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**University Business Academy in Novi Sad, Faculty of  
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# **BOOK OF PROCEEDINGS**

Editor: Dr Branko Savić, professor

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International Multidisciplinary Conference  
"Challenges of Contemporary Higher Education" - CCHE 2024  
Kopaonik January 29th - February 3rd 2024  
Vol\_2



**Challenges of  
Contemporary  
Higher Education**

Belgrade, 2024

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## TRAINING FAMILY PHYSICIANS IN A MOBILE ECOSYSTEM FOR THE PREVENTION OF PROGRESSION OF CARDIOVASCULAR DISEASE

*Maria Dremina<sup>1</sup>, Ishenbai Moldotashev<sup>2</sup>, Yuriy Bogdanov<sup>3</sup>*

**Abstract:** The study aims to support family physicians in successfully integrating innovative methods of cardiovascular disease diagnosis, in order to ensure a high standard of health care in Kyrgyzstan. Cardiovascular disease (CVD) is a significant health threat and more than 52% of deaths in Kyrgyzstan are related to these diseases, especially in rural areas where there is difficulty in diagnosing CVD due to limited access to healthcare facilities and lack of qualified specialists. In response to these challenges, an innovative mobile ecosystem for screening and prevention of CVD progression has been developed, the prototype of which has been successfully tested in rural areas. The mobile ecosystem includes a set of modern diagnostic methods, a community of trained family physicians using digital technologies, educational programmes and telemedicine support, thus providing a comprehensive approach to controlling and preventing the progression of cardiovascular disease.

**Key words:** Cardiovascular disease, family physicians, access to health care, prevention, work-based learning (WBL), telemedicine, ECG spectral analysis, mobile ecosystem.

### 1. INTRODUCTION (HEADING 2 STYLE)

According to the World Bank, Kyrgyzstan ranks 60th in the ranking of the world's poorest countries, with 32% of the population living below the poverty line as of 2022. Cardiovascular disease (CVD) accounts for more than 52% of deaths in Kyrgyzstan. These statistics are worrying, especially given the current situation in a country where a significant share of the population (65%) lives predominantly in rural areas. Under these circumstances, rural residents face limited access to health centres and hospitals, making diagnosis of CVD more difficult than in urban areas.

The main factors predetermining the low efficiency of CVD diagnosis and prevention include the lack of qualified medical specialists in rural areas, limited access to specialised equipment, low public awareness of risk factors and symptoms of the disease, high economic barriers to health care. These problems have a wide range of negative consequences for the health of the population and the health care system as a whole. Delayed diagnosis and initiation of CVD treatment, lack of awareness of the disease, and inaccessibility of treatment interventions all lead to serious complications, including disability, loss of ability to work, and even death.

This situation has not only humanitarian but also economic consequences. The costs of treating CVD complications, the work capacity of the population and life expectancy become a major challenge for the country. This context emphasises the urgent need to develop effective strategies to prevent CVD progression, including new approaches in additional training of family physicians, who, as key actors of primary health care in the country, will be able to detect early and preclinical CVD and prevent it effectively, even with limited resources and availability.

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## **2. CURRENT TRENDS IN CVD PREVENTION IN KYRGYZSTAN**

To date, a comprehensive study on the prevalence of key risk factors for cardiovascular disease (CVD) has been successfully completed in Kyrgyzstan [1]. Such factors as smoking, arterial hypertension, hypercholesterolemia, fasting hyperglycaemia, obesity and overweight, hypodynamia, excessive alcohol consumption, insufficient consumption of fruits and vegetables, and increased salt intake were analysed. These factors were considered in the context of socio-demographic characteristics of the republic's population.

An important result was the first assessment of 10-year cumulative cardiovascular risk according to the WHO scale. This allows to determine more effectively the tactics of patient management and to develop scientifically based approaches to primary and secondary prevention of cardiovascular diseases. The obtained data served as a basis for the development of new adapted interventions and recommendations oriented to modern international principles of cardiovascular disease prevention. These activities contribute to the improvement of risk factor detection, diagnosis and timely treatment.

The results of the analysis of trends in morbidity, mortality and loss of working capacity of the population of Kyrgyzstan for 2014-2018 highlighted the need for effective measures to combat CVD. The developed priority approaches and activities within primary health care are included in the state programme for prevention and control of non-communicable diseases. This is aimed at reducing morbidity, mortality and loss of working capacity among the able-bodied population.

The data obtained have been successfully used in the development of a training programme for continuous training of primary health care workers and clinical residents of the Kyrgyz State Medical Institute of Retraining and Professional Development named after S.B. Daniyarov. These programmes cover the topics "Package of basic measures for prevention and control of cardiovascular diseases through integrated treatment of diabetes and hypertension at the primary health care level" and "Medical education regarding healthy lifestyle of the population".

Kyrgyzstan also has the Kyrgyz-Chinese Centre for the Prevention of Cardiovascular Disease [2], whose activities are aimed at strengthening cooperation and increasing the effectiveness of preventive measures for CVD, improving the skills of medical workers in the diagnosis and treatment of CVD. The main objectives of the centre include the establishment of a CVD screening system, as well as the intensification of research and academic exchange for CVD prevention. In this way, collaboration has been initiated in the country to develop research programmes and support innovative projects in health services. The clustering of data aimed at reducing the number of diseases became the basis for organising health services and allocating research funds. However, the research programmes mentioned above focus mainly on expanding the existing level of scientific knowledge.

## **3. AN INNOVATIVE MOBILE ECOSYSTEM FOR CVD SCREENING AND PREVENTION**

Despite the efforts and measures taken to combat the spread of CVD, the available programmes are not sufficiently effective. Their implementation is hampered by limited access, especially in remote areas, personalised approach and wide coverage are not always ensured. In response to these challenges, we have developed an innovative mobile ecosystem project to screen and prevent the progression of CVD. Our approach not only complements existing programmes, but also provides new tools and technologies for more effective prevention and risk management. Importantly, a prototype of our mobile ecosystem has already been implemented and is operating successfully. We have managed to combine advanced technologies and a personalised approach, which makes our ecosystem a significant tool in the fight against CVD.

The following key elements are also included in the ecosystem.

- A screening method based on spectral analysis of a single-channel electrocardiogram, the essence of which is to identify the peculiarities of functioning of the cardiovascular system, as well as its relationship with the central nervous system under various influences. Assessment of cardiovascular system state is performed by determining the levels of energy consumption of organs and systems, as well as their frequency spectrum, which are necessary for optimal functioning. Inputs are ECG, pulse wave or natural human electromagnetic radiation recordings.
- Specially trained family physicians, health care providers and volunteers who are specially trained in the diagnosis, treatment and prevention of CVD. These professionals become key promoters and active participants in the fight against the spread of heart and vascular disease.
- Innovative digital technologies such as mobile apps, artificial intelligence algorithms to collect, process and analyse medical data. This ensures effective interaction between physicians and patients, and improves the quality of diagnosis and monitoring of diseases.
- Training and outreach programmes for family physicians, medical providers, volunteers and the community. Programmes for medical professionals and volunteers include rules for social interactions in the CVD prevention community, protocols for conducting diagnostic procedures using mobile devices and apps, protocols for conducting medical consultations and providing primary psychological support to patients. Community programmes highlight risk factors, raise awareness of healthy lifestyles and CVD prevention principles.
- Activities on screening, prevention of risk factors and early diagnosis of CVD, and lifestyle correction are built into the ecosystem.
- Telemedicine support for remote patient monitoring, counselling, and physician-to-physician exchange of medical information.
- Collaboration with government and community organisations to coordinate efforts, share information and resources, and develop and implement health policies.

Thus, the advantage of the mobile ecosystem over its peers is the integrated, balanced and interconnected approach to tackling CVD. Our approach allows us to integrate innovations into everyday medical practice, ensuring a wider coverage of the population and a more effective fight against CVD.

#### **4. CASE STUDY OF A PROTOTYPE MOBILE CVD PREVENTION ECOSYSTEM**

Training family physicians for early diagnosis and prevention of CVD represents a strategically important aspect of health care for several key reasons. First and foremost is accessibility. Family physicians representing the health care system are the first point of contact for patients living in rural areas. Family physicians provide basic health services and counselling, making them key guides to involve patients in the prevention process. The task of family physicians is to recognise the early signs of CVD and provide the necessary recommendations. In doing so, they monitor patients' health over the long term, which creates the opportunity for longer-term and more effective prevention strategies, including monitoring risk factors, conducting regular check-ups and providing support at all stages of the patient's life. Thus, training family physicians for early diagnosis and prevention of CVD contributes to a more effective and accessible health care system focused on keeping patients healthy throughout their lives.

To date, our team has conducted a test-run, the results of which serve as the basis for the development of a training programme for family physicians. This test-run was organised to detect chronic heart failure at a preclinical stage. The study was conducted in various locations, including the Kyrgyz-Turkish Nephrology Centre, the high-mountainous Jerui Gold Mine and a general medical practice centre in the village of Jal in Kyrgyzstan. The total number of test participants was 460 [3].

The data obtained, in particular the correlation coefficient for the proposed screening method, reached a value of 0.8 when analysing left ventricular diastolic dysfunction using traditional methods of cardiac function assessment.

The use of CVD spectral analysis and subsequent pattern recognition methods confirmed that it is possible to obtain an objective assessment of health status in various parameters using accessible and cost-effective methods even in the field, without the need for bulky and expensive equipment.

In addition to the test-run, we have accumulated successful experience in correcting states of psychophysical discomfort [4] associated with CVD. We also have provided work-based learning (WBL) [5] for our professionals.

The rich experience of our team has provided us with valuable insights in identifying hidden signs of CVD, including at the preclinical stage, and ways to prevent them. Based on these findings, we have developed effective training methods for family physicians aimed at improving the quality of life of the population.

Let's take a look at the key components of our training programme.

#### Module 1: Introduction to social interactions in community settings

- 1.1 Define the role of the family physician in the community.
- 1.2 Develop skills to communicate and interact effectively with diverse populations.
- 1.3 Learning how to conduct medical consultations that include frank and understandable conversations with the patient about health and psycho-emotional well-being.

#### Module 2: Use of mobile devices and applications in diagnosis

- 2.1 Familiarise students with modern mobile devices and their role in medical diagnosis.
- 2.2 Training in the use of mobile applications for screening and diagnosis of cardiovascular disease.
- 2.3 Practical lessons on the use of medical gadgets for data collection and patient monitoring.

#### Module 3: Decision-making based on diagnostic data

- 3.1 Learning how to analyse and interpret the results of medical tests.
- 3.2 Develop skills in cardiovascular disease risk assessment.
- 3.3 Create treatment plans and recommendations based on individual patient data.

#### Module 4: Psychological support of patients

- 4.1 Understand the psychological aspects of illness and their impact on patients.
- 4.2 Develop skills in providing emotional and psychological support.
- 4.3 Training in working with patients who are under stress and require psychological support.

#### Final project

Development of individual cases and scenarios for group discussion that integrate all the knowledge and skills learnt.

## 5. CONCLUSION

In conclusion, it is necessary to emphasise the significance of the achieved results revealed during the testing and approbation of the screening method and the training programme for family physicians. The obtained data indicate high efficiency of the proposed methods in detecting hidden signs of CVD at early stages. The remarkable correlation coefficient for the proposed screening method confirms its reliability and applicability in the field. The results also indicate the importance of further development of training programmes for family physicians to improve competence in CVD prevention.

These studies reflect the promising use of innovative screening methods, as well as the need to integrate these methods into the daily practice of primary health care providers. The importance of further steps in the development of family physician training is emphasised to ensure the effectiveness of preventive interventions and to improve the health of the population. Based on the identified opportunities and achievements, the proposed methods and training programmes have the potential to be widely implemented in medical practice, contributing to the reduction of morbidity and improvement of public health in Kyrgyzstan. Their novelty lies in rethinking educational approaches, introducing advanced technologies and creating a culture of health where doctors not only treat but also actively prevent diseases.

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