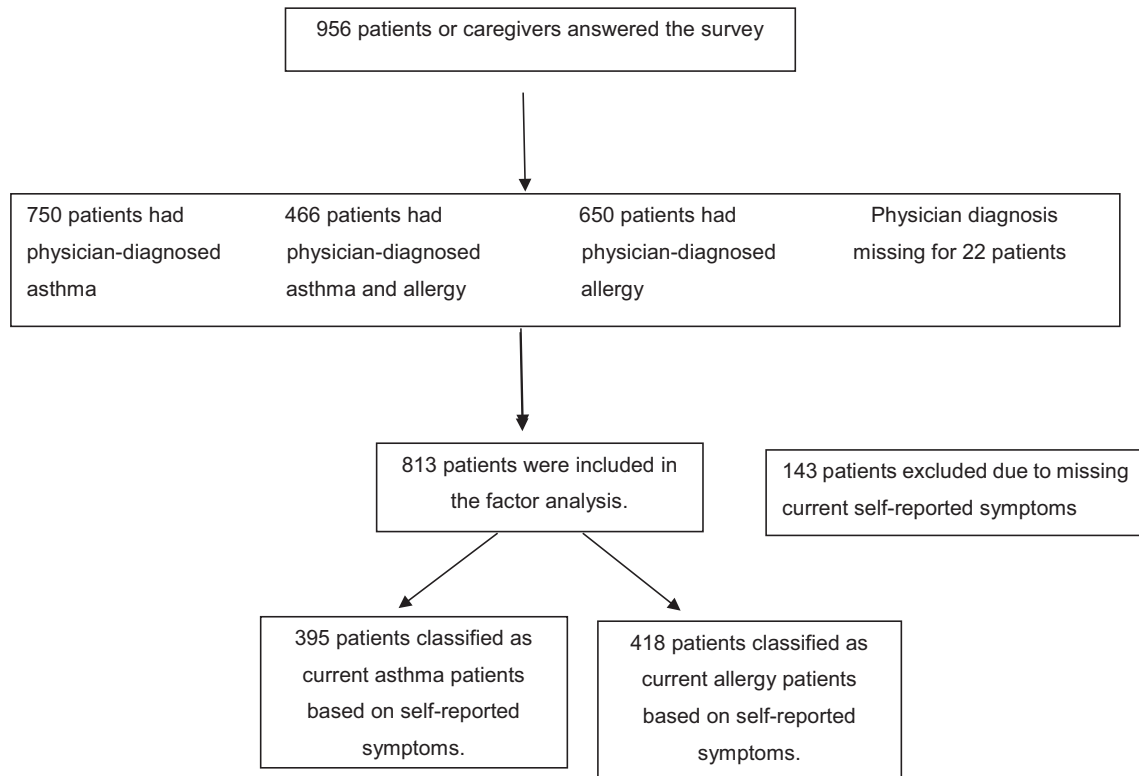
Responses were received from 360 pharmacies (46%) and in total from 956 patients buying prescription medicines. Among participants, 750 patients had asthma and 650 patients had an allergic disease diagnosed by a physician. (Fig. 1). According to the factor analysis, 395 participants were classified as current asthma patients and 418 patients as current allergy patients according to their self-reported symptoms.

The majority of both current asthma patients (74%) and current allergy patients (75%) were females (Table 1). Current asthma patients were older ( $p < 0,001$ ) and more educated ( $p < 0,001$ ) and more often ( $p = 0,013$ ) smokers than current allergy patients.

Among patients with a physician made diagnosis, 73% of asthma patients and 61% of patients at risk of anaphylaxis and less than 50% of patients with other allergic diseases had received an individual written action plan to support the self-management of their diseases. (Fig. 2).

The most common information sources among current asthma patients, to support the guided self-management, were pharmacists, physicians and nurses (Fig. 3). Among current allergy patients, pharmacists were the most common information source followed by internet and books and magazines. About three out of four of both current asthma (73%) and allergy patients (76%) reported to have received at least some information from pharmacists.

About 10% of current asthma (10%) and current allergy (9%) patients reported to have received no treatment information to support their self-management. (Table 2) In both patient groups, males and those with a



**Fig. 1.** A number of patients with physician-diagnosed asthma or allergy and a number of patients classified as current asthma or allergy patients based on their self-reported symptoms.

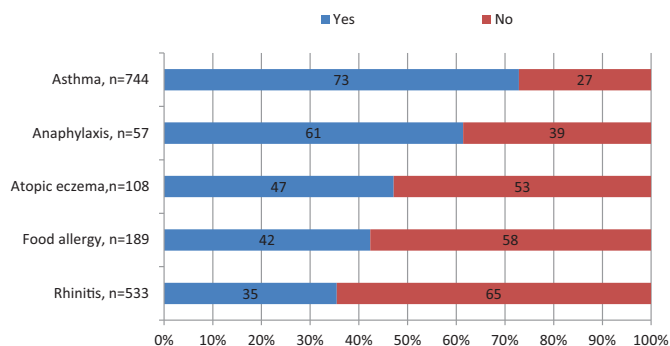
lower level of education and those out of working life seemed to receive less information. Among current allergy patients, differences between genders, educational groups and work life status groups were statistically significant.

The age groups were too small to draw statistically significant conclusions. Among current asthma patients there were no statistically significant differences in any of the demographic background variables between groups who

**Table 1**  
Characteristics of the current asthma and allergy patients included in the analysis (n = 813).

Variable	Current asthma patients n = 395 n (%)	Current allergy patients, n = 418 n (%)	p-value <sup>a,b</sup>
Gender			
Female	292 (73.9%)	312 (74.6%)	0.770 <sup>a</sup>
Male	103 (26.1%)	105 (25.1%)	
Information missing	0 (0.0%)	1 (0.2%)	
Age at the time of study (2016)			
5–15 years	16 (4.1%)	35 (8.3%)	<0.001 <sup>b</sup>
16–30 years	47 (11.9%)	63 (15.1%)	
31–45 years	54 (13.7%)	94 (22.5%)	
46–60 years	122 (30.9%)	120 (28.7%)	
61–75 years	156 (39.5%)	106 (25.4%)	
Level of Education			
Primary or secondary level education	115 (29.1%)	90 (21.5%)	<0.001 <sup>a</sup>
Post-secondary or tertiary level education	185 (46.8%)	167 (40.0%)	
Bachelor, Master or Doctoral level education	94 (23.8%)	160 (38.3%)	
Information missing	1 (0.3%)	1 (0.2%)	
Work life status			
Student	33 (8.4%)	52 (12.4%)	<0.001 <sup>a</sup>
In working life	174 (44.1%)	237 (56.7%)	
Outside working life (unemployed, retired or otherwise outside work life)	185 (46.8%)	120 (28.7%)	
Information missing	3 (0.8%)	9 (2.2%)	
Smoking status			
Non smoker	223 (56.5%)	280 (67.0%)	0.013 <sup>a</sup>
Current smoker	69 (17.5%)	54 (12.9%)	
Ex-smoker	98 (24.8%)	83 (19.9%)	
Information missing	5 (1.3%)	1 (0.2%)	

a = Chi square test, b = Mann-Whitney U -test.



**Fig. 2.** The percentage of patients with physician diagnosed asthma or allergic diseases who had received written action plans to support the self-management of their diseases.

had received no treatment information, had received information only from other sources than health care professionals and who had received information from health care professionals. (Table 2).

In the linear regression models, there were no significant outliers, the residuals were normally distributed and had constant variance. Among current asthma patients, males received statistically significantly ( $p = 0,004$ ) less information than females. (Table 3) Among current allergy patients, those who were younger, ( $p < 0,001$ ), female ( $p < 0,001$ ) and with a higher level of education ( $p = 0,036$ ) received more information for self-management than older, male and patients with lower levels of education.

**4. Discussion**

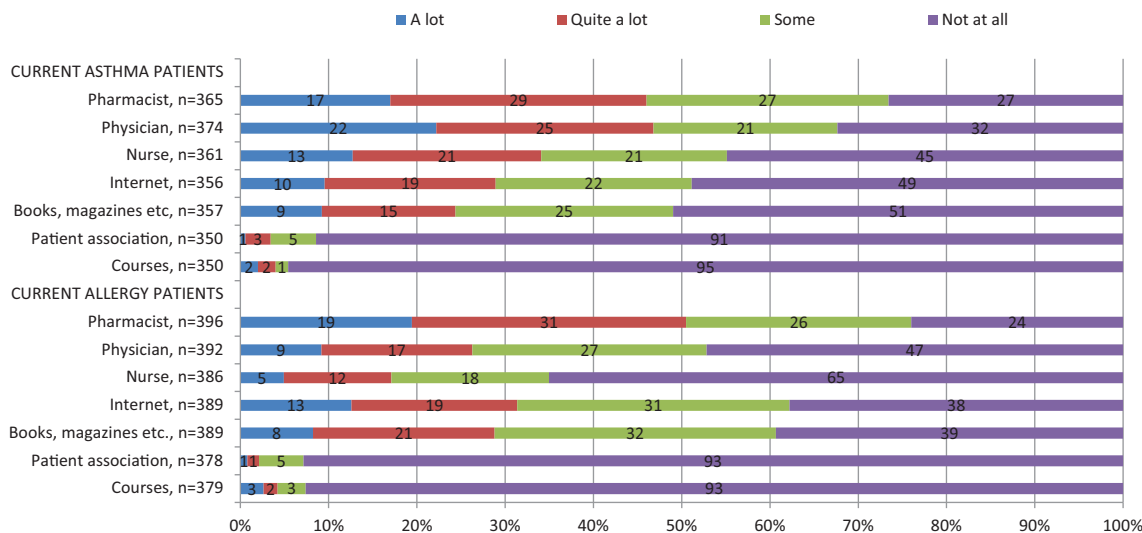
In this study, focusing on written action plans and received treatment information to support self-management of asthma and allergies, a considerable percentage of asthma patients (27%) and over 50% of atopic eczema (53%), food allergy (58%) and rhinitis (65%) patients had not received written action plans. In line with previous studies<sup>20,21</sup> this study identified healthcare professionals as the main sources of treatment information. Similarly, with previous studies<sup>21</sup> the amount of information received varied between different age groups and according to gender.

In our study, 73% of asthma patients received a written action plan which is slightly more compared with previous studies, which might be due to the recent national level programs in Finland focusing on respiratory diseases.<sup>15-19</sup> As a comparison, in the United States, 34% of children and 26% of adults who visited emergency department due to asthma had a

written action plan.<sup>8</sup> In Australia, 37% of adult and 47% of pediatric asthma patients had received a written action plan from primary health care<sup>9</sup> and more recently, it was found that only 17% of adult asthma patients had received a written action plan in Australia.<sup>10</sup> In the UK, only 23% of asthma patients had received a written action plan due, for example, to the lack of knowledge and resources and health care professionals' doubts of self-management education in primary care.<sup>12</sup> From the patient perspective, knowledge of the guided self-management of asthma is crucial when, during a 12-year follow-up in Finland, it was found that 66% of adult asthma patients had partially controlled or uncontrolled asthma.<sup>27</sup> In Finland, with e-prescriptions valid for two years, the number of controls of chronic diseases have reduced and the importance of guided self-management among asthma patients may have an even bigger impact than earlier. It is known that patients found written action plans useful in the treatment of asthma.<sup>28</sup>

Based on our findings, fewer patients with allergies other than those at risk of anaphylaxis have not received written action plans, suggesting that despite the evidence of clinical practice guidelines<sup>7</sup> and the national level public health program,<sup>17,18</sup> there is still room for improvement. From the patient perspective, it is well known that health outcomes are better among those patients who have consulted an allergy or respiratory specialist compared to those who have not.<sup>29</sup> Additionally, there is evidence from patient education programs to support allergy patients' guided self-management,<sup>5,6</sup> and shared decision making between the physician and asthma patient has shown an increase in medication adherence.<sup>30</sup> Therefore structural interventions supporting guided self-management for allergy patients could be beneficial.

Our study results align with findings from previous studies that show health care professionals, especially pharmacists, are the most common sources of treatment information for patients,<sup>20,21</sup> also for asthma and allergy patients. However, our study shows that not all patients receive treatment information. About 10% of both current asthma and current allergy patients reported to have received no treatment information. This finding is in line with findings from Finland where the number of patients who recall not having medicines information has risen from 4% to 28% from 1999 to 2014.<sup>20</sup> It is important to reach these asthma and allergy patients by alternative methods, for example, utilizing new digital personalized tools. This is supported by our finding that allergy patients are seeking information from books and the internet. For asthma patients there are mobile health apps reminding to take medications and to purchase refills, but also to record clinical and functional endpoints like symptoms or peak expiratory flow (PEF).<sup>31</sup> Digital tools have been also used for example to patient education, symptom tracking and pollen forecasts.<sup>32</sup>



**Fig. 3.** The amount of information received by current asthma ( $n = 395$ ) and current allergy patients ( $n = 418$ ) from health care professionals and other information sources to support the self-management of their diseases.

**Table 2**

Number of current asthma patients and current allergy patients who had not received any information on treatment of asthma and allergy, had received information only from other sources than health care professionals and had received information from health care professionals calculated according to background demographic variables.

Variable	Current asthma patients (n = 345) (missing responses for the received information n = 50)			p-value	Current allergy patients (n = 371) (missing responses for the received information, n = 47)			p-value
	Asthma patients who received no information n = 36 (10.4%)	Asthma patients who received information from other sources than HCPs n = 21 (6.1%)	Asthma patients who received information from HCPs n = 288 (83.5%)		Allergy patients who received no information n = 34 (9.2%)	Allergy patients who received information from other sources than HCPs n = 27 (7.3%)	Allergy patients who received information from HCPs n = 310 (83.6%)	
Gender								
Female	25 (69.4%)	18 (85.7%)	216 (75.0%)	0.390 <sup>a</sup>	20 (58.9%)	24 (88.9%)	231 (74.5%)	0.0026 <sup>a</sup>
Male	11 (30.5%)	3 (14.2%)	72 (25.0%)		14 (41.2%)	3 (11.1%)	78 (25.1%)	
Missing	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)	1 (3.2%)	
Age at the time of study								
5–15 years	0 (0%)	0 (0%)	15 (5.2%)	0.135 <sup>b</sup>	0 (0%)	0 (0%)	31 (10.0%)	<0.001 <sup>b</sup>
16–30 years	7 (19.4%)	1 (4.7%)	35 (12.1%)		2 (5.9%)	4 (14.9%)	52 (16.7%)	
31–45 years	7 (19.4%)	3 (14.2%)	38 (13.2%)		7 (20.6%)	5 (18.5%)	77 (24.9%)	
46–60 years	10 (27.8%)	5 (23.8%)	91 (31.6%)		8 (23.5%)	9 (33.4%)	93 (30.0%)	
61–75 years	12 (33.4%)	12 (57.1%)	109 (37.8%)		17 (50.0%)	9 (33.4%)	57 (18.4%)	
Level of Education								
Primary education	6 (16.6%)	6 (28.5%)	85 (29.5%)	0.612 <sup>a</sup>	8 (23.5%)	3 (11.1%)	69 (22.2%)	0.025 <sup>a</sup>
Post-secondary or tertiary level	20 (55.5%)	10 (47.6%)	132 (45.8%)		19 (55.8%)	16 (59.2%)	113 (36.5%)	
Bachelor, Master or Doctorate level	10 (27.8%)	5 (23.8%)	70 (24.3%)		7 (20.5%)	8 (29.6%)	128 (41.3%)	
Missing	0 (0%)	0 (0%)	1 (0.3%)		0 (0%)	0 (0%)	0 (0%)	
Work life status								
Student	2 (5.6%)	0 (0%)	28 (9.7%)	0.169 <sup>c</sup>	0 (0%)	2 (7.4%)	46 (14.9%)	0.005 <sup>c</sup>
In work life	18 (50.0%)	6 (28.5%)	130 (45.1%)		18 (52.9%)	15 (55.5%)	184 (59.3%)	
Outside of work life	16 (44.4%)	15 (71.4%)	128 (34.7%)		16 (47.1%)	10 (37.0%)	72 (23.2%)	
Missing	0 (0%)	0 (0%)	2 (0.7%)		0 (0%)	0 (0%)	8 (2.6%)	
Smoking status								
Non-smoker	23 (63.8%)	11 (52.4%)	164 (56.9%)	0.705 <sup>a</sup>	164 (56.9%)	15 (55.5%)	213 (68.7%)	0.238 <sup>c</sup>
Current smoker	7 (19.4%)	3 (14.3%)	49 (17.0%)		49 (17.0%)	7 (25.9%)	37 (11.9%)	
Ex-smoker	6 (16.6%)	7 (33.1%)	73 (25.3%)		73 (25.3%)	5 (18.5%)	59 (19.0%)	
Information missing	0 (0%)	0 (0%)	2 (0.9%)		2 (0.9%)	0 (0%)	1 (0.3%)	

a = Chi square test, b = Kruskal-Wallis test, c = Fisher's exact test.

For allergy patients, the pharmacist can be the only health care professional interacted with, because many of the medicines for mild and seasonal allergies are available without prescription in Finland. Therefore, some patients with allergies might seek help from pharmacists only despite the physician made diagnosis. The role of pharmacists for rhinitis patients is important, because it was found that majority of these patients select sub-optimal medications if not advised.<sup>33</sup> Similarly for asthma patients, pharmacists may be the most frequently seen health care professional, because a pharmacy is visited frequently due to the reimbursement system for medications. Specific interventions by community pharmacists can support the guided self-management of respiratory diseases.<sup>34</sup> Interventions for asthma patients have included, for example, medication counselling on dosage and inhaler techniques, and maintaining patients' adherence to medication, resulting in positive patient outcomes.<sup>34</sup> These kinds of interventions could be valuable also among allergy patients.

The asthma-related medication counselling in community pharmacies in Finland has been considered to be of better quality by the pharmacists than by the patients.<sup>19</sup> Medication counselling by pharmacists for COPD patients has been found to focus mainly on the medicinal product and not to be individually tailored or patient oriented.<sup>35</sup> According to recent studies, only about 50% of Finnish community pharmacists report having knowledge of smoking cessation and COPD clinical guidelines.<sup>35,36</sup> Continuing education on supporting patients' self-management is needed not only for pharmacists but also for other health care professionals to better implement

the clinical practice guidelines. Furthermore, interprofessional cooperation between health care professionals is needed to confirm that all asthma and allergy patients receive treatment information from their health care professionals throughout the medication use process.

#### 4.1. Strengths and limitations

To our knowledge this is the first study comparing how commonly asthma and allergy patients receive written action plans and treatment information. The survey was sent to all Finnish community pharmacies, and thus, the results represent a nationwide situation. Within the survey, females were slightly overrepresented, which might create a minor bias in the results. The response rate was 46% which is in line with recent surveys in Finnish community pharmacies.<sup>35</sup> The survey was completed in pharmacy during a customer visit, which might have influenced responders' answers concerning pharmacists as an information source. The study focused on identifying patients who had received written action plans, and their sources of treatment information. There are no data on frequency and content of received information available.

#### 4.2. Implications and future studies

Our study identified that asthma patients may get slightly more support for the self-management of their disease than allergy patients. Similar kinds



**Table 3**

Results of the linear regression analysis concerning the demographic variables of the current asthma and allergy patients having an association with the information received by patients to support self-management of their diseases.

Variable	Regression coefficient (95% CI)	p-value
Current asthma patients		
Age, years	−0.01 (−0.05; 0.02)	0.45
Gender: male	−1.39 (−2.33; −0.45)	0.004
Gender: female	Ref.	
Working life status: student	Ref.	
Working life status: in work life	0.79 (−0.90; 2.49)	0.36
Working life status: outside of work life	−0.02 (−2.04; 2.00)	0.98
R2 for the model: 0.034		
Current allergy patients		
Age, years	−0.05 (−0.07; −0.03)	< 0.001
Gender: male	−1.44 (−2.24; −0.64)	< 0.001
Gender: female	Ref.	
Education: primary education	−0.98 (−1.89; −0.06)	0.04
Education: post-secondary or tertiary level	−0.55 (−1.31; 0.21)	0.15
Education: bachelor, master or doctorate level	Ref.	
R2 for the model: 0.079		

of interprofessional approaches and practices to support self-management, which are recommended by guidelines<sup>1,2,7</sup> and are well-established among asthma patients, should be conducted among allergy patients.

Further studies from a patient perspective would be needed to identify preferred methods and media to receive support for the self-management of asthma and allergy patients. With an interventional study set especially among allergy patients on primary health care and community pharmacy level, the possible economical and qualitative outcomes for patients could be verified.

## 5. Conclusions

The majority of asthma patients and allergy patients at risk of anaphylaxis had received a written action plan. However, fewer than half of the other allergy patients had received a written action plan. The most common source of treatment information for both patient groups was pharmacists. Elderly males, and those with a lower level of education, might receive less information compared to younger females with a higher level of education. In this study, allergy patients received information more from written sources than asthma patients. About 10% of both asthma and allergy patients reported to have received no treatment information. Pharmacists have a crucial role in the support of self-management for these patients while dispensing medicines.

## Author contributions

All authors have substantial contributions to the conception and design, acquisition of data and analysis and interpretation of data. JH is the corresponding author and he has been the key person in the planning of data analyses and drafting the manuscript. PB has performed statistical data analyses. PK has designed and conducted the 2010 and 2016 surveys and participated in the planning of data analyses, drafting and finalizing the manuscript. MP-M has participated in the planning of data analyses, drafting and finalizing the manuscript. JS has participated in conducting the surveys in 2010 and 2016 and revising and finalizing the manuscript. JJ has participated in revising and finalizing the manuscript.

## Conflict of interest statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. JH has been an employee of AstraZeneca Oy since August 2019. The other authors report no conflicts of interest in this work.

## Acknowledgments

The authors gratefully acknowledge the participants of the survey. Community pharmacies that participated in the survey and the Association of Finnish Pharmacies delivering the survey are gratefully acknowledged. We sincerely thank professor emeritus Tari Haahtela for his support of the survey.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rcsop.2021.100040>.

## References

- Global Initiative for Asthma (GINA). *Global Strategy for Asthma Management and Prevention*. 2020. Available <https://ginasthma.org/gina-reports/> Accessed 29<sup>th</sup> October 2020.
- Working group appointed by the Finnish Medical Society Duodecim, the Finnish Respiratory Society, the Finnish Paediatric Society and the Finnish Society of Clinical Physiology. Current care guideline of asthma. Available: <http://www.kaypahoito.fi/web/kh/suosituksset/suositus?id=hoi06030> 2012. Accessed 29<sup>th</sup> October 2020.
- Pinnock H, Parke H, Pnagiotti M, RECURSIVE groups, et al. Systematic meta-review of supported self-management for asthma: a healthcare perspective. *BMC Med* 2017;15:64.
- Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions. *Patient Educ Couns* 2002;48:177–187.
- Stalder JF, Bernier C, Ball A, et al. Oriented patient-education network in dermatology (OPENED). Therapeutic patient education in atopic dermatitis: worldwide experiences. *Pediatr Dermatol* 2013;30:329–334.
- van Os-Medendorp H, van Leent-de Wit I, de Bruin-Weller M, Knulst A. Usage and users of online self-management programs for adult patients with atopic dermatitis and food allergy: an explorative study. *JMIR Res Protoc* 2015;4(2), e57.
- Muraro A, Werfel T, Hoffmann-Sommergruber K, et al. EAAACI food allergy and anaphylaxis guidelines group. EAAACI food allergy and anaphylaxis guidelines: diagnosis and management of food allergy. *Allergy* 2014;69:1008–1025.
- Camargo CA, Caitlin Jr R, Reed AA, et al. A prospective multicenter study of written action plans among emergency department patients with acute asthma. *J Asthma* 2009;46:532–538.
- Sulaiman N, Aroni R, Thien F, et al. Written asthma action plans (WAAPs) in Melbourne general practices: a sequential mixed methods study. *Prim Care Resp J* 2011;20:161–169.
- Tan DJ, Burgess JA, Perret JL, et al. Non-pharmacological management of adult asthma in Australia: cross-sectional analysis of a population-based cohort study. *J Asthma* 2020;57:105–112.
- Yawn BP, Rank MA, Cabana MD, Wollan PC, Juhn YJ. Adherence to asthma guidelines in children, tweens, and adults at primary care settings: a practice-based network assessment. *Mayo Clin Proc* 2016;91:411–421.
- Wiener-Ogilvie S, Pinnock H, Huby G, Sheikh A, Partridge MR, Gillies J. Do practices comply with key recommendations of the British asthma guideline? If not, why not? *Prim Care Resp J* 2007;6:369–377.
- Sauder MB, McEvoy A, Sampson M, et al. The effectiveness of written action plans in atopic dermatitis. *Pediatr Dermatol* 2016;33:e151–e153.
- Pulcini JM, Sease KK, Marshall GD. Disparity between the presence and absence of food allergy action plans in one school district. *Allergy Asthma Proc* 2010;31:141–146.
- Selroos O, Kupeczyk M, Kuna P, et al. National and regional asthma programmes in Europe. *Eur Respir Rev* 2015;24:474–483.
- Haahtela T, Tuomisto LE, Pietinalho A, et al. A 10 year asthma programme in Finland: major change for the better. *Thorax* 2006;61:663–670.
- Haahtela T, von Hertzen L, Mäkelä M, Hannuksela M. Allergy Programme working group. Finnish allergy Programme 2008–2018: time to act and change the course. *Allergy* 2008;63:634–645.
- Haahtela T, Valovirta E, Saarinen K, Allergy Program Group, et al. The Finnish Allergy Program 2008–2018: Society-wide proactive program for change of management to mitigate allergy burden. *J Allergy Clin Immunol* 2021;5. S0091–6749(21)00559–5.
- Mononen A, Niskanen A, Nummi S, et al. Appteekien astmaohjelman seurattatutkimukset [implementation of the National Asthma Programme in Finnish community Pharmacies]. *Dosis* 2010;27:100–113. [In Finnish].
- Mononen N, Airaksinen MSA, Hämeen-Anttila K, Helakorpi S, Pohjanoksa-Mäntylä M. Trends in the receipt of medicines information among Finnish adults in 1994–2014: a nationwide repeated cross-sectional survey. *BMJ Open* 2019;9, e026377.
- Peura S, Jantunen J, Salimäki J, Leinonen L, Haahtela T, Kauppi P. Is pharmacy personnel a significant source of information for patients with asthma? *Dosis* 2019;35:105–115.
- Raynor DK, Savage I, Knapp P, Henley J. We are the experts: people with asthma talk about their medicine information needs. *Patient Educ Couns* 2004;53:167–174.
- Baiardini I, Pasquali M, Giardini A, et al. Rhinasthma: a new specific QoL questionnaire for patients with rhinitis and asthma. *Allergy* 2003;58:289–294.
- Kauppi P, Peura S, Salimäki J, Järvenpää S, Linna M, Haahtela T. Reduced severity and improved control of self-reported asthma in Finland during 2001–2010. *Asia Pac Allergy* 2015;5:32–39.
- Jantunen J, Haahtela T, Salimäki J, et al. Multimorbidity in asthma, allergic conditions and COPD increase disease severity, drug use and costs: the Finnish pharmacy survey. *Int Arch Allergy Immunol* 2019;179:273–280.

26. Salo T, Peura S, Salimäki J, Maasilta P, Haahtela T, Kauppi P. Need for medication and stuffy nose predict the severity of allergic rhinitis. *Asia Pac Allergy* 2016;6:133–135.
27. Tuomisto LE, Ilmarinen P, Niemelä O, Haanpää J, Kankaanranta T, Kankaanranta H. A 12-year prognosis of adult-onset of asthma: Seinäjoki adult asthma study. *Respir Med* 2016;117:223–229.
28. Douglass J, Aroni R, Goeman D, et al. A qualitative study of action plans for asthma. *BMJ* 2002;324:1–5.
29. Zeiger RS, Schatz M. Effect of allergist intervention on patient-centered and societal outcomes: allergists as leaders, innovators, and educators. *J Allergy Clin Immunol* 2000;106:995–1018.
30. Blaiss MS, Steven GC, Bender B, Bukstein DA, Meltzer EO, Winders T. Shared decision making for the allergist. *Ann Allergy Asthma Immunol* 2019;122:463–470.
31. Matricardi PM, Dramburg S, Alvarez-Perea A, et al. The role of mobile health technologies in allergy care: an EAACI position paper. *Allergy* 2020;75:259–272.
32. Bousquet J, Ansotegui LJ, Anto JM, et al. Mobile technology in allergic rhinitis: evolution in management or revolution in health and care? *J Allergy Clin Immunol Pract* 2019;7:2511–2523.
33. Tan R, Cvetkovski B, Kritikos V, et al. The burden of rhinitis and the impact of medication management within the community pharmacy setting. *J Allergy Clin Immunol Pract* 2018;5:1717–1725.
34. Milosavljevic A, Aspden T, Harrison J. Community pharmacist led intervention and their impact on patient's medication adherence and other health outcomes: a systematic review. *Int J Pharm Pract* 2018;26:387–397.
35. Heikkilä JM, Parkkamäki S, Salimäki J, Westermarck S, Pohjanoksa-Mäntylä M. Community pharmacists' knowledge of COPD, and practices and perceptions of medication counseling of COPD patients. *Int J COPD* 2018;13:2065–2074.
36. Kurko T, Linden K, Pietilä K, Sandström P, Airaksinen M. Community pharmacists' involvement in smoking cessation: familiarity and implementation of national smoking cessation guideline in Finland. *BMC Public Health* 2010;10:444.