C. Lombardi[1], M. Bonini[2], G. Passalacqua[3] and the Mobile Apps Multicenter Italian Study Group*

[1]Unità Dipartimentale di Allergologia-Immunologia Clinica e Pneumologia, Fondazione Poliambulanza, Brescia, Italy
[2]UOC Pneumologia, Istituto di Medicina Interna, F. Policlinico Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy - National Heart and Lung Institute (NHLI), Royal Brompton Hospital & Imperial College London, London, United Kingdom
[3]Allergy and Respiratory Diseases, University of Genoa, Genoa, Italy

The role of mobile apps in allergic respiratory diseases: an Italian multicentre survey report

*M. Caminati[4], D. Peroni[5], E. Favero[6], V. Patella[7], M. Landi[8], F. Gani[9], A. Meriggi[10], A.G. Corsico[11], M.T. Costantino[12], G. Senna[4], O. Rossi[13], G. Rolla[14]

[4]Servizio di Allergologia, Ente Ospedaliero-Universitario di Verona, Italy
[5]U.O. di Pediatria, AOUP Ospedale S. Chiara, Pisa, Italy
[6]Azienda ULSS 7 Regione Veneto, Presidio Ospedaliero di Conegliano, Ambulatorio di Allergologia e Immunologia Clinica, Conegliano, Italy
[7]Centro Aziendale per la cura delle malattie allergiche e immunologiche gravi, Ospedale Santa Maria della Speranza di Battipaglia, Battipaglia, Italy
[8]Specialista in Pediatria e Patologia Clinica, Torino, Italy
[9]Servizio di Allergologia, Ospedale San Luigi Gonzaga, Orbassano, Torino, Italy
[10]UOC di Medicina del Lavoro, Sezione di Allergologia CRR, IRCCS Maugeri, Pavia, Italy
[11]Clinica Malattie Apparato Respiratorio, Fondazione IRCCS, Policlinico S. Matteo, Pavia, Italy
[12]Azienda Socio Sanitaria Territoriale di Mantova Carlo Poma, Mantova, Italy
[13]Azienda Ospedaliero-Universitaria Careggi, Firenze, Italy
[14]Azienda Ospedaliera Ordine Mauriziano di Torino, Torino, Italy

Summary

We performed a multicentre survey about the role of mobile apps in allergic respiratory diseases. The main objective was to investigate the current use and usefulness of mobile phone apps in the management of allergic respiratory disease. An original questionnaire including 12 multiple-choice questions was administered to 360 participants (153 male and 207 female subjects). Of notice, 290 subjects owned a smartphone, 120 a personal computer and 68 a tablet (multiple answers were possible). 123 subjects reported to be regular mobile-apps users, 209 were occasional users and 76 has never downloaded an app. Indeed, 259 subjects have never dealt with a medical or healthcare app, with only 8 subjects answering to often take advantage of such supportive tools. Data were even more discouraging when asking whether subjects had ever downloaded an app directly related to their own medical condition (allergy, asthma and rhinitis). 87.2% provided a negative answer. Among the few individuals who reported a previous experience with allergy/asthma apps only 2 subjects reported to regularly use the apps they had downloaded, even after months. The majority of subjects believed the apps would provide a relevant support, but only 25/360 participants found that the apps are "truly helpful", while 44 considered them of "help but not essential". Our data seem to show that the apps in the medical field, especially for allergic respiratory diseases, are welcome by patients, but their continued use and utility wane with the passage of time from the date of the download. In the future it will therefore be important to focus on the quality of the apps themselves and on the careful selection of the most suitable patients to use them. Finally, it will be important to make use of the fundamental contribution of healthcare professionals for the development of the apps.

Introduction

The prevalence of allergic respiratory diseases and asthma is increasing worldwide and the complexity and severity of such diseases continue to grow, especially in young subjects, who are bearing the greatest burden. In Europe, approximately 23% of the population is affected by allergic rhinitis (1). Asthma also represents a major health and socio-economic concern considering that more than 300 million people worldwide are currently affected by this condition. Moreover, allergic rhinitis is frequently associated to allergic asthma, increasing the overall burden on patients (2). Despite extensive availability of effective therapies, a considerable number of patients do not manage to achieve satisfactory disease control (3).

Hence, the management of asthma and other allergic respiratory conditions needs to be prompt, accurate and personalized in order to be truly effective. In this complex and multi-parametric approach, the education and active involvement of patients has been shown to be central, highlighting the importance of self-management. Electronic health (e-Health) is defined as "an emerging field at the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies" (4) and represents an innovative tool for improving the management of chronic pathologic conditions, as systemic hypertension, chronic heart failure, and diabetes. With a potential role in enhancing the quality of care, improving patient's compliance to therapy and enabling early diagnosis of disease worsening and exacerbation, e-Health might revolutionize the concept of healthcare. Additionally, with the ongoing advances in information technology, an increasing number of patients claim for electronic tools and solutions to better manage their illness. E-Health mainly covers three areas of intervention: the delivery of information, for health professionals and consumers, through Internet and telecommunications; the use of information technology to improve public health services; the use of e-commerce and e-business practices in health systems management (5). E-Health includes several areas of interest such as mobile health, telemedicine, virtual healthcare teams, electronic health records (EHRs), medication trackers and clinical decision support systems. In particular, mobile health has been defined as a new social healthcare model, achievable through the use of mobile devices such as smartphones, apps, patient trackers, and personal digital assistants (PDAs). Mobile Health can be considered a part of Health Internet of Things (IoT), a compound of devices designed to detect bio-signals and bio-images resulting from connection to medical devices or other types of sensors. This allows to gather data and information placing the patient in a proactive position in the management of his own health status and ensuring at the same time a better interaction with health-care professionals. Therefore, the application of mobile health allows to bring down spatial and temporal barriers, making the patient's management and monitoring more effective and profitable.

In the last decade, the mobile revolution has given a unique opportunity to offer medical support when and where people needed it. A large number and variety of medical and health-related apps is available on the market today; from basic app-based text message reminders, to sophisticated apps that play a multitude of functions.

A proper management of allergic respiratory diseases, like allergic rhinitis and/or asthma, includes decision-making processes based on patient's symptoms, environmental exposures and medication usage. Helping patients to understand how these variables impact their health and, when necessary, instructing them on how to take adequate actions and properly seek care, empowers them to develop relevant self-management skills (7-9).

We published a review to evaluate the web resources nowadays available and to analyze the studies about the web-based instruments used to improve asthma knowledge, control asthma outcomes (10). Reviews assessing the web-resources used, and analyzing the studies about the web-based instruments to improve asthma knowledge, control, and outcomes are now available (11). In general, studies revealed that the technology is well accepted, but the number of tools and apps available continues to increase, and agencies such as the FDA, become involved in their regulation, thus the m-Health landscape will continue to evolve. Although asthma tools and apps have great potential to improve care for asthma, the proof of data reproducibility, the demonstration of effectiveness, and the privacy issues still represent the major technical problems.

Patients, materials and methods

Recently, we performed a multicentre survey in Italy about the role of mobile apps in allergic respiratory diseases whose main objective was to investigate the current use and the possible usefulness of m-Health interventions – in the form of mobile phone apps – in the management of allergic respiratory disease. 13 centers participated in the study, with a territorial prevalence in northern Italy.

An original questionnaire including 12 multiple-choice questions with variable number of possible answers was administered to 360 participants. The first 5 questions referred to the anthropological, attitudinal and social characteristics of subjects (i.e. gender, age, type of job, educational level, preferred device used for internet connection), while the following 7 items investigated the individual's use of mobile phone apps and opinion on their usefulness in the management of allergic respiratory diseases. The study was carried out in accordance

with the ethical standards established in the Declaration of Helsinki, and that informed consent was obtained from all participants before enrolment in the study.

The questionnaire was completed by 153 male and 207 female subjects (**figure 1a**). Both children/adolescents and adults took part in the study. Twenty-seven per cent (97/360) of subjects were 17 years old or younger, and only 23 individuals (6.3%) were older than 60 years (**figure 1b**). Within the sample assessed 21 subjects had a primary school degree, 98 had a secondary school degree, 156 had a high school degree, and 78 a bachelor degree (**figure 1c**). **Figure 1d** reports the professional activity distribution of participants.

Results

Of remark, 290 subjects owned a smartphone, 120 a personal computer (either a desktop or a laptop) and 68 a tablet (multiple answers were possible). A consistent number of people (123) reported to be regular mobile-apps users, 209 interviewees referred to be occasional beneficiaries, while 76 has never downloaded an app. Unsatisfactorily, 259 subjects have never dealt with a medical or healthcare app, with only 8 subjects answering to often take advantage of such supportive tools. Data were even more discouraging when it was asked whether subjects had ever downloaded an app directly related to their own

Figure 1 – **a**, *distribution by gender with a slight prevalence of the female sex;* **b**, *age distribution with a prevalence of the age group from 17 to 39 years;* **c**, *school degree distribution with a prevalence of high school degree subjects;* **d**, *about the work activity, the most represented were the students and the employees.*
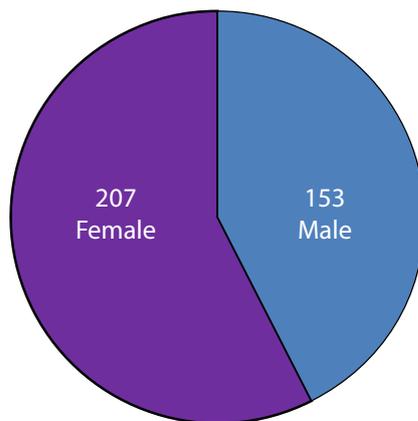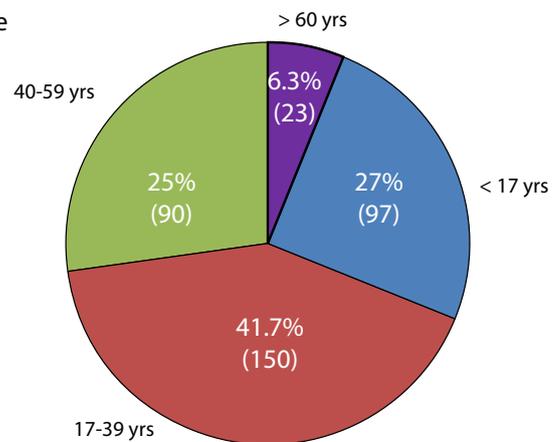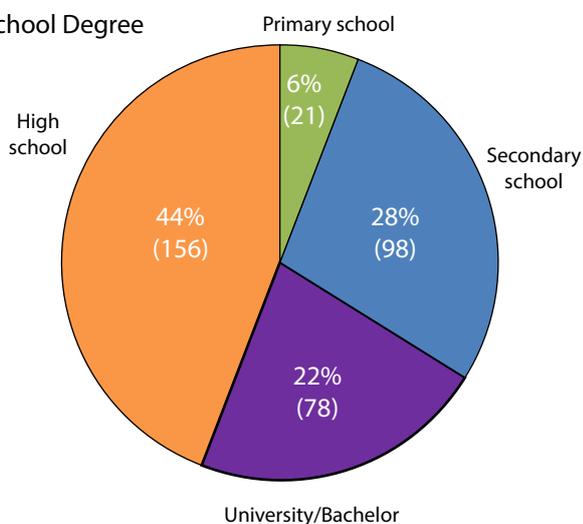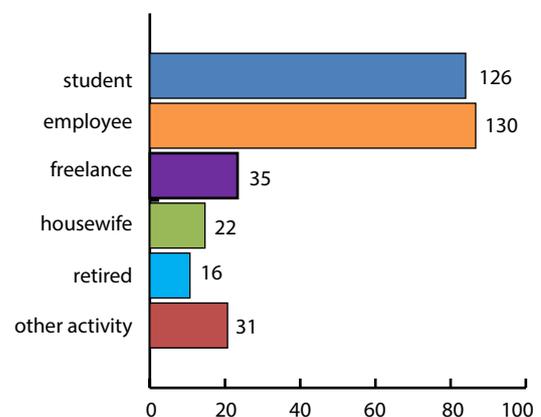
medical condition (i.e. allergy, asthma and rhinitis). In fact, 314 out of 360 (87.2%) provided a negative answer. Among the few individuals who reported a previous experience with allergy/asthma apps only 2 resulted to be frequent users. The apps that these two patients used were respectively: Asma (Momento Medico s.r.l.) and Allergy Diary by MACVIA ARIA (Peercode B.V.).

The last three domains of the questionnaires addressed the individuals' perspectives on the role and usefulness of medical apps in improving disease monitoring and self-management. The majority of subjects believed the apps could mainly provide support to increase the knowledge of the disease, with a considerable share of subjects highlighting a role in symptom monitoring and treatment reminding (**figure 2**). However, only 25 participants found the apps to be extremely helpful, while 44 considered them of support but potentially improvable (**figure 3**). Despite the personal experience, the vast majority of subjects 289 stated they likely would advise patients affected by allergic and respiratory diseases to use mobile apps and other m-health interventions.

Conclusions

Our data seem to show that the apps in the medical field, especially for allergopathies, are welcome by patients, but their continued use and utility wane with the passage of time from the date of the download. As in the approach to adherence to drug therapy, definable as the extent to which a patient acts in accordance with the prescribed interval and dose of a dos-

ing regimen, it is important to take into account the concept of "medication persistence", which must be understood as the duration of time from initiation to discontinuation of therapy (12) , as in the use of medical apps we must consider not only the aspects concerning the initial use, but above all the "persistence" over time to the use and correct use of the app itself. In the future it will therefore be important to focus on the quality of the apps themselves and on the careful selection of the most suitable patients to use them. There is great heterogeneity between the currently available mobile phone apps. It would be more useful to assess which specific types of apps (e.g. interactive vs data-recording vs information providing types) would be more widely accepted by patients and have highest compliance rates. It would also be useful to assess the willingness of subjects to use apps which are interactive and provider-linked (for example, if providers were able to download and view patient-recorded symptoms over time to tailor treatment accordingly). As such, providers and the industry might then focus on developing such apps to increase the quality of holistic patient care. Finally, it will be important to make use of the fundamental contribution of healthcare professionals for the development of the apps. In conclusion, we believe that also in the field of "medical apps" the following rule of advice should apply: "right app, to the right patient, and given by the right doctor".

Conflict of interest

The authors declare that they have no conflict of interest.

Figure 2.

Do you think that Medical Apps can be an important resource for patients suffering from allergies / rhinitis / asthma?
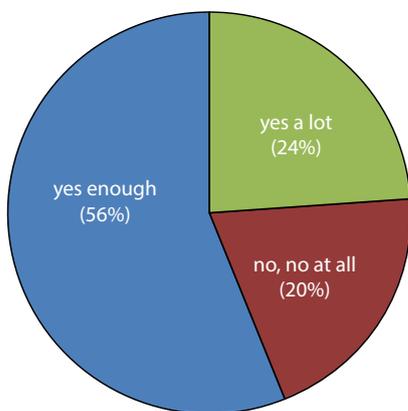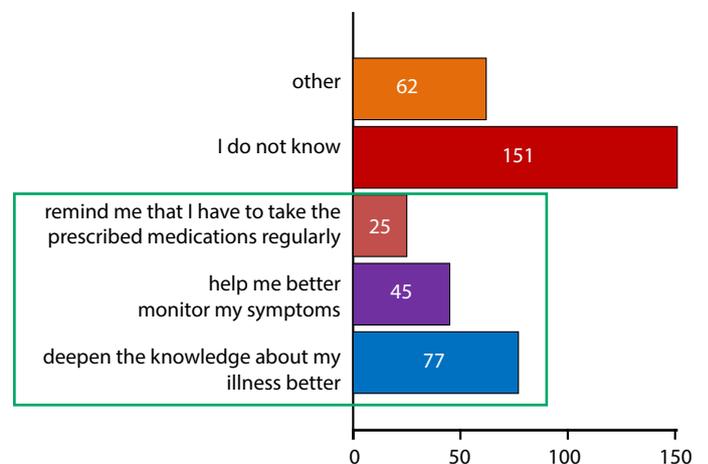

Figure 3.

You believe that Apps in the area of allergic respiratory diseases should be useful for:

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