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The status of atherosclerotic cardiovascular disease in Belgium

A silent and long-term killer

The prevalence, impact and cost of atherosclerotic cardiovascular diseases (ASCVD) and recommendations for stakeholders to improve ASCVD in Belgium

Policy paper

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Colophon

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Executive Summary

Cardiovascular diseases (CVD) are the number one cause of death in the world, representing a third of all global deaths. In Belgium, CVD and cancer are the two most important causes of death, each representing 25% of all deaths per year. Even more impactful, CVD are responsible for 20% and 25% of premature deaths in women and men respectively.[1] Atherosclerotic cardiovascular diseases (ASCVD), i.e., cardiovascular diseases that are a consequence of atherosclerosis, constitute up to 85% of all CVD. Despite being preventable and treatable, they pose a major burden on patients, healthcare providers (HCPs), healthcare systems, authorities and society as a whole. Moreover, adequate data on the current status of ASCVD in Belgium, and the impact it has on society, is missing.

This report aims at providing high-level estimations of ASCVD in Belgium. This is based on in-depth interviews with clinicians, experts and key opinion leaders, performed from June to September 2022, the aggregation of available data and actualisation of the cost-of-illness. **Today, up to 750,000 patients in Belgium are diagnosed with ASCVD, while many stay undiagnosed. The cost-of-illness of ASCVD amounts up to 5 billion euros with an average cost of 7000 euros per patient for the entire patient journey**.

During the in-depth interviews with clinicians, experts and key opinion leaders, **many challenges for ASCVD in Belgium** were mentioned. These challenges can be grouped into four major areas that together form the burning platform to be addressed for reducing ASCVD in Belgium:

- ASCVD has a significant (monetary and non-monetary) **societal impact**: it is the largest cause of disability and underdiagnosis is proven by the high mortality numbers.
- The **fact base and awareness** on ASCVD in Belgium **is missing**: clinicians, the general population, as well as the government, lack knowledge and awareness on ASCVD. There are currently no up-to-date numbers on the prevalence and incidence of ASCVD in Belgium, which would be necessary to monitor the situation, but also to define the best measures and assess their impact.
- **Care models** are **not adapted** to ASCVD: there are a multitude of guidelines. There is no common up-to-date guideline to facilitate a multi-disciplinary approach to treating ASCVD, resulting in medical practice differences and inconsistent implementation.
- **General practitioners** (GPs) **and community pharmacists lack the means and support** to manage ASCVD patients: GPs, community pharmacists and specialists do not have the support to provide good ASCVD management, and are lacking the tools, financial support and time to assist ASCVD patients or identify patients at risk.

These challenges reveal the underlying problems that require action. To put it into perspective, 26.7% of mortality in women is due to CVD, compared to 7.4% mortality due to breast cancer.[1] Nevertheless, there are dedicated plans and resources made available for the screening and treatment of breast cancer, but for ASCVD there is no plan in Belgium. This while ASCVD, in contrast to cancer, can be prevented and controlled when prevention is started early.

Based on these actual challenges, four recommendations for reducing the impact and cost of ASCVD in Belgium have been formulated.

> Recommendation 1:
> **To address the significant societal impact and cost of ASCVD, an integrated ASCVD plan for Belgium is needed.**
> A national ASCVD action plan and roadmap for Belgium (similar to diabetes and cancer), with clear goals and ambitions, should be developed with all stakeholders to support buy-in for implementation. The plan should include primordial, primary and secondary prevention (see definitions in Appendix), based on population health and healthy lifestyle promotion. In order to ensure success, it should also include incentives for the implementation.

[1] WHO, Statbel

Recommendation 2:

More awareness on ASCVD and a reliable fact base with actual data to inform measures, is needed.

An actual and accurate fact base with key numbers, based on improved data collection, is required for identifying populations and individuals, targeting underdiagnosis, supporting benchmarking and adequate decisions, and also to create awareness of the problem. Awareness and empowerment at the level of the general public is required about the importance of controlling and preventing the risk factors of ASCVD, and the fact that it is a silent killer. This has to happen from early on in life (primary and even primordial prevention). Furthermore, therapy adherence has to increase, through sensibilization of both the general population and healthcare providers.

Recommendation 3:

The medical practice for ASCVD follow-up and treatment must be harmonised, based on the latest scientific evidence, supported by top-down enablers.

Guidelines have to be harmonised and one multifactorial up-to-date guideline should be developed based on the latest scientific evidence, to facilitate a multi-disciplinary approach to treating ASCVD patients. To support implementation of the guideline, audits and benchmarking have to be performed, and inclusion in conventions is required.

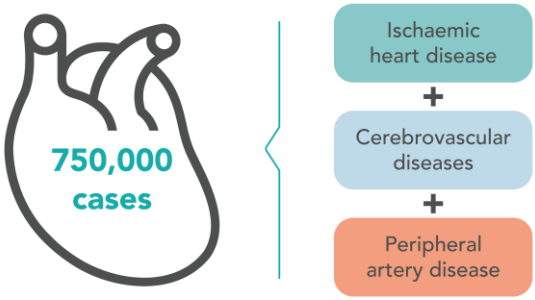
Recommendation 4:

General practitioners, community pharmacists and specialists need support to manage ASCVD patients and populations at risk.

A population health approach with GPs, specialists (i.e. cardiologists, endocrinologists, neurologists, etc.) and pharmacists is required to provide good ASCVD management. Additionally, tools and linked systems are needed to support GPs, pharmacists and specialists in identifying and managing patients at risk. GPs should be incentivised for systematically screening for ASCVD, and should be made responsible for their patient population. Population health should also be included in GP and pharmacist curricula.

ASCVD deserves a plan and roadmap, and as a starting point, a population health approach has to be implemented in Belgium. ASCVD is a silent and long-term killer. If we do not start addressing the problem now, a huge epidemic will occur in 20 to 30 years with a very high societal cost and impact.

750,000 people have clinical ASCVD



ASCVD causes 1 in 5 deaths in Belgium

21.3%
of all deaths due to ASCVD

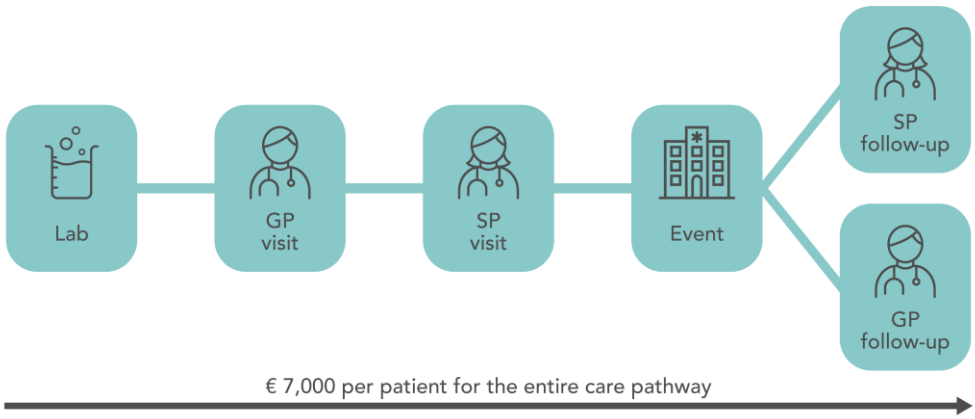
ASCVD costs

per year for Belgian society

ASCVD risk factors

- Hypertension
- High cholesterol
- Overweight
- Smoking
- Insufficient exercise
- Unhealthy and high-fat diet
- Increased alcohol consumption
- Diabetes
- Chronic kidney disease
- Male gender
- Old age
- Genetic predisposition

High-level care pathway and cost for ASCVD



A cardiovascular roadmap is necessary to tackle ASCVD

	Number of patients in Belgium	Cost of illness	
Diabetes	1.2 million	6.7% of annual healthcare budget	IQED - Initiatief voor kwaliteitsbevordering en Epidemiologie bij Diabetes
Cancer	68,782	6.9% of annual healthcare budget	Cancer plan
ASCVD	**750,000**	**7.2% of annual healthcare budget**	**National cardiovascular plan and roadmap**

IQED = Initiative for Quality improvement and Epidemiology in Diabetes

1. What is atherosclerosis and ASCVD

1.1 Definition

Atherosclerosis is the **chronic process of hardening of the arteries with plaque formation and narrowing of the arterial lumen due to infiltration of cholesterol-rich lipoproteins in the arterial wall** (Figure 1). It can affect all arteries and is therefore a systemic disease. It is not to be confused with arteriosclerosis, a more general term for the hardening of the arteries, without necessarily plaque formation. Atherosclerosis can lead to atherothrombosis, the formation of a blood clot in the artery due to rupture of the atherosclerotic plaque. This may lead to an acute event.[2]

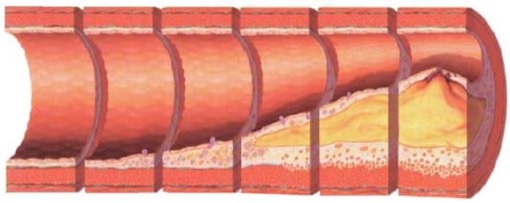


Figure 1. Progressing atherosclerotic plaque.
Figure credit: Npatchett

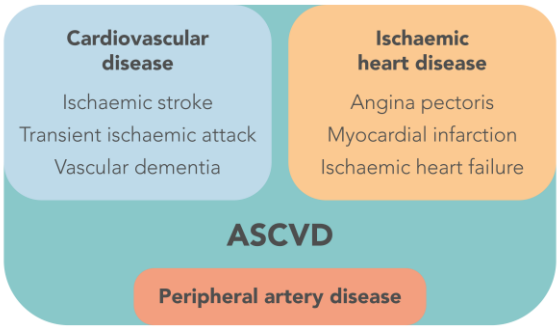


Figure 2. Schematic overview of the clinical outcomes of atherosclerotic cardiovascular diseases (ASCVDs).

The development of atherosclerosis is slowly progressing, leaving most cases asymptomatic for decades. Symptoms will only arise when there is a reduced blood flow due to narrowing of the arterial lumen, or due to thrombosis after plaque rupture. The clinical presentation of atherosclerosis can be acute or chronic, and can vary as the progression from subclinical to clinical atherosclerosis is heterogeneous.[3] **Diseases of the heart, brain and arteries as a consequence of atherosclerosis are called atherosclerotic cardiovascular diseases (ASCVD).** The most important ASCVD are ischaemic heart diseases (including myocardial infarctions (MI), ischaemic heart failure and angina pectoris), cerebrovascular diseases (ischaemic stroke, transient ischaemic attack and vascular dementia), and peripheral artery disease (Figure 2) (see definitions in Appendix).

1.2 Risk factors

ASCVD is a complex disease and is caused by a combination of risk factors. These risk factors include **increasing age, male gender, hypertension, smoking, dyslipidaemias (e.g., high cholesterol levels), diabetes mellitus, obesity, chronic kidney disease, lack of physical activity, an unhealthy high-fat diet, and high alcohol intake** (Figure 3). Predisposition to ASCVD is also associated with **genetic abnormalities** that affect, for example, the susceptibility of the arterial wall to plaque formation and the plasma low-density lipoprotein cholesterol (LDL-C) concentration.[4]

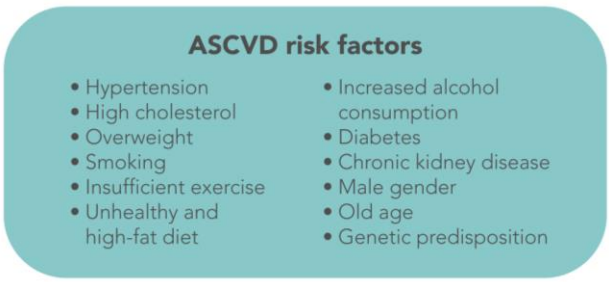


Figure 3. Atherosclerotic risk factors.

Regardless of the many risk factors, **elevated levels of LDL-C are the only risk factor sufficient to drive the development of atherosclerosis and subsequent ASCVD on itself**. [5] LDL is a lipid

"Monitoring and control of the risk factors is essential in decreasing the prevalence and burden of ASCVD, as everyone has at least one atherosclerotic risk factor."
- Cardiologist

[2] Landmesser et al (2017)
[3] Libby et al (2019)
[4] Borén et al (2020)
[5] ESC Guidelines (2021)

transporter, carrying cholesterol from the liver to the rest of the body and delivering it to cells. High-density lipoprotein (HDL), another lipid transporter, removes excess cholesterol from the blood vessels and delivers it to the liver where it is recycled or excreted. Therefore, HDL-C and LDL-C are commonly known as the 'good' and the 'bad' cholesterol, respectively.

"Despite the high prevalence of the risk factors, the awareness among patients, clinicians, and the government on their importance for ASCVD is low."
- Cardiologist

On top of half of the Belgian population having high cholesterol, the other most prevalent risk factors of atherosclerosis are smoking, high blood pressure, obesity, and alcohol use. [6] In men, the most important risk factors of age-standardized disability-adjusted life years (DALYs, see definition in Annex)[7] in Belgium in 2016 were smoking (14% of total DALYs), alcohol use (9% of total DALYs) and high systolic blood pressure (8% of total DALYs). In women, the leading risk factors of age standardized DALYs were smoking (7% of total DALYs), high systolic blood pressure (6% of total DALYs) and high body mass index (6% of total DALYs).[6]

An overall estimation of the population with high to very high risk for ASCVD, as described in the European Society of Cardiology/European Atherosclerosis Society guidelines (ESC/EAS), could be made **based on cardiovascular risk calculation on population data.** The population with high and very high cardiovascular risk are defined in Figure 4, based on the following risk parameters: age, sex, smoking, systolic blood pressure and non-HDL cholesterol levels (to determine the Systemic Coronary Risk Estimation 2 (SCORE2)) as well as the presence and duration of diabetes mellitus and co-morbidities (inflammatory disease, body mass index, socio-economic parameters), the presence of familial hypercholesterolemia, chronic kidney disease and diagnosed ASCVD.

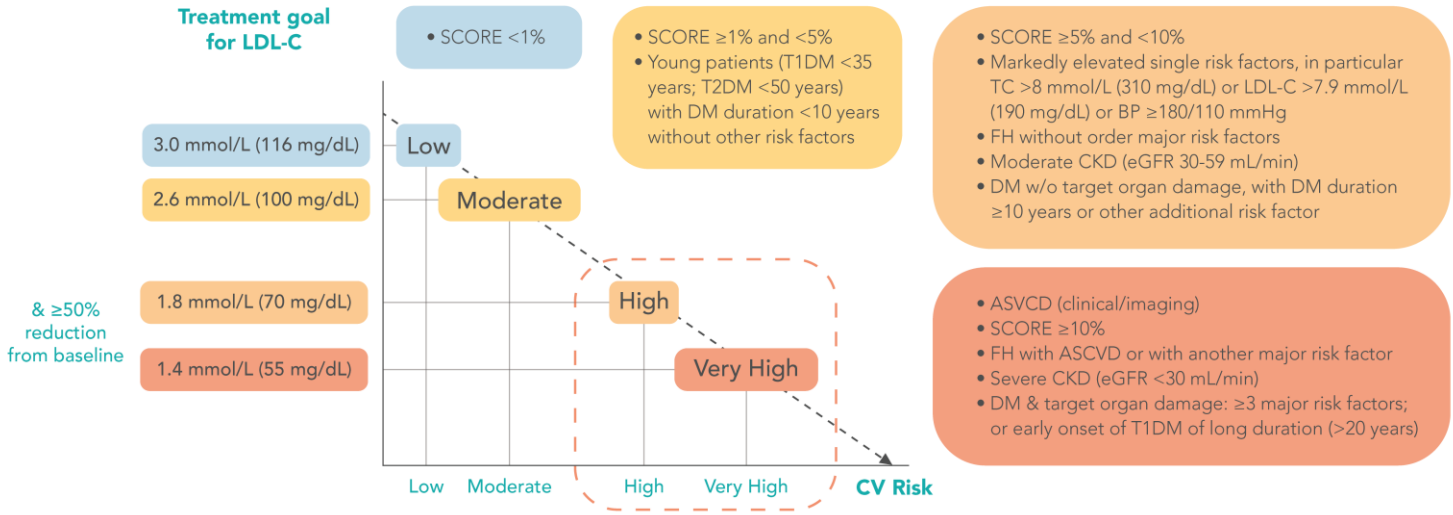


Figure 4. Population with high and very high cardiovascular risk as defined in the ESC/EAS guidelines.
SCORE = systemic coronary risk estimation, T1DM = type 1 diabetes mellitus, T2DM = type 2 diabetes mellitus, DM = diabetes mellitus, TC = total cholesterol, LDL-C = low-density lipoprotein cholesterol, BP = blood pressure, FH = familial hypercholesterolemia, CKD = chronic kidney disease, eGFR = estimated glomerular filtration rate, ASCVD = atherosclerotic cardiovascular disease.
Note: This figure is adapted from the ESC/EAD guidelines on the management of dyslipidaemias in 2019. Novel EC/EAS guidelines on cardiovascular disease prevention from 2021 have an updated version of the SCORE (i.e. SCORE2), of which the result should be taken into account when defining a patient's risk category.

Although being male is a risk factor, overall, **ASCVD kills more women than men**. Men have a higher risk for ASCVD than pre-menopausal women. This difference might be **due to hormonal protection by oestrogens**

[6] Sciensano
[7] DALY is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.

in women but can also be caused by the fact that women experience other symptoms and are treated differently compared to men.[8]

Women are less likely to have chest pain and they may have symptoms are harder to associate with cardiac trouble. Because of this, they are more likely to dismiss the warning signs of a heart attack and delay seeking care. Health care providers (HCPs) often downplay women's symptoms or delay treating them in comparison with men. Women are twice as likely to be told that their symptoms are all in their head or related to mental illnesses.[9]

[8] Maas et al (2010), Borén et al (2020)
[9] The New York Times (2022)

2. The current situation in Belgium

2.1 Estimation of the incidence of ASCVD in Belgium

Cardiovascular diseases (CVD) are the number one cause of death around the world, representing a third of all global deaths (Figure 5). In Belgium together with cancer, CVD are the most common cause of death, responsible for 27,297 deaths in 2019. This represents 25.1% of all deaths in that year.[10] Even more impactful, cardiovascular diseases are responsible for 20% and 25% of premature deaths in women and men respectively. In terms of total disease burden, CVD is responsible for 11.6%.[10,11] **Atherosclerosis is the most common underlying cause of CVD and 85% of all CVD are ASCVD, both in prevalence and mortality. This results in 21.3% of all deaths being caused by ASCVD in 2019** (Figure 6).

Figure 5. Global cardiovascular mortality

Figure 6. Mortality of atherosclerotic cardiovascular disease in Belgium

Despite being preventable and treatable, ASCVD still poses a major burden on patients, health care providers (HCP) and society, and is the largest cause of disability in the Western world. **If we do not start addressing this problem now, a huge epidemic will occur in 20 to 30 years' time.** Despite representing a large part of all CVD, an up-to-date fact base with key numbers on incidence and prevalence of ASCVD in Belgium is missing, resulting in an unclear and outdated view on the disease burden. The missing fact base on ASCVD contributes to the lack of awareness of this topic as well as the current outdated system and measures to prevent and manage the disease.

"ASCVD is the largest cause of disability in the Western world"
- Cardiologist

To address this, an estimation has been made, based on aggregating the prevalence of the most important clinical outcomes of ASCVD. This was validated through in-depth interviews with clinicians, experts and key opinion leaders. The prevalence of clinical ASCVD was estimated at a total of 750,000 cases in Belgium (Figure 7). As ASCVD is a slowly progressing disease and silent killer, there is a high prevalence of underdiagnosis as proven by the high mortality rates. **The approximately 750,000 cases in Belgium are only the tip of the iceberg.**

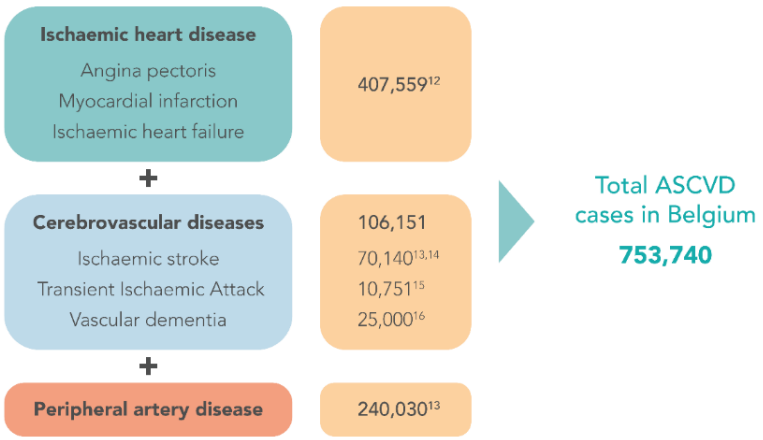


Figure 7. Prevalence of ASCVD in Belgium.
Note: Due to missing data, the number of cases in Belgium had to be estimated. This is a ballpark figure. Sudden cardiac death and aortic aneurisms have not been considered in these calculations. [12, 13, 14, 15, 16]

[10] WHO, Statbel
[11] Van de Borne et al. (2022)
[12] Secondary prevention of heart attack and stroke – Belgium (2021)
[13] Health interview study Sciensano (2018)
[14] Devroey et al (2003)
[15] Types of stroke, Hopkins Medicine
[16] Extrapolation from NIH UK

2.2 ASCVD prevalence will lead to an epidemic and costs will skyrocket in the future

Figure 8: Estimated cost of atherosclerotic cardiovascular disease in Belgium

The **estimated disease burden of ASCVD on today's society in Belgium is 5 billion euros** (Figure 8). This number has been obtained through the indexation of a study performed in 2008 on the cost-of-illness of ASCVD in Belgium [17]. The study concluded that the cost of ASCVD amounted to 3.5 billion euros in 2004. Given a healthcare indexation of 147.76 from 2004 to July 2022, this would amount to 5.2 billion euros in 2022. This is a rough estimation as minimal Belgian data is available on this subject. **With the prospect of a huge epidemic of ASCVD in 20 to 30 years' time, the overall costs for Belgian society will increase significantly.**

To validate this estimation, the care practice and journey of 2004 have been compared to today's situation. The entire care journey of a patient with ASCVD consists of laboratory testing, general practitioner (GP) and specialist consultations and follow-up, as well as hospital stays in case of an event (Figure 9). During the in-depth interviews, clinicians, specialists, and key opinion leaders mentioned some shifts in the medical practice. However, these shifts outbalance each other. Therefore we could estimate the **cost per patient for the entire care pathway as 6.93 euros**, based on the estimated prevalence of 750,000 clinical ASCVD patients in Belgium.

> *"If we do not start addressing the problem now, a huge epidemic will occur in 20-30 years with a very high cost"*
> - Cardiologist

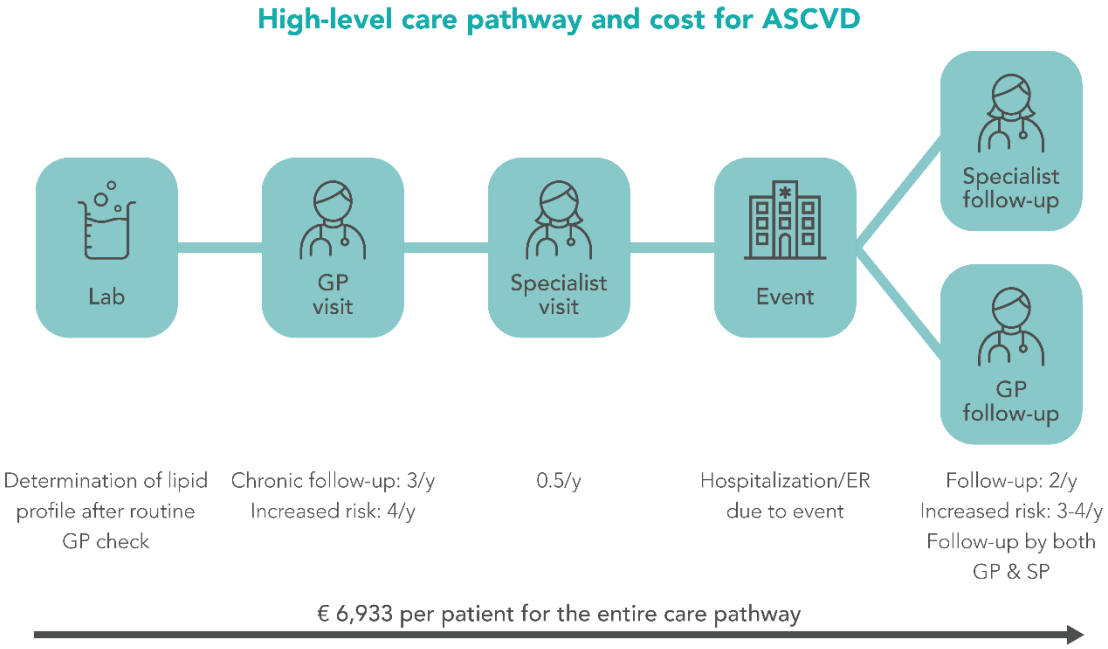


Figure 9. High level care pathway and cost for ASCVD.
Estimation of the healthcare cost of ASCVD per patient, based on the common high-level care pathway. GP = general practitioner, SP = specialist.

[17] Vlayen et al. (2008)

3. The challenges and burning platform

3.1 The four major challenges to reduce ASCVD in Belgium

Interviews with clinicians, experts, and key opinion leaders in the field of ASCVD revealed many challenges in Belgium. These challenges can be grouped into four major areas that together form the burning platform to improve ASCVD in Belgium (Figure 10). They reveal the underlying problems that require action to prevent the large societal impact and costs.

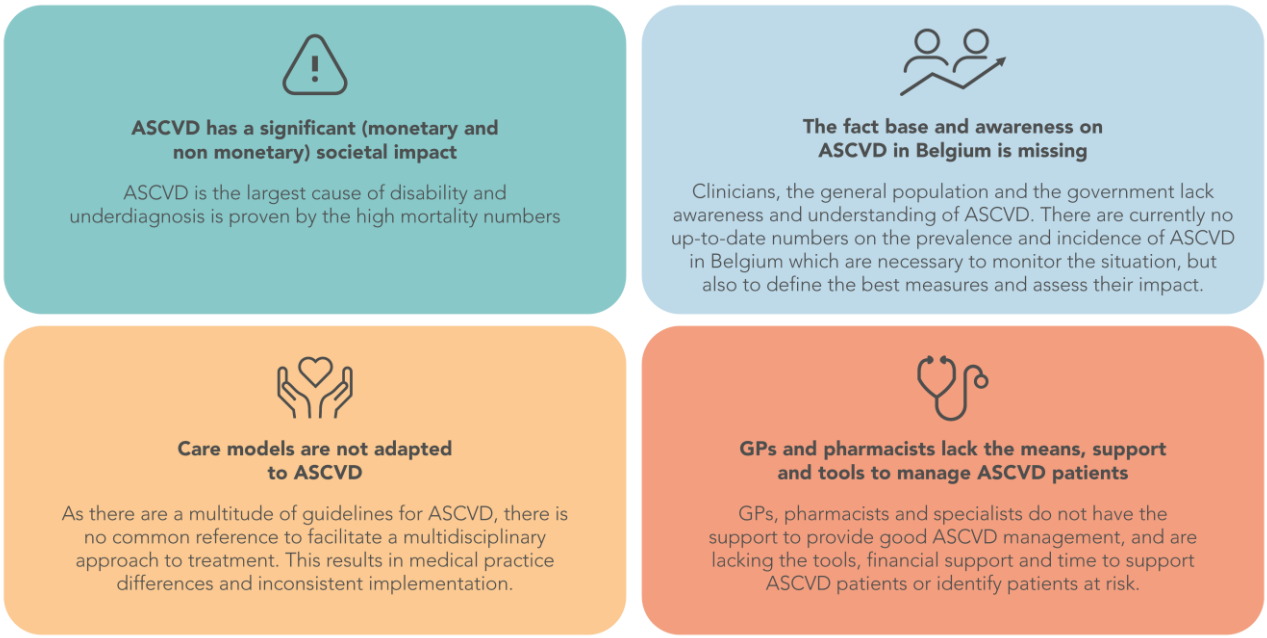


Figure 10.Overview of the four major areas for improvement to reduce the impact and cost of ASCVD in Belgium.
Source: interviews with specialists, general practitioners, pharmacists and data scientists and analysis thereof.
ASCVD = atherosclerotic cardiovascular disease, GPs = general practitioners.

Further details on each of the challenges is listed below.

Challenge 1: ASCVD has a significant (monetary and non-monetary) societal impact

- ASCVD is the largest cause of disability in the Western world and represents a high burden for patients, HCPs and society.
- Almost everyone has one or several risk factors for ASCVD and will have atherosclerosis at some point in life. But the risk factors are common, abundant and non-specific (e.g., being overweight, lack of physical exercise, smoking, high blood pressure), making ASCVD difficult to manage.
- Underdiagnosis of ASCVD is proven by the fact that mortality is very high.
- ASCVD poses a large cost to society due to an outdated and reactive treatment mindset, based on waiting until patients have an event or are really sick before treating them. This lack of prevention is very cost-inefficient.
- ASCVD is a silent and long-term killer. It needs action now to avoid becoming a huge epidemic in the near future with a high cost linked to it.

Challenge 2: The fact base and awareness on ASCVD in Belgium is missing

- Clinicians, the general population as well as the government lack knowledge and awareness of ASCVD being a silent killer and posing a huge problem for society.
- This is most likely because there is currently no up-to-date fact base with actual numbers on the prevalence and incidence of ASCVD in Belgium, nor on the cost and impact it has for society. There are several reasons why we do not have this today: ASCVD is a complex disease with multiple clinical outcomes, diagnosis is mostly based on cardiovascular risk factors, and the risk factors are numerous.

- Collecting and aggregating the key statistics to monitor the situation is necessary to:
    - segment the population and identify groups and individuals with ASCVD in need for intervention, and to
    - identify the measures needed to lower the prevalence and burden of ASCVD, and to evaluate those measures.
- It is a broad and complex pathology; hence people do not identify with it.
- For primary prevention, lifestyle changes are necessary.

Challenge 3: The current care models are not adapted to ASCVD

- There are multiple guidelines (Europe/Belgium/Flanders/ Wallonia) available for GPs and specialists, each with a different approach and not consistently updated with the latest scientific evidence. This results in medical practice differences and inconsistent implementation (i.e., LDL-C thresholds and recommended treatment differences).
- There is no common guideline for GPs, pharmacists and specialists, taking every aspect and discipline of ASCVD into account to facilitate a multidisciplinary approach to treating ASCVD.
- There are too few revalidation centres which are not decentralized enough to reach all patients. The sooner patients revalidate, the sooner they can contribute to society again and the lower the societal costs will be.
- There is a high focus on inpatient care, rather than outpatient care.
- Clinical labs still use outdated target levels, making lipid profiling more burdensome.

Challenge 4: GPs and community pharmacists lack the means, support and tools to manage ASCVD patients

- GPs and specialists do not have the support to provide good ASCVD management, i.e., to perform screening, segmentation and identification of patients and referral to specialists. GPs and pharmacists are lacking the tools to support ASCVD patients or identify patients at risk, and specialists often have no view on longitudinal data and the links to the combination of risk factors.
- Population health principles (to segment patients and develop specific initiatives) are not included into GP and pharmacist curricula.
- Limited awareness and education of GPs on ASCVD has a negative impact on the patient pathway in which they play a crucial role.

4. Call to action and recommendations

The high incidence and prevalence of ASCVD and the rising cost and impact for society related to this disease need to be addressed. Clinicians, experts and key opinion leaders have voiced a clear call for action, where the time to act is now.

4.1 Awareness that everyone has risk factors for ASCVD is insufficient

The risk factors of ASCVD are very common, abundant and unspecific, and result in a broad and complex pathology. Therefore, **people do not identify themselves with the risk factors nor the disease**. They consider ASCVD as an expected passage in their life, rather than as a disease to be prevented. There is a huge lack of awareness concerning the risk factors and their possible consequences. This is striking as **almost everyone has at least one risk factor and will develop some level of atherosclerosis at one point in their life**. Data on the risk factors to allow monitoring and control of those risk factors is essential in decreasing the prevalence and burden of ASCVD. As exposure to the risk factors has a cumulative effect throughout life, managing childhood adiposity is a key public health challenge. The increasing incidence of obesity and diabetes mellitus also poses a substantial threat to the increase in ASCVD. A change in nutrition patterns will be necessary for the implementation of ASCVD prevention, but there is currently little support for action on nutrition on an EU-level due to differing economic interests of EU countries.

4.2 Despite being available, implementation of the guidelines is not consistent

ASCVD is preventable and treatable. Nevertheless, given the prevalence of ASCVD, it is clearly not managed appropriately. Besides a lack of awareness and missing numbers to monitor the situation, the guidelines on the management and treatment of ASCVD have not been sufficiently implemented. The implementation of the most recent guidelines, reflecting the latest scientific insights on the management and treatment of ASCVD is essential. The current lack of this data is considered as one of the most important platform topics. **The knowledge on what must be done, as well as (international) guidelines, are available, but they are not adequately implemented.** There are several underlying causes for this.

First, there is no financing for the development of adequate guidelines in Belgium adapted to the national clinical practice, nor for the thorough implementation of them. The guidelines that are available originate from several sources, each of which have a slightly different approach. For each of the HCPs (i.e. GPs, cardiologists, endocrinologists and neurologists), different guidelines are available. They are not aligned with each other and often restricted to one HCP's specialty. This hinders a multidisciplinary approach in treating patients with ASCVD and their complex combination of risk factors.

Second, there is a difference in the implementation of the guidelines between the different HCPs. GPs and pharmacists implement a more holistic approach with a focus on the improvement of a patient's quality of life. The added value of additional treatment as compared to the expected cholesterol decrease is taken into account before increasing the lipid-lowering treatment regimen. This results in a less strict implementation of the guidelines and fewer patients reaching their target cholesterol level.

Third, there is a strong inertia of both the medical society and patients to take statins. Drug adherence, especially to statins, is very low. Also, access to other treatments is limited. The reimbursement conditions are too strict, leaving statins and ezetimibe as the only options. This hinders the implementation of the guidelines and limits patients to reaching their target cholesterol level.

Finally, there is a lack of support that incentivises the implementation of the guidelines.

4.3 Missing data, insufficient support and limited awareness amongst general practitioners and pharmacists

There is a need for support especially for GPs and pharmacists, as they play a crucial role in the patient journey. GPs are often the first point of contact with a low threshold and act as gatekeepers to the rest of the patient journey. Community pharmacists have frequent contacts with the entire population, are easily accessible, and have an important referral position. **GPs lack support to do routine screening for patients at risk for ASCVD, which is essential in addressing the current underdiagnosis**. This is due to the limited time a GP can spend per patient, inadequate electronic medical data records and software, and laboratories still using outdated cholesterol thresholds as targets for blood analysis and lipid profiling. This limits the possibility to segment the population and perform the identification of the patients at risk of ASCVD. Limited awareness and education negatively influence the management of ASCVD as well. GPs and pharmacists need better education on ASCVD as they still consider it as the cause of certain cardiovascular events, and not as its own disease. Their knowledge and awareness on ASCVD are essential to educate the patient on the essence and urgency of diagnosis and treatment. An underlying issue of inappropriate management of ASCVD is that neither the GP, pharmacist nor the specialist is incentivised to feel responsible for their patient.

4.4 A national ASCVD plan and roadmap, as is available for cancer and diabetes, is needed

To put ASCVD into perspective: in Belgium, 1.2 million patients have diabetes, and 6.7% of the total healthcare budget is spent on the disease (Figure 11). For cancer, which has an incidence of 70,000 patients, 6.9% of the total healthcare budget in Belgium is spent. Based on a healthcare budget of 36 billion euros in 2022, 7.2% of the healthcare budget is spent on ASCVD, for at least 750,000 patients[18]. For both diabetes and cancer, national plans are in place and many initiatives are being taken to fight these diseases. Awareness is high amongst both the government and the population. But this has not always been the case. Years ago, there was no fact base for diabetes. Therefore, initiatives to gather this data were the starting point to lower the burden of diabetes (the Initiative for Quality improvement and Epidemiology in Diabetes). **Despite having a prevalence, mortality (for cancer) and cost in the same range, none of this is the case for ASCVD, while a lot of health benefits can still be gained from tackling ASCVD. This disease deserves a similar national plan and roadmap.** The critical success factors and learnings gained from other plans should be leveraged. The ASCVD plan and roadmap must be based on the latest scientific insights and should be developed with broad support by all stakeholders.

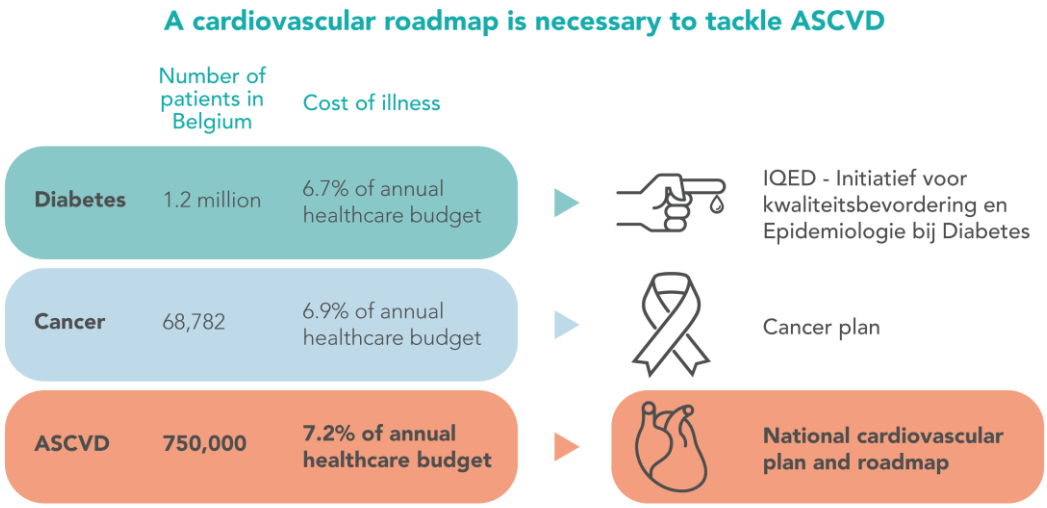


Figure 11. Overview of prevalence, cost-of-illness and national initiatives for diabetes, cancer and ASCVD in Belgium.
ASCVD = atherosclerotic cardiovascular disease, IQED = Initiative for Quality improvement and Epidemiology in Diabetes.

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Intensive sensibilization and increased awareness, as well as a transformation of the clinical practice are necessary to pave the way in tackling ASCVD with a focus on prevention (Figure 12). **Prevention is the most important solution**, as most people have at least one risk factor for ASCVD and will develop atherosclerosis at some point in life. Therefore, financial investments for prevention are necessary. Even a shift to primordial prevention from childhood and adolescence onward by promoting healthy lifestyles should be aimed for (see definition in Annex). A focus on nutrition will be important as it underlies many of the atherosclerotic risk factors.

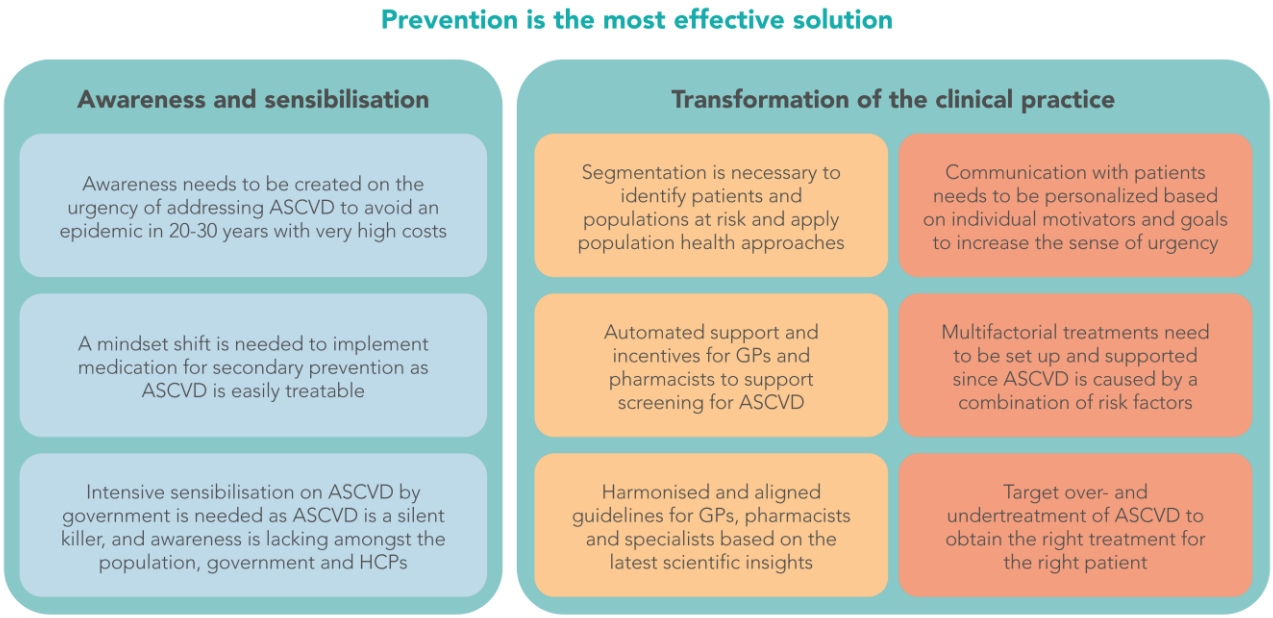

Figure 12. Building blocks necessary for tackling ASCVD in Belgium.
ASCVD = atherosclerotic cardiovascular disease. HCPs = health care professionals, GPs = general practitioners.

4.5 Intensive awareness and sensibilization is needed

Several initiatives will be necessary to increase awareness and sensibilization amongst the public, GPs, community pharmacists and specialists. Awareness needs to be created on ASCVD being a silent and long-term killer and on the urgency of addressing ASCVD as early as possible. It needs to be crystal clear that a lot of health benefits can still be gained from tackling ASCVD. This awareness is also necessary to highlight the importance of doing this now, as the results will only be seen in 10-20 years. Immediate **awareness is crucial to avoid an epidemic of ASCVD in 20 years with immense costs.** Intensive sensibilization on ASCVD by the government is needed. This will also benefit many other diseases, as the risk factors for ASCVD are very common and essential to the overall health of individuals. Fundamental to obtaining prevention will also be the mindset shift to implement medication for prevention rather than solely to cure. The fact that ASCVD is easily treatable by improving the risk factors or with drugs that have relatively few side effects (e.g., as compared to cancer treatments) should be used as an incentive. It is an easy win that should be leveraged. Moreover, the mindset concerning the treatment of ASCVD is outdated and very cost-inefficient: waiting for patients to get an event or get really sick before treating them.

> *"The mindset concerning the treatment of ASCVD is outdated. Waiting for patients to get an event or really become sick before treating them, is very cost-inefficient."*
> - Cardiologist

4.6 Transformation of the clinical practice

Awareness and sensibilization alone will not be sufficient. Transformation of clinical care is essential to support and incentivize HCPs to actively screen and manage ASCVD.

First, **segmentation is necessary to identify patients and populations at risk who are in need of an intervention.** For ASCVD that are largely genetically determined, such as familial hypercholesterolemia, screening of family members should be performed once a patient is identified and diagnosed. Cascade screening needs to be implemented and the necessary funding should to be provided.

Second, **automated support and incentives for GPs to facilitate the systematic screening of ASCVD and the implementation of the guidelines is essential**. For example, pop-ups integrated in their practice software, practice nurses, automated risk calculations based on the data in the patient files etc., could help tremendously. Also, guidelines adapted to the practice of GPs are necessary for easy implementation, however, these should still be based on the latest research and not dilute the quality of care.

> *"Treatment of the patient needs to be done on an individual and personal level to create sufficient engagement. They need to be triggered through their personal goals in life"*
> - Pharmacist

Third, **communication with patients needs to be very personalized based on individual motivators and goals to increase their awareness and sense of urgency.** Patients need to be approached and goals need to be set on an individual level, when patients are most motivated (e.g. in the hospital, after an event). This individual patient engagement can be obtained with '**Care Plan Conversations**'. Holding these will allow the identification of personal triggers and motivators, and clear and tailored to-do lists can be set up to tackle ASCVD and its risk factors.

Fourth, **multifactorial and multidisciplinary treatment is required**. Most HCPs keep themselves to their specialization. Since ASCVD is the result of many risk factors, the effort of lowering its burden should be multifactorial and across multiple specialisations ASCVD patients come into contact with, i.e., GPs, cardiologists, endocrinologists, neurologists and pharmacists. A strategy is needed to treat a patient in a multifactorial way, both in primary and secondary prevention with the same goals for both GPs, community pharmacists and specialists. This also requires a common guideline. However, the guideline cannot be the 'middle ground' nor should it be based on what is feasible budget-wise, but should be based on the latest scientific evidence. A compromise would dilute the quality of care and it cannot be a policy decision. GPs should be empowered and supported to implement these guidelines and they should be involved in the development of them from the start.

> *"Cardiologists do not have time to look beyond placing stents and prescribing statins, while a multifactorial approach could obtain much better results"*
> - General practitioner

Fifth, **a shift from inpatient to outpatient care is necessary**. Inpatient care is too dominant and should be avoided by focussing on prevention and obtaining sustainable rehabilitation. The number of rehabilitation centres needs to be increased and decentralized to increase the access to them and to facilitate the follow-up of patients. The faster patients rehabilitate, the faster they can contribute to society again and the lower their costs will be.

Finally, **both over- and undertreatment of ASCVD must be addressed**. Overtreatment can be decreased by better stimulating and supporting a healthy lifestyle and physical movement. For example, a visit to a dietician should be reimbursed. Undertreatment is a cause of (often poly-treated patients) being reluctant to taking more drugs and often not seeing the added value. Furthermore, besides the enormous reluctance to taking statins due to their reputation for negative side effects, there are enormous differences in reactions to them. These should be considered and followed up, by measuring their safety and efficacy.

4.7 Population health management is required to transform the current clinical practice to address ASCVD

> *"There are no clear numbers on the status of ASCVD in Belgium. But the fact that CVD are still one of the most important causes of death illustrated the huge impact they have"*
> - Cardiologist

Population Health Management (PHM) can be the solution to the essential proactive care and identification of patients at risk, facilitating prevention and high-quality care. PHM is a proactive approach to managing the health and wellbeing of a population. It aims to incorporate the total care of needs, costs and outcomes of the population, moving away from the provision of reactive, demand-led care. It is based on the process of auditing, feedback and benchmarking, allowing for continuous improvement of care, and increasing the accountability of HCPs. PHM will be required to transform the clinical practice to tackle ASCVD. Yet, our healthcare system does not allow PHM due to a separation of responsibilities for therapy and prevention.

Three essential topics need to be addressed. **First, mapping of the needs for the implementation of PHM is necessary to not only consider what needs to be obtained, but also how it needs to be obtained**. For example, proactive communication with patients, interdisciplinary collaboration with back-office support, data collection and the right tools to do so, a mindset shift on a HCPs' responsibility for a neighbourhood and not only their own patients, innovation budgets and changes in the existing system and clinical practice to facilitate implementation.

Next, the necessary systems to integrate several sources of information will need to be set up as accurate data will be paramount in obtaining interdisciplinary screening, segmentation, prevention, follow-up, and benchmarking of population, patients, and HCPs. Currently, we do not have the right systems to integrate several data sources to obtain the necessary segmentation of the population. All systems contain aggregated data that is not linked to individual patients or persons. On the short term, insights could be obtained from combining these 'static pictures' from different systems. But in the long term, all data should be coupled to the individual patient across the different systems.

Lastly, determination of the criteria for segmentation of the population is needed as not only health indicators but also vulnerability indicators and socio-economic factors need to be considered. This segmentation needs to be done based on interdisciplinary discussions with the different health actors within one neighbourhood. It is necessary to identify those individuals where the largest health gains can be achieved and select those patients in need for a consultation with a specialist, as consultations are limited and often taken up by patients who do not need it.

ASCVD needs a plan and roadmap with a PHM approach that must be implemented in Belgium (Figure 13). **All stakeholders are necessary and must contribute and work together to make PHM possible.**

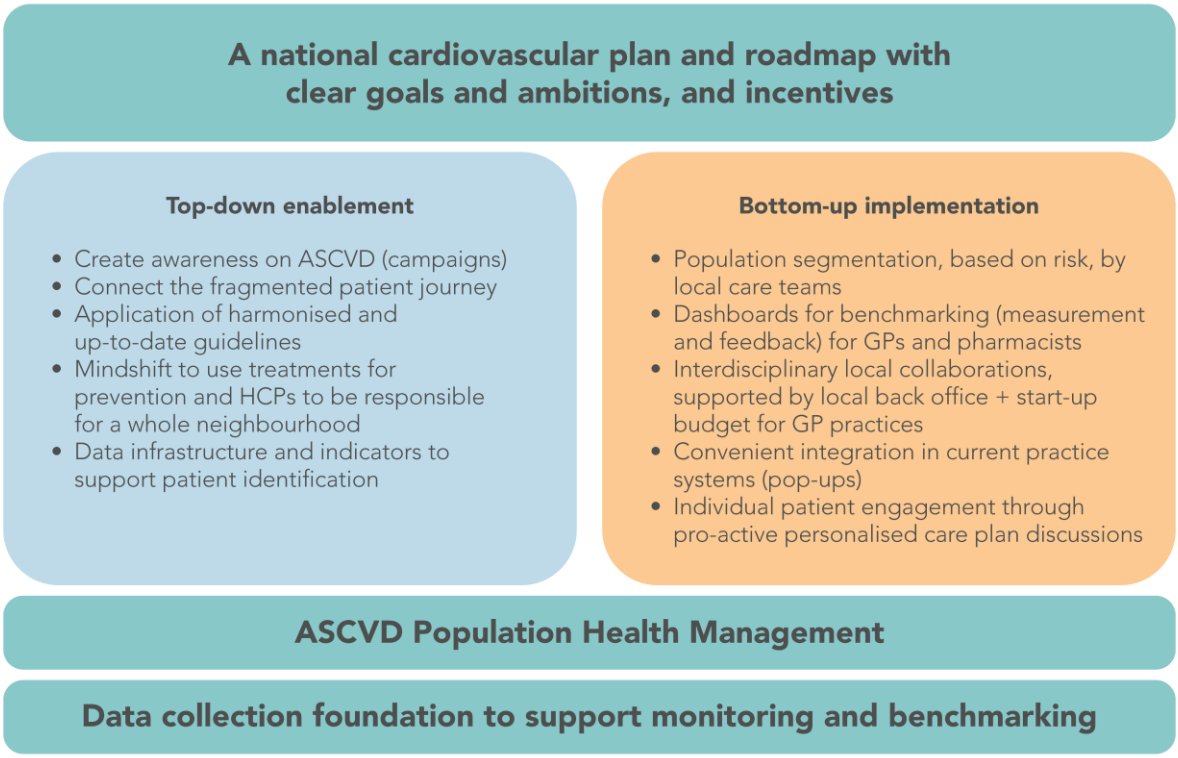

Figure 13. Top-down and bottom-up approach for a national cardiovascular plan and roadmap.
ASCVD = atherosclerotic cardiovascular disease. HPCs = health care professionals, GPs = general practitioners.

4.8 Recommendations for reducing ASCVD in Belgium

To address the actual challenges, in summary, four recommendations for improving ASCVD and reducing the impact and cost of ASCVD in Belgium are made, based on the in-depth interviews with clinicians, specialists and key opinion leaders:

Recommendation 1: To address the significant societal impact and cost of ASCVD, an integrated ASCVD plan for Belgium is needed

A national ASCVD plan and roadmap for Belgium (as with diabetes and cancer) with clear goals and ambitions should be developed with all stakeholders (GPs, community pharmacists, specialists, government, and insurance funds or sick funds) to support buy-in for implementation. It should also include incentives for implementation, and primordial, primary, and secondary prevention, based on population health and healthy lifestyle promotion to support the transformation from reactive to proactive care. The plan should also focus on the short-term measures (low hanging fruit), because a lot of healthcare gains can already be made by identifying and treating patients at risk.

Recommendation 2: More awareness on ASCVD and a reliable fact base with actual data to inform measures are needed

- Awareness and empowerment at the level of the public, about the importance to control the risk factors of ASCVD and the fact that it is a silent killer, is required. This must happen from early on in life (primary and even primordial prevention). Also, therapy adherence must improve, through ssensibilization of both the population and HCPs.
- An actual and accurate fact base with key numbers, based on improved data collection, is required for identifying populations and individuals, target underdiagnosis, support benchmarking and adequate decisions, but also to create awareness of the problem.
- Data collection and access to the key numbers is necessary to monitor the situation, and even create awareness of the problem. Such an actual and accurate fact base is required for adequate policy decisions, measuring the impact of initiatives to lower the prevalence and burden of ASCVD, and for the development and adaptation of the ASCVD plan and roadmap. At the GP level, it will also support segmentation of the population and identify populations and individuals with ASCVD in need for intervention. Data will also support benchmarking between GP practices and populations, and the implementation of a barometer through regional back offices and support for GPs.
- At the pharmacy level, it is important to develop stratification tools in the shared pharmaceutical file, so that patient groups with medication-related problems, or target groups at risk of problems, can be detected at an earlier stage.
- Longitudinal data collection and analysis is required to implement evidence-based medicine.

Recommendation 3: The medical practice for ASCVD follow-up and treatment must be harmonised, based on the latest scientific evidence, and supported by top-down enablers

- Guidelines must be harmonised and a multifactorial up-to-date guideline based on the latest scientific evidence should be developed, to facilitate a multi-disciplinary approach to treating ASCVD patients. To support implementation of the guideline(s), audit and benchmarking must be performed, and inclusion in conventions is required.
- Treatment thresholds must be clear, adapted on an ongoing basis, based on the latest scientific data and uniformly implemented. HCPs need to be incentivised to implement a multifactorial treatment approach. Therapy adherence has to increase, both through education of the population and HCPs. GPs should develop personalised treatment plans for patients, based on their goals and perform personalized communication based on the individual motivators of patients. Finally, more dedicated revalidation centres are needed to reach all patients and support faster return to work and so patient become an economic contributor again.

Recommendation 4: GPs, community pharmacists and specialists need support to manage ASCVD patients and populations at risk

- A population health approach with GPs and specialists (i.e., cardiologists, endocrinologists, neurologists) and community pharmacists is required to provide good ASCVD management. This includes performing screening, segmentation and identification of patients, and referral to specialists.
- It is necessary to put tools in place and link the systems to support GPs, community pharmacists and specialists to identify patients at risk and manage them better. Teams of GPs and pharmacists should be incentivised (e.g., via a practice support nurse or supported by regional back offices for primary caregivers) to systematically screen for ASCVD and should be made responsible for their patient population. Finally, population health management should be included in GP and pharmacist curricula, to increase knowledge and capabilities.

ASCVD needs and deserves a plan and roadmap, and as a starting point, a population health management approach must be implemented in Belgium. Some short-term initiatives can already result in big improvements. ASCVD is a silent and long-term killer. If we do not address the problem now, a huge epidemic will occur in 20-30 years from now, with a very high societal cost and impact.

Appendix: List of definitions

	Definition
Angina pectoris	Chest pain or pressure, usually due to insufficient blood flow to the heart muscle. The main causes are coronary artery diseases; other causes include anaemia, abnormal heart rhythm and heart failure.
ASCVD	Atherosclerotic cardiovascular disease; disease of the heart and arteries as a consequence of atherosclerosis.
Atherosclerosis	The chronic process of hardening of the arteries with plaque formation and narrowing of the arterial lumen due to infiltration of cholesterol-rich lipoproteins in the arterial wall.
DALY	Disability-adjusted life years. One DALY represents the loss of the equivalent of one year of full health. DALYs for a disease or health condition are the sum of the years of life lost to due to premature mortality and the years lived with a disability due to prevalent cases of the disease or health condition in a population.
Ischaemic heart disease	The reduction of blood flow to the heart muscle due to atherosclerosis in the arteries of the heart. Also called coronary heart disease, coronary artery disease and myocardial ischemia.
Ischaemic heart failure	A cardiac condition characterised by systolic dysfunction and reduced cardiac output, resulting from an imbalance between myocardial oxygen demand and supply.
Ischaemic stroke	Damage to the brain cells due to a disruption of the brain's blood supply, which can be due to a thrombus caused by an atherosclerotic plaque rupture elsewhere in the body.
Myocardial infarction	Damage to the heart cells caused by reduced blood supply. A myocardial infarction occurs most frequently due to coronary artery diseases, however, coronary artery spasms may be a cause.
Peripheral artery disease	A narrowing or blockage of the arteries in the leg or arms resulting in a reduced blood flow and supply.
Primordial prevention	Prevention focusses on preventing the formation of a risk factor, therefore often aimed at children and adolescents.
Primary prevention	Intervening before health effects occur, through. measures such as vaccinations, altering risky behaviors (poor eating. habits, tobacco use), and banning substances known to be associated.
Secondary prevention	Screening to identify diseases in the earliest. stages, before the onset of signs and symptoms.
Transient ischaemic attack	Transient disruption of the brains blood supply.