SCIENTIFIC RESEARCH: MODERN CHALLENGES AND FUTURE PROSPECTS

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PROSPECTS OF MOBILE APPLICATIONS FOR MONITORING AND PREVENTION OF HEART DISEASES

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Cardiovascular diseases (CVD) are one of the leading causes of death in the world, causing millions of deaths annually. In the context of the digital transformation of medicine, mobile applications are gaining significant importance as tools for early diagnosis, monitoring of patients' condition and prevention of complications. The integration of modern technologies allows to increase the availability of medical services, reduce treatment costs and strengthen control over risk factors such as arterial hypertension, dyslipidemia and diabetes.

Aim: to investigate the potential of using mobile applications for monitoring and prevention of cardiovascular diseases, to identify their main advantages and challenges.

Materials and methods: the study used the method of literature analysis, reviews of mobile applications on the iOS and Android platforms, as well as analysis of statistical data on the effectiveness of their use. The sample included 11 applications that are positioned as tools for monitoring CVD.

Results and discussion: Mobile applications are becoming an important tool for the prevention and early detection of heart diseases. They help to monitor heart health, track key indicators, improve patient-doctor communication and increase awareness of risk factors [9].

Mobile applications for monitoring cardiovascular diseases can be divided into several categories:

1) Applications for measuring physiological indicators: pulse, blood pressure. Examples include the following applications:

- Instant Heart Rate - the application uses the smartphone camera to measure heart rate (HR). It does not require additional equipment, to measure the pulse, you just need to place your finger on the smartphone camera. Suitable for people who want to quickly assess their pulse at any time [5].
- Withings Health Mate - works with fitness trackers and health devices from Withings, such as smart tonometers, scales and watches. Helps monitor health comprehensively: heart rate, blood pressure, activity level and weight. The app can create long-term health graphs and provide personalized recommendations based on data analysis [13].
- Qardio Heart Health works with the QardioArm blood pressure monitor and QardioCore monitors, allowing you to measure blood pressure, heart rate, and ECG. This app is able to create detailed graphs with measurement history and conduct automatic data analysis and reminders for the next measurements [11].

2) Fitness and nutrition trackers. Examples of apps in this group include:

- MyFitnessPal - helps you track calorie intake, macronutrients, physical activity, and hydration. It also includes a barcode scanner for quickly adding food [10].
- Google Fit - tracks physical activity, steps, distance, calories burned, and heart rate (when integrated with devices) and creates personalized goals for the user [4].
- Lifesum - helps track diet, weight, physical activity and offers meal plans, analyzes the nutritional value of food and provides personalized recommendations based on goals (weight loss, weight gain) [6].

3) Medication reminder tools. This group includes:

- Medisafe Pill Reminder - the application reminds you to take your medication and keeps track of your treatment schedule. In addition, it is possible to add family members to monitor their medication intake. The application integrates with Google Fit [8].
- CareZone - allows you to keep track of your medications, record symptoms and create reports for your doctor. The application stores a list of

medications and doses and offers a label scanning function to add medications, and also has a separate section for tracking blood pressure and pulse [3].

4) Telemedicine and doctor communication platforms. Examples of the following applications are:

- Teladoc Health - is a platform for consultations with doctors via video calls or chat. The application allows for quick consultations with specialists such as a general practitioner, pediatrician and cardiologist, and also offers remote monitoring of chronic diseases and can issue prescriptions and referrals for tests prescribed by a doctor [12].
- Amwell - the application allows you to contact certified doctors via video call, in particular, to receive consultations in the field of mental health, cardiology, dermatology [1].

Separately, it is worth mentioning such an application as Apple Health (with a heart health monitoring function). It integrates with the Apple Watch smartwatch, which provides constant real-time monitoring, i.e. measures heart rate, heart rate variability, and can also assess blood pressure (in combination with connected tonometers, for example, QardioArm). If the application detects abnormalities, such as atrial fibrillation or abnormally high/low pulse, it sends a recommendation to consult a doctor [7].

Mobile applications for monitoring cardiovascular diseases are effective tools for maintaining health. They allow to measure key physiological indicators, monitor the level of physical activity and nutrition, remind you to take medication, and provide communication with doctors through telemedicine platforms. Thanks to applications such as Instant Heart Rate, Withings Health Mate, or Teladoc Health, users are able not only to monitor their condition in real time, but also to receive professional help in a timely manner. This significantly improves the quality of life and contributes to the prevention of heart disease [14].

However, these applications, in addition to their advantages, also have disadvantages, namely limited measurement accuracy, since data obtained through a smartphone camera or wearable devices may be less accurate than medical

equipment. This can lead to false readings or diagnoses. Some applications require additional devices, such as Withings Health Mate or Qardio Heart Health, require special devices (tonometers, sensors), which can be expensive and not available to everyone. Many applications, especially telemedicine platforms, require constant access to the Internet, which can be a problem in remote areas or during power outages.

It should be noted that the general data analysis algorithms used by these applications do not always take into account individual characteristics of users, such as comorbidities or genetic predisposition, which can reduce the accuracy of recommendations [14].

A common problem with the widespread use of these applications is the lack of medical supervision. Users may overly rely on applications, ignoring the need to consult a doctor, which can lead to untimely diagnosis of serious problems.

In addition, such applications may contribute to the development of psychological discomfort, as constant monitoring can cause anxiety in some users, especially if the application issues warnings or inaccurate alarms about possible deviations.

Conclusions: Thus, mobile applications are becoming an important tool for the prevention and monitoring of cardiovascular diseases, allowing for timely identification of risks, monitoring of key indicators and improving communication between the patient and the doctor. However, they have limitations in accuracy, accessibility, and individualization of data, which requires additional medical supervision. Despite the challenges, their implementation significantly improves the quality of medical services and the level of awareness of users about their own health.

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