

Implementation of the MASK-Air® App for Rhinitis and Asthma in Older Adults: MASK@Puglia Pilot Study

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Keywords

MASK-Air · mHealth · Elderly · Rhinitis · Asthma

Abstract

Introduction: MASK-air® is an app whose aim is to reduce the global burden of allergic rhinitis and asthma. A transfer of innovative practices was performed to disseminate and implement MASK-air® in European regions. The aim of the study was to examine the implementation of the MASK-air® app in older adults of the Puglia TWINNING in order to investigate (i) the rate of acceptance in this population, (ii) the reasons for refusal and (iii) the evaluation of the app after its use. **Methods:** All consecutive geriatric patients aged between 65 and 90 years were included by the outpatient clinic of the Bari Geriatric Immunoallergology Unit. After a 1-h training session, older adults used the app for 6 months. A 6-item questionnaire was developed by our unit to evaluate the impact of the app on the management of the disease and its treatment. **Results:** Among the 174 recruited patients, 102 accepted to use the app (mean age, SD: 72.4 ± 4.6 years),

6 were lost to follow-up, and 63 had a low education level. The reasons given not to use the app included lack of interest (11%), lack of access to a smartphone or tablet (53%), low computer literacy (28%), and distrust (8%). At follow-up, the overall satisfaction was high (89%), the patient considered MASK-air® “advantageous” (95%), compliance to treatment was improved (81%), and the rate of loss to follow-up had decreased to 6%. **Conclusion:** Older adults with a low level of education can use the MASK-air® app after a short training session.

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Introduction

DG Santé (EU) prioritizes the empowerment of citizens via digital tools for user feedback and person-centred care in all age groups for the digital transformation of

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health and care [1]. Although seniors are becoming more technology-savvy and their interest in mHealth is steadily increasing, they often have difficulties in using apps.

MASK (Mobile Airways Sentinel network) aims to reduce the global burden of allergic rhinitis (AR) [2] and asthma, giving the patient and the health-care professional simple tools for better shared decision-making. The freely available MASK app (MASK-air[®], formerly *the Allergy Diary*, free on Android and iOS) is an ICT system centred around the patient. MASK is a DG Santé Good Practice on the digital transformation of health [1].

A transfer of innovative practices (TWINNING) was performed to disseminate and implement MASK-air[®] in 22 countries or regions. Around 1,000 patients were enrolled in the study globally [2]. The Geriatric Immunology Unit of the University of Bari “Aldo Moro” has been a MASK adopter since 2017. The aim of the present study was to examine the implementation of the app in older adults of the Puglia TWINNING in order to investigate (i) the rate of acceptance of MASK-air[®] by older adults with AR, (ii) the reasons for refusal, and (iii) the evaluation of the app after its use.

Methods

Study Design

In this observational pilot study, usage of the MASK-air[®] app was proposed to the participating elderly patients. They were provided with exhaustive and thorough information on its usage and benefits through training sessions at the clinic. They were then subjected to a regular continuous follow-up and were reviewed at the clinic every 6 months using the standard follow-up protocol. At each follow-up visit, the patients were asked to fill in a 6-item questionnaire specifically designed to assess (i) their opinion of the app, (ii) the obstacles relating to its usage, (iii) the perceived advantages and disadvantages, (iv) the role it played in the self-perception of disease control, and (v) its role in the doctor-patient relationship.

Setting

The Geriatric Immunology Unit of the University of Bari “Aldo Moro” and a network of hospital centres and allergy specialists across the entire Apulian territory. The SIAAIC (*Società Italiana Asma Allergologia ed Immunologia Clinica*) board offered its support for the study.

Participants

All consecutive geriatric patients aged between 65 and 90 years were included by the outpatient clinic of the Bari Geriatric Immunology Unit. The exclusion criteria were explicit: refusal by the patient, lack of access to a compatible device (smartphone and/or tablet), and/or irreparable inability to use the app. Patients were recruited at the clinic through media coverage and the involvement of local associations for elderly people. It should be noted that most patients recruited by the centre were characterized by

low adherence to treatment associated with socioeconomic status, self-support capabilities, and literacy.

The diagnosis of asthma or rhinitis was made by an allergy specialist based on the GINA and ARIA criteria [3]. The diagnosis of atopic dermatitis was based on the Hanifin and Rajka diagnostic criteria [4]. Skin prick tests were performed for home dust mite, alder, hazel, grass, cypress, birch, olive, pellitory and ragweed pollen, cat and dog (LoFarma, Milan, Italy).

Ethics and Privacy

The terms of reference – translated into all languages and customized according to country legislation – allow the use of the results for research purposes. The data were anonymized, including the geolocalized data [5]. The European Union General Data Protection Regulation has been enforced since May 2019 [6]. An independent review board approval was not required since the study is observational, there was strictly no intervention and users agreed to having their data analysed (terms of use).

MASK-Air[®]

The app collects information on (i) the AR symptoms experienced (nasal and ocular), (ii) disease type (intermittent/persistent), (iii) how the symptoms impact the users’ lives, and (iv) type(s) of AR treatment used [7–9]. Geolocalized users assess their daily symptom control using the touchscreen functionality on their smartphone to click on 5 consecutive VAS scores (general, nasal and ocular symptoms, asthma, and work) [7]. Users input their daily medications using a scroll list which contains all country-specific over-the-counter and prescribed medications available. The days reported by users included those with or without treatment.

Training to Use the MASK-Air App

Each participant or assigned caregiver was walked through their first usage of the MASK-air[®] app by a physician or a trained nurse. Any doubts regarding the questions were clarified, and the usage was carefully explained (smartphone and/or tablet). Brief practical workshops, each lasting approximately 45 min and catering for a maximum of 10 patients, were held twice a month at our centre by young and specially trained physicians.

Outcomes

Impact of the MASK-Air App

A 6-item questionnaire was developed by our unit to evaluate the impact of the app on the management of the disease and its treatment (see online suppl. Material 1; for all online suppl. material, see www.karger.com/doi/10.1159/000518032). The education level was studied according to the 2011 revision of the International Standard Classification of Education [10]. The participants’ sleeping habits during the 4 weeks preceding the interview were assessed: those reporting asthma/rhinitis/allergy-related nocturnal awakenings for more than 2 days per week were considered as affected by “sleep awakenings.”

Results

Demographic Characteristics

Of the 174 older adults screened, 101 were aged between 65 and 86 years (mean age, SD: 72.4 ± 4.6 years.

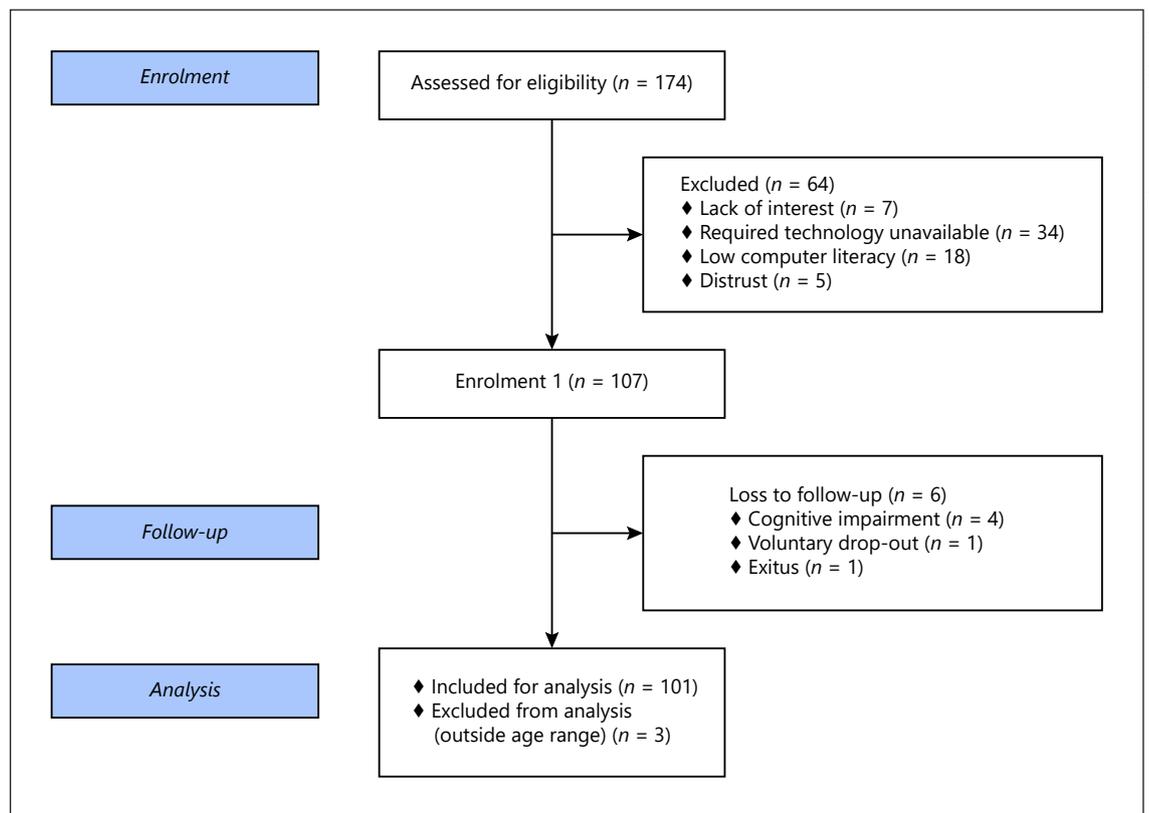


Fig. 1. CONSORT flowchart.

Forty-eight (47.5% males) patients were enrolled in the programme and analysed (Fig. 1); 74% were retired, with a predominance of people with low literacy (62.37%) (Table 1). The results of the patients with different multimorbidities ($R + C$, $R + A$ or $R + A + C$) were similar and were pooled. The patients were suffering from rhinitis alone (20%), asthma alone (4%), conjunctivitis alone (4%), asthma and rhinitis (22%), conjunctivitis and rhinitis (20%), or from all 3 of the diseases (32%). Ten patients were diagnosed with atopic dermatitis, 2 of whom had rhinitis alone, and 8 rhinitis, asthma, and conjunctivitis.

All patients were sensitized, but polysensitization was more common (74%). Monosensitization ranged from 0% (animals) to 39% (house dust mites) and 47% (pollen). Sleep awakenings were found in all groups: rhinitis alone (40%), asthma (50%), and multimorbid patients (43.75%).

Acceptability of the App at Enrolment

The usage of MASK-air[®] was refused by 64 patients. In each case, the reasons were recorded (Fig. 1) as were the clinical data in a separate database. The reasons given included

lack of interest (11%), lack of access to a smartphone or tablet (53%), low computer literacy (28%), and distrust (8%).

Follow-Up

Evaluation of the App

The overall satisfaction was high (89%): patients considered MASK-air[®] as “advantageous” (95%) while reporting an improved compliance to treatment (81%). The rate of loss to follow-up lowered to 6%. Furthermore, patients reported that the system improved their doctor-patient relationship (70%), considering this method as being more focused on their specific needs (53%). It is worth noting that all patients expressed full satisfaction at being trained by and interacting with young health-care professionals, well-versed in the innovative technologies upon which the entire system is built.

Loss to Follow-Up

A total of 6 patients were lost to follow-up, mostly due to worsening cognitive impairment ($n = 4$), refusal or inability to continue using the app ($n = 1$). One case was lost due to exitus for unrelated causes.

Table 1. Demographic and clinical characteristics of the patients

Total patients	No	101	
Age, years	Range	65–86	
	Mean ± SD	72.4±4.56	
Sex	M/F	48/53	
Occupation	Employed	3	
	Housewife	22	
	Retired	75	
	Unemployed	1	
Education	Primary or lower	63	
	Secondary	24	
	Tertiary	14	
Rhinitis alone	N	20	
	Sleep awakenings	8	
	% Sensitized	100 (45% mono-sensitized)	
	HDM	Single	3
		Multiple	2
	Pollen	Single	6
		Multiple	9
Animal	Single	0	
	Multiple	2	
Asthma alone	N	4	
	% Sensitized	100	
Conjunctivitis alone	N	4	
	% Sensitized	100	
Multimorbidity (R, A, C)	N	74	
	Sleep awakenings	26	
	% Sensitized	100 (35% mono-sensitized)	
	HDM	Single	6
		Multiple	18
	Pollen	Single	20
		Multiple	42
Animal	Single	0	
	Multiple	14	

Discussion

The prevalence of allergic diseases in the geriatric age group is increasing worldwide. It is proving to be a challenge for both the clinician and the patient due to peculiarities in presentation, treatment, and management [11]. This is partly correlated with more accurate diagnostic tools, a longer life expectancy of allergic patients (over the past 20 years), and with environmental pollu-

tion and climate change contributing to the onset of allergic asthma and dermatitis. At the same time, the incidence of AR appears to be higher in older adults, its association with other comorbidities severely affecting the patients' quality of life [12]. It is interesting to note that 10 patients were diagnosed with atopic dermatitis, showing that this disease should not be overlooked in older people [13].

With regard to mHealth, elderly patients represent a rather peculiar population: even though the use of modern technologies such as Internet access and smart devices is growing steadfastly, the viability of such a novel approach remains dependent upon variables such as computer literacy, education level, and socioeconomic status. This is the first study on older adults with rhinitis and/or asthma to use mHealth in the assessment of daily control of asthma. The strengths of this study include the enrolment of all patients seen by trained allergists and the use of a well validated app (MASK-air[®]) encompassing multiple clinical variables in a single tool geared towards both the patient and the clinician.

The results obtained in this study show that a large proportion of older asthmatics can readily use a phone/tablet app further to a short training session tailored to their specific needs and expectations. Although most enrolled patients had primary or lower education levels, they were still able to quickly learn how to use MASK-air[®], reporting a high overall satisfaction level with the tool. MASK-air[®] offers real-life integrated care pathways to patients affected from rhinitis and/or asthma multimorbidity, thus reducing the health and social impact stemming from said diseases. The deployment of MASK-air[®] by our centre has shown a noticeable increase in patients' compliance to treatment, both tangible and self-perceived, thus potentially remedying one of the aspects directly linked to high disease management costs. This was particularly obvious given our centre's accumulated experience, denoting a greater frequency of low adherence to treatment in the elderly directly associated with factors such as socioeconomic status, self-support capabilities, and literacy. The data gathered from the questionnaires show how participants perceived a vast improvement in their doctor-patient relationship. This can explain the low loss-to-follow-up rate in the study cohort and act as a counterbalance to the patients' low health literacy in their disease management. It should be noted that this is the first study to show that older adults can advantageously use MASK-air[®] when given the appropriate support and training.

Critical issues remain in the wide adoption of a mHealth solution in elderly people, some regarding Italy in general, others Apulia in particular. Patient participation depends on ownership and/or daily access to a supported device as well as to an adequate data connection. This issue is further complicated by old age and by Italy's well-known digital divide [14]. It was not uncommon in our study to witness the usage of feature phones or the inability to download/update the app due to the unavailability of mobile/broadband data plans for the participant. Low levels of education, low computer literacy, and general mistrust in technology are frequent in Apulia and other southern Italian regions, especially among the elderly. These obstacles can only be partially remedied by the centre's deployment and communication strategies as well as the involvement of caregivers and older adults' associations. Some of the other obstacles (e.g., purchase of a compatible device) cannot be influenced at all. While initial user engagement was noticeably high, a sustained daily usage of the system by the patient has proven to be a difficult metric to assess. Answers provided by both patients and caregivers were often unreliable, with conflicting dates, vague approximations, or dismissive stances.

Improving long-term adherence to app usage and consequently treatment appears therefore to be a priority in moving forward. Despite the unmodifiable socioeconomic variables, our experience denotes how MASK-air® can be advantageously and adequately adopted by older adults through an approach specifically designed around their particular needs, favouring a familiar setting as well as interpersonal dynamics (e.g., collective training sessions and participation of local associations and allergy specialists). An added benefit is represented by an improvement in the patient education of self-management strategies while maintaining a strong patient-centred approach to allergic diseases, a self-perceived empowerment (which has shown positive repercussions in compliance to treatment) and an improved doctor-patient relationship. In addition, lessons learned from our experience can be expanded to the management of chronic diseases, the latter being of considerable importance to older people.

The study has several limitations including those of mHealth (largely discussed in previous MASK-air articles) but also the lack of a control group. However, this study is a pilot study, and the aim was to determine whether the older population could use the app. A study with a control group will be carried out later. The study also has strengths: there are very few *mHealth* studies in

older adults, and this one confirms that a validated app can be used in AR in older people, even in those with a low level of literacy.

Statement of Ethics

The terms of reference – translated in all languages and customised according to country legislation – allow the use of the results for research purposes. The data were anonymized, including the geolocalized data. The European Union General Data Protection Regulation has been enforced since May 2019. In accordance with local and national guidelines, ethical approval by an independent Review Board was not required for this study, given that the study is observational, there was strictly no intervention, users agreed to having their data analysed (terms of use), and they signed an informed consent before being enrolled. The study was conducted in accordance with the Declaration of Helsinki.

Conflict of Interest Statement

Professor Jean Bousquet declares membership in advisory boards, consultations, and/or honoraria for meeting lectures for Chiesi, Cipla, Hikma, Menarini, Mundipharma, Mylan, Novartis, Sanofi-Aventis, Takeda, Teva, and Uriach, as well as shares in Kyomed and MASK-air. All other authors have no conflicts of interest to declare.

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Author Contributions

Maria Teresa Ventura: conceptualization, project administration, investigation, and writing – original draft. Antonio Francesco Maria Giuliano: methodology, investigation, software, data curation, and writing – original draft. Rosalba Buquicchio: writing – review and editing. Anna Bedbrook: formal analysis, visualization, and writing–review and editing. Wienczyslaw Czarlewski: writing–review and editing. Daniel Laune: writing–review and editing. Vincenzo Patella: writing–review and editing. Giorgio Walter Canonica: writing–review and editing. Jean Bousquet: supervision, resources, validation, and writing – original draft, writing–review and editing. Maria Teresa Ventura and Antonio Francesco Maria Giuliano contributed to this manuscript in equal parts.

Data Availability Statement

All data generated or analysed during this study are included in this article and its online suppl. material files. Further enquiries can be directed to the corresponding author.

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