Risk management of cardiovascular diseases in the primary health care setting

Gestión del riesgo de enfermedades cardiovasculares en el ámbito de la atención primaria de salud

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Abstract

Cardiovascular diseases (CVDs) remain one of the leading causes of death and disability worldwide. In conditions of limited health care resources, prevention and management of CVD risk factors at the level of primary health care is of particular relevance. This article is devoted to the analysis of modern approaches to assessing and reducing the risks of cardiovascular diseases in primary health care.

The paper discusses key aspects of CVD risk management, including the use of risk stratification algorithms such as SCORE, QRISK and others adapted for different populations. The importance of a comprehensive approach is emphasised, taking into account not only traditional risk factors (hypertension, hypercholesterolemia, smoking), but also social determinants of health, such as income level, education and access to medical care.

Particular attention is paid to the role of the interdisciplinary team in organising prevention work, including general practitioners, nurses, nutritionists and psychologists. The authors emphasise the need to introduce digital technologies to monitor patients, increase their awareness and participation in the management of their health.

The article also considers the effectiveness of different secondary prevention strategies, such as medication (statins, antihypertensive drugs) and non-medication methods (lifestyle changes, physical activity, smoking cessation). Emphasis is placed on the importance of a personalised approach that takes into account the individual characteristics of the patient.

It is emphasised that successful CVD risk management at the primary health care level requires a systematic approach, including coordination of actions between health care professionals, patients and public organisations, which contributes to the reduction of morbidity and mortality from CVD, improvement of the quality of life of the population and optimisation of the use of health care resources.

Key words: cardiovascular diseases, risk management, primary health care, prevention, risk factors, risk stratification, risk assessment algorithms, secondary prevention, personalised approach, interdisciplinary cooperation.

Resumen

Las enfermedades cardiovasculares (ECV) siguen siendo una de las principales causas de muerte y discapacidad en todo el mundo. En un contexto de recursos sanitarios limitados, la prevención y el manejo de los factores de riesgo de ECV en la atención primaria cobran especial relevancia. Este artículo se dedica al análisis de enfoques modernos para evaluar y reducir el riesgo de enfermedades cardiovasculares en la atención primaria.

El artículo analiza aspectos clave de la gestión del riesgo de ECV, incluyendo el uso de algoritmos de estratificación del riesgo como SCORE, QRISK y otros adaptados a diferentes poblaciones. Se enfatiza la importancia de un enfoque integral, considerando no solo los factores de riesgo tradicionales (hipertensión, hipercolesterolemia, tabaquismo), sino también los determinantes sociales de la salud, como el nivel de ingresos, la educación y el acceso a la atención médica.

Se presta especial atención al papel del equipo interdisciplinario en la organización del trabajo de prevención, incluyendo médicos generales, enfermeras, nutricionistas y psicólogos. Los autores enfatizan la necesidad de introducir tecnologías digitales para el seguimiento de los pacientes, aumentar su concienciación y participación en la gestión de su salud. El artículo también analiza la eficacia de diferentes estrategias de prevención secundaria, como la medicación (estatinas, antihipertensivos) y los métodos no farmacológicos (cambios en el estilo de vida, actividad física, abandono del hábito tabáquico). Se hace hincapié en la importancia de un enfoque personalizado que tenga en cuenta las características individuales del paciente.

Se destaca que una gestión eficaz del riesgo de ECV en la atención primaria requiere un enfoque sistemático que incluya la coordinación de acciones entre profesionales sanitarios, pacientes y organizaciones públicas, lo que contribuye a la reducción de la morbilidad y la mortalidad por ECV, la mejora de la calidad de vida de la población y la optimización del uso de los recursos sanitarios.

Palabras clave: enfermedades cardiovasculares, gestión del riesgo, atención primaria, prevención, factores de riesgo, estratificación del riesgo, algoritmos de evaluación del riesgo, prevención secundaria, enfoque personalizado, cooperación interdisciplinaria.

Introduction

Cardiovascular diseases (CVDs) represent one of the most serious global health problems, being the main cause of mortality and disability of the population worldwide. According to the World Health Organisation (WHO), more than 17 million people die annually from CVDs, accounting for about 30% of all deaths on the planet. Moreover, a significant proportion of these cases are associated with the presence of manageable risk factors such as arterial hypertension, dyslipidaemia, smoking, obesity, diabetes mellitus and unhealthy lifestyles[1].

Primary health care plays a key role in preventing the development of CVDs and reducing their consequences. It is at this level of medical care that early detection of risk factors, organisation of preventive measures and monitoring of patients' health status take place. However, the effectiveness of CVD risk management at the primary level often faces a number of challenges: limited resources, insufficient patient awareness, difficulties in implementing modern risk assessment algorithms and lack of population motivation to change lifestyle[2].

Against the backdrop of the growing burden on health care systems, it is evident that traditional approaches to the prevention and treatment of CVDs require revision[3]. Emphasis should be placed on comprehensive, personalised risk management strategies that take into account both biological and social determinants of health. The introduction of digital technologies, the development of interdisciplinary interaction and strengthening the role of the patient as an active participant in the process of managing his/her health are becoming priority areas for the modernisation of primary health care.

Thus, the development and implementation of effective CVD risk management programmes at the primary health care level is not only a scientific but also a practical task, the solution of which can significantly affect the reduction of morbidity and mortality from cardiovascular pathologies. This work is aimed at analysing modern approaches to CVD risk management and developing recommendations for their application in primary health care.

When writing an article on the above topic, the following research methods were applied:

- study and systematisation of data from scientific publications, World Health Organization (WHO) recommendations, international clinical guidelines (e.g., ESC, NICE, AHA/ACC) and national CVD prevention programmes. This method provided up-to-date information on current approaches to cardiovascular disease risk management;

- Comparison of different CVD risk management strategies used in different countries or regions. For example, comparison of the effectiveness of risk assessment algorithms (SCORE, QRISK, Framingham Risk Score) and their adaptation to local population characteristics;

- study of interrelationships between different factors influencing the development of CVD (biological, social, economic and environmental). The synthesis method helped to identify complex causes of diseases and to develop integrated approaches to their prevention.

The results of studies aimed at identifying the most effective methods of CVD risk management at the primary health care level were also summarised, which made it possible to create a holistic picture of the current state of the problem and offer practical recommendations.

Results

Primary health care (PHC) plays a central role in the health care system, especially in the context of cardiovascular disease (CVD) risk management[4]. In the context of limited financial, human and technological resources that characterise many countries, the effective use of PHC as a platform for prevention becomes a strategically important area. CVD prevention at this level allows not only to reduce the burden on secondary and tertiary care, but also to prevent the development of severe complications such as myocardial infarction, stroke or chronic heart failure[5].

CVD prevention at the primary care level is based on several key principles. Regular screening of patients allows timely detection of such risk factors as arterial hypertension, dyslipidaemia, diabetes mellitus and overweight, which creates an opportunity for their correction at early stages, when the changes are still reversible[6].

The use of risk assessment algorithms (e.g., SCORE, QRISK2) helps to classify patients according to the likelihood of developing CVD in the next 10 years. This information allows us to focus our efforts on high-risk groups where the potential benefit of interventions is greatest.

Instead of focusing on individual risk factors (e.g., lowering blood pressure alone), current guidelines emphasise the need for comprehensive management of all risk factors simultaneously[7]. This includes medication (statins, antihypertensive drugs) and non-medication (lifestyle changes, physical activity, smoking cessation).

CVD risk management requires close co-operation between health care providers and patients. Educating patients about their risks, teaching healthy lifestyle habits and motivating them to change are critical components of success.

In resource-limited settings, it is important to implement cost-effective strategies. For example, group counselling, the use of medical assistants or nurses, and digital technologies (telemedicine, mobile apps for self-monitoring) can significantly increase the availability of preventive services[8].

Thus, CVD risk management at the primary health care level is a strategic approach to improving public health, which is particularly relevant in resource-limited settings. Effective implementation of these measures helps to reduce morbidity and mortality from CVDs, improve the quality of life of patients and optimise health system costs.

Cardiovascular disease (CVD) risk management at the level of primary health care requires an accurate as-

sessment of the probability of pathology development in a particular patient[9]. For this purpose, risk stratification algorithms adapted for different populations are widely used. These tools allow classifying patients by risk levels and developing personalised prevention and treatment plans. Let us consider the key aspects of this strategy.

Risk stratification algorithms represent an important tool in cardiovascular risk management. SCORE was developed by WHO and the European Society of Cardiology to estimate the 10-year risk of CVD mortality[10]. The above algorithm takes into account age, gender, total cholesterol, blood pressure, and smoking, and is adapted for different regions, taking into account high and low risk, which makes it a universal tool.

QRISK is used in the UK and covers a wider range of factors including age, gender, ethnicity, social status, presence of diabetes mellitus, chronic kidney disease and other comorbid conditions[11]. The algorithm presented is particularly sensitive for diverse populations. The Framingham Risk Score is based on data from the long-term Framingham study and estimates the risk of coronary artery disease over 10 years, taking into account traditional risk factors[12]. In addition, there are population-adapted models specifically designed for Asian, African or Latin American populations, taking into account genetics, lifestyle and access to medical care.

The principles of using risk stratification algorithms include personalisation of the approach, which allows identification of patients with different levels of risk of CVD development. Targeted use of resources focuses on high-risk groups, helping to optimise costs for diagnosis, treatment and monitoring. Justification of therapeutic decisions is based on the results of risk assessment, helping the physician to choose the most effective treatment, such as prescribing statins or antihypertensive drugs[13].

The adaptation of algorithms for different populations takes into account ethnic differences, in which some algorithms may be less accurate for certain populations due to genetic predispositions, lifestyle and social conditions. Socioeconomic factors also play an important role, as models such as QRISK take into account the impact of social status and access to health care on CVD risk. Regional specificities, such as high salt intake or low physical activity, require adjustment of the algorithms to improve their accuracy[14].

The comprehensive approach to risk management involves implementing measures to reduce risk once it has been assessed. Non-drug methods include lifestyle changes such as healthy eating, smoking cessation and regular physical activity, as well as psychological support to increase patient motivation. Medication methods are used to control blood pressure with antihypertensive drugs, lower cholesterol with statins, and prevent thrombosis with aspirin in high-risk patients. Monitoring and feedback ensure regular follow-up of patients and adjustment of the risk management plan based on the progression of indicators.

Limitations and challenges in the use of risk stratification algorithms relate to the accuracy of prediction, as some algorithms may under- or overestimate risk in certain populations. Data availability can also be an issue, as the correct application of algorithms requires the collection of a complete history and biochemical parameters, which is difficult in resource-limited settings. The difficulty in interpreting the results remains relevant, as not all health professionals have sufficient training to correctly use the algorithms and explain their results to patients[15].

The introduction of digital technologies greatly facilitates the use of risk stratification algorithms. Modern information systems and mobile applications can automatically calculate risk based on entered data, store observation history and track changes. Moreover, they provide patients with visual information about their health, which promotes greater engagement in risk management.

Discussion

Traditional cardiovascular disease (CVD) risk factors such as hypertension, hypercholesterolaemia, smoking, overweight and diabetes mellitus have long been recognised as key predictors of pathology. However, modern studies increasingly emphasise the importance of expanding the list of risk factors to include social determinants of health[16]. Such factors - income level, education, access to medical care, working and living conditions - have a significant impact on the probability of CVDs and their outcomes. An integrated approach that takes into account both biological and social aspects becomes essential for effective CVD risk management.

Low income is directly related to an increased risk of CVDs. People with limited financial resources often face a number of problems:

- limited access to quality nutrition (high cost of healthy foods);

- lack of opportunities for regular physical activity due to lack of time or money;

- increased stress associated with financial difficulties, which can lead to the development of depression, anxiety and other psycho-emotional disorders negatively affecting the cardiovascular system.

Educational level is closely related to health awareness and the ability to make good decisions:

- a high level of education is usually associated with a better understanding of the importance of a healthy lifestyle and willingness to follow doctors' recommendations;

- people with a low level of education may have difficulties in interpreting medical information, which reduces their motivation and ability to comply with preventive recommendations[17].

Accessibility and quality of medical care play a crucial role in CVD risk management. In regions where health services are scarce, patients are less likely to undergo screening tests, increasing the likelihood of delayed diagnosis. Economic barriers (e.g. high costs of treatment or medications) may prevent adequate management of chronic conditions such as arterial hypertension or dyslipidaemia.

Working under conditions of high stress or physical overwork may increase the risk of developing CVDs. Unfavourable environmental factors (e.g. air pollution) are also significant triggers of cardiovascular disease. Residents of neighbourhoods with inadequate amenities (limited access to parks, sports fields or food) face additional barriers to maintaining health.

An integrated approach to CVD risk management that addresses both traditional risk factors and social determinants of health allows:

- to understand better the causes of disparities in CVD prevalence between different population groups;

- to develop targeted programmes aimed at eliminating social barriers;

- to strengthen individual patient motivation through information and support[18].

CVD risk management requires not only a medical but also a social view of the problem. Traditional risk factors, such as hypertension and hypercholesterolaemia, remain important, but their influence is significantly enhanced by social determinants of health, such as income level, education and access to medical care. An integrated approach that takes these aspects into account contributes to more effective prevention and reduces inequalities in cardiovascular health, which is particularly relevant in resource-limited health care settings where it is important to use available resources as rationally as possible[19].

Prevention and risk management of cardiovascular disease (CVD) requires a multidisciplinary team including general practitioners, nurses, nutritionists, psychologists and other specialists. This approach provides comprehensive support for patients, taking into account both medical and social aspects of their health. The multidisciplinary team represents a critical element in cardiovascular risk management, with each specialist fulfilling a unique role. GPs are the main coordinators of preventive care, carrying out initial screening of risk factors, assessing the patient's general condition and developing individualised risk management plans, including prescribing appropriate medication to control blood pressure, cholesterol levels and other parameters. They also inform patients about the importance of a healthy lifestyle and the importance of adhering to recommendations[20].

Nurses play a key role in monitoring the condition of patients by regularly measuring blood pressure, weight and monitoring medication intake. They support patients by helping them adapt to new treatment regimes and offering practical advice on lifestyle changes. Moreover, nurses can organise group sessions to teach patients self-management skills such as blood pressure measurement or weight monitoring.

Dietitians create personalised nutrition programmes aimed at weight loss, cholesterol normalisation and glycaemic control. They teach patients how to choose the right foods, plan menus and prepare meals that meet the recommendations for CVD prevention. In addition, dietitians provide motivational support to help overcome the difficulties associated with changing dietary habits[21].

Psychologists focus on managing stress, which can be a trigger for the development of cardiovascular disease. They use behavioural therapy techniques to encourage the abandonment of unhealthy habits, such as smoking, and to strengthen motivation for a healthy lifestyle. In addition, psychologists provide emotional support to patients facing depression, anxiety or other psychoemotional problems that affect CVD risk.

Physiotherapists and therapeutic physical education instructors develop safe and effective exercise programmes that take into account the patient's age, health condition and abilities. They monitor the programme, adjusting it if necessary, and teach movement techniques to minimise the risk of injury.

Social workers help address social barriers, such as problems with access to health care, financial difficulties or lack of information. They connect additional resources, for example through local charities, government support programmes or other social services.

Pharmacists counsel patients on the use of medications, explaining possible side effects and drug interactions. They also help to monitor medication regularity by reporting problems to the physician in a timely manner[22].

Information technology and administrative staff provide effective data management by collecting, storing and analysing patient information to optimise risk management processes. Automated systems can send reminders about medication or upcoming check-ups, which promotes better adherence to treatment.

In conclusion, the interdisciplinary team is an integral part of successful CVD prevention and risk management. Each specialist contributes to a comprehensive patient support system that takes into account medical, psychological and social needs. This approach significantly increases the effectiveness of preventive measures and improves the quality of life of patients, especially in the context of limited healthcare resources, when it is important to use all available professional competences to achieve the best results. The need to implement digital technologies for patient monitoring is becoming evident, as it allows to automate data collection processes, ensure their accuracy and accessibility, and increase patients' involvement in managing their health.

In today's world, digital technologies are becoming an integral part of healthcare, especially in the field of cardiovascular disease (CVD) prevention and risk management. These innovations make it possible to optimise patient monitoring processes, increase patient engagement in managing their own health and improve the quality of care. The implementation of digital technologies for monitoring patients with CVD risk factors is becoming a necessary step to improve the efficiency of primary care[23].

Secondary prevention of cardiovascular disease (CVD) aims to prevent recurrent complications in patients who have already suffered myocardial infarction, stroke or other cardiological pathologies. To achieve this goal, both drug and non-drug methods are used, each of which has its own effectiveness and place in integrated risk management. A personalised approach that takes into account the individual characteristics of the patient plays a key role[24].

Medication methods are the basis of secondary prevention of CVD. They aim to control risk factors and reduce the likelihood of developing new events. Statins reduce the level of low-density lipoprotein (LDL, «bad cholesterol») and thus reduce the atherosclerotic process. Studies show that statins can reduce the risk of recurrent myocardial infarction by 25-30% and the risk of stroke by 20-25%. The dosage and the choice of a particular drug depend on the initial cholesterol level, the presence of comorbidities and the tolerability of the drug.

Antihypertensive drugs control blood pressure by reducing the burden on the cardiovascular system. Normalisation of BP can reduce the risk of recurrent cardiovascular events by 30-40%. The choice of drug depends on the type of hypertension, the patient's age, the presence of diabetes or renal failure.

Antiaggregants (aspirin, clopidogrel) prevent blood clots, reducing the risk of ischaemic complications. The use of antiaggregants can reduce the risk of recurrent myocardial infarction or stroke by 20-25%. The use of these drugs requires consideration of the risk of bleeding and other side effects[25].

Conclusions

Cardiovascular disease (CVD) risk management at the primary health care level is a complex challenge requiring the integration of medical, social and technological approaches. In resource-limited settings, the health care system should focus on prevention and risk factor management to reduce CVD morbidity and mortality. Primary health care plays a key role in preventing the development of CVDs through early detection of risk factors, use of risk stratification algorithms (e.g. SCORE, QRISK) and implementation of personalised prevention programmes.

Effective CVD risk management requires taking into account not only traditional factors (hypertension, hypercholesterolaemia, smoking) but also social determinants of health, such as income, education and access to health care. This approach helps to eliminate inequalities in cardiovascular health.

Successful implementation of preventive measures is impossible without the coordinated work of an interdisciplinary team including general practitioners, nurses, nutritionists, psychologists and other specialists. Each member of the team makes a unique contribution to maintaining the patient's health.

The introduction of digital technologies to monitor patients, collect data and provide personalised recommendations significantly increases the effectiveness of prevention programmes. Telemedicine, mobile applications and artificial intelligence systems are becoming important tools to enhance the interaction between patients and healthcare professionals.

For patients already diagnosed with CVD, a combination of medication (statins, antihypertensives, antiaggregants) and non-medication methods (lifestyle changes, physical activity, smoking cessation) is necessary. A personalised approach that takes into account the individual characteristics of the patient significantly improves adherence to treatment and clinical outcomes.

Increasing public awareness of CVD risk and prevention and involving patients in managing their health are important components of success. Education programmes, information campaigns and technologies that support self-management contribute to improved health outcomes.

Thus, CVD risk management at the primary health care level requires a systematic approach involving coordination between health care providers, patients and community organisations, which not only reduces CVD morbidity and mortality, but also improves the quality of life of the population, increases the efficiency of health

care resources and ensures the long-term sustainability of the medical system.

References

1. Nederlands Huisartsen Genootschap. NHG-standaard Cardiovasculair risico management (tweede herziening). Huisarts Wet. 2019;62(4):55–7.
2. Visser S, ten Veen P, Verheij R. Kwaliteit van ICPC-codering. Huisarts Wet. 2012;55(10):459.
3. Maddox TM, et al. The Learning Healthcare System and Cardiovascular Care. A scientific statement from the American Heart Association. Circulation. 2017;135:e826–57.
4. Holtrop JS, Rabin BA, Glasgow RE. Qualitative approaches to the use of the RE-AIM framework: rationale and methods. BMC Health Serv Res. 2018;18:177.
5. Gaglio B, Shoup JA, Glasgow RE. The RE-AIM framework: a systematic review of use over time. Am J Public Health. 2013;103:e38–46.
6. Daly CA, Clemens F, Sendon JL, Tavazzi L, Boersma E, Danchin N, et al. Euro Heart Survey Investigators. The clinical characteristics and investigations planned in patients with stable angina presenting to cardiologists in Europe: From the Euro Heart Survey of Stable Angina. Eur Heart J. 2005;26:996–1010.
7. Bennet L, Larsson C, Söderström M, Råstam L, Lindblad U. Diastolic dysfunction is associated with sedentary leisure time physical activity and smoking in females only. Scand J Prim Health Care. 2010;28:172–8.
8. Collins TC, Suarez-Almazor M, Bush LR, et al. Gender and peripheral arterial disease. J Am Board Fam Med. 2006;19:132–40.
9. McDermott M, Greenland P, Liu K. Sex differences in peripheral arterial disease: Leg symptoms and physical functioning. J Am Geriatr Soc. 2003;51:222–8.
10. Manjunath G, Tighiouart H, Ibrahim H, MacLeod B, Salem DN, Griffith JL, et al. Level of kidney function as a risk factor for atherosclerotic cardiovascular outcomes in the community. J Am Coll Cardiol. 2003;41:47–55.
11. Ford ES, Zhao G, Li C. Pre-diabetes and the risk for cardiovascular disease. J Am Coll Cardiol. 2010;55:1310–1317.
12. Getz L, Sigurdsson JA, Hetlevik I, Kirkengen AL, Romundstad S, Holmen J. Estimating the high risk group for cardiovascular disease in the Norwegian HUNT 2 population according to the 2003 European guidelines: Modelling study. BMJ. 2005;331:551–5.
13. Fowkes FGR, Murray GD, Butcher I, Heald CL, Lee RJ, Chambless LE, et al. Ankle brachial index combined with Framingham risk score to predict cardiovascular events and mortality: A meta-analysis. JAMA. 2008;300:197–208.
14. Dormandy JA Rutherford RB: Management of peripheral artery disease (PAD) TASC Working Group. Trans Atlantic Inter-Society Consensus (TASC) J Vasc Surg. 2000;31:S1–44.
15. Fowkes FGR, Housley E, Macintyre CCA, Prescott RJ, Ruckley CV. Variability of ankle and brachial systolic pressures in the measurement of atherosclerotic peripheral arterial disease. J Epidemiol Community Health. 1988;42:128–33.
16. Fowkes FGR, Low LP, Tuta S. Ankle-brachial index and extent of atherothrombosis in 8891 patients with or at risk of vascular disease: Results of the international AGATHA study. Eur Heart J. 2006;27:1861–7.
17. Diehm C, Schuster A, Allenberg JR, Darius H, Haberl R, Lange S, et al. High prevalence of peripheral artery disease and co-morbidity in 6880 primary care patients: Cross-sectional study. Atherosclerosis. 2004;172:95–105.
18. Stenlund H, Lönnberg G, Jenkins P, Norberg M, Persson M, Messner T, et al. Fewer deaths from cardiovascular disease than expected from the Systematic Coronary Risk Evaluation chart in a Swedish population. Eur J Cardiovasc Prev Rehabil. 2009;16:321–4.
19. Ketola E, Laatikainen T, Vartiainen E. Evaluating risk for cardiovascular diseases: Vain or value? How do different cardiovascular risk scores act in real life. Eur J Public Health. 2010;20:107–12.
20. Banga JD, Van Dijk JL, Van Dis I, Giepmans L, Goudswaard AN, Grobbee DE. NHG Standaard Cardiovasculair risicomanagement (eerste herziening). Huisarts Wet. 2012;55(1):14–28.
21. Piepoli MF, Hoes AW, Agewall S, et al. 2016 European guidelines on cardiovascular disease prevention in clinical practice. The sixt joint task force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EAPCR). Eur Heart J. 2016;37(29):2315–81.
22. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patient care. Lancet. 2003;362:1225–30.
23. Grol R, Braspenning J, Dijkstra R, Hulscher M, Wensing M. Implementation of NHG guidelines: success or problem? Huisarts Wet. 2010;53(1):42–6.
24. Wandell PE, de Waard A-KM, Holzmann MJ, et al. Barriers and facilitators among health professionals in primary care to prevention of cardiometabolic disease: a systematic review. Fam Pract. 2018;35(4):383–98.
25. Wensing M, Wollersheim H, Grol R. Organizational interventions to implement improvements in patient care: a structured review of reviews. Implement Sci. 2006;1:2.
26. Sonderlund AL, Thilsing T, Korevaar J, Hollander M, Lionis C, Schellevis F, et al. An evidence-based toolbox for the design and implementation of selective-prevention primary-care initiatives targeting cardio-metabolic disease. Prev Med Rep. 2019;16:100979.