

Use of an online self-management training for patients with atopic dermatitis or food allergy: a cross-sectional study

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ABSTRACT

Title Use of an online self-management training for patients with atopic dermatitis (AD) or food allergy (FA): a cross-sectional study.

Background For chronically ill patients, technological self-management systems could provide a practical method of monitoring their condition. For most eHealth interventions, participant attrition is a problem. Increasing the diffusion of eHealth requires a better understanding of factors that are related to usage of eHealth.

Aim and research question The aim of this study was to explore use and influencing factors of two online self-management programs for patients with AD or FA. Research questions were: What is the usage of both programs and the main features within the program? Which demographic and disease-related factors are related to usage?

Method This quantitative study consisted of two parts; a prospective cohort, and cross-sectional part, to measure usage and identify patient characteristics. Data were collected with a questionnaire composed of the heiQ (self-management), ISDL (disease severity), DLQI or FAQLQ – AF (quality of life) and usage log files.

Results Forty percent of registered patients (n = 441) did not log in. Of patients who logged in, 56% used the training once. Furthermore heiQ domain 7; social integration and support, was related to use of both programs (AD (n=48): $\rho = -.368$, $p = .012$; FA (n = 43): $\rho = -.380$, $p = .01$), age is related in AD patients ($\rho = .482$, $p = .001$). Regression demonstrated age as predictive variable in AD training (B = .070, $p = .003$) and social integration and support for FA training (B = -2.173, $p = 0.047$).

Conclusion This study demonstrated that 60% of all patients logged in, but over half of these patients used the program only once. Possible predictive variables of use were a higher age and lower social support.

Recommendations Further research should focus on reasons for (non)-usage using qualitative methods to understand attrition and adherence.

Keywords: Atopic dermatitis, Food allergy, self-management, eHealth, usage

SAMENVATTING

Titel Gebruik van een online zelfmanagement training voor patiënten met constitutioneel eczeem (CE) of voedselallergie (VA): een cross-sectionele studie.

Inleiding Technologische zelfmanagement systemen kunnen voor chronisch zieke patiënten een praktische manier bieden om hun ziekte te begrijpen en monitoren. Voor veel eHealth interventies is uitval onder patiënten een probleem. Uitbreiding van verspreiding van eHealth interventies vereist een beter begrip van factoren die inzicht geven in gebruik van eHealth technologieën.

Doel en Onderzoeksvraag Het doel van dit onderzoek was om het gebruik van twee online zelfmanagement trainingen en factoren die dit beïnvloeden, te onderzoeken. De onderzoeksvragen waren: Wat is het gebruik van beide programma's en de verschillende elementen? Welke demografische en ziektegerelateerde factoren zijn gerelateerd aan het gebruik?

Methode Deze kwantitatieve studie bestond uit twee delen; een prospectief cohort en een cross-sectioneel deel, om gebruik te meten en patiëntenkenmerken te identificeren. Onderzoeksinstrumenten waren: een vragenlijst samengesteld uit de heiQ (zelfmanagement), ISDL (ziekte ernst), DLQI, FAQLQ - AF (kwaliteit van leven) en logbestanden.

Resultaten Van alle geregistreerde patiënten (n = 441) logde 40% niet in. Van de patiënten die wel inlogde, gebruikte 56% de training eenmaal. Daarnaast was sociale integratie en steun gerelateerd aan gebruik van beide programma's (CE (n = 48): $\rho = -.368$, $p = 0,012$; VA (n = 43): $\rho = -.380$, $p = .01$) en leeftijd bij patiënten met CE ($\rho = 0,482$, $p = .001$). Regressieanalyse toonde leeftijd als voorspellende variabele in CE ($B = 0,070$, $p = .003$) en sociale integratie + steun voor VA ($B = -2,173$, $p = 0.047$).

Conclusie Deze studie toonde aan dat 60% van alle patiënten inlogde om de training te gebruiken, maar meer dan helft hiervan gebruikte de training n keer. Mogelijke voorspellende variabelen van gebruik waren: een hogere leeftijd en lagere sociale steun.

Aanbevelingen Verder onderzoek moet zich richten op de redenen van (niet) gebruik door een kwalitatieve onderzoeksoptzet.

Trefwoorden: Constitutioneel eczeem, voedselallergie, zelfmanagement, eHealth, gebruik

INTRODUCTION

Atopy refers to the genetic tendency to develop allergic diseases such as atopic dermatitis and asthma. Atopy is typically associated with increased immune responses to common allergens, like food allergens (1).

Atopic dermatitis (AD) is a chronic inflammatory pruritic skin disease, with periods of exacerbations and remissions. AD occurs primarily in children, but cases in adulthood as well as adult late-onset AD occur (2,3). AD affects between 2% and 15% of adults in industrialized countries (4,5).

Food allergy (FA) is 'an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food' (6). It affects 3% to 4% of adults (7-9). Food-induced allergic reactions are responsible for a variety of symptoms involving the gastrointestinal and respiratory tract, and the skin.

For patients with a chronic condition, technological self-management systems could provide a practical method of understanding and monitoring their condition, as well as a counselling function to achieve a lasting behaviour change (10). Self-management is defined as the individual's ability to manage symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition (11). Previous studies have shown that eHealth technologies contribute positively to healthcare for patients with a chronic illness, realizing increased patient-provider communication, positive impact on behaviour change, improved therapy adherence, increased empowerment and cost reductions (12-15). In the Netherlands, two online self-management programs are online since May 1, 2011. These programs are based on scientific guidelines and professional experience for patients with AD or FA and is additional to the care of the general practitioner (GP) or medical specialist. By attending this online training, patients learn to better cope with their condition, with the effects of their illness on daily life, and executing the prescribed treatment (16,17). Both programs consists of several modules with information, patient experience stories, videos and exercises.

In 2010, a feasibility study (18) on the self-management programs for adults took place to explore the usefulness and ease of use of the training. This was based on the Technology Acceptance Model (TAM) developed by Davis (19). According to TAM the perceived usefulness and perceived ease of use predict the acceptance and use of technology. The feasibility evaluation showed that patients and caregivers find the online training useful and easy to use and appreciated the content of the training. However, the feasibility study was carried out in a small sample of patients and caregivers (18). Despite these positive findings, clinical practice shows that patients hardly login.

Improved healthcare services depend on the ability and the acceptance of recipients to use eHealth interventions in order to fully utilize the possibilities of the interventions (20). But attrition rates of 40%–50% are not uncommon in eHealth interventions (21).

PROBLEM STATEMENT

To optimize usage of eHealth, it is necessary to explore and analyse user acceptance. For most eHealth interventions participant attrition, in the form of dropouts and losses to follow-up, is a problem. Increasing the diffusion of eHealth technologies requires a better understanding of the factors that provide insights into the usage of the interventions.

AIM AND RESEARCH QUESTIONS

The primary aim of this study is to explore the use of the online self-management training “Living with eczema” and “Living with food allergy” in order to increase and optimize the use of the training. The secondary aim is to investigate the factors related to the use of the training. The following research questions were formulated:

- What is the usage of the online self-management training “Living with eczema” and “Living with food allergy” and which main features within the training are used by adult patients?
- Which demographic and disease-related factors are related to use of the online self-management training “Living with eczema” and “Living with food allergy” for adult patients with AD and FA?

MATERIAL AND METHODS

Design

This study consisted of two parts. First a cross-sectional part, which included patients who received an account between the launch of both programs and May 2013 and provided informed consent (IC). The second part, a prospective cohort, consisted of patients who provided IC from December 2012 to April 2013.

Study participants and recruitment

The study population consisted of adult patients with AD or FA referred to the online training “Living with eczema” or “Living with food allergy”. Patients were included in the study if they spoke Dutch, and had access to the Internet. Patients were enrolled in the programs by GPs, medical specialists, dieticians or nurses and had three months to complete the training. IC was asked at the start of the training through a letter and was incorporated as a link in the webpage of the training. The questionnaires used in this study were integrated in the training.

All registered patients since the start of the programs were included to measure the number of log-ins, gender and who referred them to the training. To investigate patient characteristics and number of log-ins, all patients who provided IC since the start of the programs were included. To examine usage of the core features of the training and patient characteristics, patients were recruited from the participants of both online self-management programs between December 2012 and April 2013. Patients were followed at least one month with a maximum of three months.

The Medical Research Ethics Committee (MREC) of UMC Utrecht reviewed the study, and indicated that the study was not subject to the WMO.

Data collection and variables

To explore the patients demographic, disease specific characteristics and possible related variables of usage, a questionnaire-based online survey was conducted, the questionnaires were incorporated at the start of the training. All patients who provided IC between December 2012 and April 2013 and only logged in once, received an email to ask them their reason for discontinuing use.

Disease severity of AD was measured using the extend + severity part of the Impact of Chronic Skin Disease on Daily Life (ISDL) (22). Extent and severity were measured for nine parts of the body (face, haired head, neck, hands, arms, torso, legs, feet, and genitals/anus). Response categories were on a 4-point Likert scale ranging from “not” to “totally” (scoring 1 – 4), adding up the scores gives the total score of the affected area (range 9 – 36). Good reliability ($\alpha = 0.64 - 0.93$) and moderate to high convergent validity ($\rho = 0.3 - 0.5$; $\rho > 0.5$) of the complete ISDL, was found in a group of patients with AD (22).

Disease characteristics of FA were measured through two questions namely; which foods causes an allergic reaction and if the patient is in possession of an EpiPen. When a patient has an EpiPen, it indicates that an allergic reaction is so severe that an anaphylactic reaction may occur. It contains a single dose of epinephrine for emergency treatment.

Quality of life (QoL) was measured using the Dermatology Life Quality Index (DLQI) (23) for patients with AD. The DLQI, is a self-administered general dermatology QoL instrument and consists of ten questions on a 4-point Likert scale ranging from 0 (not at all) to 3 (very much) (23). Construct validity and reliability ($\gamma_s = 0.99$, $p < 0.0001$) has been demonstrated in dermatology outpatients (23). The DLQI is officially translated in Dutch (24).

QoL of patients with FA was measured using the Food Allergy Quality of Life Questionnaire-Adult Form (FAQLQ-AF) (25). FAQLQ-AF contains 29 items covering four domains; allergen avoidance and dietary restrictions, emotional impact, risk of accidental

exposure and food allergy related health. The total score is the sum of all items divided by the number of items and ranges from 1 (minimal impairment in QoL) to 7 (maximal impairment). Cross-sectional validity was found to be good ($\rho = 0.76$, $p < 0.001$), and test-retest reliability was considered excellent (95% CI: 0.91–0.98) (25).

Self-management in patients with both conditions was measured using the health education impact Questionnaire (heiQ) version 3.0 (26). The heiQ is a self-evaluation instrument consisting of 40 questions on eight different domains: positive and active engagement in life health directed behavior; skill and technique acquisition; constructive attitudes and approaches; self-monitoring and insight; health service navigation; social integration and support; and emotional wellbeing. The heiQ items are scored on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The scoring for the HeiQ is a mean score per domain ranging from 1 - 4, with higher scores indicating higher self-management. The English version of the heiQ is validated and reliably ($\alpha = 0.70 - 0.89$) in patients with various chronic diseases (26). The heiQ 3.0 is officially translated into Dutch according to the guideline.

In addition to the online questionnaire, usage of both programs was automatically registered during training usage and measured through number of logins in both programs and the hits of the main features of each training separately.

Statistical analyses

Statistical analyses were performed using IBM SPSS Statistics 20.0 (27). Standard descriptive statistics were used to summarize sample characteristics. The correlation between number of logins and the different items of the questionnaires was calculated using Pearson's product-moment correlation, Spearman's rank correlation coefficient and point-biserial correlation coefficient depending on the level of measurement. Variables that were related to usage with a significance level of ≤ 0.2 , were included the initial model of a backward multiple linear regression analysis. Multiple regression was used in order to explore the relationship between usage and multiple variables and the stepwise procedure was used to eliminate variables to maximize prediction accuracy with the smallest number of predictors (28). The demographic variables age and gender were included regardless of their significance level. After creating the initial model, variables with a significance level of ≥ 0.1 were excluded. Categorical variables were converted into dummy variables and bivariate correlations were calculated to detect multicollinearity ($R \geq 0.9$). In advance, a sample size was calculated for a multiple regression analysis using four variables, in order to determine

possible predictive variables of usage. A total of 74 patients was needed in order to achieve sufficient power.

All analyses were conducted separately for patients with AD and FA and reported p-values are two-tailed. Missing data were handled according to instructions of the questionnaires.

RESULTS

A flowchart of the study can be found in figure 1.

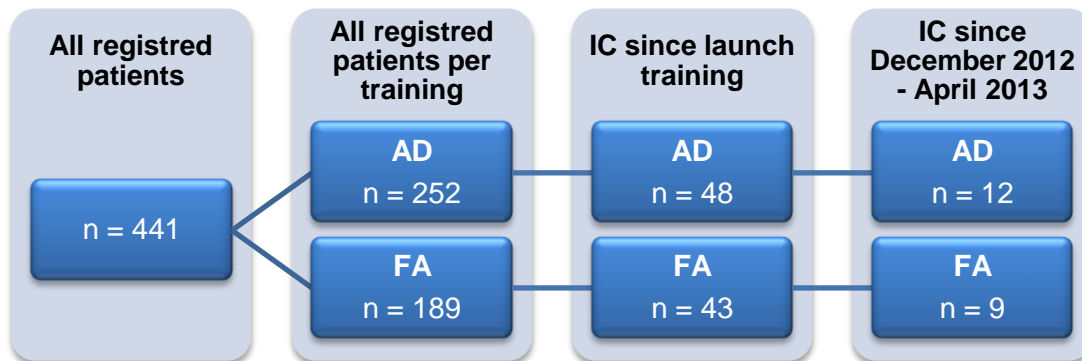


Figure 1 Flowchart of distribution of patients

Number of referrals to the training

Since the start of both programs a total of 441 patients received an account for the online training by their treating physician, nurse or dietician, 252 patients in the training for patients with AD and 189 in the training for patients with FA. Table 1 shows that most patients were female in both populations (64% in AD and 77% in FA) and were entered through an academic hospital (61% AD, 92% FA). The mean number of log-ins was 1.4 in both groups.

User of the online training "Living with AD"

Of 48 patients the results of the questionnaires were used. Reasons for not providing IC from the remaining users of the training were unknown. As shown in table 2, most of the respondents were female (63%). The mean age was 35.8 years (SD 15.9) with a mean duration of AD of 22.4 years (SD 16.7). Patients logged in 3.0 times (SD 2.6) on average in a mean period of 87.8 (SD 10.0) days. Corrected for a three month training use, the mean number of logins was 3.1 (SD 2.6). DLQI mean score was 9.17 (SD 7.30) indicating that AD has a moderate effect on patient's QoL. Self-management (heiQ) measured on eight subscales with mean scores varying from 2.0 (SD 0.6) on subscale eight; emotional wellbeing (reversed scale) to 3.2 (SD 0.5) on subscale four; constructive attitudes and approaches.

Factors related to number of logins AD training

Table two shows that a significant moderate correlation between number of logins and age ($\rho = .48$, $p = .001$), and between number of logins and heiQ domain seven; social integration and support ($\rho = -.37$, $p = .010$) was found. There were no significant correlations between number of logins and the remaining variables. The variables included in the backward linear multiple regression were; heiQ domain three; skill and technique acquisition, domain six; health service navigation and domain seven; social integration and support, age and gender as shown in table 5. In the final model, only age was significant ($B = .070$, $p = .003$) explaining 18% of the variance in number of logins (R square = .18).

User of the training "Living with FA"

A total of 43 patients were included. The majority of the participants were female (86%) with a mean age of 34.8 years (SD 13.9) and logged-in 3.3 (SD 3.2) times on average as shown in table 3. Most participants had multiple food allergies. The common types of food allergy were tree nut (81%), peanut (65%), vegetables and fruit (61%). Almost three quarters (72%) of the patients were in possession of an EpiPen. FAQLQ-AF total mean score was 2.7 (SD 1.2) with the highest score on domain three; risk of accidental exposure (2.9 ± 1.2). The lowest mean heiQ score was on domain three; skill and technique acquisition 2.9 (SD 0.4).

Factors related to number of logins FA training

A significant moderate negative correlation was found between heiQ domain seven, social integration and support, and number of logins ($\rho = -.38$, $p = .012$). No significant correlation between number of logins and the remaining variables was found as presented in table 3. Multiple linear regression was used to assess the possible predictive variables of number of logins (table 5). HeiQ domain four, seven and eight were entered at block 1; age and gender at block 2 and EpiPen at block 3. In the final model only heiQ domain seven; social integration and support, was significant ($B = -2.173$, $p = 0.047$). R square was 0.09.

Usage of FA training

By nine patients, five female with an average age of 30.8 years, the hits of the features within the training were registered as shown in table 4. A total of 109 hits (mean of 12.1 hits per patient) were measured in an average training period of 77.44 days. Module one (what is food allergy) received the most hits (46%) and module five (cross-reactivity) wasn't used at all. Experience stories and videos were little used throughout the modules, respectively five and three hits in total. The information components were responsible for half of all hits (50%).

Usage of AD training

The number of hits during the training usage was recorded for twelve patients (table 4). Of these twelve patients, ten were female with a mean age of 31.1 years. A total of 160 hits were registered with a mean of 13.3 hits per patient during training usage. Module one (what is AD) had the most hits (85/160, 53%) and none of the patients used module three (communication with healthcare provider). The information parts of the training and the exercises were visited most often (respectively 69 and 65 hits).

Reasons for non-usage

Four of the 14 patients (three AD, one FA) responded on the email about discontinuing the use of the program. Two patients indicated that lack of time was the main reason for not continuing the training. The other two patients (both AD) replied that they had few symptoms and they did not need the program at this time.

DISCUSSION

The results showed that 60 percent of all registered patient used the training at least once. Most popular features of the training were the exercises and information parts. Experience stories and videos were hardly used. A significant correlation between number of logins and a higher age and less social integration and support were found. Age was the only predictive variable in the AD training and social integrations and support (heiQ domain seven) in the FA training.

A notable, but expected result of this study is that 40% of all registered patients never logged in. We know from other studies that high attrition rates are not uncommon in eHealth interventions. A systematic review on novel technologies for the management of chronic illness from Rosser et al. (29), found attrition rates up to 84% in many of the included studies. Meta-analysis on the effectiveness of web-based vs. non web-based interventions for chronically ill patients by Wantland et al. (30) showed an average drop-out rate of 21 % in both groups. Eysenbach (31) distinguishes two attrition processes; loss-to-follow-up and nonusage attrition. In this study, nonusage is responsible for the attrition. The high attrition rate of both programs could possibly be explained by the fact that the training is not fully integrated in the clinical care patients receive, which could serve as an additional push factor for use.

Regression analysis showed that age was the single predictive variable of number of logins in the training for patient with AD. Other studies on Webbased interventions report a higher age as a predictive variable as well (32,33). But a review of Or et al (34) on use of Consumer

Health Information Technology (CHIT) found that age was examined in 39 studies and did not show a consistent effect on usage.

Unexpectedly disease-related factors, such as disease severity and QoL did not come forward as related variables of usage. This could be explained by the fact that the patients in this study had mild complaints regarding their disease. The mean scores of the DLQI and ISDL showed a moderate effect on QoL and moderate disease severity in AD patients, also scores on the FAQLQ -AF showed a mild impairment of QoL. In the study of Nijland et al. (35) on usage of a diabetes application, patients with more symptoms used the application more often.

In both groups, heiQ domain seven; social integration and support, was negatively related to number of logins and in FA patients a predictive variable. Meaning that patients with a lower social integration and less support are more likely to use the self-management program. A review on the influence of social support and chronic illness self-management of Gallant (36) showed that higher levels of support were significantly associated with better self-management. These findings could explain why patients with less social support, presumably use the training more.

Some limitations need to be taken into account. The main limitation of this study includes the small sample size. In particular the part of the study where usage of the main features of the training was measured. For a select group of participants, besides number of logins also usage of the main features were measured, however how long patients were logged in is unknown. This could be valuable information to fully gain insight in usage patterns. The fact that most data of training usage included the maximum of the three month training period, gives a more comprehensive picture of actual usage among the patients.

Participants could fill in an evaluation at the end of the training on the usability of the training, but this evaluation questionnaire was scarcely completed. Therefore, other reasons for nonusage other than previously mentioned are unknown. From the TAM (19) we know that perceived ease of use and perceived usefulness are the main predictors of technology acceptance, however, due to the non response of the evaluation questionnaire these variables couldn't be taken into account for the prediction of usage in this study. The generalizability of this study should be evaluated in light of the fact that it was conducted on a small sample of patients with AD or FA who were referred to the online self-management training. The participants of the study were self-selected and may differ from the other enrolled patients

CONCLUSION

The online self-management programs for patients with AD or FA were used by 60 percent of the registered patients. However more than half of these patients only logged in once. These results demonstrate that attrition is still a problem among users of an eHealth intervention. The information parts and exercises were used most often, while experience stories and videos were hardly read or seen. The patients in this study had mild complaints regarding their disease. Furthermore this study demonstrated that both programs were used most by patients with less social intergration and support, also older patients with AD uses the program more. Regression showed age as the only predictive variable for the number of logins in the AD training and heiQ domain seven; social integration and support, for the FA training.

RECOMMENDATIONS

Future research should focus on the usability of the training using a theoretical model such as the TAM. Also reasons for usage and nonusage among the participants of the program can be explored using a qualitative research design to gain insight in attrition and adherence. It is important that future research, to identify predictive variables of usage include a larger sample size. Furthermore in this fast involving era of new technologies, mobile phone technology is an emerging field within eHealth applications (37) and research into the possibilities of this technology for patients with a chronic illness could be a next step to increase usage.

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TABLES

Table 1 Baseline usage of the study population

	All (%)	AD (%)	FA (%)
n	441 (100)	252 (57)	189 (43)
Gender, female	306 (69)	160 (64)	146 (77)
Enrolled by:			
Academic hospital	327 (74)	154 (61)	173 (92)
General hospital	101 (23)	92 (37)	9 (5)
General practitioner	10 (2)	7 (3)	3 (2)
Dietitian	2 (1)	-	2 (1)
Other	2 (1)	-	2 (1)
Number of logins			
0	177 (40)	100 (40)	77 (41)
1	146 (33)	83 (33)	63 (33)
2	51 (11)	32 (13)	19 (10)
3	21 (5)	11 (4)	10 (5)
>3	44 (10)	26 (10)	20 (11)
Logins, mean ± SD	1.39 ± 2.2	1.39 ± 2.13	1.39 ± 2.31

Table 2 Patient characteristics AD and correlation to analyze the relation between number of logins and different variables

Demographic and Disease related variables	Value	Correlation	
		ρ	P-value
n	48	-	-
Number of logins (mean ± SD) (range)	3.02 ± 2,61 (1–11)	-	-
Length of training ,days (mean ± SD)	87.77 ± 10.03	-	-
Gender, female (%)	30 (63)	$r_{bp} = -.02$.88
Age, years (mean ± SD)	35.77 ± 15.90	.48	.001**
Duration AD , years (mean ± SD)	22.42 ± 16.71	-.15	.29
ISDL (mean ± SD)	18.79 ± 4.64	-.02	.87
DLQI (mean ± SD)	9.17 ± 7.30	0.07	.62
heiQ (mean ± SD)			
Domain 1 Positive and active engagement in life	3.09 ± 0.54	-.02	.89
Domain 2 Health directed behaviour	2.88 ± 0.56	.02	.88
Domain 3 Skill and technique acquisition	2.63 ± 0.47	-.24	.10
Domain 4 Constructive attitudes and approached	3.18 ± 0.52	-.11	.46
Domain 5 Self-monitoring and insight	2.81 ± 0.28	-.07	.65
Domain 6 Health service navigation	3.00 ± 0.44	-.26	.07
Domain 7 Social integration and support	2.93 ± 0.58	-.37	.01*
Domain 8 Emotional wellbeing (negative effect)	1.99 ± 0.60	.06	.68

ISDL, Impact of Chronic Skin Disease on Daily Life, DLQI, Dermatology Life Quality Index; heiQ, health education impact Questionnaire;

*Significant at $p < .05$

**Significant at $p < .01$ level

Table 3 Patient characteristics FA and correlation to analyze the relation between number of logins and different variables

Demographic and Disease related variables	Value	Correlation	
		ρ	p-value
n	43	-	-
Number of logins (mean \pm SD)	3.30 \pm 3.22	-	-
Length of training , days (mean \pm SD)	88.77 \pm 6.37	-	-
Gender , female (%)	37 (86)	$r_{bp} = -.14$.36
Age , years (mean \pm SD)	34.77 \pm 13.92	.27	.08
Type of food allergy (%)		-	-
Peanut	28 (65)		
Tree nut	35 (81)		
Vegetables + fruits	26 (61)		
Milk	11 (25)		
Egg	7 (16)		
Seafood	3 (7)		
Other	9 (21)		
Number of food allergies , (mean \pm SD)	2.72 \pm 1.26	-.06	.70
In possession of EpiPen , n (%)	31 (72)	$r_{bp} = .22$.160
heiQ , (mean \pm SD)			
Domain 1 Positive and active engagement in life	3.20 \pm 0.49	-.08	.62
Domain 2 Health directed behaviour	3.05 \pm 0.68	.01	.96
Domain 3 Skill and technique acquisition	2.87 \pm 0.39	-.13	.42
Domain 4 Constructive attitudes and approached	3.29 \pm 0.45	-.22	.16
Domain 5 Self-monitoring and insight	2.89 \pm 0.34	.12	.44
Domain 6 Health service navigation	3.06 \pm 0.42	-.06	.71
Domain 7 Social integration and support	3.00 \pm 0.45	-.38	.01*
Domain 8 Emotional wellbeing (negative effect)	1.85 \pm 0.59	.20	.20
FAQLQ-AF total , (mean \pm SD)	2.74 \pm 1.18		
Domain 1 Allergen avoidance & dietary restrictions	2.58 \pm 1.35	-.08	.62
Domain 2 Emotional impact	2.84 \pm 1.68	.01	.96
Domain 3 Risk of accidental exposure	2.90 \pm 1.18	.08	.60
Domain 4 Food allergy related health	2.71 \pm 1.68	-.08	.61

heiQ, health education impact Questionnaire; FAQLQ-AF, Food Allergy Quality of Life Questionnaire-Adult Form
*Significant at $p < .05$

Table 4 Usage per module and component

Food allergy		Atopic dermatitis	
n	9	n	12
Age, years (mean ± SD)	30.9 ± 14.3	Age, years (mean ± SD)	31.1 ± 11.2
Gender, f/m	5/4	Gender, f/m	10/2
Number of logins, (mean ± SD)	2 ± 1.7	Number of logins (mean ± SD)	2.1 ± 1.2
Training length, days, (mean ± SD)	77.4 ± 22.2	Training length, days (mean ± SD)	77.2 ± 21.1
Modules (% of total hits)	Hits	Modules (% of total hits)	Hits
Module 1; What is FA	50 (46)	Module 1; What is AD	85 (53)
Module 2; How is it diagnosed	23 (21)	Module 2; Treatment of AD	42 (26)
Module 3; What to do in case of allergic reaction	16 (15)	Module 3; Communication with healthcare provider	0 (0)
Module 4; Diet & food allergy	14 (13)	Module 4; Coping with itch	14 (9)
Module 5; Cross-reactivity	0 (0)	Module 5; Living with AD	19 (12)
Module 6; Coping with FA in daily life	6 (6)		
Components (% of total hits)	Hits	Components (% of total hits)	Hits
Introduction	22 (20)	Introduction	NA
Information	54 (50)	Information	69 (43)
Video	3 (3)	Video	14 (9)
Exercise	24 (22)	Exercise	65 (41)
Experience story	5 (5)	Experience story	12 (7)
More detailed information	1 (1)	More detailed information	0 (0)
Total hits	109		160

Table 5 Multiple linear regression to evaluate the predictors of usage

Atopic dermatitis			Food allergy		
Variable	B	p-value	Variable	B	p-value
Age	.07	.003**	heiQ D7 Social integration and support	-2.17	.047*
heiQ D3 Skill and technique acquisition	-.78	.36	heiQ D8 Emotional wellbeing	.95	.33
heiQ D6 Health service navigation	-.36	.72	Age	.05	.19
heiQ D7 Social integration and support	-1.02	.17	In possession of EpiPen	1.19	.28
Gender	-.60	.43	Gender	-2.17	.13

*Significant at p<.05 level

**Significant at . p<.01 level