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Evaluation of health applications to support the asthma treatment process, available in Poland

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Summary

Introduction: Asthma, is one of the most frequently diagnosed chronic diseases in the world. Among the key elements of asthma treatment are primarily to obtain control over the disease and to activate the patient and his participation in the treatment process. E-health and telemedicine come in handy here in the form of applications for smartphone devices, thus supporting self-coping with chronic disease. The purpose of the study was the quantitative and qualitative assessment of applications supporting such a process available in Polish.

Material and methods: The study was based on a review and analysis of available applications that meet the criteria for switching on various types of mobile devices, supported by various operating systems. Searching for qualified applications for analysis was carried out from October 14 to November 8, 2022, based on keywords: asthma, application, and dairy.

Results: Ultimately, 4 applications dedicated to asthma were analyzed. The highest number of points was obtained by the Mytherapy application - 5.5 points/12 points - but it did not reach the adopted threshold of good quality application - a minimum of 75% of possible points.

Conclusions: A small number of available applications in Polish have been identified, and a clear gap was noticed in access to the complete application - each of the applications emphasized the specific treatment area, apart from the element marked clearly during the interview - the database of drug interaction used in asthma

with other pharmaceuticals. These conclusions prompt the direction of both attempts to create an application holistically approaching the topic and further research in this area.

Keywords: asthma, e-health, application

Introduction

Asthma is one of the most common chronic diseases worldwide. The estimated number of patients in the world in 2017 is nearly 300 million people, predicting that in 2025 this number will amount to about 400 million people. Although the number of asthma cases has increased significantly over the past 25 years, disability-adjusted life years (DALYs) and deaths have steadily declined. Looking at the epidemiology of asthma in local terms, in Poland in 2017, according to the estimates of the Global Burden of Disease (GBD), the rate of people with asthma was 4,917 per 100,000. population, i.e. about 1.9 million people (less than 5% of the population) (1). In Europe, around 8-9% of people suffer from asthma and it is estimated that the same number of people have asthma-like symptoms (2).

Asthma is a complex and multifactorial disease that is increasingly recognized as a heterogeneous disease with both allergic and non-allergic phenotypes. Although mortality due to asthma is low compared to other chronic diseases, accounting for less than 1% of deaths worldwide, it represents a significant economic and social burden (3, 4).

The etiology of asthma is increasingly attributed to interactions between genetic susceptibility, host factors, and environmental exposure. Such as environmental factors (air pollution, pollen, mold, house dust mite allergens and other inhalant allergens), host factors (obesity, nutritional factors, infections, sensitization), and genetic factors (asthma susceptibility gene loci) (5) (6). And cytokines such as interleukins 4 and 13 are the main drivers of inflammatory diseases such as asthma (7). In addition, asthma can be an occupational disease. Certain occupations, such as bakers, millers and transport workers, are associated with a particularly high risk of developing allergic respiratory diseases (8).

It is a heterogeneous disease with both allergic and non-allergic etiology characterized by chronic inflammation of the airways. Typical symptoms of asthma are primarily wheezing, shortness of breath, and cough of varying frequency and intensity, but also among the symptoms associated with asthma, there will be a feeling of tightness in the chest, as well as obstruction of expiratory airflow through the Airways (9) Although severe asthma is not common, according to the Global Initiative for Asthma (GINA) guidelines, severe asthma is defined as a disease that remains uncontrolled despite adherence to optimized therapy (treatment with GINA step 4 or 5) and treatment of predisposing factors or requires such treatment to achieve good symptom control and reduce the risk of exacerbations (10).

Considering that the Internet has become an important factor influencing the area of health, it is worth using its resources to increase patient awareness (11). And digital health skills can be essential to increasing patient engagement in mobile health interventions (12).

Telehealth is promoted as a strategy to support self-management of long-term illnesses (13), combined with the popularity of all kinds of mobile devices, such as smartphones, etc., this enables the development of health-promoting applications - including applications that enable and improve the quality of patients' participation in the treatment of asthma. Mobile patient health monitoring applications have great potential to improve asthma management (14) by increasing education in self-healing, as well as improving patient self-control, thus obtaining not only clinical benefits but also humanistic and economic (15-17).

The aim of the study was a quantitative and qualitative assessment of applications supporting the treatment of asthma available in Polish.

Material and methods

The search for applications eligible for review was carried out in the period from October 14 to November 8, 2022, based on the following keywords: Asthma, application, diary, on 4 different mobile devices supported by the Android operating system, smartphones in version 10 and a tablet with operating system version 9, and a smartphone supported by the IoS system. The criteria for inclusion in the further review of the found applications were: 1) a Polish language version when using the application, 2) An application that allows free use, and 3) directed at adults.

In addition, to create criteria for evaluating the functionality and usefulness of health applications for patients with asthma, a literature review was conducted (14,18,19) and an In-Depth Interview (IDI) was conducted with

a person treated for asthma daily. Based on the data obtained from the interview, the following application evaluation criteria were defined:

1. Medication Reminder

2. Registration of symptoms

3. Exacerbation test (Asthma Control Test) - active self-monitoring of the disease, aimed at leading to full control of Asthma

4. Possibility of data sharing

5. Connection to external monitors

6. Combination with inhalers

7. Database of interactions with other drugs

8. Using the application (also with limited functions) without having to pay fees

9. Part for the doctor (functions) - part of the application dedicated to the doctor, enabling easier management of the treatment of individual patients (e.g. through ready measurement results, lists, and changes in pharmacological treatment generated automatically from the part for patients - placed in the "For the doctor" tab. Access is limited by logging in by the number of the right to practice the profession)

10. Part for the patient (functions) - an element of the application directly available to the patient, containing all options facilitating the management of Asthma treatment and their individualization.

11. Report generation

12. Additional Features

The threshold for assessing the good quality of the application was a minimum of 9 points / 12 points possible to obtain, i.e. 75%.

Results

The application search yielded 37 results for smartphones and 31 applications for Apple IOS. After removing duplicate results and taking into account only applications that meet the inclusion criteria, 4 applications available for both smartphones and Apple IOS were qualified for the final analysis: FindAir, AioCare Patient, MyTherapy, and StethoMe.

The results of the evaluation of the quality of the application together with the points based on the criteria presented in the materials and methods are presented in Table 1. The highest sum of points was obtained by the MyTherapy application – 5.5 points/12 possible points. Two of the analyzed applications obtained the same sum of 5 points/12 possible points. The application with the lowest sum of points received 3.5 points/12 points.

Tab.1 Evaluation of health applications dedicated to patients with asthma

Criterion	The names of the analyzed applications			
	FindAir	AioCare Patient	MyTherapy	StethoMe
1. Reminder about taking medications.	YES (1 point)	NO	YES (1 point)	License
2. Registration of symptoms	NO	NO	YES (1 point)	License
3. Exacerbation test	NO	TAK (1 point)	NO	NO
4. Possibility to share data	YES (1 point)	NIE	YES (1 point)	YES (1 point)
5. Połączenie z monitorami	NO	YES (1 points)	NO	YES (1 points)
6. Combination with inhalers	YES (1 point)	NIE	NO	NO

7. Database of interactions with other drugs	NO	NO	NO	NO
8. Free version	YES (1 point)	Free Limited Use (0.5 points)	YES (1points)	Free Limited Use (0.5 points)
9. Part for the doctor	NO	NO	NO	YES (1points)
10. Patient part	YES (1 point)	YES (1 point)	YES (1 point)	YES (1 point)
11. Report generation	YES	YES	YES	YES
12. Additional features	-	-	Measurement reminder (0.5 points)	Smart stethoscope - additional support device (0.5 points)
Total points earned	5 points	3.5 points	5.5 points	5 points

By the adopted threshold of good quality of applications -75% of the points possible to obtain, none of the analyzed applications achieved this result. The application with the highest number of points did not even get 50% of the possible points (Fig.1).

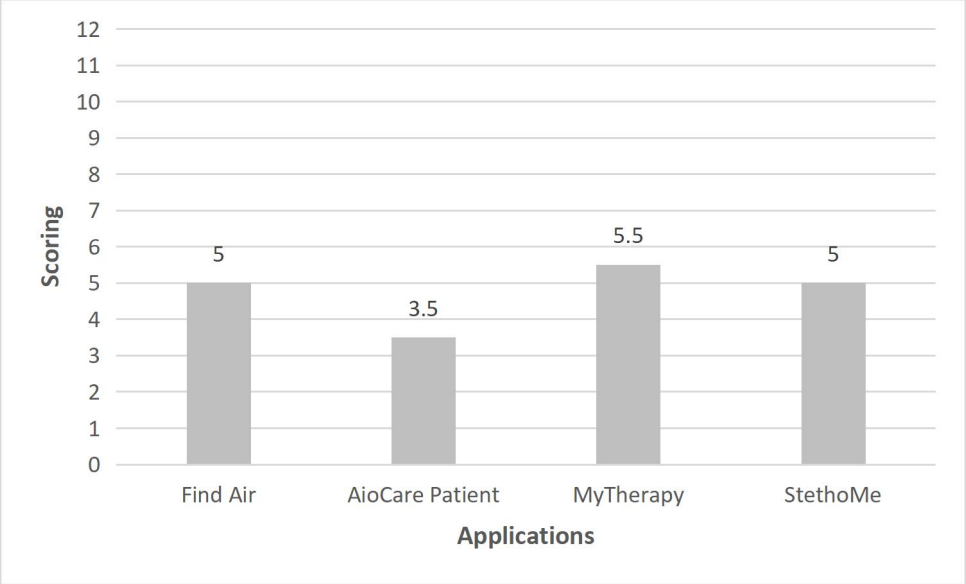

Fig.1 List of the analyzed applications, along with the points you barn

Discussion----------

The development of digital medical technologies, including applications supporting the treatment process both from the point of view of the patient and the doctor, expanding the scope and increasing the personalization of treatment, has a beneficial effect, especially for patients with confirmed chronic disease. The report "241 mobile health applications" developed by the Open Health Care System (OSOZ) estimates that the number of applications around the world whose task is to take care of health is over 318,000 (20).

With effective disease self-management, the burden of asthma can be reduced. And mobile health (mHealth) applications can enable effective self-management interventions for asthma, thereby improving patient quality of life while reducing overall treatment costs for healthcare systems (21).

The purpose of this publication was to review the existing health applications to support the treatment process in patients diagnosed with Asthma and to assess their functionality and usefulness for patients. Analyzing the total

number of Asthma-related applications found in each of its areas, in the first phase of the search, a small number (n=4) available in Polish is strongly noticeable, contrary to the estimates of Himers et al who write about over 500 asthma-related applications available in 2019 (14) However, such a small number of applications available on the Polish market may also have its positive sides, because, as research shows, the availability of too many applications can overwhelm patients when searching. Some reviews indicate the lack of clear evidence on the effectiveness of the application, as well as the need to fill the gap in research related to this topic (13) (22) in this area, it is also necessary to consider extending the research, especially the characteristic functions of the application and their impact on patients' regularity. On the other hand, a 2017 systematic review of the literature that included 12 randomized controlled trials found better asthma control with these apps, even though the quality of the apps was quite variable overall (13) An example of an electronic tool positively reviewed by Sousa-Pinto et al for daily assessment of fluctuations in asthma control and guiding treatment optimization is e-DASTHMA (23).

In our study, in addition to a literature review, the application's stakeholder was used to create the application evaluation criteria by conducting an In-Depth Interview (IDI) with a person treated for asthma daily. In general, stakeholder engagement should already be in place during application development to maximize application usability and compatibility (24). Such actions could contribute to reducing the discrepancy between the intended and actual usability of the application and create optimal conditions for using the application by adapting it to the everyday life of the user.

The analysis of the results embedded in the table shows the differentiation of functions in each of the applications dedicated to people suffering from asthma. Each of the programs focuses only on specific areas related to the treatment of this chronic disease. Each of the applications lacks various individual functions, but as it is visible in the graph above, none of the programs has in its range of database capabilities containing interactions of pharmaceuticals used in the treatment of asthma with other drugs, which was indicated as one of the key elements during the interview. MyTherapy software should be indicated as the most optimal choice due to the highest number of points scored. However, paying attention to functionality, the StethoMe application could also be distinguished. Here, however, it should be emphasized that it is necessary to purchase a license to achieve its full potential, and the Smart Stethoscope - an additional supporting device, determines its functioning, which is characteristic of the health application market.

This study indicates a gap in access to high-quality applications on the Polish market that could support the asthma treatment process and the exchange of information between the patient and medical staff. Taking all the above into account, it is worth creating an application based on information obtained from people most interested in this subject, i.e. patients treated for Asthma daily, and on data from extended research on the effectiveness and functionality in the field of self-healing, comparing it with the standard process therapeutic. In addition, despite the indicated shortcomings, both in terms of practicality and the evidence base, it should be remembered that mobile applications constituting a treatment diary and other functions that facilitate self-monitoring of the treatment process are an effective option to support self-healing. Especially considering the assumptions of e-health (13).

There are concerns that apps could be harmful to users when used as non-evidence-based medical tools (25). The lack of transparent legal regulations in the field of mHealth applications may create difficulties in choosing safe and effective applications for patients and healthcare providers. Implementation of the medical applications certification system could facilitate access to high-quality applications on the Polish market, assessed in terms of safety and effectiveness by appropriately appointed bodies (13).

Conclusions

On the Polish market, there is a small number of mobile applications for monitoring the asthma treatment process for adults. However, among the available applications, after an analysis based on specific criteria - none received a high-quality app rating. To facilitate patients' access to safe and EBM-based applications, it is worth considering the possibility of introducing certification of medical applications on the Polish market.

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