ORIGINAL PAPER

doi: 10.5455/aim.2024.33.35-39
ACTA INFORM MED. 2025, 33(1): 35-39
Received: FEB 16, 2025
Accepted: MAR 19, 2025

Muhamed Djedovic[1,2], Bedrudin Banjanovic[1], Amel Hadzimehmedagic[1,2], Ilirijana Haxhibeqiri Karabdic[1], Tarik Selimovic[1], Damir Kurtagic[1], Edin Kabil[1] , Slavenka Straus[1,2]

[1]Clinic for Cardiovascular Surgery, Clinical Center of the University of Sarajevo, Sarajevo,Bosnia and Herzegovina

[2]Medical Faculty, University of Sarajevo. Sarajevo, Bosnia and Herzegovina

Corresponding author: Muhamed Djedovic, Clinic for Cardiovascular Surgery, Clinical Centre University of Sarajevo; Address: Bolnicka 25, Sarajevo 71000, Bosnia and Herzegovina. E-mail: djedovicm5@gmail.com ; ORCID ID: https://www.orcid. org/0000-0003-1752-5666.

Justification of Screening for Peripheral Arterial Disease in the Elderly Population Through Clinical and Financial Cost-benefit Analysis

ABSTRACT

Background: Peripheral arterial disease (PAD) is a chronic condition of reduced blood flow through the arteries. Early detection and prevention of PAD, especially in at-risk populations, is crucial to reducing morbidity and mortality. **Objective:** The aim of the study was to examine the clinical feasibility of vascular ultrasound screening for early detection of PAD, as well as potential financial savings through preventive measures. **Methods:** The study was conducted as a prospectively designed cross-sectional study with retrospective sample analysis, in which the sample consisted of 826 patients over 60 years of age, of both sexes, divided into two groups, conducted from January 2023 to May 2024. **Results:** The study included 826 patients aged 60 and over, divided into two groups after ultrasound examination of the arteries (Group A with atherosclerosis /63.8%/; Group B - without atherosclerosis /36.2%/). The average age was 65.44±5.9 years, 60-65 years was 64.3%, and over 65 years was 35.7%. A statistically significant difference was recorded between the analyzed groups in terms of comorbidities and risk factors. We found that age, gender, hypertension, hyperlipidemia, diabetes, smoking and chronic obstructive disease have a significant relationship with the degree of atherosclerosis. Multivariate analysis showed that the age of the subjects, hyperlipidemia, hypertension and smoking are significant predictors of atherosclerosis. The prevalence for hemodynamically significant stenosis of ACI/ACC was 5.0%, for peripheral arteries 4.2%, the prevalence of aneurysm abdominal aorta (>3 cm) was 2.3%, and 0.5% for diameter >5 cm. **Conclusion:** The results show the high efficiency of ultrasound diagnostics in identifying asymptomatic patients with advanced atherosclerosis, emphasizing the need for better organization of preventive programs, which could lead to potential savings in healthcare costs through earlier detection and treatment.

Keywords: screening, ultrasound, peripheral artery disease.

1. BACKGROUND

Peripheral arterial disease (PAD) is a chronic condition, with atherosclerosis as the dominant background, leading to reduced flow through narrowing of the vessel lumen by plaque. The flow declines first during exertion and then at rest. The pathophysiology of plaque involves a long-term chronic inflammatory process associated with hyperlipoproteinemia (1). Plaque can gradually progress to occlusion. Sometimes, the plaque may rupture suddenly, exposing subendothelial thrombogenic structures and leading to sudden occlusion, or it may rupture only the cover of the unstable lipid core, leading to minor/major distal embolism (2-4).

The clinical picture of PAD ranges from asymptomatic to symptomatic. Depending on the region affected, strokes, claudication, pain at rest or, in extreme cases, ulceration or gangrene may occur. In a significant percentage, multiple vascular basins are affected simultaneously, as well as those that do not fall under PAD (vessels of the heart, kidneys, mesentery) (5). Asymptomatic conditions last for years, which is why early detection of atherosclerotic plaques is the gold standard. In practice, unfortunately, the first sign of diseases of the neck vessels (stroke) is in 75% of cases, the first sign of leg artery

disease (claudication or wounds/gangrene) is in 50% of cases, the first sign of abdominal aortic disease (dissection, rupture, painful conditions) is in 75% of cases. The first sign of disease in distant regions is in 25% of cases for the heart (heart attack).

Cardiovascular diseases (CVD) are the most common non-communicable diseases. Overall, CVD-related deaths are higher than all cancers and lung diseases combined, with an estimated 207 deaths per 100,000 people in 2020 (9). Mortality is expected to increase to 300/1,000,000 people by 2025 (8). One subset of CVD is peripheral arterial disease, which in this study includes carotid artery disease.

It is estimated that over 200 million people worldwide suffer from PAD, and this population is predominantly located in middle-income and developing countries. The global prevalence of PAD (all stages) excluding carotid disease is about 5% at the age of 25, 8% at the age of 45-55 and 12-20% at the age of over 80. In Europe it ranges from 8-28% for all ages (10). The number of patients in the world has doubled since 1990, while the incidence of atherosclerosis is growing particularly rapidly in developing countries (6). As for the incidence, we believe that it is constant and increases by 20% in those over 70 years (7). For carotid disease, the prevalence of all stages (IMT, plaque, stenosis) increases with age and predominates in men. In the age group of 30-79 years, we have positive IMT (>1mm) in about 30% of cases, the presence of plaque (focal IMT >50% or 1.5mm) in about 20%, and stenosis in 1% of the population globally (11).

Since, according to some analyses, the number of patients with all CVDs is much higher and amounts to around 400 million (11), various preventive concepts have been considered for the detection of this disease and the risk of complications. In the case of PAD, including carotid artery disease, early detection is usually based on the analysis of risk factors, especially the lipid profile, and by measuring the ABI index (ankle-brachial index) and vascular ultrasound examination. Just as the existence of asymptomatic disease is significantly related to age, so is the development of symptomatology. We state this because the results shown in individual studies on incidence and prevalence depend on the method used (detection of disease or symptoms). Taking everything into account and the fact that Bosnia and Herzegovina belongs to a middle-developed country, it is expected that the prevalence of these diseases will continue to increase (4).

2. OBJECTIVE

The aim of the study is to examine the clinical justification of vascular ultrasound screening of the elderly population. An additional aim is to examine the possible financial benefit of early detection and adequate treatment.

3. PATIENTS AND METHODS

The research was carried out as a prospectively designed cross-sectional study with retrospective analysis of the sample, the sample consisted of 900 patients over 60 years of age, both sexes, conducted from January 2023 to May 2024. The research was supported by the Federal Ministry of Education and Science. At the end, 826 patients were selected for analysis (symptomatic, previously surgically/endovascularly treated excluded). Data for the analysis were collected from the candidates' health records (demographic and medical data) and screening ultrasound examinations performed in a standardized protocol at sites predisposed to atherosclerosis (common carotid artery, carotid artery bifurcation, abdominal aorta, main femoral artery with bifurcation, popliteal artery and pedal arteries).

Categorization of patients due to severity of the findings was performed on the basis of the morphological and hemodynamic characteristics of the ultrasound findings. Instructions, therapy, and recommendations for re-checks were given.

Morphological characteristics of the arteries were observed using B-mode, defining the presence of pathological IMT (>0.9mm), the presence of plaque (focal IMT>50% or wall >1.5-2mm). Hemodynamic characteristics of the examined arteries were assessed by spectral analysis, for the carotid artery using standard scales (50% stenosis = PSV>125cm/s), for the abdominal aorta diameter (>3cm), and for all other arteries the presence of a twofold increase in peak velocities at the stenosis (PSV x 2). After examination, if a pathological finding was present, patients were classified into one of three categories for each region in order to assess the severity, necessary therapy, periodicity of controls, or possibly urgency.

Classification of ultrasound findings by region

* Carotids (atherosclerotic disease): Group "A" – severe (plaque, elevated velocities > 125cm/s), Group "B" – moderate (plaque), Group "C" – initial (plaque or thickened IMT > 0.9mm), or normal findings.

* Abdominal aorta (aneurysm): Group "A" – severe (diameter > 5.5 cm), Group "B" – moderate (diameter 3 – 5.5 cm), Group "C" – initial (diameter 2 – 3 cm), or normal findings.

* Lower extremity arteries (atherosclerotic disease): Group "A" – severe (claudication, plaque, monophasic, PSV elevated velocity > 200 cm/s or focal doublet), Group "B" – moderate (plaque, biphasic), Group "C" – initial (plaque, triphasic), or normal findings.

Statistical analysis

Basic characteristics were collected and presented as number of cases and percentages. Categorical values were analyzed using the $\chi 2$ test and Fisher's exact test. Student's T-test and Mann-Whitney U test were used to analyze quantitative values. Univariate and multivariate logistic regression were performed to assess the association between individual factors and the occurrence of atherosclerosis. Statistical hypotheses were tested at the α=0.05 level, i.e. the difference between samples was considered significant if $p<0.05$. Statistical analyses were performed using IBM SPSS Statistics ver. 21.0.

4. RESULTS

The 826 patients were analyzed, 473 men (57.3%) and 353 women (42.7%). The average age was 65.44±5.9 years (ranging from 60 to 88 years). The age was uniform in relation to gender p=0.823. Men are 65.4±5.7 years old, and women 65.5±6.1 years old. In group A (with atherosclerosis) there were 527 (63.8%) patients, while in group B (without atherosclerosis) there were 299 (36.2%). The patients with atherosclerosis are on average 67.3±6.4 years older, compared to patients without atherosclerosis, who are on average 62.12±2.7 years old, the difference was statistically significant (p=0.0001).

A statistically significant difference was observed in terms of the presence of atherosclerosis and the cut-off age - 65 years (p=0.0001). The 270 (51.2%) patients with atherosclerosis were older than 65 years, while only 25 (8.4%) older than 65 years were without recorded atherosclerosis. The gender did not have a statistically significant effect in the studied groups (p=0.586).

A statistically significant difference was observed between the examined groups due to aspirin use and in the cases present comorbidities. The average values of systolic and diastolic pressure was statistically significant between the analyzed groups (p=0.0001), which is not the case with the value of HgA1c (p=0.245).

Univariate analysis showed that age, gender, hypertension, hyperlipidemia, DM, smoking, and COPD had a significant relationship with the degree of atherosclerosis.

Multivariate analysis showed that age, hyperlipidemia, hypertension, and smoking were significant predictors of atherosclerosis.

	Total 826	Group A 527 (63.8%)	Gropu B 299 (36.2%)	P
Age (mean ± SD)	65.44±5.93	67.32±6.42	62.12±2.72	0.001
60-65	531 (64.3%)	257 (48.8%)	274 (91.6%)	
>65	295 (35.7%)	270 (51.2%)	25 (8.4%)	0.0001
Gender				
Male	473 (57.3%)	306 (58.1%)	167 (55.9%)	
Female	353 (42.7%)	221 (41.9%)	132 (44.1%)	0.586
CAD	64 (7.7%)	59 (11.2%)	5 (1.7%)	0.0001
COPD	47 (5.7%)	42(8%)	5 (1.7%)	0.0001
HTA	485 (58.7%)	381 (72.3%)	104 (34.8%)	0.0001
Hyperlipidemia	356 (43.1%)	289 (54.8%)	67 (22.4%)	0.0001
DM (insulin dependent)	67 (7.7%)	57 (10.8%)	10 (3.3%)	0.0001
DM (insulin independent)	171 (20.7%)	142 (26.9%)	29 (9.7%)	0.001
HgA1c	184 (22.3%)	7.53±0.98	7.75±1.06	0.245
Aspirin	425 (50.2%)	326 (61.9%)	89 (29.8%)	0.0001
Systolic pressure (mean ± SD)	826 (100%)	133.04±10.96	129.65±11.23	0.0001
Diastolic pressure (mean ± SD)	826 (100%)	85.68±7.65	82.59±7.87	0.0001

Table 1. Demographic characteristics, risk factors and comorbidities of patients . CAD – coronary artery disease, COPD – chronic obstructive pulmonary disease, HTA – hypertension, DM – diabetes mellitus

	OR	95% CI	P
Age	1.311	1.245-1.381	0.0001
Gender	0.914	0.686- 1.217	0.537
HTA	4.510	3.330-6.108	0.0001
DM	3.237	2.152-4.868	0.0001
Smoking	2.055	1.509-2.799	0.0001
COPD	5.092	1.992- 13.016	0.001

Table 2. The influence of risk factors on atherosclerosis through univariate logistic regression. HTA – hypertension, DM – diabetes mellitus, COPD – chronic obstructive pulmonary disease

	Wald	OR	95% CI	P
age	87.36	1.263	1.203-1.326	0.0001
HLP	21.09	2.353	1.633-3.389	0.0001
HTA	13.31	1.967	1.368-2.830	0.0001
Smoking	5.22	1.515	1.061-2.163	0.022

Table 3. Multivariate logistic regression - the influence of independent risk factors on the dependent variable - atherosclerosis. HLP – haperlipidemia, HTA - hypertension

	ACC /ACI	Aorta	PAD
normal	350 (43.5%)	781 (94.6%)	380 (46%)
Stage C	277(33.5%)	26 (3.2%)	241(29,2%)
Stage B	158(19.1%)	15 (1.8%)	170 (20,6%)
Stage A	41 (5%)	4 (0.5%)	35 (4.2%)
total	826 (100%)	826 (100%)	826 (100%)

Table 4. Stages of atherosclerosis. PAD – perifery artery disease

A significant percentage (9.7%) of newly diagnosed asymptomatic patients with advanced atherosclerosis (Stage A) was found. It was recorded that 143 patients (29.5%) were hypertensive despite the therapy for hypertension, and 46 patients (13.5%) had elevated blood pressure during the screening.

5. DISCUSSION

Taking into account HLP, DM, HTA and preventable risk factors (insufficient physical activity, stress, obesity, nicotine, etc.), the first measure in the treatment of atherosclerosis and the prevention of complications is the establishment of healthy lifestyles, followed by screening and preventive measures (primary, secondary, etc.). Preventive measures are possible in all stages of the development of arterial blood vessel diseases. Primary prevention should be one of the basic tasks of primary health care and public health. Unfortunately, patients with advanced vascular disease are very common in Bosnia and Herzegovina.

For the above reason, all measures for the early detection of arterial diseases (screening) are welcome, especially in the era of wide availability of modern diagnostics.

Atherosclerosis is a systemic disease, and atherosclerotic changes in one arterial region significantly affect other regions, contributing to the development of vascular diseases and increasing the risk of vascular events in the cerebrovascular, coronary, and peripheral systems (12). These concomitant atherosclerotic diseases of different vascular territories cause an unfavorable prognosis (13).

Complications of atherosclerosis are a serious health problem worldwide. Identification of patients at high risk of complications due to significant arterial stenosis caused by atherosclerosis, including stroke and cardiovascular disease, allows for timely medical treatment or surgical intervention (14). Research shows that both medical and surgical therapies are beneficial in reducing the risk of stroke in asymptomatic patients (15).

In our study, a significant prevalence of atherosclerosis (63.8%) was recorded in patients older than 60 years. The research results indicate a statistically significant difference in the prevalence of HTA, HLP, DM, smoking and COPD in pa-

tients with atherosclerosis. A study by Sahin et al reported a 30% reduction in the incidence of stroke in elderly patients with a blood pressure reduction of 10 mmHg (16). Our study recorded 143 patients with HTA (29.5%) who used antihypertensive therapy, as well as 46 patients (13.5%) with HTA at screening, which may indicate inadequate therapy (underdosing) of patients with hypertension as well as a significant number of potentially undiagnosed (newly discovered) patients with hypertension. All of this suggests that that timely diagnosis and appropriate treatment of HTA may result in a reduction in the risk of cardiovascular and microvascular events.

Similar to hypertension, smoking leads to the worsening of atherosclerosis and the development of thrombi in atherosclerotic arteries (17). Some studies indicate that patients with HbA1c levels > 6%, show increased rates of vascular diabetic complications and strokes (18). This is significantly lower than the percentage of HbA1c in our study (> 7.5%), with a note that HgA1c was not performed in all patients with DM, only in 184 patients (78.6%), which indicates inadequate monitoring of patients with DM (21.4%). Elevated cholesterol levels are associated with ischemic stroke, and a correlation has been identified between elevated cholesterol levels and carotid artery intima-media thickness (19). Studies by Zoungas et al. indicate that better control of blood glucose levels, lipid status and blood pressure results in a 50% reduction in the risk of cardiovascular and microvascular events (18).

According to the data from the Development Report of the Sarajevo Canton (contains data for all cantons in the Federation of Bosnia and Herzegovina) the number of patients aged ≥ 60 is around 431,000. The results of our study indicate a prevalence of asymptomatic hemodynamically significant ACC/ACI stenosis (≥50%) of 5%, which is significantly higher than the report by Marjolein and colleagues who reported a prevalence in the general population of 0-3.1% (14).

The prevalence of abdominal aortic aneurysm (≥3 cm) is 2.3%, while the prevalence of abdominal aortic aneurysm >5 cm is 0.5%. These results differ significantly from other studies that found a prevalence of 0.92% for the population aged 30 to 79 years (20).

The results of our study indicated a prevalence of PAD of 4.7%, while the study by Cornejo et al. for patients with DM reported a significantly lower prevalence of 3.81% in the entire population, while gender-related results indicated a higher prevalence in men (5.17%) compared to the prevalence in women (2.78%) (21).

Previous studies have shown that carotid artery screening is cost-effective if the prevalence is greater than 4.5% (22). The results of our study indicate a prevalence of hemodynamically significant stenosis (≥50%) of 5% and therefore impose cost-effectiveness.

Previous prevention programs have often been expensive because they implied two facts: that it is a disease of epidemic proportions and that detailed vascular examinations with a lipidogram and ABI index need to be performed. Today, we know that there are high-risk populations and that we detect some of them on the go, so we can plan preventive examinations in a focused manner. If we try to do a population-based preventive examination to detect PAD, respecting all previous recommendations, we have several challenges. As for the population, screening is justified if there is a prevalence of 20% and to some extent when it is 15-20%. According to earlier results of the authors of this study, the presence of plaques (any stage) is much higher than 20% (in fact, it is about 80%) in patiens > 65 years of age.

In addition, if we take into account the low level of education of the population who have to go to a few locations for a "voluntary" preventive examination (laboratory, vascular clinic, radiology), the number of interested patients is questionable. Therefore, the support of institutions and NGOs can significantly help in such projects. Considering that classifying patients into a certain risk group does not automatically mean that plaques have developed, it is necessary to specifically design a plan for preventive vascular examinations. In this sense, it is important to know that, in our experience, the time for measuring the ABI index is longer than a focused vascular ultrasound examination of the carotid, aorta and leg arteries. Unpublished results of the authors of this study in a population older than 55 years showed that every patient with plaques has HLP and that every patient with hemodynamically significant stenosis on ultrasound had a low ABI index. Based on the above, we believe that the optimal preventive examination, both financially and in terms of time, is one that includes only the use of vascular ultrasound (without lipidogram or ABI index).

These preventive examinations are very important to us because in vascular pathology we have excellent results in the treatment of severe diseases of the carotid subclavian basin, aorta and leg arteries. Also, the conservative treatment of milder conditions of certain regions implies that distant vascular basins that may have plaques (heart, kidneys, mesentery) will also be treated because it is the same therapy.

All of the above helps to plan much smaller funds for screening in the face of financial uncertainty than was once thought. Considering the total financial outlay of the health system as well as the consequent costs to the patient, a cost-benefit analysis of this concept is required for the purpose of developing better screening and overall prevention.

6. CONCLUSION

Screening of asymptomatic individuals at high risk plays a key role in detecting significant carotid and peripheral artery stenosis, as well as in early diagnosis of abdominal aortic aneurysm (AAA), thus enabling treatment on time. Education and information of patients during screening can significantly contribute to better disease prevention and reducing the risk of serious complications. The justification and cost-effectiveness of the screening is found in the fact that the results of our study show a significantly higher prevalence compared to other studies. Further research is needed to assess the balance of benefits and harms in specific subpopulations.

- **Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms.
- **Author's contribution:** The all authors were involved in all steps of preparation of this article. Final proofreading was made by the first author.
- **Conflicts of interest:** The authors declare that they have no conflict of interest..
- **Financial support and sponsorship:** None.

REFERENCES

1. Jebari-Benslaiman S, Galicia-García U, Larrea-Sebal A, et al. Pathophysiology of Atherosclerosis. Int J Mol Sci. 2022 Mar 20; 23(6): 3346. doi: 10.3390/ijms23063346.
2. Libby P, Schoenbeck U, Mach et al. Current concepts in cardiovascular pathology: the role of LDL cholesterol in plaque rupture and stabilization. Am J Med. 1998 Feb 23; 104(2A): 14S-18S. doi: 10.1016/s0002-9343(98)00041-2.
3. Global Burden of Disease Collaborators. Global burden of peripheral artery disease and its risk factors, 1990-2109: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Glob Health. 2023; 11: e1553–e1565. doi: 10.1016/S2214-109X(23)00355-8
4. Criqui MH, Aboyans V. Epidemiology of peripheral artery disease. Circ Res. 2015 Apr 24; 116(9): 1509-1526. doi: 10.1161/CIRCRESAHA.116.303849. Erratum in: Circ Res. 2015 Jun 19;117(1):e12. doi: 10.1161/RES.0000000000000059.
5. Aday AW, Matsushita K. Epidemiology of Peripheral Artery Disease and Polyvascular Disease. Circ Res. 2021 Jun 11; 128(12): 1818-1832. doi: 10.1161/CIRCRESAHA.121.318535.
6. Anand, S., Bradshaw, C. & Prabhakaran, D. Prevention and management of CVD in LMICs: why do ethnicity, culture, and context matter?. BMC Med 18, 7 (2020). https://doi.org/10.1186/s12916-019-1480-9
7. Zemaitis MR, Boll JM, Dreyer MA. Peripheral Arterial Disease. [Updated 2023 May 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430745/
8. Chong B, Jayabaskaran J, Jauhari SM, et al. Global burden of cardiovascular diseases: projections from 2025 to 2050. Eur J Prev Cardiol. 2024 Sep 13: zwae281. doi: 10.1093/eurjpc/zwae281.
9. Connie W. Tsao, Aaron W. Aday, Zaid I. Almarzooq et al. Heart Disease and Stroke Statistics—2023 Update: A Report From the American Heart Association. Circulation. 2023; 147: e93–e621. doi.org/10.1161/CIR.000000000000112
10. Horváth L, Németh N, Fehér G et al. Epidemiology of Peripheral Artery Disease: Narrative Review. Life (Basel). 2022 Jul 12; 12(7): 1041. doi: 10.3390/life12071041.
11. Song P, Fang Z, Wang H, et al. Global and regional prevalence, burden, and risk factors for carotid atherosclerosis: a systematic review, meta-analysis, and modelling study. Lancet Glob Health. 2020 May; 8(5): e721-e729. doi: 10.1016/S2214-109X(20)30117-0.
12. Lin JC, Kabbani LS, Peterson EL, et al. Clinical utility of carotid duplex ultrasound prior to cardiac surgery. J Vasc Surg 2016; 63: 710–714. doi: 10.1016/j.jvs.2015.10.008.
13. Golomb BA, Dang TT, Criqui MH. Peripheral arterial disease: morbidity and mortality implications. Circulation 2016; 114: 688–699. doi: 10.1161/CIRCULATIONAHA.105.593442.
14. de Weerd M, Greving JP, Hedblad B, et al. Prevalence of asymptomatic carotid artery stenosis in the general population: an individual participant data meta-analysis. Stroke 2010; 41: 1294-1297. doi: 10.1161/STROKEAHA.110.581058.
15. Le Fevre ML, Siu AL, Peters JJ, et al. Screening for Asymptomatic Ca rotid Artery Stenosis: U.S. Preventive Services Task Force Recommen dation Statement. Ann Intern Med 2014; 2; 161: 356-462. doi: 10.7326/M14-1333.
16. Şahin AD, Üstü Y, Işık D. Management of Preventable Risk Factors of Cerebrovascular Disease. Ankara Med J 2015; 15: 106-113.
17. Pezzini A, Grassi M, Del Zotto E, et al. Synergistic effect of apolipopro tein E polymorphisms and cigarette smoking on risk of ischemic stroke in young adults. Stroke 2004; 35: 438–442. doi: 10.1161/01.STR.0000112973.00867.98.
18. Zoungas S, Arima H, Gerstein HC, et al. Effects of intensive glucose control on microvascular outcomes in patients with type 2 diabetes: a meta-analysis of individual participant data from randomised controlled trials. Lancet Diabetes Endocrinol 2017; 5: 431-437. doi: 10.1016/S2213-8587(17)30104-3.
19. Sanossian N, Saver JL, Navab M et al. High-density lipoprotein cholesterol: an emerging target for stroke treatment. Stroke 2007; 38: 1104–1109. https://doi.org/10.1161/01.STR.0000258347.19449.0f
20. Song P, He Y, Adeloye D et al. Global Health Epidemiology Research Group (GHERG). The Global and Regional Prevalence of Abdominal Aortic Aneurysms: A Systematic Review and Modeling Analysis. Ann Surg. 2023 Jun 1; 277(6): 912-919. doi: 10.1097/SLA.0000000000005716.
21. Cornejo Del Río V, Mostaza J, Lahoz C et al. Prevalence of peripheral artery disease (PAD) and factors associated: An epidemiological analysis from the population-based Screening PRE-diabetes and type 2 DIAbetes (SPREDIA-2) study. PLoS One. 2017 Oct 26; 12(10): e0186220. doi: 10.1371/journal.pone.0186220.
22. Yin D, Carpenter JP. Cost-effectiveness of screening for asymptomatic carotid stenosis. J Vasc Surg 1998; 27: 245-255. doi: 10.1016/s0741-5214(98)70355-6.