The Cardiovascular Health Strategy (CVHS) of Spain's National Health System

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The Cardiovascular Health Strategy (CVHS) of Spain's National Health System

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Table of Contents

Presentation

Since the epidemiological transition of the 1950s, cardiovascular diseases (CVDs) have become ever more significant in terms of their impact on the population's health, and are now the leading cause of death. Despite this, CVD mortality is decreasing, so our focus must now be on improving cardiovascular health, while at the same time addressing other challenges, such as chronicity and disability.

This Cardiovascular Health Strategy (CVHS) has been designed —with the participation of patients, health professionals, administrators, researchers and Spain's Autonomous Communities and Autonomous Cities— to respond to these and other challenges.

This Strategy has been conceived as a continuation and extension of the Ischaemic Heart Disease Strategy, approved at the National Health System's Interterritorial Council meeting of 22 October 2007. Stemming from its evaluation, and also thanks to dialogue between all the actors involved, this new Strategy responds to the need to incorporate new perspectives on cardiovascular health —not only as regards chronicity, but also in terms of preventing and limiting the impact of such diseases.

To this end it is crucial to have a comprehensive, person-centred approach to care that considers all the factors involved in cardiovascular health: social determinants, in particular gender, to patient education and health staff training, the need to improve early diagnosis and the importance of prevention and rehabilitation.

These are some of the aspects considered in this text, which have been organized into three cross-cutting themes and seven specific themes. Given their importance and impact, four of these themes are specific diseases: ischaemic heart disease, heart failure, valvular heart disease and arrhythmia. In total, 130 specific actions have been defined for improving the population's cardiovascular health. Specific indicators have also been included to evaluate the Strategy and assess its reach in the coming years.

The Strategy also addresses the impact of the COVID-19 pandemic in Spain. It analyses the known shortcomings which have worsened cardiovascular health and health conditions, especially among the most vulnerable people. It also describes some of the opportunities that have emerged from this crisis, such as the use of telemedicine.

This health crisis has taught us many lessons, one of them being the value of public services and the importance of our National Health System. Therefore, our objective is to increase and improve the capabilities of the National Health System to tackle people's health-related challenges and improve their lives, thus achieving the goal of good cardiovascular health for all.

Carolina Darias
Minister of Health

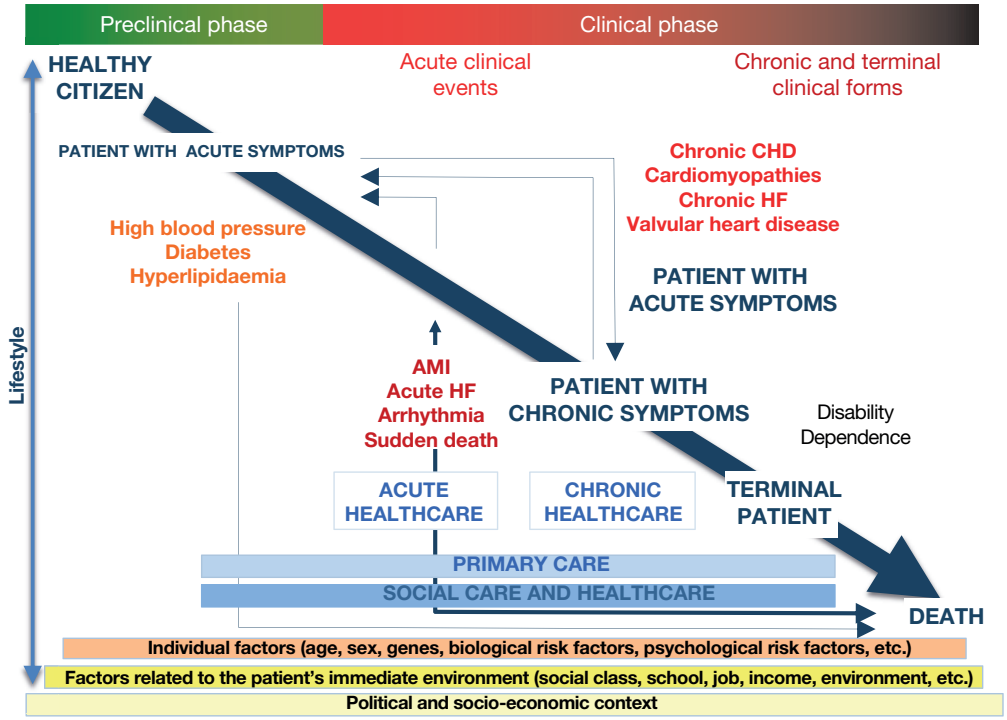
I Towards a Cardiovascular Health Strategy

1.1 Why the shift towards a cardiovascular health strategy?

The high prevalence of cardiovascular diseases (CVDs) and their risk factors, as well as their coronoar current impact on health and quality of life and their economic and social consequences make cardiovascular health a major social and health challenge.

A strategy focused on population cardiovascular health must not only to reduce the prevalence and/or incidence of related pathologies, but also to achieve the highest possible level of health in individuals, representing a paradigm shift from strategies focused on reacting to diseases. Areas such as education, the promotion of healthy lifestyles, the prevention of the onset or progression of risk factors and CVDs, early detection, the training of professionals, patients and carers, research, innovation and knowledge management are all critical aspects of a strategy focused on cardiovascular health. From a citizen perspective, this complements the approach of efficiency, quality, safety, multidisciplinarity and continuity of care for acute and chronic CVD patients which should underpin strategies focused on healthcare and the National Health System (Figure 1).

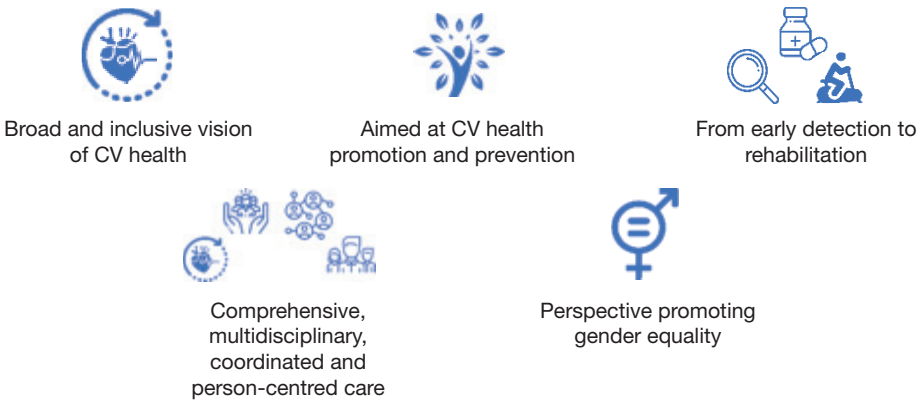
Figure 1. Diagram of the vision of cardiovascular health and the areas for action envisaged in the Cardiovascular Health Strategy (CVHS)



Source: Ministry of Health

This approach aims to address the multiple challenges posed by cardiovascular health in the population from a comprehensive viewpoint, starting with the aspects that influence citizen health, education, capacity building and health promotion, and incorporating key aspects of today's society such as research and technological innovation. All of this has been developed to address CVD care needs from the point of view of individual patients, their families, their environment and a health system that maintains quality, efficiency and safety while reinforcing its sustainability. It must do this without losing sight of the fact that people —and not the system itself— are the key focus, adopting an equity-based approach, with a particular focus on gender equity (Figure 2). In this way, the development of this **Cardiovascular Health Strategy (CVHS)** seeks to establish a framework that allows all the agents involved to identify and implement priority actions to combat the challenges facing the cardiovascular health of the Spanish population.

Figure 2. Key points of the Cardiovascular Health Strategy



Source: Ministry of Health

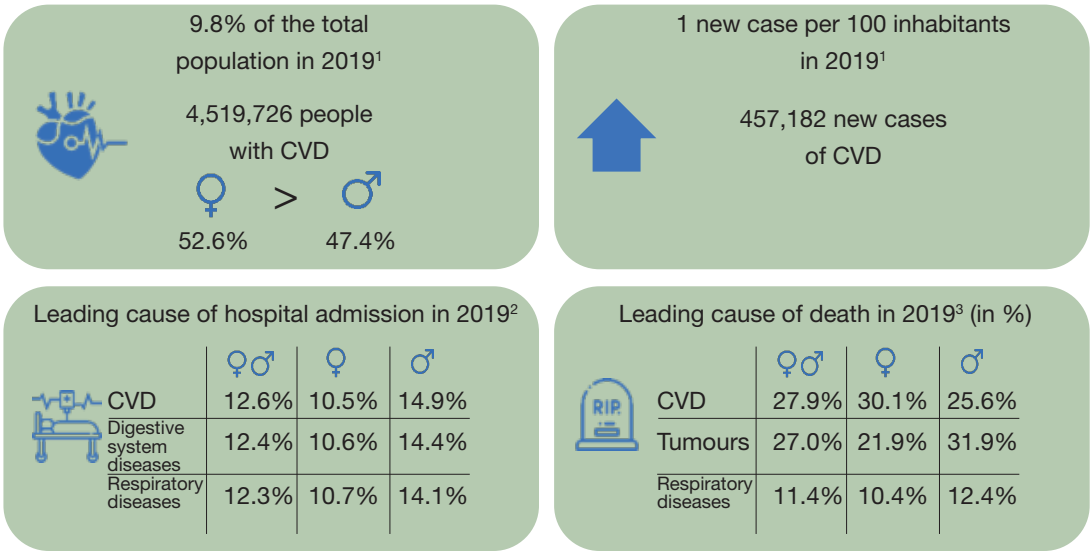
1.2 Impact of cardiovascular disease in Spain

In 2019, the prevalence of cardiovascular diseases[1] (CVDs) in Spain was 9.8% of the population, of which 52.6% were women and 47.4% men (1). The annual incidence rate was one new case per 100 people (1). In the same year, CVDs were the cause of 37.4% of deaths among the population of the European Union, accounting for more than 2 million deaths (1). In Spain, they were the leading cause of death, accounting for 27.9% of the total —with tumours (27.0%) and respiratory diseases (11.4%) being the second and third causes, respectively (2)— as well as being the leading cause of hospital admissions (3) (Figure 3).

The development of CVDs and the occurrence of cardiovascular events are subject to individual and social and structural and intermediary determinants of health. These determinants include:

[1] This includes ischaemic heart disease, heart failure, atrial fibrillation, sudden death and aortic valvular disease, and the incidence of most acute cardiovascular events, such as acute myocardial infarction and stroke.

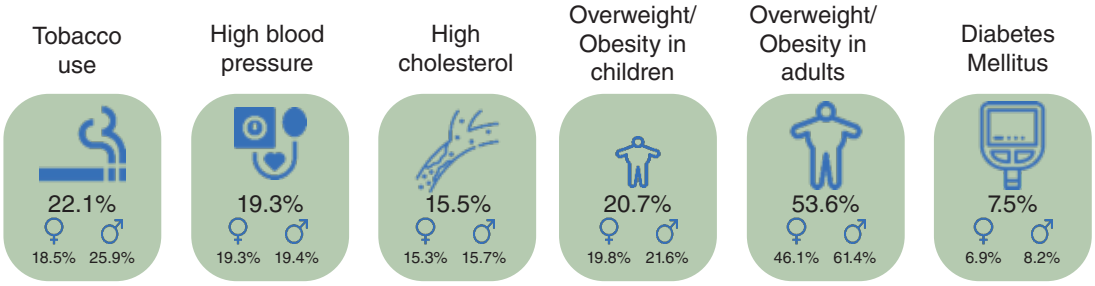
Figure 3. Cardiovascular diseases in Spain



Sources: 1. Global Burden of Disease Study, 2019 (GBD 2019), Institute for Health Metrics and Evaluation (IHME), 2020. 2. Hospital Morbidity Survey, 2019, National Statistics Institute (INE). 3. Death statistics according to cause of death, 2019, INE

- Those associated with material resources, such as low socio-economic status, which is a predictor of increased CVD risk (4), or environmental factors, such as the influence of air quality on CVD mortality risk (5).
- Lifestyle risk factors, such as tobacco use, which is the leading cause of cardiovascular morbidity and mortality (Figure 4) (6).
- Biological risk factors, whether of metabolic origin, such as high blood pressure (HBP), high cholesterol, overweight/obesity or diabetes mellitus (DM), or non-modifiable origin, such as age (Figure 4) (7).

Figure 4. Self-reported prevalence of the most prevalent risk factors in the population with the strongest association with cardiovascular disease[2]



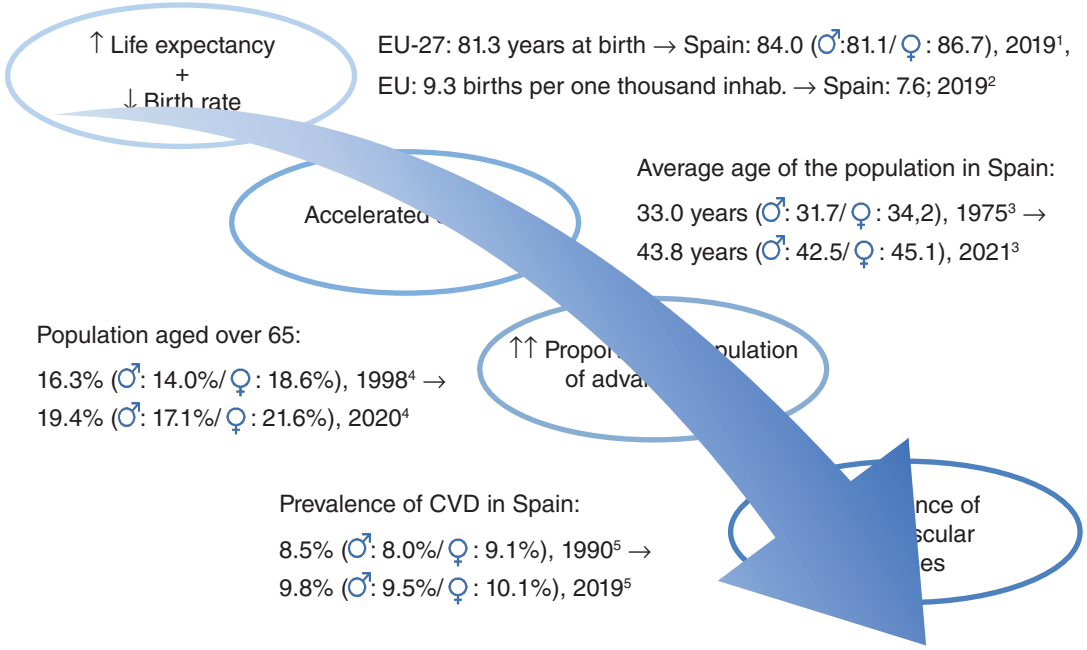
Legend: ♀ Women ♂ Men

Source: European Health Survey in Spain 2020, INE

[2] The overweight/obesity indicator for adults refers to the population aged 18 and over, the overweight/obesity indicator for children to the population aged 15-17, while the other indicators refer to the population aged 15 and over.

Age is the principal determinant of CVD morbidity and mortality (Figure 5). With the exception of tobacco use, both the prevalence of cardiovascular risk factors (CVRFs) and the prevalence of most kinds of CVD increase significantly with age and peak at very advanced ages —those exceeding 75 years of age (8) (9). This is key in the context of a society facing an accelerated ageing process (10) (11) (12).

Figure 5. Influence of age on the prevalence of cardiovascular diseases



Sources: 1. Life expectancy at birth (years), 2019, Eurostat. 2. Crude birth rate, 2019, Eurostat. 3. Population structure indicators, 1975 and 2021, INE. 4. Statistics Continuous Register, 1998 and 2020. 5. Global Burden of Disease 2019, IHME, 2020.

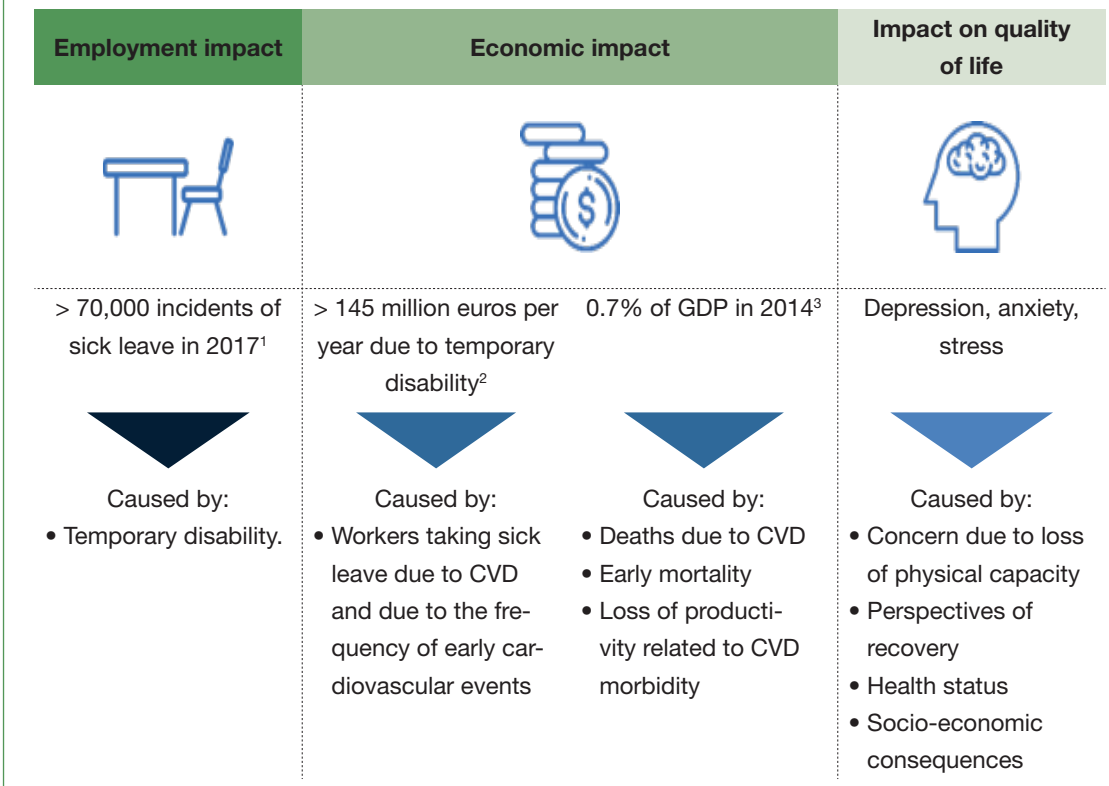
The impact of CVD extends beyond health and affects the economy and employment. Cardiovascular health problems influence the use of health system resources, as well as the labour market and productivity, with an estimated impact on the economy of 0.7% of GDP (13) and a cost of more than 145 million euros per year due to temporary disability (14).

On an individual level, cardiovascular health problems have a direct impact on people's quality of life, via functional impairment, chronic medication and its side effects, the psychological effects of poor cardiovascular health, and socio-economic consequences, among others (15) (16) (17) (Figure 6).

The COVID-19 pandemic has revealed a rising trend towards severe illness, including increased fatality in people with cardiovascular risk factors or CVD, especially in older people and, most frequently, males (18) (19) (20).

The impact of the COVID-19 pandemic in Spain on the infected population has been worsened by its effect on the healthcare system, altering the care of patients with acute CVD, such as acute myocardial infarction (21), cardiac arrest (22) or acute heart failure (23). There has been an increase in the fatality of these diseases, both in and out of hospital (24), as well as a decline in

Figure 6. Employment-related, economic and quality of life impacts of cardiovascular diseases



Sources: 1. Asociación de Mutuas de Accidentes de Trabajo (AMAT), Las patologías cardiovasculares causan más de 70.000 bajas laborales al año en España. 2018 [Cardiovascular diseases cause more than 70,000 cases of sick leave per year in Spain, 2018.] 2. Calvo-Bonacho, E. et al., Association between improvement in cardiovascular risk profile and changes in sickness absence: results of the ICARIA study, Rev Esp Cardiol 2017;70:941-951. 3. The economic cost of cardiovascular disease from 2014-2020 in six European economies, 2014, Centre for Economics and Business Research Ltd. 4. Chauvet-Gelinier JC, Bonin R., Stress, anxiety and depression in heart disease patients: A major challenge for cardiac rehabilitation, Ann Phys Rehab Med 2017;60:6-12. 5. Smith et al., Psychiatric and Behavioral Aspects of Cardiovascular Disease: Epidemiology, Mechanisms, and Treatment. Rev Esp Cardiol 2011;64:924-933

the planned care of patients with chronic diseases, which technological solutions such as telemedicine (25) (26) have attempted to alleviate.

1.3 Strategic framework

The regulatory framework of this strategy is based on the General Health Act of 25 April 1986, which stipulates that the State and the Autonomous Communities may establish joint strategies, and Act 16/2003 of 28 May, on Cohesion and Quality of the National Health System, which

recognizes the Ministry of Health's powers to establish the basis for general and health coordination and to promote the development of comprehensive health plans for the most prevalent diseases.

The Ministry of Health, in collaboration with the Autonomous Communities, scientific societies and patient and family associations, is working to improve the approach to complex and highly prevalent diseases by drawing up national strategies. The strategies, based on the best scientific evidence and the consensus of all the agents involved, aim to establish specific goals and actions to overcome shortcomings and raise the quality of care.

CVDs represent a problem of great magnitude, gravity and complexity, being the main cause of morbidity and mortality in Spain, which is why specific action is required in different areas: at population, health and social levels. The Ministry of Health believes that the CVHS is the best instrument for achieving an appropriate response to the problems posed by these diseases. First, because it brings together the stakeholders: public administrations, scientific societies, professionals and patient and family organizations. Second, because it demands consensus to establish goals, action plans and monitoring indicators. And third, because it offers high-quality proposals based on the best scientific evidence and is a dynamic instrument that can be reviewed, updated and improved upon.

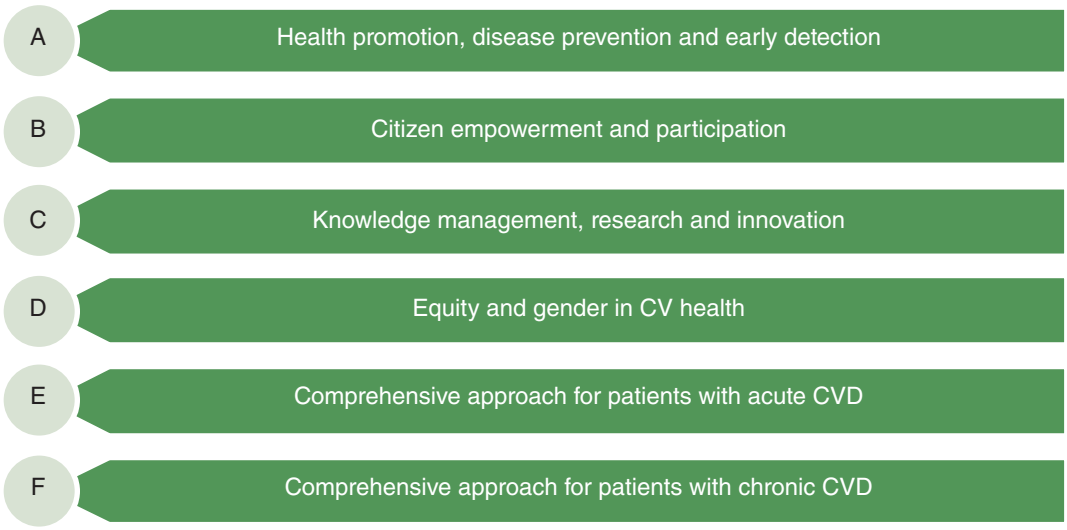
The CVHS greatly expands on the National Health System's Interterritorial Council's Ischaemic Heart Disease Strategy, of 22 October 2007. The latest evaluation of that Strategy revealed that the CVD mortality rate is decreasing. However, due in part to the strategies implemented, a growing proportion of the population is living with disability and chronic illness due to the greater longevity and survival rates of people who have undergone acute cardiovascular events or suffer from chronic CVD. Paradoxically, both are the result of the progress made in society and in the healthcare system. This situation calls for a new approach, one with a broader perspective that focuses not just on disease, but on public health, encompassing care for CVD patients alongside action among the healthy population to prevent both the development of disease and of predisposing factors. Such an approach to care must also be comprehensive, multidisciplinary, coordinated, and person-centred, and pay particular attention to health inequities, especially gender inequities. This is the starting point for replacing the Ischaemic Heart Disease Strategy with a Cardiovascular Health Strategy with a new approach and a broader, more inclusive vision.

The CVHS development process began with an international review of the strategies implemented in Australia (27) (28), the United Kingdom (29) and France (30). In this way, the main action areas were identified using a population approach, and paying attention to patients and their families, responding to their needs and expectations, promoting comprehensive care, coordination between levels of care, social support, and empowerment of citizens and patients. The priority action areas for consideration for the CVHS were established based on this analysis (Figure 7).

A review of national and regional plans was carried out in parallel with the international review. Spain's National Health System's Health Strategies, including the CVHS, are designed to improve care for those diseases with the highest prevalence rates, disease burden and economic impact. Thus, this strategy has been developed considering the goals and action areas common to other National Health System initiatives previously published by the Ministry of Health. The aim is to strengthen pre-existing initiatives with similar approaches, avoiding the unnecessary redefinition of ongoing actions, and ensuring alignment with the major priority action areas and the many existing initiatives at both national and international level (Figure 8).

Likewise, the measures included in the Palliative Care Strategy must also be considered for those patients with a cardiovascular disease who are in an advanced, terminal phase of the disease.

Figure 7. Major areas of actionaction areas identified as priorities in the CVHS



Source: Ministry of Health

Figure 8. Relationship between pre-existing strategies and areas of actionaction areasidentified

	Strategy on Coronary Heart Disease (2009)	Strategy on diabetes (2012 Update)	Strategy on Addressing Chronic Disease (2012)	Strategy on Health Promotion and Disease Prevention in the National Health System (2013)	Strategy on Nutrition, Physical Activity and Prevention of Obesity (2015)
A Health promotion, disease prevention and early detection	✔	✔	✔	✔	✔
B Citizen empowerment and participation	✔	✔	✔	✔	✔
C Knowledge management, research and information	✔	✔	✔		✔
D Equity and gender in CV health		✔		✔	✔
E Comprehensive approach for patients with acute CVD	✔			✔	✔
F Comprehensive approach for patients with chronic CVD	✔	✔	✔	✔	✔

Source: Ministry of Health

1.4 Goal of the Cardiovascular Health Strategy

The **main goal** of the National Health System's Cardiovascular Health Strategy is to improve the cardiovascular health of the Spanish population. This goal consists of:

- Promoting people's cardiovascular health by developing a comprehensive approach that facilitates the adoption of healthy and sustainable lifestyles and environments.
- Reducing the incidence, prevalence and complications of cardiovascular diseases in Spain through prevention, improvement of acute and chronic care, recovery and restoration of health, prevention of disability, and improvement of the quality of life and well-being of patients and their families.
- Promoting the adoption of measures that have been proven effective, safe, efficient and sustainable.

1.5 Scope and design of the CVHS

With the help of a *multidisciplinary Advisory Committee,* six *themes* have been defined to enable the specification of the principal action areas identified after the review of the strategic framework:

a) Health promotion, disease prevention and early detection
b) Citizen empowerment and participation
c) Knowledge management, research and innovation
d) Equity and gender in cardiovascular health
e) Comprehensive care for people with acute CVD
f) Comprehensive care for people with chronic CVD

Each theme focuses on a different area of cardiovascular health, taking into account the actions of multiple agents, including CVD patients, carers, health and non-health professionals, administrators and the public. The definition of each theme enables both a general approach to cardiovascular health and its application to specific conditions and pathologies requiring specific actions. Four conditions have been chosen in this strategy due to their prevalence and social impact:

- Ischaemic heart disease
- Heart failure
- Arrhythmia
- Valvular heart disease

Three cross-cutting perspectives have been added to this vertical overview by pathology, which transcend the concepts of disease to take a broader perspective on health:

I. Promotion, prevention and citizen capacity building
II. Knowledge management, research and innovation

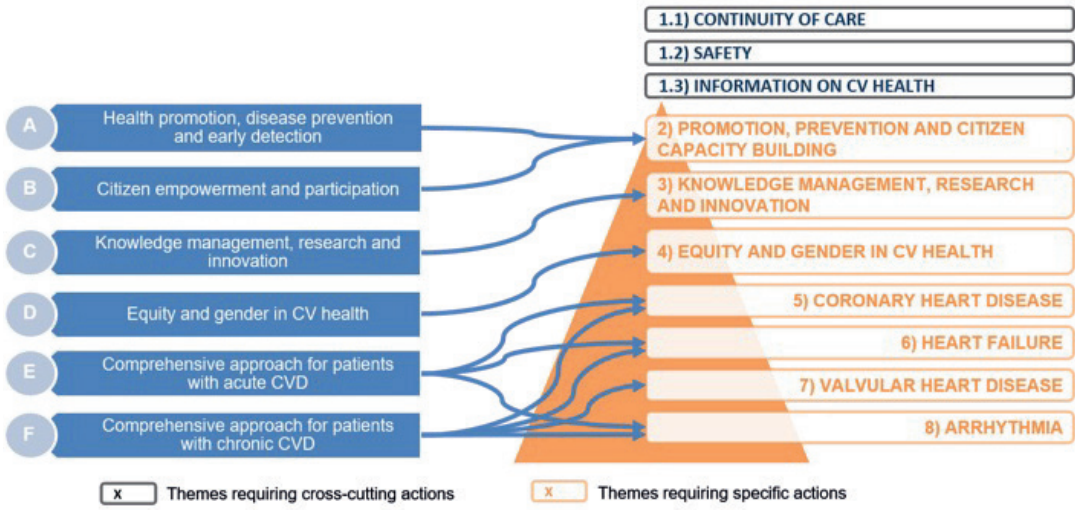
III. Equity and gender in cardiovascular health

Similarly, since the initial discussions, it has been understood that there are three values that must also be considered in all approaches, specifically:

i. Patient safety
ii. Continuity of care
iii. Promotion of information systems

The model under which the CVHS was developed enables it to be duplicated and expanded upon to be applied specifically to other cardiovascular syndromes not considered on an individual basis in this edition (Figure 9).

Figure 9. Relationship between pre-existing strategies and action areas



Source: Ministry of Health

II Diagnosis of the cardiovascular health of the Spanish population

2.1 Introduction

CVDs are one of the leading causes of disease burden internationally and in Spain. They affect people at all stages of life and are preventable through the promotion of healthy lifestyles and environments, as well as through specific prevention measures. Likewise, an appropriate clinical approach can reduce the harms of the disease on individuals and society, while reversing existing consequences, lifting the limitations they cause, and delaying the progress of the disease.

The focus of the **Cardiovascular Health Strategy (CVHS)** is to improve the cardiovascular health of the Spanish population, increase the time people live with the best possible health and quality of life, reduce the prevalence and incidence of CVDs and improve health care for CVD patients.

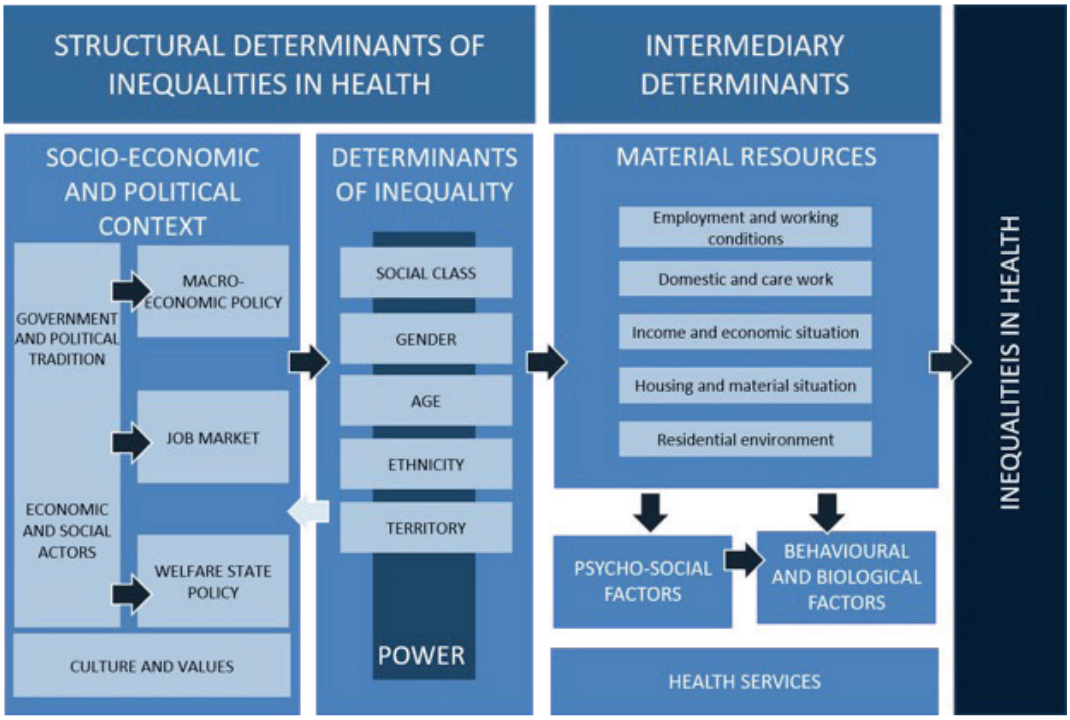
For people at risk of developing a CVD or with a subclinical (asymptomatic or invisible) disease, systems must facilitate early detection, empowering citizens, health and non-health professionals, patients and carers. This also maximizes the opportunities offered by education, research, innovation and knowledge management. Once within the system, it is necessary to determine the magnitude of the problem to organize the relevant actions. The goal is the best clinical care and management of healthcare resources, with an integrated and person-centred approach that guarantees equity, efficiency, quality, safety and continuity of care in the National Health System.

Cardiovascular health —a broader concept than the absence of CVD— is a spectrum ranging from risk factors such as genetic predisposition, physical environment, socio-economic status, psychological and emotional environment, lifestyle or biological risk factors, to CVDs themselves, including asymptomatic and acute events and chronic diseases.

A person's health status is influenced by social determinants of health, which the World Health Organization (WHO) defines as "the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life". These conditions are defined by social, political, economic, environmental and cultural aspects that are closely linked to the health status of individuals and the population group to which they belong (31).

The conceptual framework of the determinants of social inequalities in health proposed by the Committee to Reduce Social Inequalities in Health in Spain differentiates between structural determinants of health inequalities and intermediary determinants (Figure 10). Structural determinants include the socio-economic and political context, including the social structure and how power and resources are distributed —government, social policies, rights, the labour market, and social values. They also encompass the determinants of inequality that establish the hierarchy of power in society— social class, gender, age, ethnicity and location. Structural determinants in turn influence the emergence and impact of intermediary determinants such as material resources, psychosocial processes, behavioural and biological factors, and the functioning of health services.

Figure 10. Conceptual framework of the determinants of social inequalities in health. Committee to Reduce Social Inequalities in Health in Spain, 2010



Sources: Ministry of Health, Social Services and Equality. Committee to Reduce Social Inequalities in Health in Spain. Moving toward equity: a proposal of policies and interventions to reduce social inequalities in health in Spain. Madrid 2015

This conceptual framework shows how the segmentation of social groups according to variables such as income level, education, occupation and gender creates social inequalities in living and working conditions. The structural determinants of health inequalities are responsible for the socio-economic stratification of the population, generating better or worse opportunities for health, depending on vulnerability, exposure to harmful agents, and accessibility of basic services. Thus, structural determinants in turn influence the existence and characteristics of intermediary determinants (material conditions, psychosocial circumstances, behavioural and biological aspects, access to and quality of health services). People's interactions with these determinants shape their health (32).

2.2 Structural determinants of health inequalities

Structural determinants are those that affect people's living conditions. They have the capacity to have a greater cross-cutting and lasting impact on morbidity and mortality rates than most of the known risk factors for disease (33). They can be divided between those related to the socio-economic and political context and those related to determinants of inequality deriving from the social structure.

2.2.1 Socio-economic and political context

The socio-economic and political context refers to aspects closely linked to the social structure and the distribution of power and resources within it. Government, here, is understood in a broad sense to encompass political tradition, transparency, corruption and the power of trade unions, among other aspects. Economic and social actors are also included.

All these agents are considered responsible for the macro-economic policies, labour market conditions and public policies that shape the welfare state, and through which health inequalities can be addressed (34):

- *Policies related to political power.* In a broad sense, these include policies favouring citizen participation in elections and those that strengthen the work of trade unions and civil society.
- *Social policies aimed at improving the welfare state.* Implementation of these policies enables improved provision of universal public services such as education, health care and care for dependent persons.
- *Macro-economic policies (fiscal policies, market regulation, etc.).* These policies serve to reduce income inequalities and poverty through progressive taxation, market regulation, the promotion of pro-equity strategies, and support for minimum pensions.
- *Labour market policies.* These policies are aimed at improving working conditions, preventing occupational hazards and workplace risks to ensure appropriate health for workers, regulating wages and establishing a minimum wage that guarantees decent living conditions. Other aspects considered are the regulation of working hours and of temporary work, sick pay and unemployment benefits, as well as policies aimed at achieving full employment.

The social and cultural values of the population are also social determinants of health (33).

2.2.2 Determinants of inequality

Determinants of inequality are those factors that shape social power structures, such as class, gender, age, ethnicity or race, and region of origin or residence. These factors determine the chances of having good health and cause health inequalities due to differences in access to resources (33).

In Spain, different studies have found that socio-economic status, gender, region and, in recent years, immigration, constitute determinants of inequality with a major impact on the health of the population (33). For example, low socio-economic status, defined as low income, low educational attainment, or having a precarious job, is a predictor of increased risk of CVD (4). People who are more socio-economically disadvantaged have more CVRFs and less access to health care and treatment. A correlation has been shown between low socio-economic status and the presence of subclinical atherosclerosis (35). Similarly, a recent study shows that lower levels of education (intersectional perspective) are associated with greater inequality in overall cardiovascular mortality in Spain, which is especially significant for ischaemic heart disease and heart failure mortality in young women (36).

Determinants of inequality interact with each other in each person and community, increasing vulnerability, making it necessary to address them from an intersectional perspective. So-

cial vulnerability refers to the lack of security and the helplessness affecting certain people and communities as regards their living conditions and their capacity to address such situations. In addition, people in a state of social vulnerability often have a poorer baseline health status, which leads to a poorer prognosis for future illness (37).

Similarly, people from lower socio-economic strata have limited lifestyle choices and develop more harmful behaviours (poor diet, low levels of physical activity, alcohol and tobacco use, poor adherence to treatment plans) that may be related to their living conditions, thus shaping intermediary determinants (38).

2.3 Gender as a determinant of inequality in cardiovascular health

2.3.1 Risk factors, promotion and prevention from a gender perspective

Gender is the system of values, norms, roles and stereotypes determining structural, psychosocial and behavioural processes. Despite efforts, there has been a stagnation in the overall reduction of the impact of CVDs on women in the last decade. This requires recognizing the fact that, beyond known biological sex differences, gender inequality factors increase the risk of CVD. This recognition of the problem represents a preliminary step to implementing strategies to achieve gender equity with respect to CVD (39).

Thus, there are several gender-related aspects that affect women's cardiovascular health, for example:

- The gender system assigns women the role of carers. This leads to physical and mental overload with associated risks to their own health and the neglect of self-care associated with the caregiving role (40). Caring responsibilities also impact on resilience in women with CVD, for example when some prioritize family responsibilities over rehabilitation services (41).
- Women's difficulties in reconciling work and family life and the unequal distribution of domestic and care tasks have increased pressure in both areas, generating additional stress for women and the added difficulty of managing time and habits in a healthier way (42) (43).
- Harassment and daily discrimination —including violence— are chronic stressors that impair cardiovascular health (44).
- Women's role in society can influence their access to the health care system. Forty-five percent of US women cancel or delay medical appointments due to the social stigma of being overweight (45).
- Women have worse working conditions (greater precariousness, more part-time schedules, more temporary work, more informal work) and worse economic conditions, meaning that, from an intersectional perspective, they are negatively affected both by gender and by the other social determinants, multiplying the impact.

One of the fundamental mechanisms for achieving gender equality is empowerment, defined as having power and control over one's own life. Institutions can support processes that foster

self-empowerment and, in the case of women and girls, should facilitate their ability to articulate their needs and priorities and play a more active role in promoting their gender-related interests and needs (46). This includes the promotion of initiatives that address aspects related to social roles, family roles, employment status and economic conditions, as well as the following realities directly linked to common CVRFs in the classic approach to cardiovascular health:

- Due to childhood socialization, girls are more sedentary than boys from a very early age and physical activity is further reduced during adolescence. Such inactivity is a predictor for sedentary lifestyles in adult women (47) (48).
- Adolescent girls use tobacco as a weight control mechanism more often than teenage boys do, as they are under greater social pressure about their image (49).
- • Women are less awarene of signs and symptoms of CVD than men: only 39% of women recognize heart attack symptoms, compared with 57% of men (50).

2.3.2 Availability of information on gender in the approach to care

CVDs in women remain under-studied, under-recognized, under-diagnosed and under-treated, according to the Lancet's women and cardiovascular disease Commission (51). CVD is the leading cause of mortality for women and was responsible for 35% of all deaths in women globally in 2019 (51). The figures remain unchanged and there continues to be a paucity of sex-segregated data on the different pathologies that fall under the category of cardiovascular disease. In fact, the incidence of ischaemic heart disease in women is thought to be underestimated, but no specific data are available. Moreover, myocardial infarction (MI) is gradually increasing in young women and in women over the age of 65, while the incidence of myocardial infarction with non-obstructive coronary arteries (MINOCA) is rising in women under the age of 60. Furthermore, a study by the Spanish Cardiology Society in collaboration with the Ministry of Health involving 277,281 MI patients (of whom 39% were women) highlighted that the risk of death in women was twice what it was in men (18.7% vs. 9.3%) and that this was partly due to a lower utilization of primary angioplasty in women (52).

Despite growing evidence about the role of sex and gender in cardiovascular health, both health professionals and women themselves continue to be inattentive to or insufficiently educated about CVD risk factors and the development of CVD (53). For example, a review article in the *European Heart Journal* reports how the hormonal changes that women experience throughout their lives have an impact on the risk of their developing CVD (54).

2.3.3. Impact of gender on detection and diagnosis

In general, women with cardiovascular disease are often under-diagnosed and under-treated. On many occasions, women who consult a doctor about chest pain are diagnosed with anxiety or stress, rather than angina pectoris, which may lead to an avoidable future MI (51). It should be noted that chest pain is the main symptom in both genders (around 80%), including in patients under the age of 55 (55), although women have more additional symptoms such as nausea, vomiting

and dizziness, a circumstance that may be interpreted as a different symptomatology in women than in men and may affect their diagnosis (56).

It has been found that, due to their gender roles, women wait longer than men to consult a doctor after the onset of symptoms; it has also been found that the interval between consultation and diagnostic testing is greater for women. Some studies have shown that men are more likely than women to have their cardiac problem correctly diagnosed at the time of medical attention (55).

Analysis of delays in diagnosis must address each of the different levels of care, as there is evidence of how each level of care can contribute to inequality in access, use and quality of care for the same health need, depending on whether the CVD patient is a man or a woman (57). Delayed diagnosis and treatment also have an impact on comorbidity and mortality in women.

The occurrence of heart failure (HF) after an MI is more common in women than in men (58). HF in the context of MI is linked to delayed reperfusion, therefore early diagnosis and treatment is key to preventing its occurrence. Moreover, it is important to note that when women present with new onset heart failure after an MI, they have a higher mortality rate than men, even after adjustment for comorbidities, delay in hospital care, severity of the coronary artery disease and differences in treatment (58). Therefore, regardless of the delay in hospital care, a woman who has had an MI is much more vulnerable than a man to new-onset heart failure.

2.3.4 Gender and choice of treatment

As a result of delayed suspicion of CVD and lesser use of certain related tests, women often receive less, or later, necessary treatment (59). An added obstacle to improving the approach to CVD in women is that male can interfere with results (60).

In all areas of cardiovascular health, there are available clinical practice guidelines that compile the scientific evidence from a multitude of clinical trials, in the interests of efficient application of different treatments in cardiovascular health. The guideline recommendations do not distinguish between genders, and women receive less evidence-based treatment than men (61). For example, women are less likely than men to receive several medications used for secondary prevention after acute coronary syndrome, such as antiplatelet agents, beta-blockers and statins (62). Moreover, men and women show significant differences in body composition, pharmacodynamics and pharmacokinetics and have different hormonal fluctuations (menstrual cycle/pregnancy/menopause) (63) (64) (65). Despite this, women are sometimes under-represented in clinical trials related to cardiovascular health (66).

Therefore, it cannot be assumed that women are like men. Women should also be included in trials. Alternatively, the lack of information on the efficacy and safety of cardiovascular drugs in women could be remedied by post-hoc analyses, retrospective studies, and a review of charts, records or observational studies.

The consumption of medicines for the cardiovascular system is higher in men than in women for all age groups, except in the 0-4 age group, where females consume 66% more, and in the 75 years and older age group (67).

Shortcomings in the treatment of women with CVD have been addressed by various initiatives, especially in the field of ischaemic heart disease, with modest improvements in their care. These gender inequalities, however, are also observed in other pathologies such as heart failure,

sudden death and supraventricular arrhythmias. (41) (68). Decision-making in healthcare may also be biased due to sex differences in the prevalence of certain diseases, given that diagnostic suspicion is lower in the sex that suffers the least from any given disease. Gender differences in age of onset, comorbidity and symptomatology also play a role, as in the case of acute myocardial infarction (AMI) (68) (69).

2.3.5 Relationship between gender and cardiovascular mortality

In 2019, 9,000 more women than men died of cardiovascular disease in Spain. Mortality by sex can vary significantly depending on the specific CVD. The cardiovascular pathology that causes the highest female mortality rate is stroke, a cerebrovascular disease. The second leading cause of death from cardiovascular disease is MI (64).

However, significantly more information is needed to assess the impact on women's CVD mortality of gender inequalities in the approach to care. For example:

- Women with acute coronary syndrome have been and are cared for by less specialized medical teams (they receive less care from regional heart attack care networks), receive less specific treatment (less percutaneous revascularization), and these factors result in higher mortality (52).
- Despite the presence of network systems for ST-elevation myocardial infarction (STEMI), women are less likely to receive a percutaneous coronary intervention (PCI) and they have a higher in-hospital mortality rate than men (52) (71).

2.4 Intermediary health determinants

Structural determinants cause inequalities in intermediary factors, and these in turn generate health inequalities. These factors encompass material resources, psychosocial factors, behavioural and/or biological factors and health services. Material resources have an impact on psychosocial processes such as lack of control, lack of social support, and stressful situations, as well as on individual behaviours which, together with each person's biological determinants, have an impact on their health.

Finally, while health services are considered to contribute very little to the existence of health inequalities, their accessibility and quality can have an impact on the health and well-being problems of the most disadvantaged (34).

2.4.1 Material resources

Material resources refer to employment conditions (employment status, precariousness) and work (physical and ergonomic risks, organization, and psychosocial environment), the unpaid workload (care of the home and household), income level and economic and wealth status, the quality of housing and related facilities, and the neighbourhood or area of residence and its characteristics (33).

The environment in which people live refers to the municipalities or neighbourhoods in which they live, to their families, and to their social and community networks. Access to healthy products, the characteristics of housing, neighbourhoods, access to green areas for outdoor exercise, safety in the streets, the social and family environment, all contribute to people's ability to lead healthy lifestyles, and therefore to the prevention or development of diseases, including cardiovascular diseases.

These factors are not evenly distributed among the population, a fact which produces and reinforces inequalities, affecting both the prevalence of diseases and the capacity, skills and tools to protect against them. People's living environments have significant impacts, both positive and negative, on their cardiovascular health (72) (73) (74). Exposure to high levels of air pollution reduces life expectancy and increases overall mortality, as well as mortality from cardiovascular diseases (5). In Europe, this decrease in life expectancy is of 2.2 years on average, with an annual mortality rate of 133 people per 100,000, of which 40-80% are due to cardiovascular events (68). In Spain, environmental pollution causes 2,700 deaths per year due to cardiovascular disease (69). There are numerous examples of this association (70): e.g., a correlation has been shown between proximity to green spaces and a lower prevalence of certain CVRFs (hypercholesterolaemia, high blood pressure and diabetes) (71). Temperature extremes, due both to excessive cold and heat, are also associated with CVD mortality (72).

Another important factor in the framework of material resources are e-health technologies. These technologies are used for a variety of health-related purposes. For example, telemedicine has great potential within health services for use in medical consultations, clinical diagnosis and other forms of medical care offered remotely and has been boosted by the COVID-19 pandemic. The Ministry of Health is working on a National Health System Digital Health Strategy.

It is important to assess how the incorporation and roll-out of this technology is being carried out in the public health system, to ensure that it does not generate health inequalities because of difficulties in accessing and using it due to people's socio-economic situations (80).

For patients, digital technologies are a means of empowerment through the use of devices such as smartphones and their applications for disease management and access to information made possible by the Internet and different digital media. In recent years, there has been a general increase in the use of information and communication technology (ICT) among the population. Despite this, there are still inequalities in the use of ICT due to age, place of residence, level of education, employment, nationality, or income level, with women being more frequent users of technology for health-related purposes (80).

The digital divide causes greater social vulnerability, but also epidemiological vulnerability in individuals, as was seen during the COVID-19 pandemic. The factors that have the greatest impact on the digital divide are largely the same as those that make up the social determinants of health. Thus, exclusion from or difficulties in accessing digital technologies can increase social inequalities in health and increase social polarization (80).

2.4.2 Psychosocial factors

Poor psychosocial well-being also constitutes a CVRF, allowing for the prediction of poorer cardiovascular health and more adverse clinical outcomes in CVD. In addition, there is a high likelihood of psychosocial factors being linked to the level of cardiovascular risk; for example, there is

a link between psychosocial factors and tobacco use and the amount of physical exercise a person undertakes. Psychosocial aspects that are associated with CVD risk factors can be classified into three categories (16) (81):

1) Negative emotional states, such as depression, anxiety, anger and restlessness

Depression, anxiety, anger and hostility, and stress (acute and chronic) are factors that increase the risk of CVD. Recommendations now include standardized screening for depression and the establishment of a treatment plan in patients with cardiac pathologies. A dose-response relationship is considered to exist between depression and cardiovascular events, such that the higher the level of depression, the higher the cardiovascular risk. Anxiety is associated with increased cardiac mortality, especially in the most severe cases of CVD. The influence of stress on cardiovascular risk depends on the presence of acute stressors or stress triggers, and chronic stress. Acute stress affects cardiovascular physiology by increasing the risk of arrhythmia, myocardial ischaemia and myocardial infarction. Acute stress variables may refer to catastrophic events such as wars or earthquakes), highly competitive sporting events or intense physical activity.

Chronic stress, however, seems to influence CVD through chronic physiological alterations, and is linked to, work-related stress, marital problems, long-term caregiving, neighbourhood issues and economic status.

2) Personality traits

Certain personality traits are also associated with an increased risk of CVD, particularly those linked to Type A personalities (characterized by intense ambition, competitiveness, time urgency and hostility) and Type D personalities (combining a negative affective state with social inhibition). One of the elements characterizing Type A personalities, hostility, is a significant predictor of CVD risk. In the case of Type D personalities, the combination of highly negative emotions and significant social withdrawal has been linked to an almost two-fold increase in the risk of adverse cardiac outcomes in people with ischaemic heart disease.

3) Social variables

CVD risk may also be modified by a person's social variables. For example, social support acts as a protective buffer against negative life events. Thus, low social support is associated with a 1.5 to 2-fold increase in CVD risk in both healthy individuals and those with cardiac disease (16).

2.4.3 Health services

One of the most significant determinants of health status is the accessibility, availability and quality of health service facilities and resources. Healthcare can mitigate the impact of other determinants linked to health inequalities. Thus, health services must mitigate the effect of the so-called "inverse care law", which states that the availability of quality health services tends to vary in inverse proportion to the needs of the population served (34).

In the cardiovascular field, one of the positive examples with the greatest impact has been the development of acute myocardial infarction (AMI) care networks. In Spain, all public health administrations have implemented AMI care networks, which allow patients with suspected AMI to be appropriately cared for from the pre-hospital phase. The implementation of these networks has increased accessibility and equity in healthcare, improving health outcomes by favouring early patient care and increasing reperfusion rates, reducing the size of infarctions and the likelihood of developing heart failure, and improving patient prognosis, reducing mortality in the acute phase (82).

Health organizations also play an important role in promoting and coordinating policies for action on social determinants, thus having an impact on other factors that influence the health status of the population they serve (32). Health services promote initiatives with a high impact on cardiovascular health, such as screening and comprehensive lifestyle advice —mainly in primary care (83)— training health professionals in health promotion and disease prevention (84) and promoting programmes that incorporate and take advantage of community health resources (85).

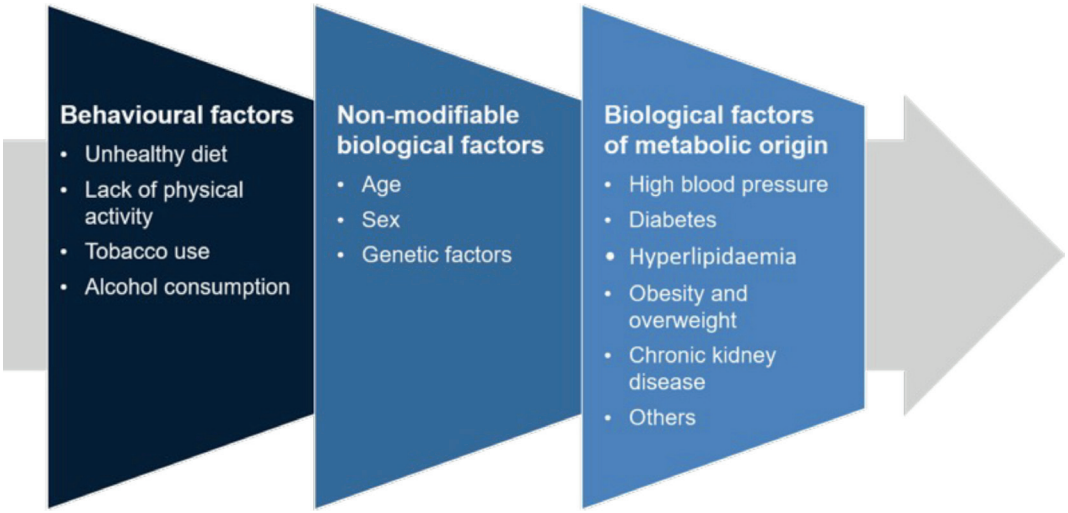
2.5 Cardiovascular risk factors

Biological and lifestyle-related risk factors (Figure 11) are the traits and characteristics of and exposure experienced by an individual that increase their likelihood of suffering from a particular disease (7). Such risk factors can be innate or acquired and in the case of CVDs they are also referred to as cardiovascular risk factors (CVRFs). They can be classified as metabolic (86), lifestyle-related, or as linked to living conditions or social determinants of health. The American Heart Association (AHA) has identified seven risk factors (*Life's Simple 7*) which, if maintained at stable and controlled values through the adoption of healthy lifestyles, contribute to achieving optimal cardiovascular health. The Simple 7 are not smoking, maintaining a normal BMI, engaging in sufficient physical activity, following a balanced diet, and maintaining total cholesterol at <200 mg/dL, blood pressure at <120/80 mm Hg and fasting blood glucose levels at <100 mg/dL (87).

It has been observed that acting with respect to the main CVRFs can prevent three out of every four CVDs and prevent the appearance of new episodes in patients that have suffered an acute cardiovascular event (88). Despite this evidence, the prevalence of metabolic CVRFs (diabetes, high blood pressure, high cholesterol and obesity, among others) is increasing in Spain due to multiple factors including population ageing (89).

Although traditionally the term CVRFs has been used to refer to risk factors related to CVDs of atherothrombotic origin (primarily coronary disease, cerebrovascular disease and peripheral vascular disease), specific risk factors exist for other types of CVD, such as kidney disease, alcohol consumption and anaemia for heart failure; thyroid alterations, alcohol consumption and pulmonary diseases for atrial arrhythmias; and high blood pressure, kidney disease and high cholesterol for valvular heart disease (90) (91) (92) (93) (94) (95) (96) (97). It is important to highlight that there is evidence of significant inequalities in the prevalence of behavioural/lifestylerelated CVRFs (such as lack of physical activity) (98) (99) and in biological CVRFs and their monitoring (100). Said inequalities relate to the structural conditions in which people live and grow, and encompass socio-economic, cultural, educational, occupational and gender-related aspects.

Figure 11. Classification of behavioural and biological risk factors



Source: Ministry of Health

The National Health System's Interterritorial Council's 2013 National Health System's Health Promotion and Disease Prevention Strategy (101) is part of the strategy to address chronicity in the National Health System (102) and its general aim is to promote the health and well-being of the population by promoting healthy environments and lifestyles.

The CVHS is aligned with the goals of the above Strategy, which addresses the leading risk factors from the viewpoint of chronicity and environment (healthcare, education, community) with a life-long perspective.

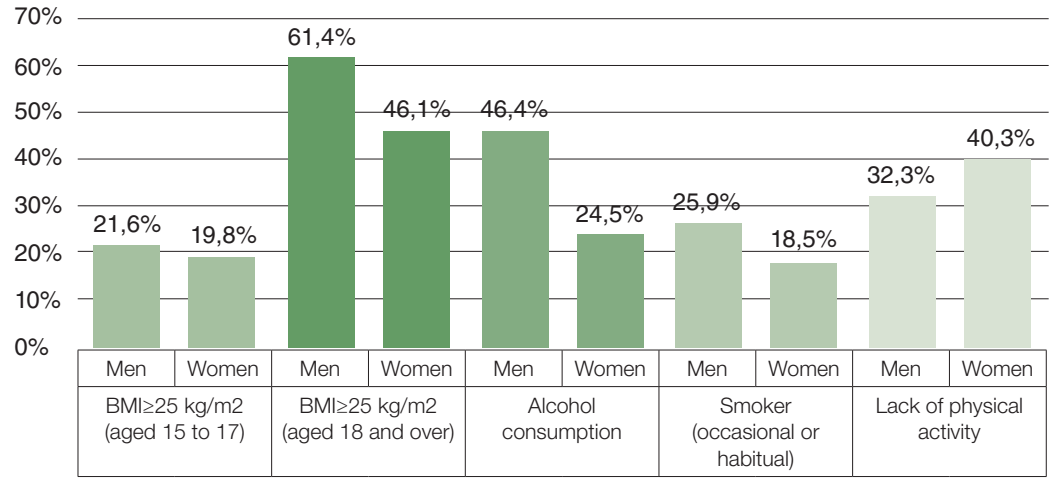
2.5.1 Lifestyle-related risk factors

Lifestyle-related risk factors include unhealthy diet, physical inactivity, and consumption of tobacco and alcohol (Figure 12). These factors are preventable, both by the health and educational authorities —primarily through public policies that improvement individual and collective opportunities— and by individuals themselves through the adoption of healthy lifestyles and active involvement in managing their own health and diseases.

- **Unhealthy diet**

An unhealthy diet can trigger health problems that lead to an increase in cardiovascular risk. A high calorie diet with high contents of saturated fats, sugar and salt can lead to the appearance and development of diseases that are considered cardiovascular risk factors, such as diabetes, high blood pressure, high cholesterol and obesity (7). In Spain, in 2020, 28.8% of women and 36.1% of men stated that they did not eat fresh fruit daily and 48.1% of women and 59.1% of men stated that they did not eat salad or vegetables daily either (103).

Figure 12. Percentage of population with lifestyle-related risk factors, by sex



Source: European Health Survey in Spain (EESE), INE, 2020

- Physical activity

32.4% of men and 40.3% of women report that they are not physically active (96). This difference is most notable among young people and middle-aged people, as well as in the oldest age groups.

Moreover, 35.3% of the Spanish population aged between 15 and 69 years does not engage in the amount of healthy physical activity recommended by the WHO (104) or by the Ministry of Health (48). This contributes to the development of other CVRFs such as high levels of cholesterol, obesity, diabetes and high blood pressure. Thus, the less physically active a person is, the greater the probability of their suffering from a CVD (105).

On the contrary, becoming more physically active generates beneficial effects, such as a lower risk of developing a CVD or type 2 diabetes and protection against several CVRFs, such as high blood pressure or obesity (48). Doing more physical exercise helps to reduce the long-term risk associated with a sedentary lifestyle, provided that the exercise is done regularly and is of at least moderate intensity (7).

- Tobacco use

Tobacco use is the principal cause of premature cardiovascular morbidity and mortality, and it is estimated that in 2017 between 21.8% and 30.3% of the deaths attributable to tobacco (in absolute numbers) were caused by CVD. In 2017, tobacco caused 53,825 deaths in Spain among the over-35s, representing 12.9% of the total mortality rate (106).

Thus, active consumption of tobacco ranks as one of the main avoidable causes of death (107) and generates a high healthcare and social cost (108) (109), with tobacco use being more prevalent among the least privileged social groups, and therefore a source of inequity (108). Passive exposure to tobacco smoke also increases cardiovascular risk (110).

Over the past few decades, tobacco use in the population has declined more dramatically in men than in women (109). However, as regards young people aged between 14 and 18, the

most recent Survey on the Use of Drugs in Secondary Schools in Spain (ESTUDES) (covering the 2018/19 period) reflected that 38.2% of the boys and 44.3% of the girls surveyed had consumed tobacco during the previous 12 months and that the average age at which they began using tobacco was at around 14. 26.7% of students smoked tobacco during the 30-day period prior to the date of the survey, with approximately one third of them, 9.8%, reporting daily consumption (9.4% of the boys, 10.3% of the girls), up one percentage point on the 2016 figure (111).

- **Alcohol consumption**

Alcohol consumption has been associated in the past with certain benefits for cardiovascular health. For example, some studies reported that "moderate" consumption of alcohol reduced the risk of cardiovascular mortality or acute myocardial infarction (112) (113) (114) (115) (116) (117) (118) (119), probably due to its capacity to raise an individual's levels of HDL cholesterol and due to the polyphenol content of certain types of drinks produced using a fermentation process (120) (121).

However, the harmful effects of alcohol on multiple aspects of health, including both cardiovascular health (intensive consumption increases the risk of heart attack and consumption of 30 g/day increases the risk of cardiovascular diseases such as high blood pressure, atrial fibrillation, alcoholic cardiomyopathy and heart failure) (122), and non-cardiovascular health (cancer, liver or pancreatic damage and malnutrition), significantly exceed any hypothetical benefits (123). Thus, any possible cardiovascular benefit derived from consuming alcohol is insufficient to offset the potential fatality of the set of diseases associated with its consumption and it must therefore be considered a risk factor. In fact, it is the leading attributable cause of death in the world among people aged between 25 and 49 (124).

In Spain, alcohol consumption is the 4th leading risk factor for disability-adjusted life years (DALYs), ranking 2nd in women and 5th in men (125). In addition, it caused 15,489 deaths per year from 2010 to 2017 (with men accounting for 74% of these deaths) (126). Alcohol is the most highly consumed psychoactive substance in Spain, with the lowest perceived risk (127) (128). 14.2% of men and 3.4% of women affirm that they consume alcohol daily. The average age at which young people start to drink is 14 for both sexes (111), with consumption becoming more prevalent as age increases, irrespective of the person's sex (128).

Most people are subject to more than one CVRF, and these risk factors interact with each other. The effect of simultaneous exposure to several CVRFs is greater than would be expected based on their simple summation and it would therefore not make sense to address each one of them independently. Moreover, lifestyles are influenced by living conditions and by social determinants of health.

For these reasons, it is essential to adopt a comprehensive (bio-psychosocial) approach, accounting for everyone's specific circumstances, as proposed in the document on Comprehensive Lifestyle Advice to be provided by Primary Care professionals, linked to community resources for the adult population (83). Addressing any of the risk factors will help to reduce other factors withe common determinants. The most accessible care level for this approach is primary care, although the intervention may be performed at any level of care. Moreover, the incorporation of community resources enables synergies between interventions carried out in primary care at the level of individual or group advice or intervention and broader interventions at population level. Health resources maps, of which there are several examples (such as the

LOCALIZA SALUD map (80) available on the Ministry of Health's website), are useful for this. The ideal option is an approach focused on intervention prior to contact with the health system, by educating the population in healthy habits and the risks of consuming harmful substances.

2.5.2 Non-modifiable biological risk factors

The non-modifiable risk factors to be considered in the prevention of CVDs include age, sex and genetic inheritance.

- **Age**

Age is the most significant CVRF. The incidence and prevalence of most CVDs grow exponentially with age. This is the case with ischaemic heart disease (also known as ischaemic heart disease), heart failure, atrial fibrillation, sudden death and some types of valvular heart disease, especially aortic stenosis (AoS), which is currently the most prevalent. Approximately 58% of people diagnosed with a circulatory system disease are 65 years old or older, and 63.3% of this latter group have at least two CVRFs.

In the case of valvular heart disease, the prevalence amounts to 12% in people aged over 75 (129). This factor, in the context of a society that is facing an accelerated ageing process because it has one of the highest average life expectancies in Europe (10) (11) and its birth rate has fallen (12), represents a major challenge for the global approach to cardiovascular health in our country.

- **Sex**[3]

Sex is a significant factor in the development of CVDs, which appear earlier in men, by an average difference of 6-10 years. However, the distribution and impact of modifiable CVRFs is similar in men and women (130). In fact, CVDs, and above all cerebrovascular disease and ischaemic heart disease, are the leading cause of death in women (68).

Being a woman constitutes a protection against atherosclerotic disease in general, and coronary disease in particular, as it appears in women later than in men and therefore, as a group, men have greater cardiovascular risk than women. This advantage lessens progressively with age, with the difference between the sexes reducing after menopause. At this stage of life, people have higher lipid levels and are at a greater risk of obesity and high blood pressure. Consequently, greater emphasis should be placed on promoting exercise and healthy eating. Furthermore, certain CVRFs are exclusive to women, such as early menopause (whether natural or induced), the use of oral contraceptives, prolonged exposure to endogenous oestrogens, polycystic ovary syndrome, gestational diabetes and pregnancy-related high blood pressure disorders, which must be addressed specifically (7) (68). Furthermore, pre-term birth also constitutes a risk factor for developing CVD as it entails placental insufficiency, indicating endothelial dysfunction (131). Finally, the increased CV risk due to the hormone therapy received by trans-gender women should also be highlighted (132).

[3] Some factors attributable to sex may be conditioned by the interaction between sex and gender.

- **Genetic factors**

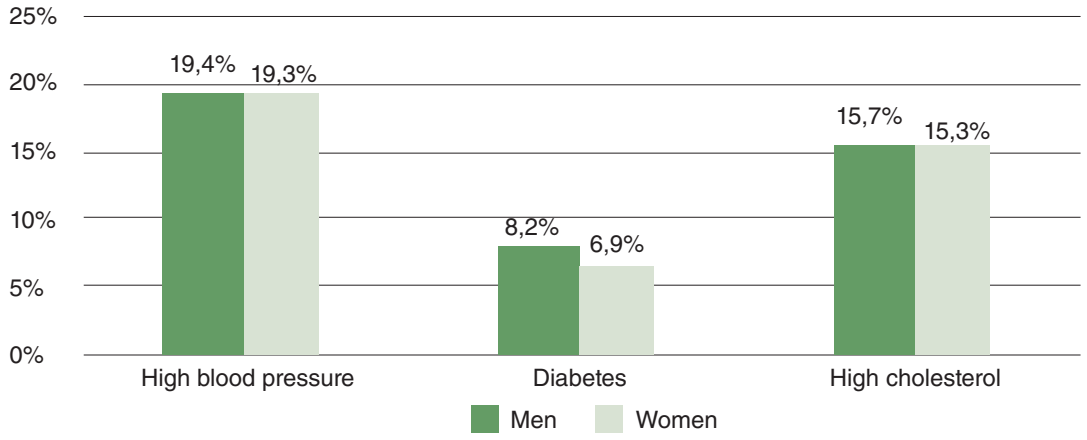
In recent years, genetics have been accorded greater significance as a predisposing factor for most CVDs, such as familial high cholesterol (133), although not necessarily in its presentation or development. High blood pressure and ischaemic heart disease, for example, have a multi-factor origin. The genetic factor predisposes but does not on its own explain the disease in the absence of other environmental modifying factors or the coexistence of other CVRFs (134).

Genetic factors have been identified for other CVDs, such as dilated cardiomyopathy, peripartum and other inherited cardiomyopathies and some types of arrhythmia, among others. Although this field is developing rapidly, knowledge regarding the role of genetics in other CVDs is still limited and is frequently deduced indirectly from family histories.

2.5.3 Biological risk factors of metabolic origin

Following a healthy lifestyle and living in a healthy environment prevents the appearance of cardiovascular diseases. According to the WHO, metabolic risk factors can be considered "intermediate risk factors", and are manifestations of modifiable risk factors, related to lifestyle. These intermediate risk factors are important because they indicate a greater risk of CVD and can be detected in primary care. Moreover, like those related to lifestyle, they are preventable. The prevalence of CVDs at population level is conditioned by the prevalence among the population of CVRFs which, in turn, are related to lifestyle. The Global Burden of Disease 2020 estimates that in 2019 cardiovascular deaths were more frequently attributed to metabolic CVRFs than to lifestylerelated CVRFs (1).

Figure 13. Self-reported prevalence of the main metabolic cardiovascular risk factors of cardiovascular diseases in Spain, 2020



Source: European Health Survey in Spain (EESE) 2020, INE, 2020[4]

[4] It should be underscored that the data provided by the National Health Survey, as well as by all those sources based on surveys, enable the monitoring of trends and, to a certain extent, assessment of the effect of the initiatives implemented; however, they are less useful in assessing the magnitude of the factors whose measurement requires physical examination or laboratory determinations.

- **High blood pressure**

It is estimated that high systolic blood pressure is the leading cause of attributable mortality in the world, both in women and in men, having resulted in 10.8 million deaths (19.2% of all deaths) in 2019 (135), in addition to being the second leading CVRF (after tobacco) responsible for loss of health, because it causes the highest number of premature deaths and years lived with disability (136).

The prevalence of high blood pressure increases with age and can lead to secondary symptoms at the systemic level, with effects at the cerebrovascular, renal and cardiac levels, among others (7). The recorded prevalence of high blood pressure in 2016 was 16.5% of the population, being somewhat higher in women (17.3%) than in men (15.7%) (136). However, a cross-cutting study carried out among adults in Spain estimates a prevalence of 42.6%, higher in men (49.9%) than in women (37.1%) and in people with pre-diabetes (67.9%) or diabetes (79.4%). Under-diagnosis is especially high among 18-30 year olds and 31-45 year-olds; it is estimated that 84.1% and 65.9%, respectively, of high blood pressure patients in these age groups have yet to be diagnosed (137).

88.3% of people diagnosed with high blood pressure received pharmacological treatment, but the high blood pressure was only properly controlled in 30.0% of them (137). It has been demonstrated that achieving a high blood pressure control rate of 90% decreases the rate of myocardial infarction by 24% and deaths due to stroke by 42% (138) (139).

- **Diabetes mellitus**

Diabetes mellitus (hereinafter, diabetes) has become the world's 8th leading cause of disability-adjusted life years (DALYs), and the 3rd leading cause in people aged between 50 and 74, after ischaemic heart disease and cerebrovascular disease (140). In Spain, it is estimated that diabetes accounts for 4.15% of DALYs, with a similar distribution in both sexes, and for 2.36% of total deaths (2.81% in women and 1.91% in men) (1). In addition, increased blood glucose levels, even in individuals who do not go on to develop diabetes, also represents a high risk of atherosclerosis and is usually associated with obesity (7) (141).

In general, people with type 2 diabetes are considered at high risk of developing a cardiovascular disease (7), with between 14.7% and 17% of such patients developing a CVD within 10 years, and between 10.5% and 19.8% of them suffering from cardiovascular complications (134). Diabetes predisposes sufferers to the early appearance of CVD —20-30 years earlier in women and 15-20 years earlier in men (135)—. Deaths due to myocardial infarction in diabetic patients are more numerous than in the general population: diabetic women are twice as likely to die from myocardial infarction as non-diabetic women (144) (145).

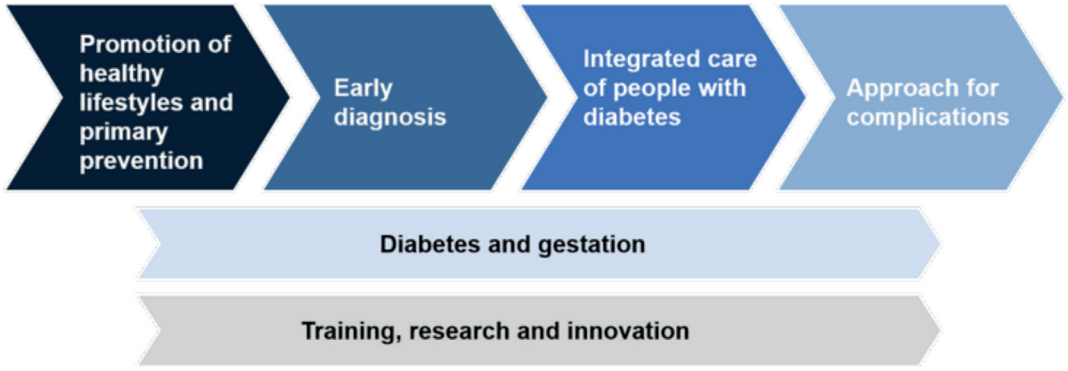
High fasting blood glucose levels constitute the metabolic CVRF that is increasing most rapidly at global level and in Spain (124). Over the past 25 years, the prevalence of the disease has quadrupled (146). The recorded prevalence of diabetes among primary care patients in Spain was 7.6% in 2019 (147). Moreover, 12% of the population has been diagnosed with pre-diabetes and it is estimated that 6% suffers from diabetes without being aware of it (148). The prevalence of diabetes has been steadily increasing in Spain. Since 1987, the age-adjusted prevalence of diabetes has increased from 4.2% to 7.1% (149).

Although the mortality rate due to diabetes has fallen over the past few decades (150), in the past few years Spain has seen the total number of hospitalizations of diabetic patients more

than double, with heart failure being the most frequent cause of hospitalization (151) and atrial fibrillation the most frequent among diabetic women (152).

Control of diabetes in the Spanish population could be improved upon, with a significant proportion of patients failing to reach the recommended goals (153). It is important to highlight that control of diabetes and of the other CVRFs observed in Spain is worse in women with diabetes in comparison with men (154) (155). In response, the National Health System's Diabetes Strategy (142) includes several action lines establishing minimum goals for slowing down and reversing the trend in the incidence of diabetes in Spain, improving patients' life expectancies and quality of life and reducing the number of deaths caused by diabetes. These action lines are aligned with those of the CVHS (Figure 14).

Figure 14. Strategic lines of actionaction lines of the National Health System's Diabetes Strategy



Source: National Health System's Diabetes Strategy. Update. Ministry of Health, Social Services and Equality. 2012

Despite the number of years that this Strategy has been in place —since 2006 with an update in 2012— it has not succeeded in reversing the prevalence of diabetes and efforts to follow the recommendations and to achieve the defined goals continue to be necessary (146).

- Hyperlipidaemia

According to the reported prevalence, high cholesterol affects 15.5% of the Spanish population aged 15 or above (103). The cardiovascular risk associated with altered lipid levels (essentially cholesterol and triglycerides) is multiplied if it coexists with other CVRFs, such as high blood pressure or tobacco use (7). A review published in 2015 reported a prevalence of high cholesterol of between 40% and 58% among Spanish patients admitted to hospital with acute coronary syndrome, and of between 40% and 72% among patients with chronic ischaemic heart disease (156). The cholesterol thresholds considered acceptable by scientific societies have been steadily falling, increasing the prevalence of high cholesterol, especially in cases of high risk. In 2016, 70.6% of patients with acute coronary syndrome presented LDL cholesterol values more than 100 mg/dL (136) or had cholesterol levels above those recommended (157). Studies monitoring lipids in patients with coronary disease have revealed lower than recommended levels —a factor that is associated with a worse prognosis in the medium and long term (158) (159) (160)—.

- **Obesity and overweight**

More than 60% of the Spanish adult population is overweight or obese. The cause appears to be related to a lack of physical exercise and to a failure to follow the Mediterranean diet, above all in those social groups with the lowest levels of education (161) (162).

Between 1987 and 2020, the prevalence of obesity in adults increased from 7.4% to 16.0% (16.5% in men and 15.5% in women) (103). The incidence of obesity increases with age, affecting 21.0% of people aged over 65, a group in which women have a greater prevalence of obesity than men (103). In fact, the prevalence of overweight, obesity and morbid obesity is steadily increasing in Spain, above all among males (149).

Excess weight is also a problem among children: in 2019, 40.6% of children in Spain aged 6 to 9 had excess weight, and 17.3% of this group of children was obese, according to data from the ALADINO study. This has a serious impact on short-and long-term health, it affects these children's quality of life, and is related to low self-esteem, with all the associated consequences for children: rejection, academic failure and exclusion (163).

- **Chronic kidney disease**

In patients with chronic kidney disease, CVD is the leading cause of morbidity and mortality (148) (164); this group of patients frequently has other CVRFs. In Spain, in 2018 the prevalence of chronic kidney disease was 15.1%, being more frequent in men (23.1%) than in women (7.3%) (165). The frequency of this disease increases with age and in individuals with a prior CVD (14.6% vs. 3.8% in subjects without a CVD).

- **Other health conditions**

Frailty is defined as a progressive, age-related deterioration of physiological systems that results in a decrease in a person's functional ability and intrinsic capacity, making them more vulnerable to stress factors and increasing the risk of adverse health outcomes (166) (167).

Frailty is associated with multivessel coronary artery disease (168) and is a relevant prognostic factor in patients with CVD. Its evaluation and approach can be a determinant for adverse outcomes in patients with cardiovascular disease (169). Due to its implications for cardiovascular health, its prevention, early detection and specific interventions, especially multicomponent physical exercise, are crucial (170).

Evaluating frailty has become a key aspect for assessing a patient's potential response to treatment, their recovery capacity, or the futility of pursuing a particular course of treatment or approach in this era in which invasive cardiovascular interventions (percutaneous interventions, cardiac surgery, implantation of cardiac devices, circulatory support systems, etc.) have increased exponentially in octogenarian and nonagenarian patients.

2.6 Psychological, social and economic impact of cardiovascular diseases

CVDs are one of the main causes of disability-adjusted life years. Ischaemic heart disease was the leading cause of DALYs in Spain in 2019 (5.7% of the total) (1). Myocardial infarction is

also associated with a worse perception of the patient's health, primarily in women (171). CVDs are also a major cause of disability. In addition to the physical impact, patients are affected at the psychological, employment-related, social and economic levels.

Managing the psychological consequences of disease is important not only because such impacts constitute health problems in themselves, but also because they worsen the physical symptoms of the disease. Patients with CVD can suffer significant regressions in their baseline social situation secondary to losses in functionality and increased dependence, which can harm their general well-being (172).

Moreover, CVDs have a significant impact on people's working lives, with a deterioration in functional ability due to their health, which leads to absenteeism and disability, whether temporary or permanent. The increase in morbidity and premature mortality lowers productivity (13). These diseases also have a major economic impact, both in direct and in indirect terms. This impact represents a considerable proportion of Gross Domestic Product (GDP) and the economic costs associated with CVDs are rising.

The prejudicial socio-economic impacts of CVDs may act as a determinant of inequality, which is related to or interacts with other, pre-existing determinants. The negative socio-economic impacts of these diseases can have a particularly intense effect on people with a low socio-economic level or who belong to underprivileged social groups, such as older people living alone, migrants with few resources, or women with heavy burdens of care, among others.

2.6.1 Morbidity of cardiovascular diseases

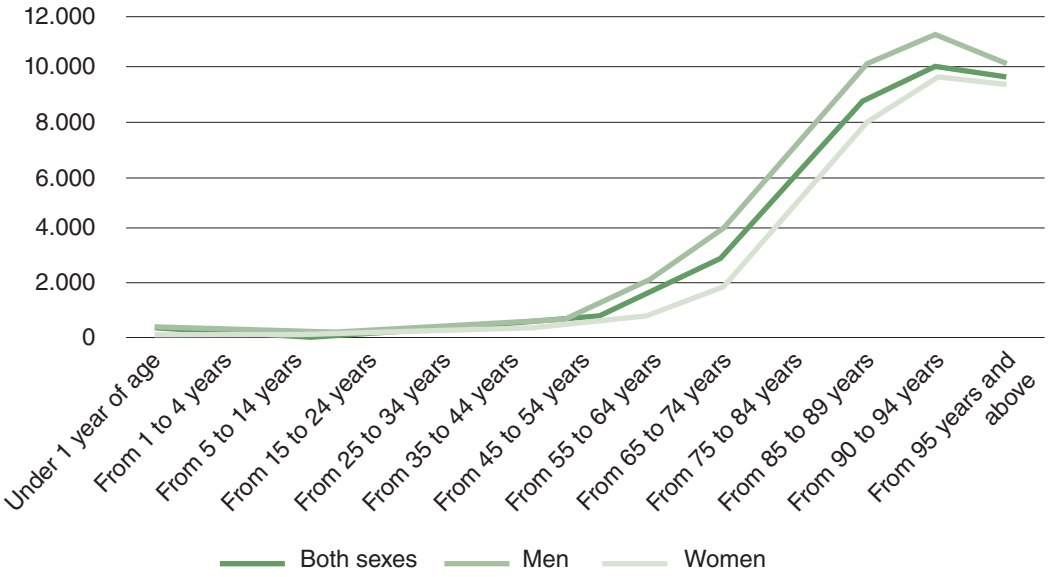
The burden of disease in Spain has increased over the past few decades due to the accelerated ageing of the population (173). In 2016, 34% of the Spanish population had at least one chronic disease, primarily among the over-65s (77.6% of this group) (136), with chronic circulatory system diseases accounting for 15.3% of the total (174).

In Spain, CVDs constitute one of the biggest health problems, with an estimated prevalence of 9.8% in the entire population in 2019, and an annual incidence of 1 new case per 100 people, equal to 457,183 new cases per year (1). 38.3% of over-70s (39.5% of men and 37.5% of women) have been diagnosed with a CVD. Ischaemic heart disease is the most common CVD among men (18.0%), and peripheral arterial disease among women (19.6%) (1). Cardiovascular disease has a distribution that is highly concentrated in the later stages of life, with the tipping point at 60 years of age (Figure 15).

According to the 2019 Hospital Morbidity Survey, published by the INE, the number of hospital admissions related to circulatory system diseases was 614,302, which represents 12.6% of total hospital admissions. This figure makes circulatory system diseases the leading cause of hospital admission, followed by digestive system diseases and respiratory system diseases, respectively (12.4% and 12.3%) (3).

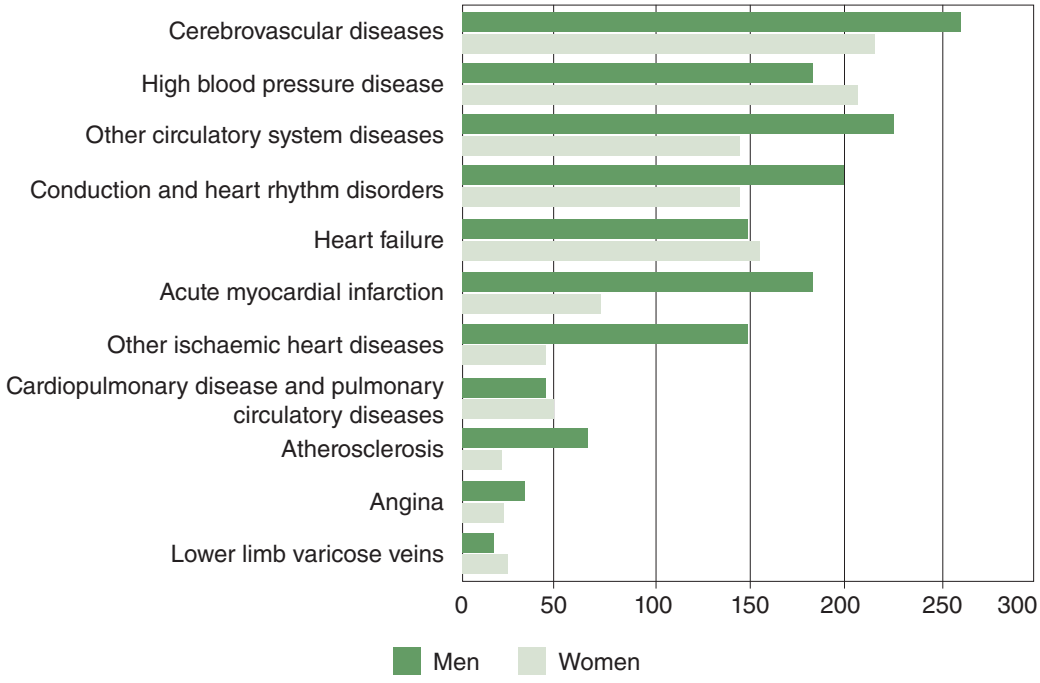
The pressure on the healthcare system due to CVDs and their associated mortality can be estimated from healthcare information systems. In 2015, 448,572 hospitalizations for circulatory system diseases and disorders were recorded in the Minimum Basic Data Set (MBDS). In 2017, a decrease of 2.3% was observed in the admissions reported through the MBDS due to this cause (175). Other sources, such as the 2019 Hospital Morbidity Survey, estimate the hospital morbidity rate associated with circulatory system diseases at 1,304 out of every 100,000

Figure 15. Hospital morbidity rate per 100,000 inhabitants for circulatory system diseases



Source: 2019 Hospital Morbidity Survey. INE

Figure 16. Hospital morbidity rate per 100,000 inhabitants by type of cardiovascular disease



Source: 2019 Hospital Morbidity Survey. INE

inhabitants —1,512 in men compared with 1,104 in women. This ratio is inverted in the case of high blood pressure— 207 in women compared with 182 in men —and heart failure— 155 women compared with 149 men (3). The average stay of patients with circulatory system diseases recorded in the MBDS shows an upward trend, from 8.08 days in 2016 to 8.16 days in 2019 (175).

The hospital morbidity rate associated with acute conditions is 126 hospitalizations per 100,000 inhabitants due to myocardial infarction (183 in men compared with 72 in women), 173 for conduction and heart rhythm disorders (199 compared with 147) and 28 out of every 100,000 inhabitants for angina (34 compared with 22) (3).

In 2018, 2,207,918 hospital stays due to CVD were recorded in men and 1,710,250 in women[5]. In 2019, stays changed-0.2% and +1.6%, respectively (3) (176). In specialized care (hospitals and specialist centres) 1,331,626 first consultations were made (36.6% of the total cardiology consultations), resulting in an increase of 4.6% in 2019 (175). Of the 287,734,329 consultations recorded in the Primary Care Clinical Database (Spanish acronym: BDCAP), 22,138,889 (7.7%) were associated with CVD as the reason for the consultation (137).

As regards the impact of acute events related to the most significant cardiovascular health problems addressed in the CVHS, it is estimated that one in every four adults in Europe will suffer from atrial fibrillation (AF) (94). Approximately 30% of patients with AF are admitted to hospital at least once a year and 10% at least twice a year, which represents twice the probability of hospitalization as the population without AF (169). The direct cost of AF amounts to 1% of total healthcare expenditure (87).

2.6.2 Disability and mortality caused by cardiovascular disease

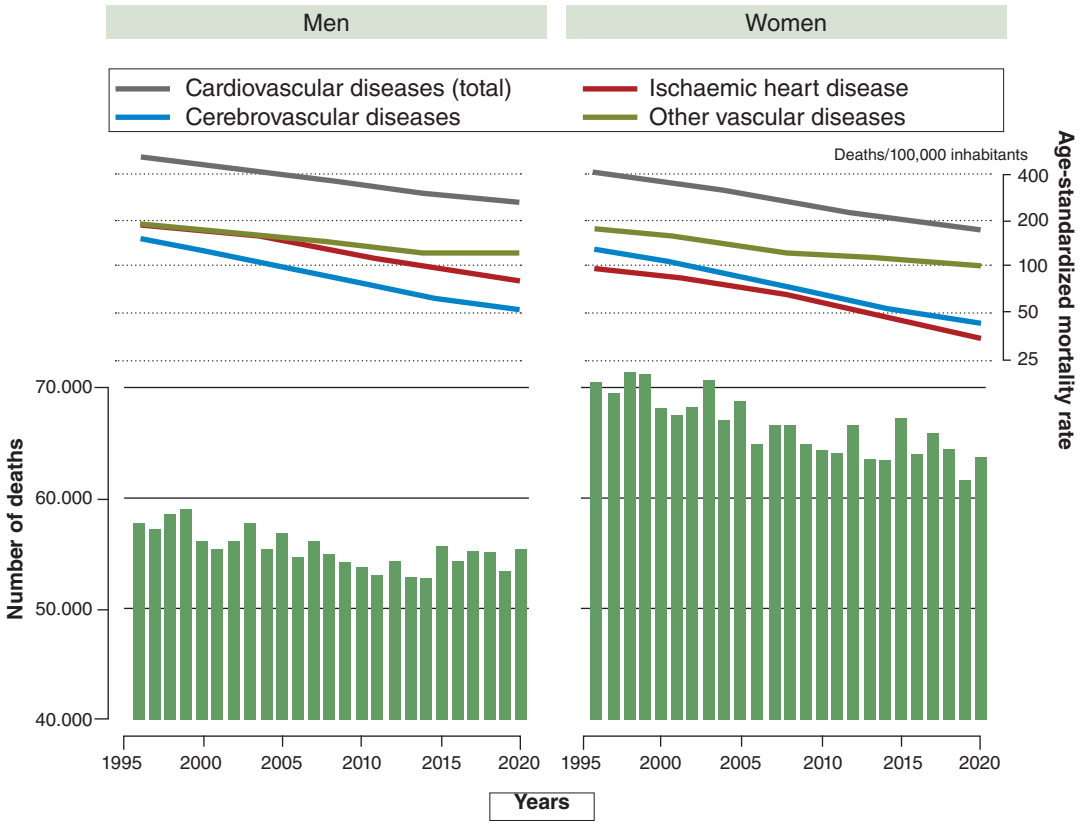
CVDs represent the 3rd leading cause of burden of disease, accounting for 12.5% of total DALYs. In 2006, 602,000 DALYs were caused by CVD; of this figure, 84% are due to years of life lost due to premature mortality and the remaining 16% represent years lived with disability or poor health (178). The DALY rate in 2019 in Spain was estimated at 3,986 per 100,000 inhabitants, of whom 14.56% had a CVD (15.35% in men and 13.75% in women) (1).

Moreover, CVDs are the leading cause of death, ahead of cancer and respiratory diseases (2). In Spain, there are approximately 120,000 annual deaths from CVDs —approximately one out of every 4 deaths in men and one out of every 3 in women— with significant differences in the average age of death, at 78 and 84 years, respectively. Among them, ischaemic heart diseaseischaemic heart disease (IHD) is the leading cause of death in men, but in women it is cerebrovascular disease (1). Almost three quarters of deaths from CVD (72.2%, 88,376) occur in patients over the age of 80.

Spanish age-standardized cardiovascular mortality rates are among the lowest on the continent, in addition to presenting a steady annual decrease of approximately 3.5% for both sexes, with the decline in ischaemic heart disease being faster in men than in women (5.0% compared with 3.8%, respectively) (Figure 17) (179). However, this decrease appears to be slowing down and may even have stopped altogether in men (75).

[5] Cerebrovascular diseases are not included.

Figure 17. Trends in the absolute number of deaths and mortality rates per cardiovascular disease in Spain, by sex



Source: Update of Bueno H, Pérez-Gómez B. Circulation 2019;140:13--15

It should be noted that most avoidable deaths are due to coronary disease and do not take place in a hospital environment (178).

2.6.3 Psychosocial impact on the patient and on their immediate social circle

The psychological alterations associated with CVD are common and significant because they have a prognostic impact, being associated with worse outcomes, not only in terms of psychological symptoms and quality of life, but also in terms of health outcomes, such as mortality (180). The prevalence of depressive symptoms in patients with coronary disease and with heart failure in Spain is high and is associated with a higher mortality rate.

Among myocardial infarction sufferers, the proportion of young women who report depressive symptoms and a need for treatment of depression following their heart attack is higher than that of men (181) (182). The proportion of patients who report experiencing stress after an acute

myocardial infarction is also significant and always greater in women than in men (183) (184).

CVDs have an impact on all aspects of health, including patients' sex lives. A study carried out in Spain and in the United States in young AMI patients revealed a high prevalence of sexual disorders at one month and at one year of having suffered the heart attack. In addition, the study found that the information provided by health professionals was inadequate, whether because it was not provided at all or contained erroneous recommendations. All these problems were more prevalent in women than in men (185) (186).

For these reasons, the integration of psychologists to address the psychological impacts of CVDs must be considered in the development of multidisciplinary CVD care units, such as cardiac rehabilitation units and multidisciplinary HF units. Evidence is starting to emerge regarding the favourable effects of psychological interventions in patients with CVD (187), although such interventions are not common in the National Health System.

Family members of CVD patients may also suffer from related psychological symptoms, especially those family members who are most aware of the CVD patient's disease and whose lifestyles are therefore affected by it. According to the WHO: "Intervention at the level of the family and community is essential for prevention because the causal risk factors are deeply entrenched in the social and cultural framework of the society" (188) (189).

Certain factors related to people's circumstances and to their social and family environments may affect their cardiovascular health, as may many aspects linked to their psychological state or associated with their gender (7).

- **Exposure to stressful situations**

Exposure to stressful situations stemming from a person's working life and other demands that of their social and family environments, in addition to social inequalities, cause increased levels of stress, which are associated with a greater probability of cardiovascular disease. Stress exposure also favours the adoption of addictive or unhealthy behaviours such as tobacco use, alcohol consumption and physical inactivity, which in turn constitute cardiovascular risk factors (7).

- **Well-being**

Well-being, understood as a set of positive emotions, optimism and satisfaction with life itself has been suggested as a potential factor of cardiovascular health and longevity (182) and although its definition still requires broader methodological development (183), it must be evaluated due to its significant implications for cardiovascular health and health in general. Countries such as Canada have established well-being surveillance systems, which aggregate social, economic, healthcare and clinical structure variables into well-being indicators offering a comprehensive view of health (192).

2.6.4 Socio-labour and economic impact

CVDs are a common cause of leave due to temporary disability (there are more than 70,000 cases of sick leave per year for this reason in Spain) (193), with an economic impact exceeding 145

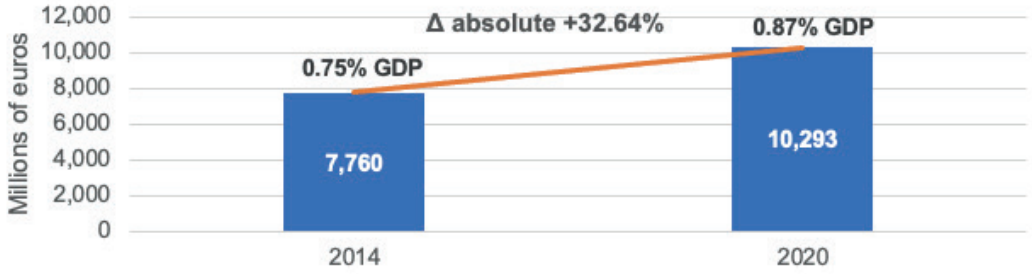
million euros (14). A study published in 1999 indicated that, following an AMI, approximately 56.5% of patients returned to work, 19% took early retirement, 16% were recognized as having a permanent disability, 5% were left unemployed and 3.5% died (194) (195). However, whether a patient returns to work does not depend exclusively on the gravity of the cardiovascular episode suffered or on the treatment received, but also on factors including the determinants of inequality in health identified by the WHO, such as gender (196) and other social factors (197), as well as on the care and rehabilitation system (196).

All of this highlights the importance of considering social, economic and psychological factors when seeking to help patients resume their normal lives and return to work (14). Among the factors favouring patients' return to work, cardiac rehabilitation is of particular importance. A study shows that 63% of heart-attack patients who are subsequently placed in a multidisciplinary cardiac rehabilitation programme can re-enter the workforce (198).

A study estimated that the impact of the 128,169 deaths caused by CVDs in Spain in 2014 entailed a direct healthcare cost of approximately 5.9 billion euros (124 euros per inhabitant), amounting to 77% of the estimated total (199).

To this direct cost were added indirect costs due to premature mortality amounting to approximately 1.8 billion euros and a cost of 60 million due to loss of productivity related to the morbidity of cardiovascular diseases, including work absences due to illness (13). Adding together the direct and indirect costs, in 2014 the total cost amounted to 7.76 billion euros, which represents 0.75% of GDP for that year (Figure 18) (13) (199).

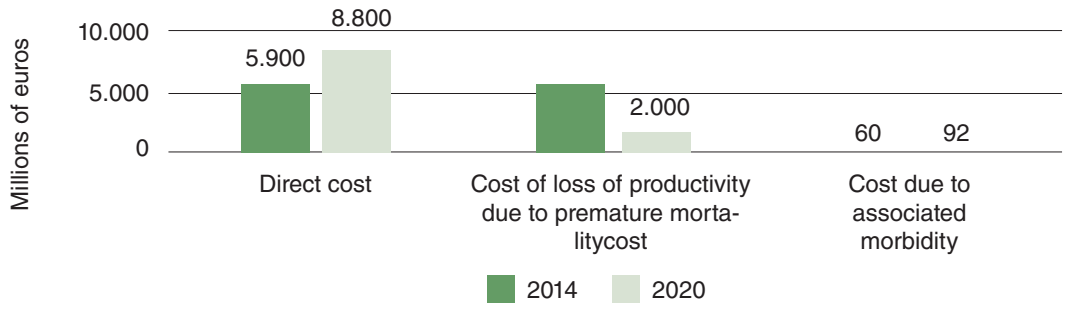
Figure 18. Economic impact of cardiovascular diseases



Source: The economic cost of cardiovascular disease from 2014-2020 in six European economies. Centre for Economics and Business Research Ltd

It was estimated that the impact might reach 10.9 billion euros by 2020, which would represent 0.87% of the GDP forecast for that year (199). The direct cost is predicted to rise to 8.8 billion euros (180 euros per inhabitant), the cost per premature mortality to close to 2 billion euros and the cost of the loss of productivity related to the morbidity of CVDs to almost 92 million euros. The rise in cost is primarily because of population ageing and the evolution associated with the forecast mortality and morbidity (Figure 19).

Figure 19. Economic impact of cardiovascular diseases 2014-2020



Source: The economic cost of cardiovascular disease from 2014-2020 in six European economies. Centre for Economics and Business Research Ltd

2.7 Community engagement in health

The concept of community engagement has different definitions. According to the UK's National Institute for Health and Care Excellence (NICE), it is a process wherein different community agents are involved in decisions to improve their health and well-being and to reduce inequalities in health. This process includes diagnosis of needs, planning, design, implementation and evaluation of actions (200). The lack of a standardized definition and the complexity of community engagement interventions and processes are a barrier to research.

Community engagement in health has a long-standing tradition. As early as 1978, at the Alma-Ata Conference, social engagement was recognized as an essential element in the improvement of the health of individuals and of public health. In Spain, the General Health Act (1986) recognizes and regulates the right to community engagement in healthcare planning and management. Spain's Autonomous Communities have developed regulations that provide for this right, as well as on health councils as participatory bodies. Moreover, the General Act for the Defence of Consumers and Users (1984), the Patient Autonomy Act (2002), the Cohesion and Quality of the National Health System Act (2003), and the Public Health Act (2011) regulate this right, as well as the participation bodies of the different territorial levels (health councils and social engagement councils). Despite the abundance of legislation on the matter, work remains to be done to achieve real and effective participation by the population in decision-making on community health, as well as in the planning of community-based interventions.

However, the Spanish Network of Healthy Cities, the Health Promotion and Disease Prevention Strategy, the local networks of Spain's Autonomous Communities and other national action networks (Network of Cities Friendly to Older People, Network of Child-Friendly Cities) have in recent years promoted community engagement actions in health. The adherence of local public administrations to the National Health System's Health Promotion and Disease Prevention Strategy has entailed the creation of an inter-sectoral coordination board on health and the identification of local community resources and assets. The local level is better suited than any other to approaching health from a social determinant perspective, as local authorities are closer to the networks formed by political and technical agents and private citizens.

To foster community engagement, the Ministry of Health has published a guide intended to serve as a support document for working in a broad and collective manner beyond healthcare, unifying criteria and proposals for the different agents involved who wish to begin or continue community actions that favour health and equity (201).

2.8 Research and innovation in cardiovascular health

The clinical and epidemiological significance of CVDs demands that we conduct research to increase our knowledge of the causes and mechanisms underlying them as well as our awareness of the impact they have in Spain —including on people's health and clinical management outcomes—. We must also study diagnoses and treatments so that, through innovation, we may adapt existing prevention strategies, organizational models and tools to maintain cardiovascular health and improve the prognosis for individuals who already have a CVD.

In 2018 (the latest year with available data), Spain dedicated 1.24% of GDP to R&D and assigned 2,855 researchers per 1 million people to carry out research and development (the average figures for the European Union are 2.18% of GDP and 3,731 researchers per 1 million people) (202). Despite this, clinical and epidemiological cardiovascular research in Spain is relevant and has national and international impacts. The bibliometric analysis of the participation of Spanish institutions in international research in cardiovascular health indicates that the number of cardiovascular publications at global level doubled between 2000 and 2018, with the contribution of Spanish authors representing just 2.33% and an estimated time lag with respect to global production of between 0 and 7 years (202). *The Revista Española de Cardiología,* published by the Spanish Cardiology Society, had an impact factor of 4,753 (second quartile) in 2021, and is the journal that has published the highest number of articles by Spanish institutions.

Although basic biomedical research and translational cardiovascular science have less of a historical tradition than other areas such as neuroscience, molecular biology, immunology and oncology, the Carlos III Health Institute decided to redress this situation through two major initiatives carried out in the past 25 years. First, in 1998 it promoted the creation of the National Cardiovascular Research Centre (CNIC), a centre of excellence for basic and translational cardiovascular research. Secondly, in 2008 it established three thematic networks for cooperative cardiovascular research (HERACLES, RECAVA and REDINSCOR), which were grouped together and strengthened in 2017 with the creation of the Biomedical Research Network Centre for Cardiovascular Diseases (CIBERCV) (203).

A search in PubMed for articles published in the past 10 years on "cardiovascular disease" brings up a figure of close to 1 million articles. If the search is restricted to "cardiovascular risk" this number drops to 200,000 and to just over 100,000 if restricted further to "cardiovascular prevention" or "cardiovascular health outcomes". The findings are reduced to approximately 5,000 when asking about "patient-reported outcomes", "precision medicine" or "artificial intelligence" in the cardiovascular environment. Although this example intentionally lacks methodological rigour, it does indicate that most traditional cardiovascular research has been aimed at the study of physio-pathological mechanisms and at diagnostic and therapeutic innovation. Only recently has there been an increase, to offer just a few examples, in systematic studies on omics data, on phenotypes and environmental exposure (204), on individual variability in preventive measures (205), on analysis of large databases focused on improving

knowledge of health outcomes in real life (206) (207), or the short-and long-term influence of the incorporation of patient-reported outcomes and experiences (208) (209). It is likely that advancing knowledge of many of these aspects will be crucial to progressing towards individualized, precision cardiovascular healthcare.

Technological innovation has been incorporated at a fast pace in all aspects of cardiovascular health and patient care. Its use in people's daily lives includes systems for monitoring physical activity, diet, pulse rate or other biological variables contained in specific personal devices or incorporated into mobile phones. In healthcare, technological innovation is used in all areas, including clinical management, diagnostic and therapeutic methods, and patient follow-up and monitoring. There have been spectacular advances in the analysis of biochemical and genetic parameters and electric and other signals, in imaging techniques, pharmacology, devices and surgical interventions —which are less invasive and involve more advanced surgical techniques, repairs and prostheses— and percutaneous interventions, which enable advanced solutions that avoid the drawbacks of open heart surgery such as coronary angioplasty, implantation of prosthetic heart valves ablations. However, the enthusiasm for cutting-edge technology and new devices in healthcare and in clinical practice may be leading to unreasonably high expectations and an accelerated use with insufficient evaluation of their long-term efficacy, safety and cost-effectiveness, which constitutes a challenge and a major opportunity for the cardiovascular research community.

Special attention must be paid to databases, which are key to any development strategy or initiative. In Spain, health databases are fragmented and poorly connected. There are institutions that provide information at State level: the National Statistics Institute, National Epidemiology Centre, Ministry of Health, with State initiatives and databases, as well as the National Health Surveys in Spain (NHSS), the National Health System's Minimum Basic Data Set (MBDS) on hospital admissions, and the Primary Care Clinical Database (BDCAP). However, a lot of the information belongs to Spain's different Autonomous Communities or to local healthcare institutions —hospitals, primary care centres— which frequently use different tools in each centre (hospitals' electronic health records [EHRs]) or level of care (hospital and primary care). These tools do not connect with each other, and it is difficult to share information due to technical, operational or strategic issues, meaning that many opportunities for global knowledge of the epidemiological and clinical reality of CVDs in Spain are wasted. It is essential to exploit all the data available in a coordinated manner and to use the data to improve and develop cardiovascular health and healthcare for CVD patients.

2.9 Impact of the COVID-19 pandemic on cardiovascular health

The global pandemic triggered by the SARS-CoV-2 virus, which causes COVID-19, has placed a strain on healthcare systems from many perspectives. During the so-called "first wave" of the pandemic, between March and April 2020, many Spanish hospitals had to significantly increase their intensive care capacity and their admission capacity to care for patients with COVID-19. Planned admissions, diagnostic tests and non-urgent interventions had to be postponed sine die to allocate resources to the high number of infected patients admitted in a serious condition, until the situation abated.

The vast majority of the urgent care programmes for problems not related to COVID-19, such as AMI and stroke, remained active during this crisis, but as the weeks went by the perception of Spain's health professionals was that the number of patients coming to hospitals with these issues had fallen considerably. The general impression was that, for example, people suffering from symptoms compatible with those of an AMI were not seeking hospital care due to their fear of entering an environment with a high risk of infection with SARS-CoV-2 and/or because they assumed that their condition was less urgent than that of the people who were being attended to by healthcare organizations in that moment. In fact, Spain's cardiological community launched a news and social media campaign on its own initiative to strengthen and raise awareness among the population of the need to report any symptoms suggestive of AMI to outpatient emergency services. By way of example, at the peak of the pandemic, the hospital mortality rate of patients admitted with an ST-elevation myocardial infarction (STEMI) was 7.5%, compared with 5.1% for the same period of the prior year (210).

Furthermore, this pandemic has changed our way of understanding consultations. To reduce the risk of contagion of the most vulnerable patients (such as those with heart disease) and of health workers, most in-person appointments were cancelled, and telemedicine appointments were introduced at all health centres. This change has occurred in all healthcare organizations and today represents a significant part of the care provided by the National Health System. However, major questions have yet to be decided regarding organizational, legal and care-related aspects, inter alia, and this form of care must be properly consolidated following a necessarily heterogeneous and urgent roll-out (26).

The Spanish Cardiology Society recently published a consensus statement seeking to improve the quality of care provided in telemedicine consultations, reviewing the conditions that clinical cardiologists treat most frequently among their outpatients and proposing certain minimums in this care process (211). Taking the three most common diseases —ischaemic heart disease, heart failure and arrhythmia— as a starting point, this statement clarifies the fundamental aspects to be reviewed in telephone interviews, the patients who must be seen in person, and criteria for primary care follow-up, in addition to suggesting improvements to telemedicine.

In addition to the above, the effect of the COVID-19 pandemic on the availability of information and on time series analysis should be considered. The systemic alteration it provoked made 2020 and, to a lesser extent, 2021, atypical years as regards the availability of information and the evolution of time series for health variables, as well as regards factors conditioning the available data.

III Specific cardiovascular diseases considered in the CVHS

3.1 Ischaemic heart disease

Epidemiology

The incidence of ischaemic heart disease (IHD) in Spain in 2019 was 361.4 new cases per 100,000 inhabitants and was much higher in men (463.4) than in women (263.6). The incidence rate of CHD increases significantly with age, as among those aged between 50 and 69 the global incidence rate was 485.5, while for those aged 70 or above it was 1,415.4. In this latter age group, the incidence rate for men was 1,773.2, while that for women was 1,160.6 (1). The prevalence of CHD in Spain has been creeping up gradually over the past 10 years, from 2.8% in 2009 to 3.3% in 2019; 4.2% of men and 2.4% of women suffer from this disease (1). In the coming decades, it is expected that this growing trend in the prevalence of CHD will continue, as a result, in part, of population ageing. In 2019, it is estimated that CHD caused close to 1 million deaths in the European Union, representing 48.5% of deaths due to CVDs (1). In Spain, that same year the number of deaths due to CHD amounted to 29,247, representing 25.1% of the total deaths due to CVD (2).

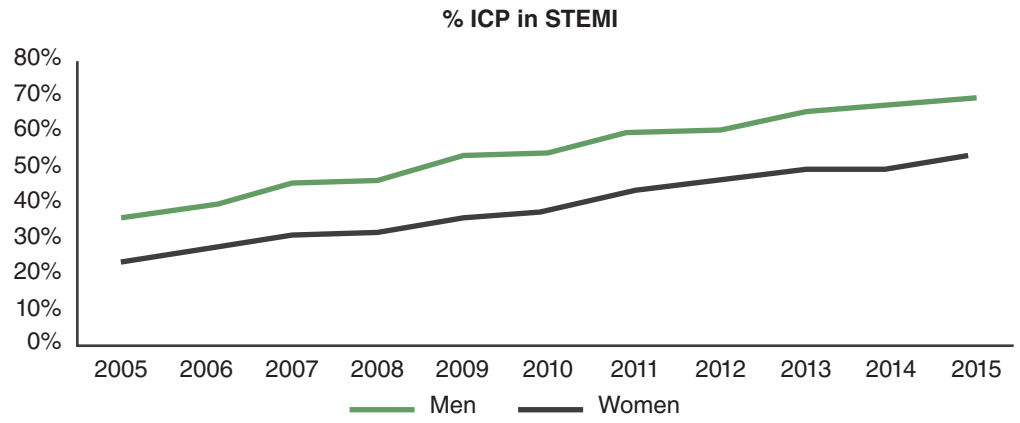
Heart attack networks in Spain

As regards the specific care provided for AMI that presents as ST-elevation acute coronary syndrome (STE-ACS), regional care networks have been developed in Spain with the aim of providing a response (primary angioplasty) to these cases within two hours of the onset of symptoms (212), thereby reducing patient mortality rates. The roll-out of these networks across the different Autonomous Communities has been uneven, despite their importance in terms of reducing morbidity and mortality rates, and even in terms of improving equity. Better flows of data on functioning and outcomes would help implement continuous improvement processes that could produce quality care programmes. Differences have been reported in reperfusion rates for men and women. Among this patient group, 43% of women and 23% of men did not receive any kind of reperfusion therapy in 2015. Fewer percutaneous coronary interventions (PCI) were performed on women in all age groups, except in the 18-to-34 subgroup (Figure 20).

Early invasive strategy

Unlike treatment for STE-ACS patients, treatment for NSTE-ACS patients is not so time dependent, except in very high-risk patients, who require a coronary angiography within the first two hours of the onset of symptoms (213). However, clinical practice guidelines do recommend that a coronary angiography be performed during the first 24 hours in high-risk patients. Moreover, there is scientific evidence that coronary angiography during hospitalization lowers NSTE-ACS patients' long-term mortality rates (214), especially if performed during the first 24 hours (215). Therefore,

Figure 20. Percentage of percutaneous coronary interventions in STEMI patients, by sex. 2005-2015



Source: Sambola A. Rev Esp Cardiol 2020

learning from the experience of STE-ACS care networks would be very useful in establishing an approach to caring for NSTE-ACS patients, and in informing the organizational and logistical adaptations necessary for managing these patients, who are more numerous and have more diverse care programmes. Despite the scientific recommendations and the clinical benefits, many at-risk NSTE-ACS patients are not referred due to the perception that they do not present a sufficiently high level of risk (216). One of the current challenges in the care of acute coronary syndrome patients is how to improve the stratification of risk and the treatment of high-risk NSTE-ACS patients, primarily those with non-ST elevation myocardial infarction (NSTEMI patients).

Cardiac rehabilitation and secondary prevention programmes in hospital and primary care depending on the level of risk

Cardiac rehabilitation is expressly recommended for most CVD patients due to its functional, psychological and prognostic benefits, including lower morbidity and mortality rates. However, Spain has a shortage of reference centres (specialized units meeting a set of specific criteria and officially designated as such by the pertinent health authorities) and of centres offering cardiac rehabilitation programmes (217). In 2020, some provinces lacked reference centres despite the existence of 135 cardiac rehabilitation units (218). However, due to the impact of the pandemic, telemedicine has been promoted over the past year in the field of prevention and the development of e-supervised home-care programmes, as well as free online access for any patient requiring cardiac rehabilitation.

Establishing cardiac rehabilitation units at hospitals and qualifying primary care centres and promoting a comprehensive and multidisciplinary approach to CVD (including CHD) in primary care would contribute to better health outcomes. Such an approach would include one year of follow-up after hospital discharge, as well as the development of individual and family care plans supported by consultations with doctors and nurses, focusing on empowering patients to make permanent lifestyle changes and adhere to a lifelong therapeutic plan (219).

One persistent area for improvement in this field is women's lack of access to cardiac rehabilitation, which requires a causal analysis and a search for specific solutions, as participation in said programmes reduces CV mortality (220).

3.2 Heart Failure

Epidemiology

Heart failure (HF) is one of the most common chronic diseases, with age having a significant influence on its incidence, prevalence and mortality. In Spain, it is estimated that the incidence of HF is 278 new cases per 100,000 inhabitants and that the prevalence in the adult population is 1.89% (221). The prevalence of HF increases with age, amounting to 16.1% among people aged over 75 (222).

HF has a high short-and long-term fatality rate. In 2019, HF was the 4th leading cause of death from CVD in Spain (after ischaemic heart disease, cerebrovascular diseases and other types of heart disease), causing 13.6% of circulatory system-related deaths in men (4th leading cause of death) and 18.8% in women (3rd leading cause of death) (2).

HF normally presents in association with medical, psychological (depression) and geriatric comorbidities, such as frailty, dependence, cognitive impairment and other geriatric syndromes (223), because the people affected by this disease are generally old, which complicates disease management, both clinically and in terms of patient self-care (224). This also contributes to the high rate of readmissions or visits to the accident and emergency ward, due in many cases to decompensation (225).

Different studies confirm the existence of significant variability between countries, Autonomous Communities, and hospitals as regards the care of patients with HF, whether acute or chronic, as well as in their outcomes (mortality, treatments, average stay) (223) (226) (227) (228).

Early diagnosis

Early diagnosis of HF is crucial to identifying potentially correctable causes and establishing an appropriate treatment programme as quickly as possible, thereby improving prognosis. Given that a large proportion of initial diagnoses of HF occur during urgent care or primary care consultations, it is essential to provide the necessary diagnostic means to these units to confirm or rule out HF as a diagnosis; this is especially important in primary care.

Indeed, HF clinical practice guidelines propose different diagnostic algorithms in the event of a clinical suspicion of HF in primary care. In Spain, the Spanish Cardiology Society, in collaboration with primary care doctors, has proposed an algorithm like that of the European Society of Cardiology (170) (229) (230), which recommends natriuretic peptide testing in primary care for patients with suspected HF, and subsequent evaluation by a cardiologist within the following four weeks for those patients with high levels (170). For this reason, promoting the accessibility of natriuretic peptide testing at primary care centres is a priority, as too is the establishment of protocols ensuring fluid collaboration between the different levels of care, to provide integrated care processes with defined flows and periods of care.

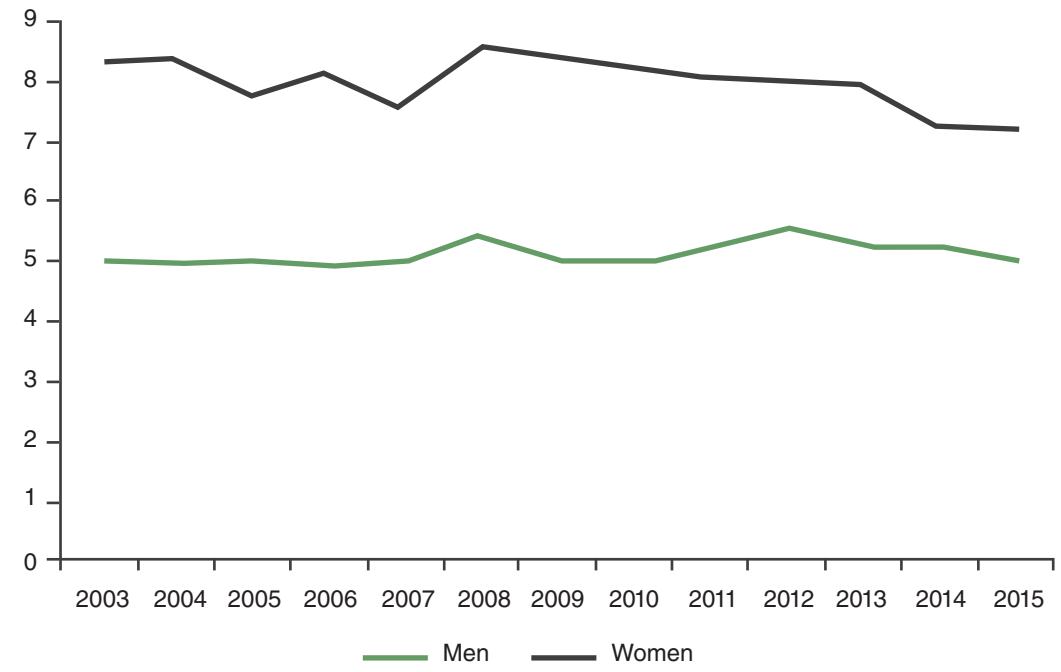
Organization of multidisciplinary care for heart failure patients

There is consensus in the clinical community about the need to establish an integrated and person-centred care pathway for HF patients through integrated multidisciplinary and person-centred programmes (231) (232) (233) (234) (235). As a result, the Spanish Cardiology Society and the Spanish Society of Internal Medicine have proposed creating three types of care units for HF patients, depending on the degree of complexity of their condition and the type of hospital in which they are located (236). These units would be formed by multidisciplinary teams, and the different types of units in each health area and autonomous community would have to work as a network, in coordination with each other, to guarantee appropriate patient flows and equitable care (236).

Cardiogenic shock

Cardiogenic shock (CS) is the most serious form of presentation of HF, with an initial fatality rate of more than 50% (237) (238). It can present acutely, most frequently in the context of AMI, or as a terminal phase of chronic heart failure. The estimated prevalence of cardiogenic shock in STEMI patients is 6.2%; the average age of patients who suffer from it is 67.7 years, and 68.7% of them are men (239). Among MI patients, cardiogenic shock is more frequent in women than in men. Thus, in Spain, in a cohort of 288,049 MI patients, the incidence of cardiogenic shock was 7.9% in women compared with 5.1% in men on average during the period from 2003 to 2015 (240).

Figure 21. Incidence of cardiogenic shock, by sex. 2003-2015



Source: Sambola A. Rev Esp Cardiol 2020

Pharmacological treatment of CS has limited effectiveness in improving prognosis and therefore these patients frequently require extraordinary measures, including mechanical cardiac support devices, such as ventricular assist devices, extracorporeal membrane oxygenation (ECMO) or heart transplant. The availability of such devices and experience of their use is limited and therefore the admission of a patient in cardiogenic shock at one centre rather than another may significantly influence their probabilities of survival (241). Women receive treatment with ventricular assist devices less often (242) and receive fewer heart transplants, despite having higher survival rates than men (243).

The creation of specialist multidisciplinary teams is considered advisable for the treatment of patients in refractory cardiogenic shock. These teams would be primarily formed by specialists in cardiac critical care, intensive medicine, advanced heart failure (integrated into advanced heart failure units) (244), interventionist cardiology and cardiac surgery, and functionally integrated into hospitals with specialist resources for the care of patients in cardiogenic shock (245) (246). In addition to internal coordination, consideration should be given to the possibility of converting these centres into reference hubs for hierarchically organized regional networks of hospital providing different levels of care, like those for AMI and stroke patients, to provide better coverage to the pertinent population groups in each region (247). Similar experiences in Spain and other countries and contexts have succeeded (248) (249) (250).

3.3 Valvular heart disease

Epidemiology

In Europe, in 2019 it was estimated that the prevalence of non-rheumatic valvular heart disease was 1.5%, 1.2% among men and 1.7% among women (1), mostly aortic stenosis followed by mitral insufficiency and multiple valvular heart disease, with degenerative valvular heart disease being the predominant aetiology (251). That year, 68.3 new cases per 100,000 inhabitants were detected (1).

An analysis of the Minimum Basic Data Set (MBDS) in Spain shows that diagnoses of non-rheumatic aortic valvular disease as the cause for hospitalization increased between 2003 and 2015 from 6,386 to 10,542, and as a comorbidity among hospitalized patients from 28,654 to 63,938. Patients are increasingly older and have more comorbidities (252). Moreover, there has recently been an increase in percutaneous procedures for aorta replacements, and in the past 20 years there has been a rise in the number of aortic valve surgery, with a significant increase in biological prostheses (253) (254).

Early diagnosis

Valvular heart diseases cause structural and functional changes to the heart, such as the dilation of the heart chambers, ventricular dysfunction and pulmonary hypertension, which worsen patients' prognoses (255). It is essential to make an early diagnosis and propose an effective treatment before such changes occur (256).

A simple method such as auscultation may detect half of patients with a moderate or severe valvular disease (257). Auscultation has proven to be efficient and comparable to non-Doppler echocardiography for diagnosing aortic stenosis, but less effective for diagnosing valvular insufficiency, whether mitral, aortic or tricuspid (258).

Echocardiography is an ultrasound imaging study of the heart, complementary to anamnesis and to physical exploration, which is highly useful in diagnosing patients with CVD, and enables prognostic stratification and monitoring of patients.

Treatment of severe aortic stenosis

There is no pharmacological treatment for valvular disease. In the event of severe aortic valve stenosis, an aortic valve replacement must be carried out. This may be done through open surgery or by using percutaneous catheters, a technique developed in this past decade. It has been proven that the results of the implantation of percutaneous aortic prostheses are comparable to those of the standard surgical procedure among high-risk (259), intermediate-risk (260) and even low-risk patients (261). However, there is no solid evidence of results regarding the effectiveness, safety and durability of transcatheter prostheses beyond five years in high-risk and two years in intermediate-and low-risk groups.

Moreover, percutaneous prostheses constitute an alternative for inoperable patients with severe aortic stenosis (262). It is important to bear in mind that degenerative aortic stenosis is more frequent among older people, who more often have comorbidities associated with their disease that lead to a bad short-term prognosis, significantly increasing the risk involved in interventions and affecting short-and long-term outcomes (263). The greater simplicity of percutaneous implantation techniques enables interventions to be performed on patients who have a very high surgical risk, but such techniques run the risk of not achieving clinical benefits for patients. Therefore, it is crucial to assess, appropriately and in a multidisciplinary manner, a patient's suitability for undergoing an aortic valve replacement procedure. Women with severe aortic stenosis are often referred later and have higher mortality rates than men (264).

The final decision regarding the implantation method and the type of prosthesis must be based on clinical, morphological, functional, social and economic criteria. Thus, it must be decided by consensus between professionals from different fields (clinical cardiology, cardiac surgery, cardiac imaging, haemodynamics, geriatrics, nursing, etc.) and the patient and their family members. As in other clinical contexts, only multidisciplinary teams can account for all the aspects involved in making the final decision, thus improving outcomes and reducing mortality (265).

3.4 Arrhythmia

Sudden death

Out-of-hospital cardiac arrest (OHCA) is one of the main causes of death worldwide. It is estimated that in Spain there are approximately 30,000 cases of OHCA per year, with a survival rate of

nearly 10% (266). In 94.1% of the cases, advanced life support is initiated, with a hospital survival rate, in good neurological condition, of 11.1%. There are differences in access to cardiovascular resuscitation and in survival between men and women, and significant variations between Autonomous Communities (267) (268).

European cardiopulmonary resuscitation (CPR) guidelines clearly identify the need to improve care in the first links of the chain of survival, early recognition of cardiac arrest, providing bystander CPR in the initial moments, and early access to defibrillation (269). The aim is to achieve greater survival with good neurological recovery (270). For every minute of delay in care, the probability of achieving this goal decreases by 10-12%; therefore, it is crucial to start doing something effective in the first 2-5 minutes of an OHCA.

In recent years, many developed countries have launched campaigns focusing on OHCA based on disseminating and teaching CPR techniques to the public, as well as on promoting the installation of automated external defibrillators (AEDs) (271). In Spain there is no global strategy to improve OHCA assistance. However, different regional and local initiatives have been implemented. There have been several initiatives to ensure that the AEDs installed in public spaces have been made conspicuous to the public and to register groups of volunteers who can be paged in the event of a cardiac arrest, with the aim of improving the percentage of OHCAs in which the first resuscitation manoeuvres may be carried out by a bystander before emergency services arrive (272).

In-hospital cardiac arrest also has great clinical relevance, and it is estimated that approximately 20,000 cases occur in Spain each year. Extending care plans to these patients constitutes an essential improvement to healthcare.

Atrial fibrillation

Atrial fibrillation (AF) is the most common sustained arrhythmia and that which generates the greatest number of consultations in A&E services, as well as the greatest number of days in hospital. AF is associated with increased morbidity —especially stroke and heart failure— and death. It is estimated to affect 1-2% of the public and more than 4% of people aged over 40 in Spain, with a similar rate for men and women (273). The prevalence of AF is foreseen to at least double in the coming 50 years, due to population ageing.

There are effective treatments (classic anticoagulants or direct-action anticoagulants) to prevent associated embolic events. However, these patients do not always receive these treatments because they may not be aware of their disease, and this is associated with a greater risk of stroke (five times higher). Patients diagnosed with AF receive low quality treatment resulting from the underutilization of recommended drugs and deficient monitoring of their use, with a less than optimal adaptation of doses (274) (275). Moreover, women with AF receive fewer oral anticoagulants than men (274).

European guidelines on AF recommend opportunistic AF screening by pulse taking or by electrocardiogram (ECG) in patients over 65, and systematic screening in patients over 75 and those patients with a greater risk of ischaemic events (176).

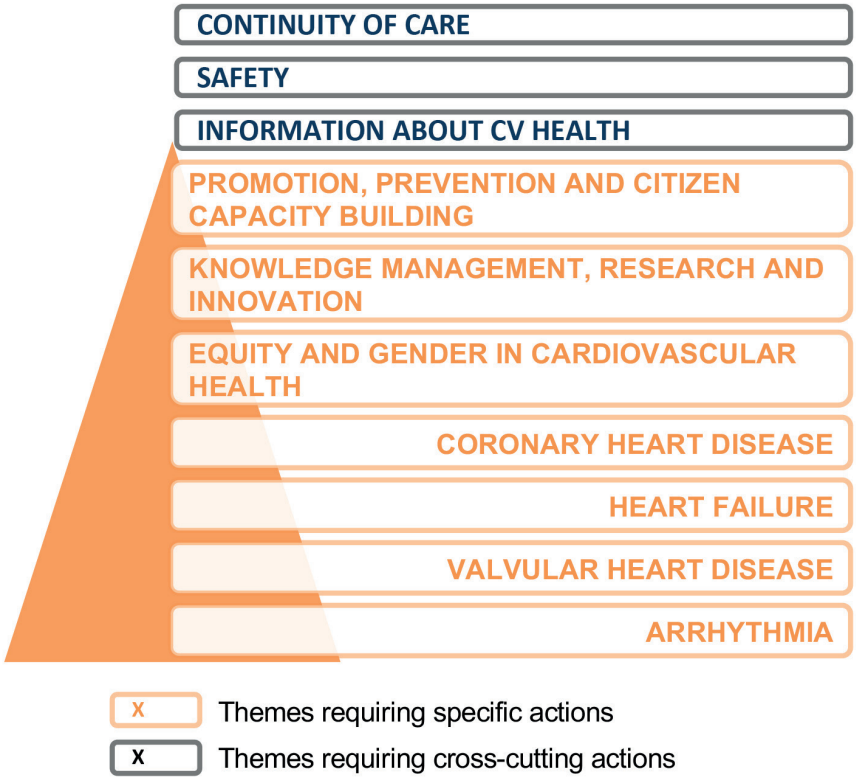
In addition to the role of health professionals, the contributions of other health professionals such as pharmacists and dentists and of technological innovations such as personal monitoring systems must also be considered.

IV Critical points for improving the population's cardiovascular health

4.1 Identification of critical points

The description of cardiovascular health in Spain, and of the approach to cardiovascular care, enables the identification of the critical points of action to be considered when implementing this Cardiovascular Health Strategy. For this reason, the structure of themes initially defined when designing the CVHS has been contemplated.

Figure 22. Themes of the CVHS



Source: Ministry of Health

To identify, substantiate and prioritize the critical points in cardiovascular health in Spain, multi-disciplinary working groups were set up for the following specific themes[6]:

[6] For more information on the methodology used, see Appendix III. Methodology for Preparing the Strategy

- Promotion, prevention and citizen capacity building
- Knowledge management, research and innovation
- Equity and gender in cardiovascular health
- Ischaemic heart disease
- Heart failure
- Valvular heart disease
- Arrhythmia

After an initial identification of critical points, these were prioritized using an abbreviated version of the Hanlon Method, whereby 24 critical points associated with said specific themes were selected, and three critical points linked to cross-cutting themes were defined. These elements constituted the basis for the subsequent reflection leading to the CVHS.

4.2 Critical points by theme

4.2.1 Critical points associated with cross-cutting themes

1.1. Critical point TR-CONTASIST: Promote and strengthen continuity of care as a key element of quality, efficient and safe healthcare for patients with CVD
1.2. Critical point TR-SEGPAC: Promote safe practices in the care of patients with CVD
1.3. Critical point TR-INFSCV: Have access to verified information by which to identify the status of cardiovascular health and CVD care in the Spanish population

4.2.2 Critical points associated with promotion, prevention and citizen capacity building

2.1. Critical point PPCC1: Promote cardiovascular health and cardiovascular disease prevention among the population of Spain
2.2. Critical point PPCC2: Raise awareness of primary cardiovascular disease prevention, focusing on lifestyle: tobacco use as a risk factor
2.3. Critical point PPCC3: Promote primary cardiovascular disease prevention through the monitoring of biological risk factors
2.4. Critical point PPCC4: Develop the capacity building of health professionals and other professionals related to the promotion of cardiovascular health and disease prevention
2.5. Critical point PPCC5: Promote capacity building for public adoption of healthy lifestyles

4.2.3 Critical points associated with knowledge management, research and innovation in CV health

3.1. Critical point KMRI1: Focus the training of health professionals on research and innovation in the improvement of cardiovascular health outcomes, as far as possible throughout their training cycle

3.2. Critical point KMRI2: Carry out initiatives to equip citizens with self-care skills in cardiovascular health
3.3. Critical point KMRI3: Include outcomes and experiences reported by patients in the report of institutional outcomes
3.4. Critical point KMRI4: Identify areas of research and innovation in cardiovascular health based on health system needs or problems that take health outcomes into account
3.5. Critical point KMRI5: Promote R&D projects that respond to existing cardiovascular health needs, foster collaboration and facilitate knowledge transfer to clinical practice
3.6. Critical point KMRI6: Promote epidemiological studies on differences in the prevalence of CVD conditioned by gender or other inequities
3.7. Critical point KMRI7: Support initiatives regarding development models for virtual care and the improvement of outcomes in patients with CVD in the framework of the National Health System's Digital Health Strategy

4.2.4 Critical points associated with gender equity in CV health

4.1. Critical point EQGEN1: Promote knowledge and self-care related to cardiovascular health among women
4.2. Critical point EQGEN2: Train all National Health System professionals in the specific aspects of CVD (diagnosis and treatment) concerning women and gender inequalities
4.3. Critical point EQGEN3: Address social inequalities in health in the Strategy's actions using an interdisciplinary approach

4.2.5 Critical points associated with comprehensive care for people with acute and chronic ischemic heart disease

5.1. Critical point CHD1: Develop cardiac rehabilitation and secondary prevention programmes in hospital and primary care depending on patients' degree of risk
5.2. Critical point CHD2: Optimize the functioning of care networks for acute coronary syndrome

4.2.6 Critical points associated with comprehensive care for people with acute and chronic heart failure

6.1. Critical point HF1: Improve the early detection and diagnosis of heart failure
6.2. Critical point HF2: Organize care for HF patients through multidisciplinary HF units/programmes, coordinated with the participation of all the professionals involved at all levels of care

6.3. Critical point HF3: Create specific networks (shock code) to organize the care of cardiogenic shock (CS) patients

4.2.7 Critical points associated with comprehensive care for people with valvular heart disease

7.1. Critical point V1: Promote the early diagnosis of common valvular heart diseases
7.2. Critical point V2: Optimize the choice of treatment for severe aortic stenosis (AoS) through comprehensive multidisciplinary valuation

4.2.8 Critical points associated with comprehensive care for people with arrhythmia

8.1. Critical point A1: Improve effectiveness in access to cardiopulmonary resuscitation (CPR)
8.2. Critical point A2: Promote the early diagnosis of atrial fibrillation (AF)

V Goals and actions

5.1 Definition of goals and actions

Having identified the critical points, the multidisciplinary groups defined the goals and actions for addressing them. The definitions proposed by each group were, in turn, reviewed and validated by:

- A Technical Committee, made up of the principal scientific societies, patients' associations and experts in cardiovascular health.
- An Institutional Committee, made up of representatives from Spain's 17 Autonomous Communities, as well as from the different ministerial units involved.

Based on the proposals made by the multidisciplinary groups and on the contributions of the Technical and Institutional Committees, the following goals and actions were defined:

- 32 general CVHS goals, related to the different critical points.
- 68 specific goals for addressing the different aspects associated with each critical point.
- 136 actions for achieving the goals put forward.

5.2 Goals and actions by CVHS theme

5.2.1 Goals and actions associated with cross-cutting themes

Critical point TR-CONTASIST: Promote and strengthen continuity of care as a key element of quality, efficient and safe healthcare for patients with CVD [7]

GENERAL GOALS	TR-CONTASIST-GG1. Establish prevention and healthcare systems for CVD patients based on the care processes and flows most conducive to quality, safety and efficiency, coordinated between levels and within each level, and perceived positively by patients
SPECIFIC GOALS	• TR-CONTASIST-SG1.1. Design integrated care processes for the diseases prioritized in the CVHS • TR-CONTASIST-SG1.2. Promote the integration of social care into the entire CVD care process (prevention, care and rehabilitation) • TR-CONTASIST-SG1.3. Incorporate users' perceptions in the management of continuity of care • TR-CONTASIST-SG1.4. Compare the cardiovascular health outcomes obtained in Autonomous Communities with different systems for organizing the continuity/integration of their healthcare service

[7] All critical points corresponding to cross-cutting themes are shown in a single section.

ACTIONS	• TR-CONTASIST-ACT1.1. Implement and disseminate integrated care processes for prioritized CVDs • TR-CONTASIST-ACT1.2. Implement and disseminate social care integration processes for prioritized CVDs • TR-CONTASIST-ACT1.3. Incorporate and disseminate users' perceptions in continuity of care • TR-CONTASIST-ACT1.4. Disseminate and compare the best practices of different systems for organizing the continuity and integration of cardiovascular care

Critical point TR-SEGPAC: Promote safe practices in the care of patients with CVD

GENERAL GOALS	TR-SEGPAC-GG1. Promote and disseminate safe practices in CVD care.
SPECIFIC GOALS	• TR-SEGPAC-SG1.1. Promote practices for the safe use of drugs in cardiovascular care • TR-SEGPAC-SG1.2. Strengthen appropriate hand hygiene to prevent infections and the transmission of multi-resistant microorganisms • TR-SEGPAC-SG1.3. Promote and disseminate safety in the use of medical devices for CVD • TR-SEGPAC-SG1.4. Strengthen programmes to promote safe cardiovascular surgical procedures • TR-SEGPAC-SG1.5. Promote the reporting and analysis of safety incidents that occur in clinical units, through the reporting system used in the corresponding autonomous community
ACTIONS	• TR-SEGPAC-ACT1.1. Promote safe drug use practices, especially among chronic, polymedicated patients, during care transitions, and in the use of high-risk drugs • TR-SEGPAC-ACT1.2. Strengthen and extend prevention and control programmes for healthcare-related infections, in particular appropriate hand hygiene in the cardiovascular environment and the use of medical devices (measures to prevent central venous catheter-related bacteraemia, mechanical ventilation-related pneumonia, and catheter-related urinary tract infection) • TR-SEGPAC-ACT1.3. Strengthen programmes to promote safe cardiovascular surgical procedures • TR-SEGPAC-ACT1.4. Ensure appropriate and unequivocal patient identification • TR-SEGPAC-ACT1.5. Promote the reporting and analysis of safety incidents that occur in clinical units, through the reporting system used in each autonomous community

Critical point TR-INFSCV: Have access to verified information by which to identify the status of cardiovascular health and CVD care in the Spanish population

GENERAL GOALS	TR-INFSCV-GG1: Design and consolidate a core data set of basic information by which to identify the status of cardiovascular health and CVD care in the population, including unknown aspects

SPECIFIC GOALS	• TR-INFSCV-SG1.1. Identify the necessary information, the sources from which it may be obtained, and the most efficient way of collecting it, to analyse and interpret the status of the population's cardiovascular health, including the factors that determine said status, and CVD care • TR-INFSCV-SG1.2. Use that information in the most efficient manner to identify the needs for improvement in health promotion and in the prevention, diagnosis, treatment and rehabilitation of cardiovascular diseases • TR-INFSCV-SG1.3. Monitor Life's Simple 7, the seven metrics of ideal cardiovascular health [8] according to the American Heart Association (AHA), in Spain's population
ACTIONS	• TR-INFSCV-ACT1.1. Develop a user-friendly map with the ideal cardiovascular health and CVD care indicators • TR-INFSCV-ACT1.2. Promote the carrying out of a systematic and structured analysis plan of the status of society's cardiovascular health and CVD care, identifying the necessary information and its sources, the most efficient way of obtaining such information, and the most standardized way of communicating it • TR-INFSCV-ACT1.3. Promote the drafting of annual cardiovascular health reports with predefined, agreed-upon indicators, and their dissemination to all the agents involved, including the 7 ideal cardiovascular health metrics

5.2.2 Goals and actions associated with promotion, prevention and citizen capacity building

<u>Critical point PPCC1</u>: Promote cardiovascular health and cardiovascular disease prevention among the population of Spain

	PPCC-GG1. Improve the cardiovascular health of the population resident in Spain throughout their entire lives through healthy lifestyles, favouring the creation of healthy environments that make the healthiest choices the easiest ones and help to reduce the incidence of and mortality caused by cardiovascular disease

[8] The 7 metrics of ideal cardiovascular health (in adults) according to the AHA are defined as:

1. Tobacco use-no tobacco use, never or not in the last 12 months
2. Weight-BMI in the normal range, <25 kg/m2
3. Physical activity-Adequate, ≥150 min/wk of moderate or vigorous activity
4. Diet-Balanced, at least 4 of the following dietary habits: ≥450 g/day of fruit and vegetables, ≥198 g/wk of fish, ≥85 g/day of high-fibre whole grains, <1,500 mg/day of sodium, ≤1 litre/wk of sugary drinks
5. Cholesterol - <200 ml/dL
6. Blood pressure - <120/80 mmHg
7. Fasting blood glucose (HbA1c) - <100 mg/dL

SPECIFIC GOALS	• PPCC-SG1.1. Strengthen population-based health promotion and disease prevention strategies in the National Health System, and in particular the National Health System's Health Promotion and Disease Prevention Strategy and the NAOS (Nutrition, Physical Activity and Prevention of Obesity) Strategy • PPCC-SG1.2. Advocate taxation and pricing policies that promote healthy eating • PPCC-SG1.3. Implement policies that foster the integration of physical activity into daily life, such as active transportation and leisure • PPCC-SG1.4. Improve the regulations on advertising unhealthy food and drinks, and alcoholic beverages • PPCC-SG1.5. Improve the regulations on food and drink available at public buildings, including healthcare and sports centres, and at public and private educational centres • PPCC-SG1.6. Strengthen the provision of lifestyle advice in primary care, especially regarding physical activity, healthy eating, and tobacco and alcohol use • PPCC-SG1.7. Enhance the community role of primary care, aimed at promoting health and preventing disease
ACTIONS	• PPCC-ACT1.1. Actively disseminate and strengthen healthy lifestyle interventions • PPCC-ACT1.2. Disseminate this information in a comprehensible and accessible manner to vulnerable people, and implement strategies and programmes on healthy lifestyles • PPCC-ACT1.3. Strengthen social marketing interventions that are sustained over time • PPCC-ACT1.4. Establish more informative and easier to understand nutrition labelling • PPCC-ACT1.5. Promote mechanisms that facilitate access to health products for people in unfavourable economic situations • PPCC-ACT1.6. Favour healthy active transportation modalities (walking and cycling), enlarge and promote restricted traffic zones and traffic-calmed areas in cities, and safe, separate and interconnected bicycle lanes • PPCC-ACT1.7. Foster physical activity at schools: integrate it into schools activities, enable the use of school facilities for sports activities outside school hours, and increase the intensity of physical activity in physical education classes • PPCC-ACT1.8. Improve the regulations on advertising unhealthy food, by using the WHO profile • PPCC-ACT1.9. Support the European Commission's work to establish thresholds for nutrients such as fat, sugars and salt above which nutrition and health claims are restricted or prohibited • PPCC-ACT1.10. Review article 44.4 of Act 17/2011 on Health Safety and Nutrition, to prevent the use of endorsements by health-related institutions in the advertising or direct or indirect promotion of unhealthy food and drinks • PPCC-ACT1.11. Install water fountains in public buildings and educational, healthcare and sports centres • PPCC-ACT1.12. Regulate restaurants' obligation to offer tap water by default with their meals • PPCC-ACT1.13. Regulate the presence and content of food and drinks in canteens and vending machines in public buildings and all public or private educational centres, so that they mainly offer healthy products and non-alcoholic beverages • PPCC-ACT1.14. Collaborate with restaurants and cafés to promote the Mediterranean diet as a heart-healthy nutrition model • PPCC-ACT1.15. Carry out systematic interventions in primary care for people who seek medical attention and/or persons with overweight or obesity, to foster physical activity, reduce sedentary lifestyles, promote healthy eating, and reduce tobacco and alcohol use. Interventions like these are included in the document on Comprehensive Lifestyle Advice to be provided by Primary Care professionals, linked to community resources for the adult population • PPCC-ACT1.16. Support and promote community actions carried out by primary care services aimed at fostering physical activity and healthy eating and at reducing sedentary lifestyles

Critical point PPCC2: Raise awareness of primary cardiovascular disease prevention, focusing on lifestyle: tobacco use as a risk factor

GENERAL GOALS	PPCC-GG2. Bring the prevalence of tobacco use in Spain down to <10% by 2040, with a downward trend of at least one percentage point every two years
SPECIFIC GOALS	• PPCC-SG2.1. Delay or prevent young people from starting to use tobacco and related products • PPCC-SG2.2. Improve the implementation of the measures set forth in the WHO Framework Convention on Tobacco Control, through the National Health System helping smokers to break the habit • PPCC-SG2.3. Introduce advances in the current regulations on tobacco use
ACTIONS	• PPCC-ACT2.1. Monitor and guarantee compliance with Act 28/2005 on tobacco • PPCC-ACT2.2. Strengthen and standardize regulations on advertising, promoting and sponsoring tobacco products, especially as regards new products • PPCC-ACT2.3. Expand smoke-free zones and promote smoke-free homes • PPCC-ACT2.4. Extend current regulations on smoke-free zones to include new tobacco products • PPCC-ACT2.5. Promote the measures included in the Comprehensive Plan against Tobacco Use • PPCC-ACT2.6. Foster educational activities to prevent tobacco use • PPCC-ACT2.7. Undertake actions to prevent young people from using electronic cigarettes and other new tobacco products • PPCC-ACT2.8. Improve health professionals' training on tobacco use • PPCC-ACT2.9. Facilitate smokers' equal access to smoking cessation programmes throughout the National Health System • PPCC-ACT2.10. Inform and raise awareness among the population for better understanding of and compliance with the regulations

Critical point PPCC3: Promote primary cardiovascular disease prevention through the monitoring of biological risk factors

GENERAL GOALS	PPCC-GG3. Consolidate early detection, accurate diagnosis and high blood pressure control as the core actions for primary cardiovascular disease prevention based on the monitoring of biological risk factors
SPECIFIC GOALS	• PPCC-SG3.1. Improve early detection, diagnosis and high blood pressure control in primary care in accordance with the recommendations of the principal clinical practice guidelines • PPCC-SG3.2. Identify and improve high blood pressure control by strengthening programmes carried out in primary care

ACTIONS	• PPCC-ACT3.1. Launch automated (linked to electronic health records) patient alert and appointment systems for the early detection of high blood pressure, with the frequency recommended in the principal clinical practice guidelines • PPCC-ACT3.2. Strengthen primary care programmes to treat and control high blood pressure, fostering the use of: a) a user-friendly protocol based on simpler clinical practice guidelines b) patient capacity-building so that patients can take their own blood pressure, modify their lifestyles via physical activity, weight control and healthy diet, including reducing their salt intake, and management of blood pressure medication c) automated (linked to electronic health records) patient alert and appointment systems for face-to-face or telemedicine consultations, to intensify the treatment of those patients whose disease is poorly controlled and of those who have very high cardiovascular risk d) use of combinations of blood pressure medication e) systems for monitoring and improving therapeutic adherence [9]

Critical point PPCC4: Develop the capacity building of health professionals and other professionals related to the promotion of cardiovascular health and disease prevention

GENERAL GOALS	PPCC-GG4. Promote the training and awareness of health professionals and other professionals regarding health promotion and disease prevention throughout their training cycle, using a comprehensive and multidimensional approach
SPECIFIC GOALS	• PPCC-SG4.1. Increase the number of professionals who are up to date on the importance of promoting cardiovascular health and preventive activities, especially in primary care
ACTIONS	• PPCC-ACT4.1. Foster the development and implementation of cardiovascular health-related actions in the training plan of the National Health System's Health Promotion and Disease Prevention Strategy • PPCC-ACT4.2. Improve primary care professionals' skills and resources for promoting healthy lifestyles

Critical point PPCC5: Promote capacity building for public adoption of healthy lifestyles

GENERAL GOALS	PPCC-GG5. Promote citizen education on how to adopt lifestyles conducive to good cardiovascular health, raising awareness of the impact and importance of such lifestyles
SPECIFIC GOALS	• PPCC-SG5.1. Facilitate education on health and health promotion by supporting the Health Promoting Schools initiative, fostering healthy eating, physical activity, emotional well-being and sustainability, and the prevention of sedentary lifestyles, tobacco and alcohol use, and the use of other addictive substances • PPCC-SG5.2. Guarantee the availability of reliable, accessible and comprehensible information to the public, paying particular attention to those who are most vulnerable

[9] Those already existing in certain Autonomous Communities, such as integrated care processes for cardiovascular risk (high blood pressure and hyperlipidaemia), will be taken into account

ACTIONS	• PPCC-ACT5.1. Foster Health Promoting Schools • PPCC-ACT5.2. Make accessible and appropriate content and information on healthy lifestyles available to the public, to facilitate the adoption of such lifestyles, especially by those who are most vulnerable

5.2.3 Goals and actions associated with knowledge management, research and innovation

Critical point KMRI1: Focus the training of health professionals on research and innovation in the improvement of cardiovascular health outcomes, as far as possible throughout their training cycle

GENERAL GOALS	KMRI-GG1. Enable health professionals to receive training throughout their training cycle, with an integrated and interdisciplinary approach, appropriate to their needs and care profiles, to improve cardiovascular health outcomes
SPECIFIC GOALS	• KMRI-SG1.1. Implement training programmes that enable health professions to acquire care skills to improve cardiovascular health outcomes
ACTIONS	• KMRI-ACT1.1. Facilitate collaboration mechanisms between the different educational levels —university, specialized training and ongoing training— with a view to improving health outcomes

Critical point KMRI2: Carry out initiatives to equip citizens with self-care skills in cardiovascular health

GENERAL GOALS	KMRI-GG2. Enable the public to acquire appropriate knowledge of cardiovascular health so they may manage their own CVD
SPECIFIC GOALS	• KMRI-SG2.1. Ensure that patients and carers receive complete and easy-to-understand information about their cardiovascular health or their care processes to facilitate shared decision-making with their healthcare team and the appropriate use of healthcare resources
ACTIONS	• KMRI-ACT2.1. Promote the training of patients and carers as regards their CVD and the care they need • KMRI-ACT2.2. Promote the use of cardiovascular health messages supervised by health providers in social media • KMRI-ACT2.3. Incorporate patients' experiences and testimonials as messages, with the collaboration of patients' organizations

Critical point KMRI3: Include outcomes and experiences reported by patients in the report of institutional outcomes

GENERAL GOALS	KMRI-GG3. Improve the care of CVD patients by following international recommendations that take patient-reported outcomes into account
SPECIFIC GOALS	• KMRI-SG3.1. Incorporate patient-reported outcomes into systematic monitoring indicators and update the CVD
ACTIONS	• KMRI-ACT3.1. Use health outcomes to identify needs or problems that require R&D and improvements in the training of health professionals and the public

Critical point KMRI4: Identify areas of research and innovation in cardiovascular health based on health system needs or problems that take health outcomes into account

GENERAL GOALS	KMRI-GG4.1. Identify the CVD needs and problems that require R&D to influence Spanish and European R&D programmes
SPECIFIC GOALS	• KMRI-SG4.1. Create a map of R&D needs in cardiovascular health that stems from the goals of the Cardiovascular Health Strategy (CVHS), assesses ongoing R&D results, and is updated regularly • KMRI-SG4.2. Facilitate the participation of all agents in identifying needs
ACTIONS	• KMRI-ACT4.1. Identify, for each need, the goals sought and the estimated health-related and economic impacts (value-based healthcare) of achieving said goals on cardiovascular health • KMRI-ACT4.2. Identify the sources of information to be used in creating the map of needs: R&D sources of information such as results of the calls for grant applications related to CVDs, CIBER (Biomedical Research Network Centre) strategic lines and actions, information on CVD healthcare management, ITEMAS (ISCIII platform to support R&D in biomedicine and health sciences), patients' associations, atlasvpm.org website and others • KMRI-ACT4.3. Create a multidisciplinary working group of experts in research, innovation and healthcare management, as well as representatives of patients' associations, to identify needs

GENERAL GOALS	KMRI-GG4.2. Foster research and innovation projects in cardiovascular health, incorporating the opinions of patients and associations
SPECIFIC GOALS	• KMRI-SG4.3. Incorporate opinions and experiences of patients and professionals into research projects in cardiovascular health

ACTIONS	• KMRI-ACT4.5. Use of artificial intelligence, with predictive tools enabling data analysis, to improve patients' healthcare and health outcomes • KMRI-ACT4.6. Incorporate value-based healthcare methodology including patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) into projects • KMRI-ACT4.7. Research into new organizational models that identify new roles and changes in areas of competence and promote multidisciplinary team • KMRI-ACT4.8. Foster the creation of multidisciplinary working groups of experts in research, innovation and healthcare management, as well as representatives of patients' associations, and disseminate the conclusions

Critical point KMRI5: Promote R&D projects that respond to existing cardiovascular health needs, foster collaboration and facilitate knowledge transfer to clinical practice

GENERAL GOALS	KMRI5-GG5.1. Ensure that R&D projects responding to the cardiovascular health needs identified are incorporated into R&D projects at the regional, national and European levels KMRI5-GG5.2. Encourage research in the National Health System and promote the participation of teams or researchers in calls for R&D grant applications, fostering collaboration between teams and centres from different Autonomous Communities KMRI5-GG5.3. Improve the transfer of R&D to clinical practice, in accordance with the updating procedure set forth in the framework of the National Health System's common portfolio of services
SPECIFIC GOALS	• KMRI-SG5.1. Identify European, national and regional R&D programmes and calls for grant applications that provide funding for the health sector, as well as those responsible for said calls for grant applications and programmes • KMRI-SG5.2. Identify those teams and research centres working on cardiovascular health that may be eligible to participate in European, national and regional calls for grant applications, to encourage and promote their participation • KMRI-SG5.3. Identify research projects that meet the cardiovascular health needs identified, the related costs/investment and the patents generated
ACTIONS	• KMRI-ACT5.1: Transfer the map of cardiovascular health needs to programmes and calls for grant applications • KMRI-ACT5.2: Encourage multiregional, national and international participation • KMRI-ACT5.3. Propose the selected projects of interest for cardiovascular health to the Institutional Committee, to achieve the support and/or interest of the Autonomous Communities for their incorporation into regional R&D programmes

Critical point KMRI6: Promote epidemiological studies on differences in the prevalence of CVD conditioned by gender or other inequities

GENERAL GOALS	KMRI-GG6: Incorporate and consolidate the sex/gender perspective and that of other determinants of inequality such as the digital divide and location, in research on CVD

SPECIFIC GOALS	• KMRI-SG6.1. Adopt a sex/gender approach to population epidemiology • KMRI-SG6.2. Adopt a sex/gender approach to clinical epidemiology • KMRI-SG6.3. Approach population epidemiology from the perspectives of inequality determinants other than sex/gender • KMRI-SG6.4. Approach clinical epidemiology from the perspectives of inequality determinants other than sex/gender
ACTIONS	• KMRI-ACT6.1. Determine the magnitude of cardiovascular diseases using different determinants of inequality, including sex • KMRI-ACT6.2. Estimate the risk factors, segmented by different determinants of inequality, including sex, in the context of Spain • KMRI-ACT6.3. Evaluate primary, secondary and tertiary prevention measures regarding CVD with a gender approach and from the perspective of other determinants of inequality • KMRI-ACT6.4. Prove the impact of sex differences and gender biases in healthcare, as the causes of delays and diagnostic errors in CVD, as well as from the perspective of other determinants of inequality • KMRI-ACT6.5. Validate diagnostic tests depending on sex (thresholds for normality/abnormality) and other inequality determinants such as age, digital divide or location • KMRI-ACT6.6. Evaluate the implementation of clinical guidelines depending on sex/gender, as well as other inequality determinants such as age, digital divide or location

Critical point KMRI7: Support initiatives regarding development models for virtual care and the improvement of outcomes in patients with CVD in the framework of the National Health System's Digital Health Strategy

GENERAL GOALS	KMRI-GG7.1. Facilitate accessibility for CVD patients through e-health platforms with proper identification, effectiveness and security validation ("prescribable apps"), assessment and replication in the National Health System KMRI-GG7.2. Foster the identification, validation, assessment and replication in the National Health System of tools to improve cardiovascular health that use artificial intelligence technologies and PROMs and PREMs
SPECIFIC GOALS	• KMRI-SG7.1. Identify and assess e-health tools that use artificial intelligence technology and PROMs and PREMs to improve cardiovascular health • KMRI-SG7.2. Identify, assess and foster the replication in the National Health System of tools to improve cardiovascular health that use artificial intelligence technology and PROMs and PREMs
ACTIONS	• KMRI-ACT7.1. Disseminate the assessment of effective e-health tools • KMRI-ACT7.2. Propose to the Institutional Committee that the Autonomous Communities support the implementation or replication of e-health tools in their health systems and seek funding programmes or instruments, as the case may be

5.2.4 Goals and actions associated with equity and gender in health

<u>Critical point EQGEN1</u>: Promote knowledge and self-care related to cardiovascular health among women

GENERAL GOALS	GEN-GG1. Incorporate the gender perspective into promotion and prevention actions, to achieve gender equity in cardiovascular health outcomes
SPECIFIC GOALS	• GEN-SG1.1. Empower women for self-care • GEN-SG1.2. Raise awareness among society as a whole and women in particular about the impact of cardiovascular diseases on women • GEN-SG1.3. Improve primary and secondary CVD prevention through interventions aimed at women • GEN-SG1.4. Incorporate the gender perspective into educating patients and the people closest to them about self-care and co-responsibility as regards their cardiovascular health
ACTIONS	• GEN-ACT1.1. Design and launch interventions to teach women and girls at educational and healthcare centres about the importance of caring for their own health, including the promotion of healthy habits, and to teach men and women about the need to share the burden of caring for others • GEN-ACT1.2. Work together with institutions responsible for equality policies to promote co-responsibility and investment in public care services • GEN-ACT1.3. Produce cardiovascular health materials about health and gender, and make them available to educational and healthcare centres, as well as to equality institutions and women's associations • GEN-ACT1.4. Develop primary and secondary CVD prevention interventions specific to women, and which address cardiovascular risk factors, considering the ways in which such risk factors are different in women than in men • GEN-ACT1.5. Ensure the mainstreaming of gender in strategies, interventions and prevention and health promotion materials relating to CVD regarding tobacco use, physical exercise, food and care • GEN-ACT1.6. Create repositories of best practices for preventing CVD and promoting cardiovascular health among women and girls • GEN-ACT1.7. Ensure that all strategies that involve working with patients such as at health schools and patient schools take into account the characteristics of CVD in women, the specific nature of certain CVD risk factors in women, and education on the early detection of symptoms • GEN-ACT1.8. Include, in educational interventions aimed at patients, awareness-raising/training about co-responsibility in caring for cardiovascular patients, reducing the excessive burden of care, which usually falls upon the women closest to them • GEN-ACT1.9. Raise awareness among patients and carers (including professionals) of the importance of reducing the stress stemming from caring for patients and dependent persons, as a cardiovascular risk prevention measure in carers

Critical point EQGEN2: Train all Spanish National Health System professionals in the specific aspects of CVD (diagnosis and treatment) concerning women and gender inequalities

GENERAL GOALS	GEN-GG2.1. Acquire and assess skills in detecting distinguishing aspects in CVD GEN-GG2.2. Improve the detection and treatment of cardiovascular risk factors (CVRF), as well as care for and treatment of women with an established CVD
SPECIFIC GOALS	• GEN-SG2.1. Use diagnostic test values standardized by sex • GEN-SG2.2. Design and implement protocols and procedures with a gender perspective • GEN-SG2.3. Improve the equitable implementation of clinical practice guidelines in men and women with equal healthcare needs
ACTIONS	• GEN-ACT2.1. Adapt standards by sex, in areas such as testing (e.g. use of ultrasensitive troponins to detect myocardial damage) or the use of imaging techniques (e.g. use of BSA-indexed ventricular diameters to determine whether surgery is indicated in patients with valvular heart disease) • GEN-ACT2.2. Develop early prevention protocols for women. High blood pressure, gestational diabetes, diabetes, hyperlipidaemia, obesity and sedentary lifestyle • GEN-ACT2.3. Promote the early diagnosis of acute coronary syndrome in women and their transfer to hospitals with revascularization capabilities • GEN-ACT2.4. Develop protocols to optimize CVD treatment, aimed specifically at women • GEN-ACT2.5. Use evidence-based therapies equitably for both sexes, especially in acute coronary syndrome, heart failure and arrhythmia

Critical point EQGEN3: Address social inequalities in health in the Strategy's actions using an interdisciplinary approach

GENERAL GOALS	GEN-GG3: Integrate equity in health into the Strategy's actions
SPECIFIC GOALS	• GEN-SG3.1. Use a checklist to include actions addressing social inequalities in health in the CVHS • GEN-SG3.2. Incorporate disaggregation by socio-economic variables into the monitoring and evaluation of the Strategy
ACTIONS	• GEN-ACT3.1. Use a checklist to analyse the Strategy's approach to addressing social inequalities in health, and propose improvements • GEN-ACT3.2. Analyse, disaggregating by socio-economic variables (age, social class, educational level, location, etc., in addition to sex/gender, which was already envisaged in previous critical points), the Strategy indicators for which such analysis is appropriate/feasible

5.2.5 Goals and actions associated with ischaemic heart disease

<u>Critical point CHD1</u>: Develop cardiac rehabilitation and secondary prevention programmes in hospital and primary care depending on patients' degree of risk

GENERAL GOALS	CHD-GG1. Improve access to cardiac rehabilitation and secondary prevention programmes equitably for male and female AMI patients following coronary revascularization through angioplasty or surgery, extending them to patients with non-revascularizable coronary disease, establishing a network including the hospital, reference hospitals, primary care and patients' organizations, to improve morbidity and mortality rates and quality of life
SPECIFIC GOALS	• CHD-SG1.1. Guarantee and facilitate the provision of secondary prevention and hospital cardiac rehabilitation in phase II programmes to patients with ischaemic heart disease and moderate to high risk as soon as possible after an acute event (AMI, percutaneous revascularization or cardiac surgery) • CHD-SG1.2. Foster continuity of care through structured secondary prevention and primary care cardiac rehabilitation in phase II and phase III programmes for low-risk patients, establishing indicators to assess effectiveness and making use of new technologies • CHD-SG1.3. Establish specific measures to make it easier for women to access and complete cardiac rehabilitation programmes

ACTIONS	• CHD-ACT1.1. Foster the development of Secondary Prevention and Cardiac Rehabilitation Units —with standardized resources and activities— in areas where they do not yet exist • CHD-ACT1.2. Develop interdisciplinary outpatient activities (phase II) for patients with high or moderate risk at tertiary or secondary hospitals or other healthcare institutions, adapted to the patients' degree of risk; and for patients with moderate or low risk at regional hospitals, health centres or peripheral specialized centres in coordination with their tertiary or secondary reference hospital, fostering the creation of networks between primary and hospital care • CHD-ACT1.3. Incorporate new technologies to strengthen the role of primary care teams (family medicine, community nursing and physical therapy) in phase II (low risk) and phase III of cardiac rehabilitation, establishing streamlined two-way communication channels between primary care centres and hospitals (specific apps, IT platforms, e-consultation, shared medical e-records) Technological communication tools between primary care and hospital care must be versatile and multipurpose • CHD-ACT1.4. Designate healthcare reference centres in secondary prevention and cardiac rehabilitation in each health area or zone • CHD-ACT1.5. Promote continuity of care by designing structured interdisciplinary protocols and programmes on secondary prevention and cardiac rehabilitation for primary care and hospital care, which ensure monitoring of and achievement of the goals of secondary prevention, establishing indicators to assess effectiveness and making use of new technologies

ACTIONS	• CHD-ACT1.6. Stratify risk, to enable individualized prescription and modification of therapy, and assess the degree of supervision necessary during the rehabilitation progress to ensure patients feel safe • CHD-ACT1.7. Promote the drafting and dissemination of ongoing multidisciplinary training programmes on cardiac rehabilitation and secondary prevention among all professionals involved in caring for patients with ischaemic heart disease • CHD-ACT1.8. Define strategies to ensure that, during phase I, each patient receives basic information about: the disease and their CVRFs; the therapeutic plan, how to handle angina pain, a clinical report with recommendations for the patient and information for the health professionals involved in monitoring them at each level of care • CHD-ACT1.9. Foster training and empowerment of patients and their families in managing their chronic disease via a heart-healthy lifestyle, adherence to the therapeutic plan, and self-control of risk factors • CHD-ACT1.10. Establish specific measures to facilitate equity and accessibility for women and for patients with lower accessibility for psychosocial reasons, to complete secondary prevention and cardiac rehabilitation programmes. This involves coordination with social services • CHD-ACT1.11. Design information and training strategies for professionals, patients and associations to raise awareness and increase the percentage of women who begin and finish secondary prevention and cardiac rehabilitation programmes • CHD-ACT1.12. Launch a training programme in primary care and hospital accident and emergency care that fosters greater knowledge of the symptoms of ischaemic heart disease in women • CHD-ACT1.13. Implement initiatives aimed at informing the public about the symptoms of ischaemic heart disease in women • CHD-ACT1.14. Foster and promote socio-community actions and entities such as group health education, expert patients, patients' associations for mutual assistance, community activities

Critical point CHD2: Optimize the functioning of care networks for acute coronary syndrome

GENERAL GOALS	CHD-GG2. Improve the accessibility and functioning of care networks for AMI
SPECIFIC GOALS	• CHD-SG2.1. Improve morbidity and mortality rates and prognosis for AMI patients, optimizing the functioning of specific networks for the immediate care of the maximum number of patients with suspected ST-elevation myocardial infarction (STEMI), and guaranteeing access to a timely invasive strategy for patients with high-risk non-ST-elevation acute coronary syndrome (NSTE-ACS), mainly non-ST-elevation myocardial infarction (NSTEMI), admitted to hospitals without haemodynamic facilities • CHD-SG2.2. Increase access to these networks for the most vulnerable people with high-risk NSTE-ACS (old age, frailty and/or comorbidities) and increase and accelerate reperfusion rates in women with suspected STE-ACS

ACTIONS	• CHD-ACT2.1. Redesign regional and provincial care networks for AMI (ICD-10: I21*; ICD-9: 410.0* to 410.7* [excluding 410.80 to 410.99]) incorporating patients with defined high-risk NSTE-ACS criteria (ICD-10: I21.4* or ICD-9: 410.7*) • CHD-ACT2.2. Promote the development of registration and quality assessment systems for care activities using indicators that ensure good clinical practice, equity and absence of variability • CHD-ACT2.3. Hold provincial and regional network meetings and identify those responsible at the provincial level, and the general coordinator of the network • CHD-ACT2.4. Define standardized action and care protocols (diagnosis, treatment, transport) in the entire geographical area for assistance and coordination between medical emergency systems and the hospitals with the capability to perform primary percutaneous coronary interventions • CHD-ACT2.5. Define strategies to ensure reperfusion is accessible 24/7 for patients in areas that are far away from centres with the capability to perform primary percutaneous coronary interventions, and for patients admitted to hospitals that do not perform percutaneous coronary interventions, avoiding unnecessary transfers • CHD-ACT2.6. Promote a training programme for all professionals involved in the care of AMI patients at the different levels of care, to improve and standardize the diagnosis and treatment of AMI • CHD-ACT2.7. Design and launch a strategic plan on education, communication, information and awareness-raising for the public and for professionals, but especially aimed at the most vulnerable groups (older patients and women), to ensure equitable access to diagnosis and therapy, and to promote a more efficient use of emergency systems • CHD-ACT2.8. Define, together with the Autonomous Communities, a minimum set of key indicators so that the AMI care networks can report information in a standardized manner • CHD-ACT2.9. Define, together with the Autonomous Communities, a minimum set of key indicators on patients with an AMI diagnosis who have not received reperfusion treatment

5.2.6 Goals and actions associated with heart failure

Critical point HF1: Improve the early detection and diagnosis of heart failure

GENERAL GOALS	HF-GG1. Promote the early diagnosis of heart failure (HF) in primary and hospital care to improve the prognosis of the disease and the quality of life of patients with HF
SPECIFIC GOALS	• HF-SG1.1. Develop protocols or systems that enable early diagnosis of HF regardless of the environment in which it is suspected (primary or hospital care)

ACTIONS	• HF-ACT1.1. Establish an evaluable ongoing training programme on heart failure to improve the skills of professionals involved in diagnosing and handling HF • HF-ACT1.2. Facilitate, at all levels of care, the determination of natriuretic peptides in patients with suspected HF, following predetermined consensus-based protocols and criteria, in accordance with standards and recommendations • HF-ACT1.3. Establish standardized, consensus-based criteria between primary care and cardiology services, for the programmed and preferential referral of patients that have tested positive for natriuretic peptides, to complete their cardiological study, including an echocardiography

Critical point HF2: Organize care for HF patients through multidisciplinary HF units/programmes, coordinated with the participation of all the professionals involved at all levels of care

GENERAL GOALS	HF-GG2. Foster the implementation of multidisciplinary care organizational models, coordinated between levels of care, that favour comprehensive care for all persons diagnosed with HF and their families and carers
SPECIFIC GOALS	• HF-SG2.1. Develop structured multidisciplinary programmes between the different spheres of care that include patients' education, optimization of treatments, psychosocial support, and improved access to care • HF-SG2.2. Implement multidisciplinary (community, specialized or advanced) care units/programmes adapted to the characteristics of the health environment and the target population
ACTIONS	• HF-ACT2.1. Foster the creation, at all levels of care, of multidisciplinary teams specialized in heart failure, with the coordinated participation of all professionals involved at the different levels, in both hospital and out-of-hospital care • HF-ACT2.2. Establish common standardized National Health System criteria for handling heart failure at care units, which include, as a priority, indications for the transfer of care between specialized, emergency and primary care services after discharge from hospital or from A&E, both after a new HF diagnosis and in successive readmissions • HF-ACT2.3. Carry out activities such as workshops, lectures and group activities for patients diagnosed with HF and their carers, to improve their symptoms, quality of life, and adherence to pharmacological and non-pharmacological treatments, thus fostering self-care • HF-ACT2.4. Include, in the evaluation of patients, a functional assessment including prognostic, frailty and functional capacity scales

Critical point HF3: Create specific networks (shock code) to organize the care of cardiogenic shock (CS) patients

GENERAL GOALS	HF-GG3. Organize, at autonomous community level, a care network for cardiogenic shock patients that facilitates advanced treatments known to improve survival rates among patients who may benefit from them

SPECIFIC GOALS	• HF-SG3.1. Determine the criteria regarding CS patients who might benefit from advanced treatments in the framework of the National Health System's common portfolio of services and who are referred to specialized centres • HF-SG3.2. Develop an activation, referral and transport protocol ("shock code") that includes the criteria for referral, receiving hospitals, appropriate means and times of transport
ACTIONS	• HF-ACT3.1. Prepare a consensus-based model and implement it at each hospital for the early identification of cardiogenic shock patients who are eligible for early revascularization and/or circulatory support, to provide early care to these patients, with each centre acting in accordance with the level of care it provides pursuant to the protocol • HF-ACT3.2. Ensure the transfer of shock code patients in a coordinated manner and with the appropriate support between health centres/systems of different levels[10] (in general, from group 1, 2 and 3 hospitals to group 4 and 5 hospitals), through the preparation, following a model approved by all the parties involved, of protocols for the transportation of CS patients in specialized means of transport and with staff trained in transporting patients fitted with circulatory assist devices • HF-ACT3.3. Ensure the availability at the centres providing the bulk of care for CS patients of multidisciplinary teams (formed by cardiologists with expertise in caring for advanced heart failure patients, cardiac surgery, interventional cardiology and critical care) who are available around the clock (24/7), through provisions set forth in the corresponding autonomous community regulations • HF-ACT3.4. Promote consensus among the Autonomous Communities for the definition of common criteria and indicators to be met by the hospitals depending on their classification as regards their participation in the autonomous community care network for CS patients, as well as others appropriate for the organizations responsible for transporting these patients

5.2.7 Goals and actions associated with valvular heart disease

Critical point V1: Promote the early diagnosis of common valvular heart diseases

GENERAL GOALS	V-GG1. Promote the early diagnosis of common valvular heart diseases
SPECIFIC GOALS	• V-SG1.1. Propose that cardiac auscultation be performed systematically among the over-65s • V-SG1.2. Analyse the data from echocardioscopies performed by non-cardiological specialists in primary and hospital care to identify patients with possible valvular heart disease • V-SG1.3. Design referral protocols for hospital care of patients with suspected valvular heart disease and for primary care monitoring

[10] This classification of hospital groups refers to the classification of clusters of general hospitals, through the use of cluster analysis, as described at https://www.mscbs.gob.es/estadEstudios/estadisticas/docs/CMBD/CLASIFICACIONHOSPITALESCLUSTER.pdf Although this classification is used as a reference in the framework of this initiative, the final classification to be used will be that defined depending on the actions proposed in relation to this critical point (see action HF-ACT3.4).

ACTIONS	• V-ACT1.1. Improve the knowledge of health professionals about the factors involved in the development of valvular heart diseases • V-ACT1.2. Promote systematic cardiac auscultation among the over-65s by primary care professionals (creation of a verification button in the primary care health record) • V-ACT1.3. Analyse the data from echocardioscopies performed in primary care to identify patients with a possible valvular heart disease • V-ACT1.4. Define common and homogeneous criteria for the referral and monitoring of patients with valvular heart disease, including: a) the indication to perform cardiac auscultation among the over-65s and in patients with symptoms of a potentially cardiac origin b) the referral to cardiology departments of heart murmur patients for echocardiograms c) the care pathway with recommended periods of re-evaluation and monitoring depending on the findings of the echocardiogram • V-ACT1.5. Organize seminars to inform and train primary care health professionals on the updated protocol

<u>Critical point V2</u>: Optimize the choice of treatment for severe aortic stenosis (AoS) through comprehensive multidisciplinary valuation

GENERAL GOALS	V-GG2. Improve the comprehensive approach for patients with severe aortic stenosis
SPECIFIC GOALS	• V-SG2.1. Create multidisciplinary working assessment models that meet minimum standards • V-SG2.2. Adapt the use of valve replacement to the evidence depending on the level of risk and the potential benefits
ACTIONS	• V-ACT2.1. Establish common criteria, agreed between specialists in cardiology, cardiac surgery, geriatrics and nursing, for the comprehensive approach for patients with severe aortic stenosis, including the different diagnostic phases, therapeutic options, risk assessment, decision trees and the different specialists that must be involved in each of the steps • V-ACT2.2. Establish a mechanism for process quality control • V-ACT2.3. Propose recommendations on the composition of multidisciplinary teams to assess and treat these patients, taking health outcomes into account • V-ACT2.4. Develop a consensus document for decision-making regarding patients with severe aortic stenosis and perform percutaneous and surgical procedures

5.2.8 Goals and actions associated with arrhythmia

Critical point A1: Improve effectiveness in access to cardiopulmonary resuscitation (CPR)

GENERAL GOALS	A-GG1. Increase survival with good neurological recovery in patients who suffer a cardiac arrest (CRA)
SPECIFIC GOALS	• A-SG1.1. Create a national framework for out-of-hospital CRA care that includes the following goals: — A-SG1.1.1. Identify the health outcomes of our health system: survival rates and neurological sequelae of CRA in Spain — A-SG1.1.2. Expand early defibrillation (facilitation + equipment). Reach a consensus on common criteria for the use of automated external defibrillators (AEDs). Increase the number of AEDs — A-SG1.1.3. Increase early resuscitation training, Basic Life Support (BLS) training and AED training for first responders. Provide BLS training to the public — A-SG1.1.4. Extend post-resuscitation care and rehabilitation for patients who regain a pulse after CRA
ACTIONS	• A-ACT1.1. Draw up a National Care Plan for Cardiac Arrest (Ministry of Health, Autonomous Communities and Scientific Societies), including the following actions — A-ACT1.1.1. Establish, together with the Autonomous Communities, common indicators to enable the collection of information on out-of-hospital cardiac arrest — A-ACT1.1.2. Establish, together with the Autonomous Communities, common indicators to enable the collection of information on in-hospital cardiac arrest — A-ACT1.1.3. Develop a Hospital Cardiac Arrest Plan for hospitals and health centres — A-ACT1.1.4. Standardize common criteria on the use and installation of AEDs on a national level — A-ACT1.1.5. Ensure that telephone support from emergency coordination centres (telephone CPR) is widely available to lay bystanders performing CPR — A-ACT1.1.6. Incorporate volunteer alert programmes, supported by the geolocation of AEDs, into Emergency Medical Services (EMS) — A-ACT1.1.7. Establish reference networks in each community for the care of patients who have recovered from CRA — A-ACT1.1.8. Early rehabilitation for patients who have recovered from CRA • A-ACT1.2. Establish a structured plan for BLS and AED training programmes aimed at: — Public employees working outdoors — The public — Students (to be included in the educational curriculum)

Critical point A2: Promote the early diagnosis of atrial fibrillation (AF)

GENERAL GOALS	A-GG2. Reduce the prevalence of undiagnosed AF among the Spanish population
SPECIFIC GOALS	• A-SG2.1 Ensure the early detection of AF through opportunistic pulse-taking in primary care of people aged 65 and older, especially in patients with high blood pressure, diabetes, obesity or heart failure, and by carrying out electrocardiograms (ECG) if the pulse is irregular
ACTIONS	• A-ACT2.1. Carry out a training programme at population level on how to take a pulse and identify whether it is arrhythmic. Launch initiatives through scientific societies and/or patient associations with the collaboration of local authorities (City Councils). "Take the pulse of your heart" • A-ACT2.2. Develop initiatives among health professionals. "Take your patient's pulse" aimed at all health agents • A-ACT2.3. Include technological information (provided that it has been validated by regulatory agencies such as the Spanish Agency of Medicines and Medical Devices (AEMPS) in Spain or the Food and Drug Administration (FDA) in the United States, and that it has scientific backing), to promote rhythm checks with wearables within the framework of the National Health System's Digital Health Strategy • A-ACT2.4. Promote tele-monitoring through devices such as ICDs and pacemakers within the framework of the National Health System's Digital Health Strategy • A-ACT2.5. Integrate radial and central pulse-taking training into the school curriculum

VI Indicators

6.1 Summary of indicators

The 61 indicators proposed for the CVHS, organized by theme and critical point, are intended to evaluate the intermediate and final outcomes sought with this Strategy[11]. In keeping with its transformative nature, the CVHS aims to guarantee an appropriate assessment of the cardiovascular health of the Spanish population and the degree of implementation and effectiveness of the initiatives needed to promote it. At present, some of the data needed to calculate the selected indicators are not available to the Spanish National Health System. Therefore, during the first year of the CVHS's implementation, working groups will be set up to determine the information needed to generate these indicators. These groups will be made up of all the agents involved, especially health professionals, those in charge of the pertinent information systems, and institutional representatives.

Each indicator has a descriptive fact sheet including its formula and expected sources of information. In general, all indicators will be disaggregated by sex, cardiovascular risk and age group, as well as by variables associated with inequality factors such as socio-economic level and region, whenever possible and in line with the CVHS's own goals in terms of equity and gender.

Appendix II includes additional indicators of interest for a complete assessment of cardiovascular health in Spain and remedies.

The following is an overview of the proposed indicators[12].

Indicators for cross-cutting themes (continuity of care, patient safety, cardiovascular health information)

1. Percentage of patients in integrated care processes for prioritized CVDs/total patients treated for prioritized CVDs
2. Percentage of patients in social-health integration processes for prioritized CVDs/total patients treated for prioritized CVDs
3. **Differences in the evolution of patients included and not included in integrated programmes, with regard to:***
   - 3.1 **Mortality**
   - 3.2 **Quality of life data**
   - 3.3 **PROMs/PREMs**
   - 3.4 **Access times for invasive therapy, where applicable**
4. Safe practices in the approach to CVD, in terms of:
   - 4.1 Protocols for the use of high-risk medicines in CVD patients
   - 4.2 Hand hygiene in CVD care
   - 4.3 Use of medical devices in CVD care, including catheter bacteraemia, phlebitis and sepsis

[11] In addition to the 61 indicators referred to above, there are 20 sub-indicators providing additional information.

[12] Indicators considered key for their potential to transform cardiovascular health in Spain are marked in bold and with an asterisk (*).

5. Percentage of cardiology services with training and dissemination programmes on safe practices in the field of CVD
6. Percentage of cardiology services with functioning security incident reporting systems
7. Availability of mapping of selected specific cardiovascular health and CVD indicators
8. Model for systematic analysis of cardiovascular health and evolution of CVD outcomes
9. **Percentage of people with the 7 metrics within a healthy range***
    - 9.1 **Percentage of people who have used tobacco in the last 12 months**
    - 9.2 **Percentage of people with BMI in normal range**
    - 9.3 **Percentage of people with moderate and high levels of physical activity**
    - 9.4 **Percentage of people with a balanced diet**
    - 9.5 **Percentage of people with cholesterol in normal range**
    - 9.6 **Percentage of people with blood pressure in normal range**
    - 9.7 **Percentage of people with fasting blood glucose in normal range**

Indicators for promotion, prevention and citizen capacity building

1. Percentage of people who have received advice on physical activity, healthy eating, and tobacco and alcohol consumption, with a note in the patient's primary care health record
2. Public initiatives aimed at promoting healthy eating, physical activity, active transport and leisure, all published in the respective official gazettes
3. Average age at first use of tobacco
4. Prevalence of tobacco use in Spain
5. Percentage of people on antihypertensive treatment with controlled blood pressure
6. Percentage of professionals trained in health promotion and disease prevention activities in the last year
7. **Percentage of schools developing programmes on the adoption of healthy lifestyles: physical activity and healthy eating, well-being and emotional health, emotional and sexual education, safety and prevention of risks, injuries and accidents, education on alcohol, tobacco and other addictive substances***

Indicators for knowledge management, research and innovation

1. Training programmes/courses for professionals in the field of cardiovascular health with an interdisciplinary and inclusive approach, focused on health outcomes
2. Availability of:
    - 2.1 Patient and carer training programmes on cardiovascular health and CVD
    - 2.2 Consistent social media outreach programmes with messages about cardiovascular health from health providers
    - 2.3 Consistent social media outreach programmes with messages about cardiovascular health, incorporating messages from patients/patient organizations
3. National and international publications on outcomes related to CVD needs obtained from patient-reported indicators

4. **Percentage of cardiology services submitting patient-reported outcome reports that measure patients' perception of care, processes or personal impact of the disease***
5. Up-to-date cardiovascular health needs map
6. Percentage of national and international projects involving patients or patient associations
7. **Percentage of projects incorporating cardiovascular health needs***
8. Percentage of cardiovascular health projects involving researchers from two or more Autonomous Communities
9. Percentage of cardiovascular health projects incorporating changes in the organization or implementation of clinical practice
10. Availability of e-health tools to improve accessibility; these should be identified, evaluated and replicated
11. Availability of tools to improve outcomes using artificial intelligence; these should be identified, evaluated and replicated
12. Availability of tools to improve outcomes incorporating PROMs and PREMs; these should be identified, evaluated and replicated
13. Percentage of population-based epidemiology studies that disaggregate design and outcomes by sex
14. Percentage of clinical epidemiology studies that disaggregate design and outcomes by sex

Indicators for equity and gender in health

1. Awareness-raising, educational and information programmes specific to women's cardiovascular health and opportunities for self-care, in collaboration with other ministries and/or departments with competence in the field of equality
2. **Percentage of annual increase in coverage of primary and secondary prevention actions for women and comparison with the increase for men***
3. Integration in primary care training programmes of at least one action on education for the improvement of cardiovascular health and self-care in women
4. Percentage of diagnostic tests in which the reference values are disaggregated by sex
5. **Implementation of gender-sensitive initiatives and protocols in the last year***
6. Percentage of CVHS indicators with available information disaggregated by socio-economic variables and determinants of inequality

Indicators for ischaemic heart disease

1. Secondary prevention and cardiac rehabilitation programmes in hospitals and health areas that care for these patients
2. Percentage of patients reached by each secondary prevention and cardiac rehabilitation intervention

3. **Percentage of AMI patients included in a secondary prevention and cardiac rehabilitation programme***
4. Time taken to enter a secondary prevention and cardiac rehabilitation programme after discharge from hospital
5. Risk-adjusted in-hospital mortality rate in patients admitted for AMI
   5.1 In patients with complete reperfusion
   5.2 In patients with primary angioplasty
6. Percentage of STEMI patients treated with reperfusion therapy
   6.1 In patients with complete reperfusion
   6.2 In patients with primary angioplasty
7. Percentage of NSTEMI patients who receive a coronary angiography during hospitalization

Indicators for heart failure

1. Prevalence of heart failure in primary care
2. **Access to natriuretic peptide testing in primary care***
3. **Multidisciplinary teams at each hospital in each autonomous community***
4. Specific protocols for referral from primary care to hospital after confirmation of HF using natriuretic peptide testing
5. In-hospital mortality rate in patients admitted for HF
6. **Percentage of hospitals with designated multidisciplinary HF teamsCardiogenic shock (CS) network exists and works across the entire autonomous community***
7. In-hospital mortality of patients admitted for cardiogenic shock

Indicators for valvular heart disease

1. **Registration system for the mandatory verification of cardiac auscultation in the over-65s in primary care EHRs with systematic registration in the Autonomous Communities***
2. Existence of specific annual primary care training programmes to improve early diagnosis of valvular heart disease
3. Protocols for referral and follow-up of valvular heart disease patients at primary care centres
4. **Hospital-based multidisciplinary working models for decision-making regarding patients with severe AoS***
5. Age-adjusted and sex-disaggregated rate per 100,000 inhabitants for:
   5.1 Transcatheter aortic valve implantation (TAVI)
   5.2 Aortic valve replacement surgery
   5.3 Non-intervention

Indicators for arrhythmia

1. **National CRA Care Plan***

2. Training programmes for public employees, the public and students on CRA care
3. Systems to measure key indicators in CRA care:
   3.1 No. of CRAs treated at out-of-hospital/hospital level
   3.2 Response time (BLS/AED)
   3.3 Use of CPR/AEDs
   3.4 Survival without neurological damage
4. **Percentage of patients who have recovered from CRA without severe neurological damage***
5. **Registration system for the mandatory verification of pulse-taking in the over-65s in primary care EHRs with systematic registration in the Autonomous Communities***
6. Proportion of patients with a first diagnosis of atrial fibrillation (AF) identified during a primary care consultation

6.2 Indicator fact sheets by theme

6.2.1 Indicators for cross-cutting themes

Critical point TR-CONTASIST: Promote and strengthen continuity of care as a key element of quality, efficient and safe healthcare for patients with CVD[13]

INDICATORS	1) Percentage of patients in integrated care processes for prioritized CVDs/total patients treated for prioritized CVDs 2) Percentage of patients in social-health integration processes for prioritized CVDs/total patients treated for prioritized CVDs 3. Differences in the evolution of patients included and not included in integrated programmes: 3.1. Mortality 3.2. Quality of life data 3.3. PROMs/PREMs 3.4. Access times for invasive therapy, where applicable
FORMULAS	1) Formula: (a/b) * 100 a = Patients in integrated care processes for prioritized CVDs b = Total patients treated for prioritized CVDs 2) Formula: (a/b) * 100 a = Patients in social-health integration processes for prioritized CVDs b = Total patients treated for prioritized CVDs 3) Formula: a-b a = Outcomes by sub-indicator in patients in social-health integration processes for prioritized CVDs b = Outcomes by sub-indicator in patients with a prioritized CVD
SOURCES	1. Autonomous Communities

13 All critical points corresponding to cross-cutting themes are shown in a single section.

Critical point TR-SEGPAC: Promote safe practices in the care of patients with CVD

INDICATORS	4) Safe practices in the approach to CVD, in terms of: 4.1) Protocols for the use of high-risk medicines in CVD patients 4.2) Hand hygiene in CVD care 4.3) Use of medical devices in CVD care, including catheter bacteraemia, phlebitis and sepsis 5) Percentage of cardiology services with training and dissemination programmes on safe practices in the field of CVD 6) Percentage of cardiology services with functioning security incident reporting systems
FORMULAS	4) Formulas: 4.1) Structured questionnaire 4.2) Indicators obtained from the patient safety strategy, narrowed down to the field of cardiovascular health 4.3) Indicators obtained from the patient safety strategy, narrowed down to the field of cardiovascular health 5) Formulas: 5.1) Formula: (a/b) * 100 a = Number of incidents reported in a year b = Total number of incidents reported in the previous year 5.2) Absolute value of number of incidents reported in a year 6) Formula: (a/b) * 100 a = Cardiology services with functioning security incident reporting systems b = Total cardiology services
SOURCES	I. Ministry of Health II. Autonomous Communities

Critical point TR-INFSCV: Have access to verified information by which to identify the status of cardiovascular health and CVD care in the Spanish population

INDICATORS	7) Availability of mapping of selected specific cardiovascular health and CVD indicators 8) Model for systematic analysis of cardiovascular health and evolution of CVD outcomes 9) Percentage of people with the 7 metrics within a healthy range 9.1) Percentage of people who have used tobacco in the last 12 months 9.2) Percentage of people with BMI in normal range 9.3) Percentage of people with moderate and high levels of physical activity 9.4) Percentage of people with a balanced diet 9.5) Percentage of people with cholesterol in normal range 9.6) Percentage of people with blood pressure in normal range 9.7) Percentage of people with fasting blood glucose in normal range

FORMULAS	7) Structured questionnaire 8) Structured questionnaire 9) Formula: (a/b) * 100 Percentage of people with the 7 metrics within a healthy range a = People with the 7 metrics in normal range b = Total number of people with recorded information on the 7 metrics 9.1) Percentage of people who have used tobacco in the last 12 months[14] a = People who have not used tobacco in the last 12 months b = Total number of people with recorded information on the 7 metrics 9.2) Percentage of people with BMI in normal range[15] a = People with BMI < 25kg/m2 b = Total number of people with recorded information on the 7 metrics 9.3) Percentage of people with moderate and high levels of physical activity[16] a = People who do ≥150 min per week of moderate or intense activity b = Total number of people with recorded information on the 7 metrics 9.4) Percentage of people with a balanced diet[17] a = People with at least 4 of the following dietary habits: ≥450g of fruit or vegetables per day, ≥198g of fish per week, ≥85g of fibre-rich wholegrain cereals per day, <1,500mg sodium per day, ≤1 litre of sweetened beverages per week b = Total number of people with recorded information on the 7 metrics 9.5) Percentage of people with cholesterol in normal range a = People with cholesterol <200mg/dL b = Total number of people with recorded information on the 7 metrics 9.6) Percentage of people with blood pressure in normal range a = People with blood pressure <120/80 mmHg b = Total number of people with recorded information on the 7 metrics 9.7) Percentage of people with fasting blood glucose in normal range a = Individuals with HbA1c <100mg/dL b = Total number of people with recorded information on the 7 metrics
SOURCES	I. Autonomous Communities

[14] In the absence of information on one or more of the above-mentioned indicators, the indicators included in the National Health System's Health Promotion and Disease Prevention Strategy on tobacco consumption may be used.
[15] In the absence of information on one or more of the above-mentioned indicators, the indicators included in the National Health System's Health Promotion and Disease Prevention Strategy on the prevalence of overweight and obesity may be used.
[16] In the absence of information on one or more of the above-mentioned indicators, the indicators included in the National Health System's Health Promotion and Disease Prevention Strategy on physical activity may be used.
[17] In the absence of information on one or more of the above-mentioned indicators, the indicators included in the National Health System's Health Promotion and Disease Prevention Strategy on healthy eating may be used.

6.2.2 Indicators for promotion, prevention and citizen capacity building

<u>Critical point PPCC1</u>: Promote cardiovascular health and cardiovascular disease prevention among the population of Spain

INDICATORS	1) Percentage of people who have received advice on physical activity, healthy eating, and tobacco and alcohol consumption, with a note in the patient's primary care health record 2) Public initiatives aimed at promoting healthy eating, physical activity, active transport and leisure, all published in the respective official gazettes
FORMULAS	1) Formula: (a/b) * 100 a = People who have received advice on physical activity, healthy eating, and tobacco and alcohol consumption, with a note in the patient's primary care health record b = Total number of people interviewed 2) Structured questionnaire
SOURCES	I. Ministry of Health II. Primary Care Clinical Database (BDCAP) III. Autonomous Communities

<u>Critical point PPCC2</u>: Raise awareness of primary cardiovascular disease prevention, focusing on lifestyle: tobacco use as a risk factor

INDICATORS	3) Average age at first use of tobacco 4) Prevalence of tobacco use in Spain[18]
FORMULAS	3) Indicator obtained from ESTUDES 4) Indicator obtained from ENSE/EESE[19]
SOURCES	I. Spanish National Health Survey (ENSE)/European Health Survey in Spain (EESE) II. Survey on Drug Use in Secondary Education in Spain (ESTUDES)

[18] The aim is to reach a rate of less than 10% by 2040, with a downward trend of at least 1 percentage point every two years.
[19] From 2022 onwards, Spanish Health Survey-(ESE)

Critical point PPCC3: Promote primary cardiovascular disease prevention through the monitoring of biological risk factors

INDICATORS	5) Percentage of people on antihypertensive treatment with controlled blood pressure
FORMULAS	5) Formula: (a/b) * 100 a = People on antihypertensive treatment with controlled blood pressure b = Total number of people on antihypertensive treatment
SOURCES	I. National Health Survey II. Primary Care Clinical Database (BDCAP)

Critical point PPCC4: Develop the capacity building of health professionals and other professionals related to the promotion of cardiovascular health and disease prevention

INDICATORS	6) Percentage of professionals trained in health promotion and disease prevention activities in the last year 7) Number of training courses on cardiovascular health promotion and disease prevention activities carried out
FORMULAS	6) Formula: (a/b) * 100 a = Number of professionals who have received training b = Total number of professionals 7) Number of training courses on cardiovascular health promotion and disease prevention activities carried out
SOURCES	I. Autonomous Communities

Critical point PPCC5: Promote the capacity building of the public in the adoption of healthy lifestyles

INDICATORS	8) Percentage of schools that include the adoption of the following healthy habits in their teaching programmes: physical activity and healthy eating, well-being and emotional health, emotional and sexual education, safety and prevention of risks, injuries and accidents, education on alcohol, tobacco and other addictive substances
FORMULAS	8) Structured questionnaire
SOURCES	I. Autonomous Communities

6.2.3 Indicators for knowledge management, research and innovation

<u>Critical point KMRI1</u>: Focus the training of health professionals on research and innovation in the improvement of cardiovascular health outcomes, as far as possible throughout their training cycle

INDICATORS	1) Percentage of training programmes/courses for professionals in the field of cardiovascular health with an interdisciplinary and inclusive approach, focused on health outcomes
FORMULAS	1) Formula: (a/b) * 100 a = Courses carried out b = Courses scheduled
SOURCES	I. Autonomous Communities

<u>Critical point KMRI2</u>: Carry out initiatives to equip citizens with self-care skills in cardiovascular health

INDICATORS	2) Availability of: 2.1) Patient and carer training programmes on cardiovascular health and CVD 2.2) Consistent social media outreach programmes with messages about cardiovascular health from health providers 2.3) Consistent social media outreach programmes with messages about cardiovascular health, incorporating messages from patients/patient organizations
FORMULAS	2) Structured questionnaire
SOURCES	I. Autonomous Communities

<u>Critical point KMRI3</u>: Include outcomes and experiences reported by patients in the report of institutional outcomes

INDICATORS	3) No. of national and international publications on outcomes related to CVD needs obtained from patient-reported indicators 4) Percentage of cardiology services submitting patient-reported outcome reports that measure patients' perception of care, processes or personal impact of the disease

FORMULAS	3) Formula: Absolute number of national and international publications on outcomes related to CVD needs obtained from patient-reported indicators 4) Formula: (a/b) * 100 a = Cardiology services submitting patient-reported outcome reports b = Total cardiology services
SOURCES	I. Carlos III Health Institute (ISCIII) II. Ministries of Health, Science and Innovation, and other ministries III. Autonomous Communities IV. Scientific Societies

Critical point KMRI4: Identify areas of research and innovation in cardiovascular health based on health system needs or problems that take health outcomes into account

INDICATORS	5) Up-to-date cardiovascular health needs map [20] 6) Percentage of national and international projects involving patients or patient associations
FORMULAS	5) Structured questionnaire 6) Formula: (a/b) * 100 a = National and international projects involving patients or patient associations b = Total national and international projects
SOURCES	I. Carlos III Health Institute (ISCIII) II. Ministries of Health, Science and Innovation, and other ministries III. Autonomous Communities IV. Scientific Societies

Critical point KMRI5: Promote R&D projects that respond to existing cardiovascular health needs, foster collaboration and facilitate knowledge transfer to clinical practice

INDICATORS	7) Percentage of projects incorporating cardiovascular health needs 8) Percentage of CVH projects involving researchers from two or more Autonomous Communities 9) Percentage of CVH projects incorporating changes in the organization or implementation of clinical practice

[20] The development of this map foresees the creation of a multidisciplinary working group, with the participation of all actors, for its design and updating. This map should include:

- Needs of all of the general goals of the CVHS
- Goals and intended impacts on health and economic outcomes
- Existing and new sources of information for monitoring

FORMULAS	7) Formula: (a/b) * 100 a = Projects incorporating cardiovascular health needs b = Total number of projects 8) Formula: (a/b) * 100 a = CVH projects involving researchers from two or more Autonomous Communities b = Total CVH projects 9) Formula: (a/b) * 100 a = CVH projects incorporating changes in the organization or implementation of clinical practice b = Total CVH projects
SOURCES	I. Carlos III Health Institute (ISCIII) II. Ministries of Health, Science and Innovation, and other ministries III. Autonomous Communities IV. Scientific Societies

Critical point KMRI6: Promote epidemiological studies on differences in the prevalence of CVD conditioned by gender or other inequities

INDICATORS	10) Percentage of population-based epidemiology studies that disaggregate design and outcomes by sex 11) Percentage of clinical epidemiology studies that disaggregate design and outcomes by sex
FORMULAS	10) Formula: (a/b) * 100 a = Population-based epidemiology studies that disaggregate design and outcomes by sex b = Total population-based epidemiology studies 11) Formula: (a/b) * 100 a = Clinical epidemiology studies that disaggregate design and outcomes by sex b = Clinical epidemiology studies
SOURCES	I. Carlos III Health Institute (ISCIII) II. Ministries of Health, Science and Innovation, and other ministries III. Autonomous Communities IV. Scientific Societies

Critical point KMRI7: Support initiatives regarding development models for virtual care and the improvement of outcomes in patients with CVD

INDICATORS	12) Availability of e-health tools to improve accessibility; these should be identified, evaluated and replicated 13) Availability of tools to improve outcomes using artificial intelligence; these should be identified, evaluated and replicated 14) Availability of tools to improve outcomes incorporating PROMs and PREMs; these should be identified, evaluated and replicated

FORMULAS	12) Structured questionnaire 13) Structured questionnaire 14) Structured questionnaire
SOURCES	I. Autonomous Communities

6.2.4 Indicators for equity and gender in health

Critical point EQGEN1: Promote knowledge and self-care related to cardiovascular health among women

INDICATORS	1) Awareness-raising, training and information programmes specific to women's cardiovascular health and opportunities for self-care, in collaboration with other ministries and/or departments with competence in the field of equality 2) Percentage of annual increase in coverage of primary and secondary prevention actions for women and comparison with the increase for men 3) Integration in primary care training programmes of at least one action on education for the improvement of cardiovascular health and self-care in women
FORMULAS	1) Structured questionnaire 2) Formula: a-b a = Percentage of women who have participated in primary and secondary prevention actions regarding cardiovascular health b = Percentage of men who have participated in primary and secondary prevention actions regarding cardiovascular health 3) Structured questionnaire
SOURCES	I. Ministry of Health II. Ministry of Equality III. Autonomous Communities

Critical point EQGEN2: Train all National Health System professionals in the specific aspects of CVD (diagnosis and treatment) concerning women and gender inequalities

INDICATORS	4) Percentage of diagnostic tests in which the reference values are disaggregated by sex 5) Implementation of gender-sensitive initiatives and protocols in the last year
FORMULAS	4) Formula: (a/b) * 100 a = Diagnostic tests in which the reference values are disaggregated by sex b = Total diagnostic tests 5) Structured questionnaire
SOURCES	I. Autonomous Communities

<u>Critical point EQGEN3</u>: Address social inequalities in health in the Strategy's actions using an interdisciplinary approach

INDICATORS	6) Percentage of CVHS indicators with available information disaggregated by socio-economic variables and determinants of inequality
FORMULAS	6) Formula: (a/b) * 100 a = CVHS indicators with available information disaggregated by socio-economic variables and determinants of inequality b = Total CVHS indicators
SOURCES	I. Ministry of Health

6.2.5 Indicators for ischaemic heart disease

<u>Critical point CHD1</u>: Develop cardiac rehabilitation and secondary prevention programmes in hospital and primary care depending on patients' degree of risk

INDICATORS	1) Secondary prevention and cardiac rehabilitation programmes in hospitals and health areas that care for these patients 2) Percentage of patients reached by each secondary prevention and cardiac rehabilitation intervention 3) Percentage of AMI patients included in a secondary prevention and cardiac rehabilitation programme 4) Time taken to enter a secondary prevention and cardiac rehabilitation programme after discharge from hospital
FORMULAS	1) Percentage of programmes established at centres that offer cardiology and rehabilitation services 2) Formula: (a/b) * 100 a = Number of hospitals with secondary prevention and cardiac rehabilitation programmes b = Total number of hospitals 3) Formula: (a/b) * 100 a = AMI patients included in secondary prevention and cardiac rehabilitation programmes b = Total AMI patients 4) Formula: Mean delay (months) between diagnosis of AMI and entry into programme
SOURCES	I. Ministry of Health II. Autonomous Communities

Critical point CHD2: Optimize the functioning of care networks for acute coronary syndrome

INDICATORS	5) Risk-adjusted in-hospital mortality rate in patients admitted for AMI 5.1) Risk-adjusted in-hospital mortality rate in patients admitted for STEMI 5.2) Risk-adjusted in-hospital mortality rate in patients admitted for NSTEMI 6) Percentage of STEMI patients treated with reperfusion therapy 6.1) With complete reperfusion 6.2) With primary angioplasty 7) Percentage of NSTEMI patients who receive a coronary angiography during hospitalization
FORMULAS	5) Formula: (a/b) * 100 Risk-adjusted in-hospital mortality rate in patients admitted for AMI a = Patients who have died of AMI b = Total hospitalized AMI patients 5.1) Risk-adjusted in-hospital mortality rate in patients admitted for STEMI a = Patients who have died of STEMI b = Total hospitalized STEMI patients 5.2) Risk-adjusted in-hospital mortality rate in patients admitted for NSTEMI a = Patients who have died of NSTEMI b = Total hospitalized NSTEMI patients 6) Formula: (a/b) * 100 Percentage of STEMI patients treated with reperfusion therapy a = Patients reperfused with fibrinolysis and/or primary angioplasty b = Total STEMI patients 6.1) With complete reperfusion a = Patients reperfused with fibrinolysis b = Total STEMI patients 6.2) With primary angioplasty a = Patients reperfused with primary angioplasty b = Total STEMI patients 7) Formula: (a/b) * 100 a = Total NSTEMI patients with coronary angiography during hospitalization b = Total NSTEMI patients
SOURCES	I. Minimum Basic Data Set (MBDS)

6.2.6 Indicators for heart failure

Critical point HF1: Improve the early detection and diagnosis of heart failure

INDICATORS	1) Prevalence of heart failure in primary care 2) Access to natriuretic peptide testing in primary care 3) Existence of multidisciplinary teams per hospital in each autonomous community 4) Specific protocols for referral from primary care to hospital after diagnosis of HF using natriuretic peptide testing 5) In-hospital mortality rate in patients admitted for HF
FORMULAS	1) Formula: (a/b) * 100 a = Patients with diagnosis of HF in a year b = Total patients in a year 2) Formula: (a/b) * 100 a = Number of health care facilities with access to natriuretic peptides b = Total health centres 3) Formula: (a/b) * 100 a= multidisciplinary teams b= number of hospitals for each autonomous community 4) Formula: (a/b) * 100 a= hospitals with protocol b= total hospitals 5) Formula: (a/b) * 100 a = HF patients who have died in hospital in a year b = Total patients hospitalized for HF in a year
SOURCES	I. Primary Care Clinical Database (BDCAP) II. Minimum Basic Data Set (MBDS) III. Autonomous Communities

Critical point HF2: Organize care for HF patients through multidisciplinary HF units/programmes, coordinated with the participation of all the professionals involved at all levels of care

INDICATORS	6) Percentage of hospitals where specific multidisciplinary HF teams exist
FORMULAS	6) Formula: (a/b) * 100 a=Number of hospitals [21] in which there are specific multidisciplinary HF teams b= Total number of hospitals21 in the autonomous community
SOURCES	I. Specific questionnaires

[21] Tertiary hospitals declaradas designated by the Autonomous Communities

<u>Critical point HF3</u>: Create specific networks (shock code) to organize the care of cardiogenic shock (CS) patients

INDICATORS	7) Specific cardiogenic shock (CS) network existing and functioning at the level of the autonomous community as a whole: yes/no 8) Hospital mortality of patients admitted for cardiogenic shock
FORMULAS	7) Formula: (a/b) * 100 a = autonomous community with yes answer b = total autonomous community 8) Formula: (a/b) * 100 8) Mortality due to autonomous community by cardiogenic shock (CS) a = mortality by autonomous community by cardiogenic shock b = total CC. AA.
SOURCES	I. CMBD II. Specific questionnaires

6.2.7 Indicators associated with valvular heart disease

<u>Critical point V1</u>: Promote the early diagnosis of common valvular heart diseases

INDICATORS	1) Registration system for the mandatory verification of cardiac auscultation in the over-65s in primary care EHRs with systematic registration in the Autonomous Communities 2) Specific annual primary care training programmes to improve earlydiagnosis of valvular heart disease[22] 3) Implementation of protocols for referral and follow-up of valvular heart disease patients at primary care centres
FORMULAS	1) Structured questionnaire 2) Structured questionnaire 3) Structured questionnaire
SOURCES	I. Autonomous Communities

<u>Critical point V2</u>: Optimize the choice of treatment for severe aortic stenosis (AoS) through comprehensive multidisciplinary valuation

INDICATORS	4) Hospital-based multidisciplinary working models for decision-making regarding patients with severe AoS 5) Age-adjusted and sex-disaggregated rate per 100,000 inhabitants: 5.1) Transcatheter aortic valve implantation (TAVI) 5.2) Aortic valve replacement surgery 5.3) Non-intervention

[22] Among other elements, these programmes should include auscultation and echocardiograms.

FORMULAS	4) Structured questionnaire 5) Formula: 5.1) (a/b) * 100 a = Transcatheter aortic valve implantation (TAVI) b = Total population 5.2) (a/b) * 100 a = Aortic valve replacement surgery b = Total population 5.3) (a/b) * 100 a = Non-intervention b = Total population
SOURCES	I. Minimum Basic Data Set (MBDS) II. Autonomous Communities

6.2.8 Indicators for arrhythmia

Critical point A1: Improve effectiveness in access to cardiopulmonary resuscitation (CPR)

INDICATORS	1) National CRA Care Plan 2) Training programmes for public employees, the public and students on CRA care 3) Existence in the National Health System of systems to measure key indicators in CRA care: 3.1) No. of CRAs treated at out-of-hospital/hospital level 3.2) Response time (BLS/AED) 3.3) Use of CPR/AEDs 3.4) Survival without neurological damage 4) Percentage of patients who have recovered from CRA without severe neurological damage
FORMULAS	1) Structured questionnaire 2) Structured questionnaire 3) Structured questionnaire 4) Formula: (a/b) * 100 a = Patients who have recovered from CRA without severe neurological damage b = Total patients who have recovered from CRA
SOURCES	I. Ministry of Health II. Autonomous Communities

Critical point A2: Promote the early diagnosis of atrial fibrillation (AF)

INDICATORS	5) Registration system for the mandatory verification of pulse-taking in the over-65s in primary care EHRs with systematic registration in the Autonomous Communities 6) Proportion of patients with a first diagnosis of atrial fibrillation (AF) identified during a primary care consultation
FORMULAS	5) Structured questionnaire 6) Formula: (a/b) * 100 a = Patients with a first diagnosis of atrial fibrillation (AF) identified during a primary care consultation b = Total patients diagnosed with AF
SOURCES	I. Autonomous Communities

VII CVHS Strategic Map

7.1 Overview of the strategic map

The CVHS strategic map encompasses, structures and synthesizes the goals, and unifies and interconnects the actions proposed, focusing them on the CVHS's strategic goals[23].

Figure 23. CVHS Strategic Map-Overview

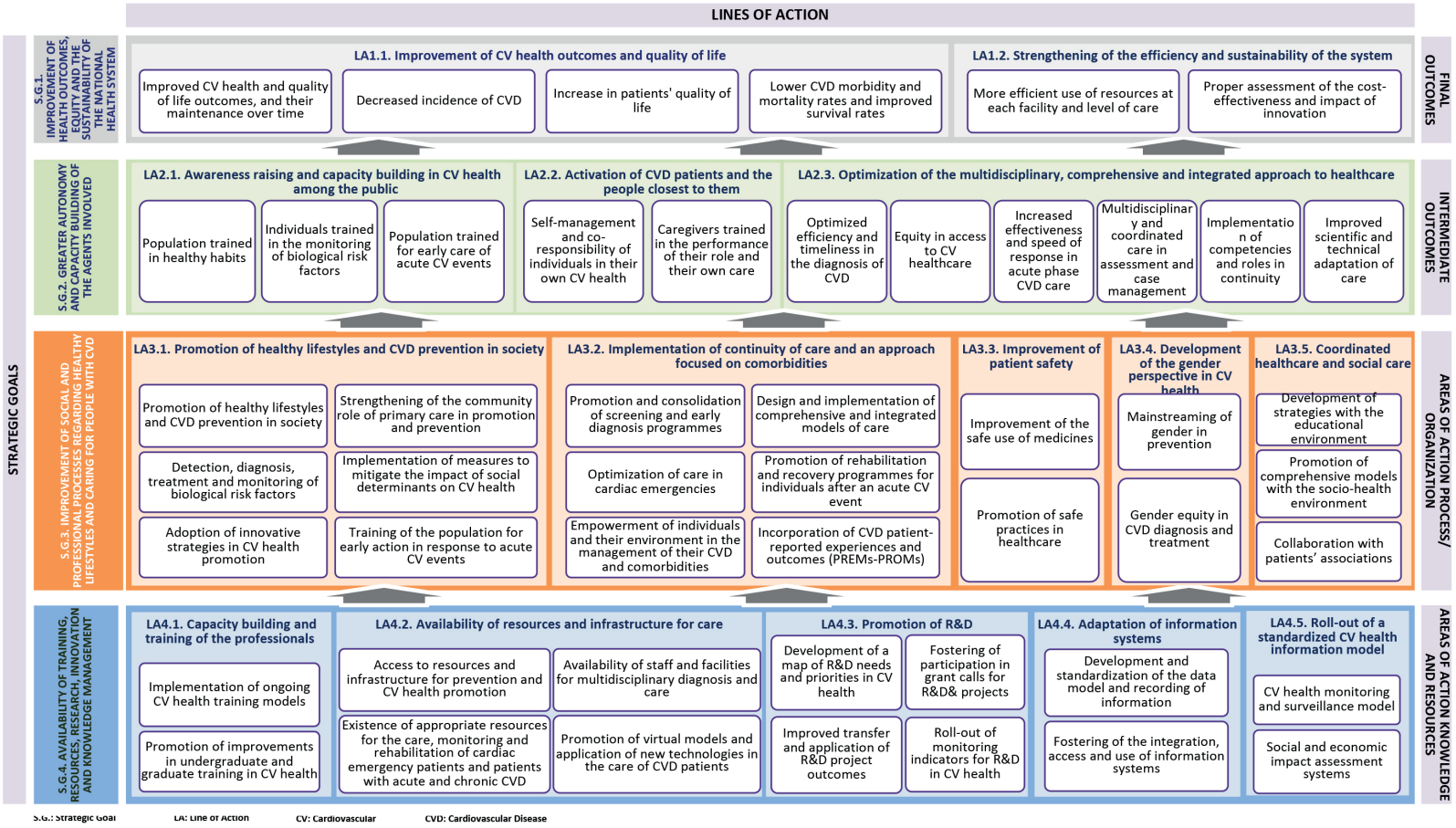
Source: Ministry of Health

The CVHS's strategic map has 4 strategic goals:

- S.G.1. Improvement of health outcomes, equity and the sustainability of the National Health System. *Goal associated with the final outcomes of the CVHS, with 2 action lines:*
  - AL1.1. Improvement of cardiovascular health outcomes and quality of life
  - AL1.2. Strengthening of the sustainability of the system
- S.G.2. Greater autonomy and capacity building of the agents involved. *Goal associated with intermediate outcomes of the CVHS, with 3 action lines:*
  - AL2.1. Awareness raising and capacity building in cardiovascular health among the public
  - LAL2.2. Activation of CVD patients and the people closest to them
  - AL2.3. Optimization of the multidisciplinary, comprehensive and integrated approach to healthcare

[23] For more details on how the CVHS strategic map has been designed, see Appendix IV. Synopsis of the design of the strategic maps based on the critical points

Figure 24. Strategic Map of the CVHS-Details of Actions



Source: Ministry of Health

- S.G.3. Improvement of social and professional processes regarding healthy lifestyles and caring for people with CVD. *Goal associated with actions regarding processes and organization, with 5 action lines:*
  - AL3.1. Promotion of healthy lifestyles and cardiovascular disease prevention in society
  - AL3.2. Implementation of continuity of care and a focus on comorbidities
  - AL3.3. Improvement of patient safety
  - AL3.4. Development of the gender perspective in cardiovascular health
  - AL3.5. Coordinated healthcare and social care
- S.G.4. Availability of training, resources, research, innovation and knowledge management. *Goal associated with actions regarding resources and structure, with 5 action lines:*
  - AL4.1. Capacity building and professional training
  - AL4.2. Availability of resources and infrastructure for care
  - AL4.3. Promotion of R&D
  - AL4.4. Adaptation of information systems
  - AL4.5. Roll-out of a standardized cardiovascular health information model

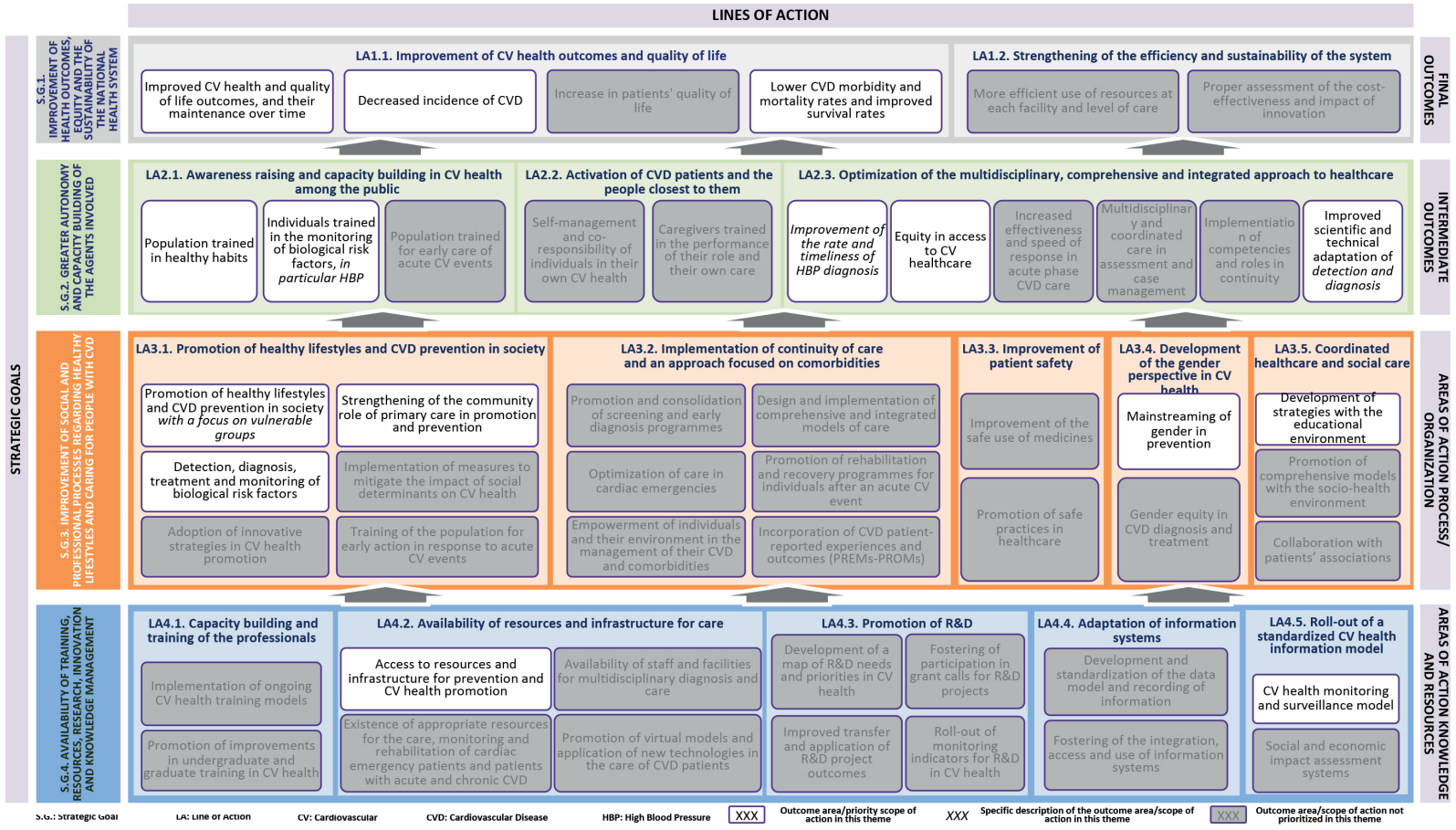
7.2 Integration of actions into the strategic map

The lines and action areas of the CVHS have been organized around the strategic goals, based on the work carried out to identify the critical points. The use of the strategic map ensures the robustness and coherence of the CVHS's approach, facilitating the identification of relationships between the action areas and the achievement of the desired intermediate and final outcomes, while facilitating a review of the indicators proposed, ensuring their value and relevance.

The CVHS's strategic map thus includes 17 outcome areas and 33 fields of action:

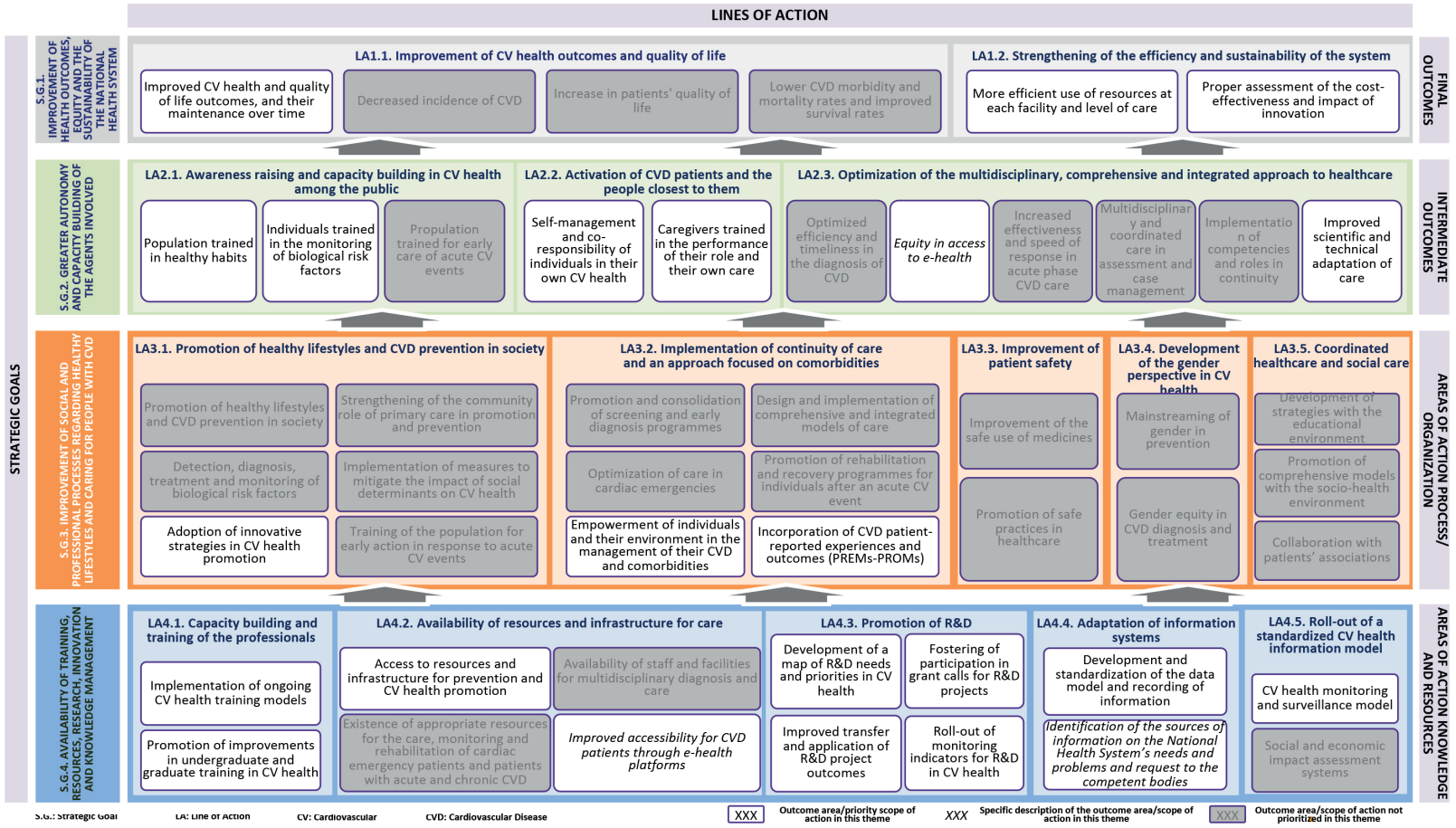
- 6 areas of achievement of final outcomes, associated with S.G.1. Improvement of health outcomes, equity and the sustainability of the National Health System
- 11 areas of achievement of intermediate outcomes, associated with S.G.2. Greater autonomy and capacity building of the agents involved
- 19 action areas regarding processes and organization, associated with S.G.3. Improvement of social and professional processes regarding healthy lifestyles and caring for people with CVD
- 14 action areas regarding knowledge and resources, associated with S.G.4. Availability of training, resources, research, innovation and knowledge management

Figure 25. Specific Strategic Map for Promotion, Prevention and Citizen Training



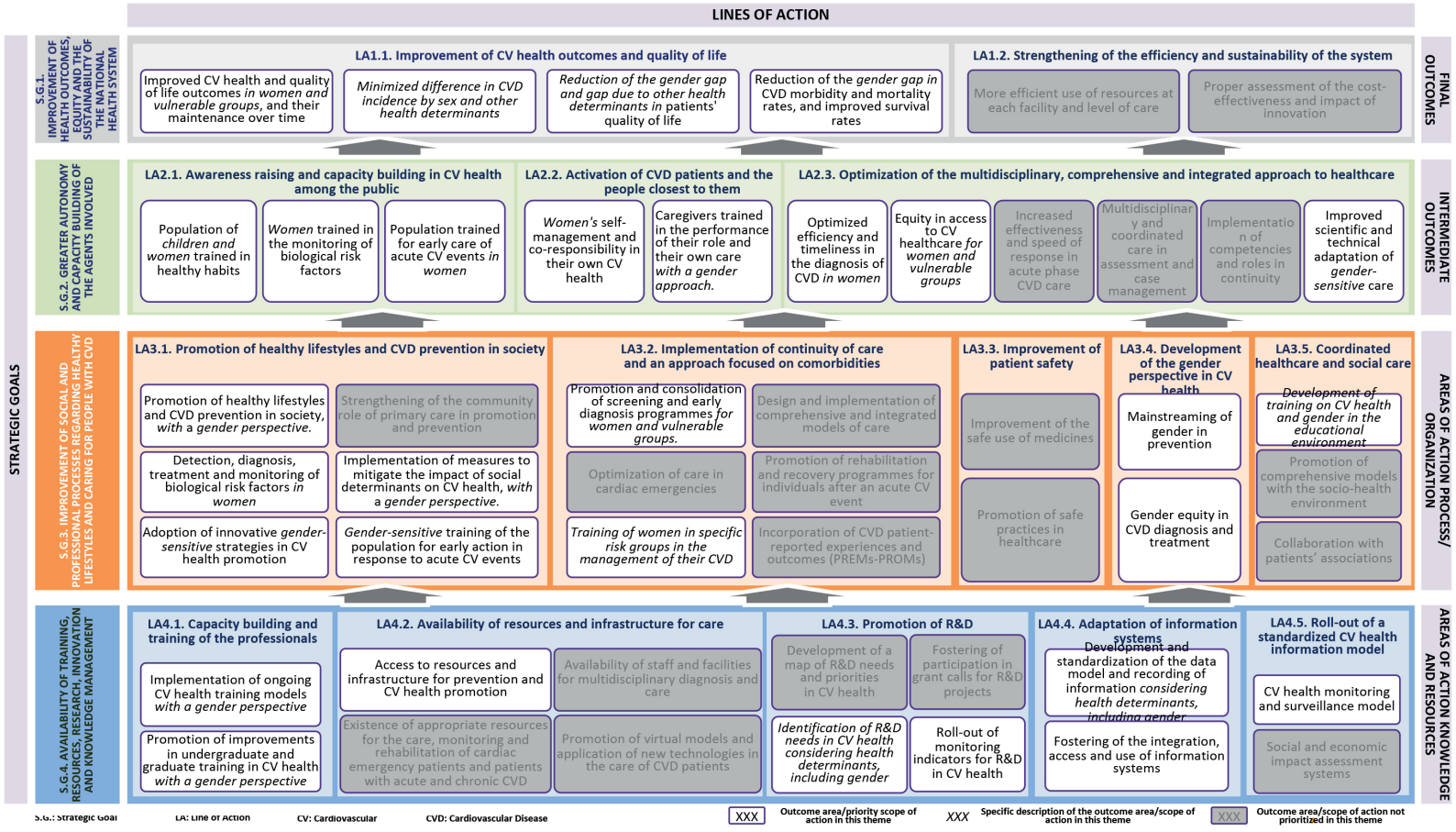
Source: Ministry of Health

Figure 26. Specific Strategic Map for Knowledge Management, Research and Innovation



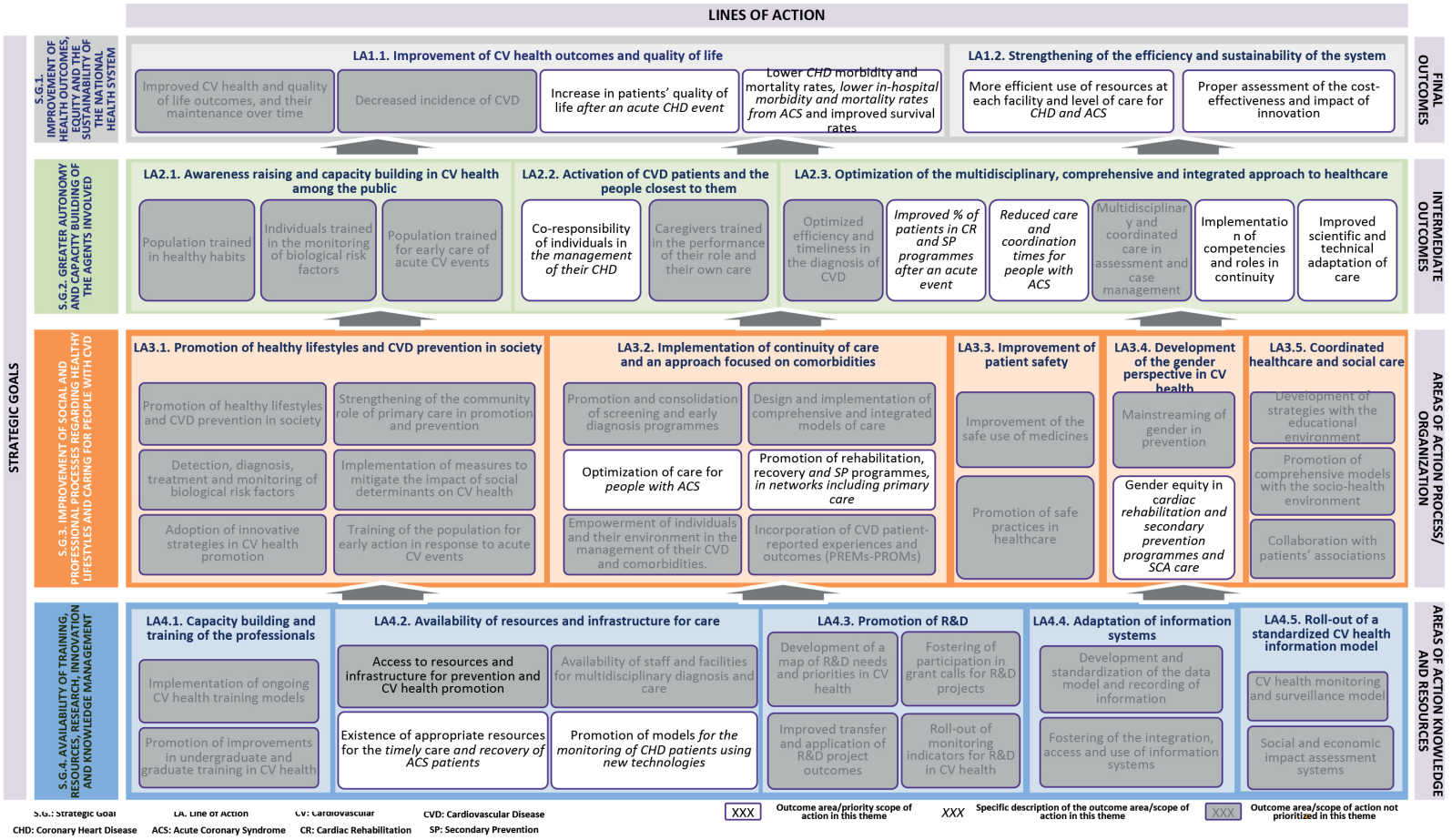
Source: Ministry of Health

Figure 27. Specific Strategic Map for Equity and Gender in Health



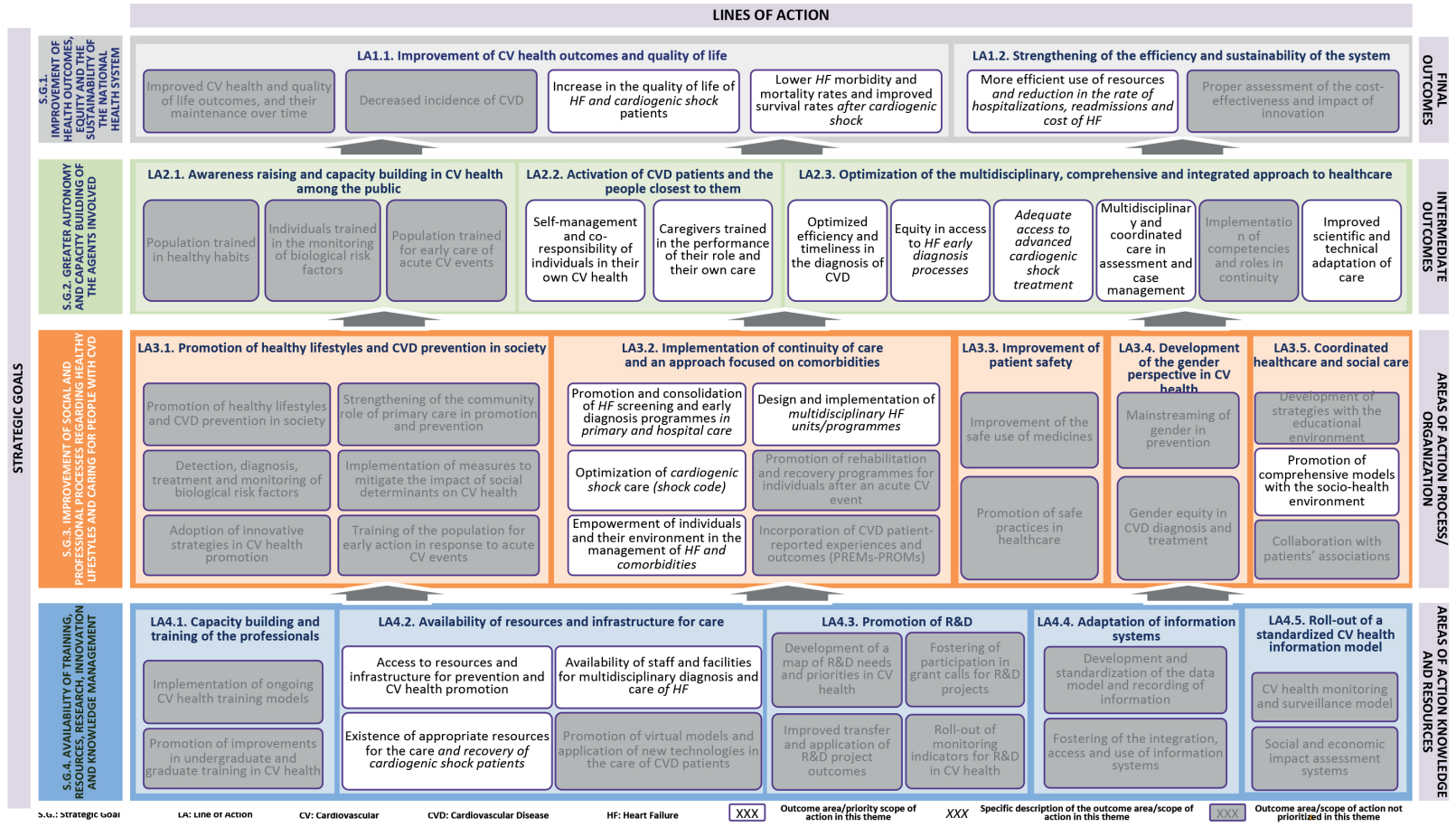
Source: Ministry of Health

Figure 28. Specific Strategic Map for Ischaemic heart disease



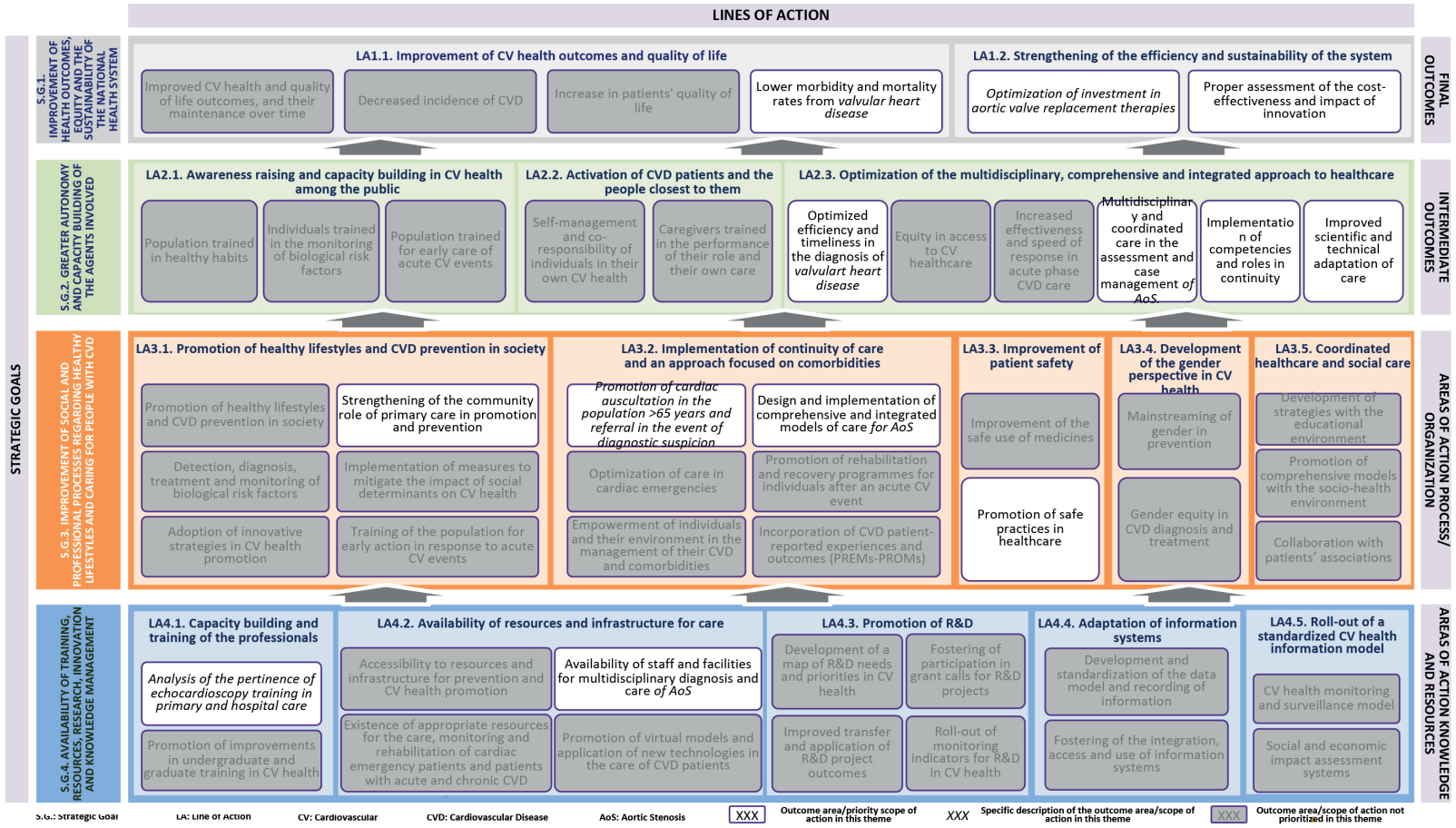
Source: Ministry of Health

Figure 29. Specific Strategic Map for Heart Failure



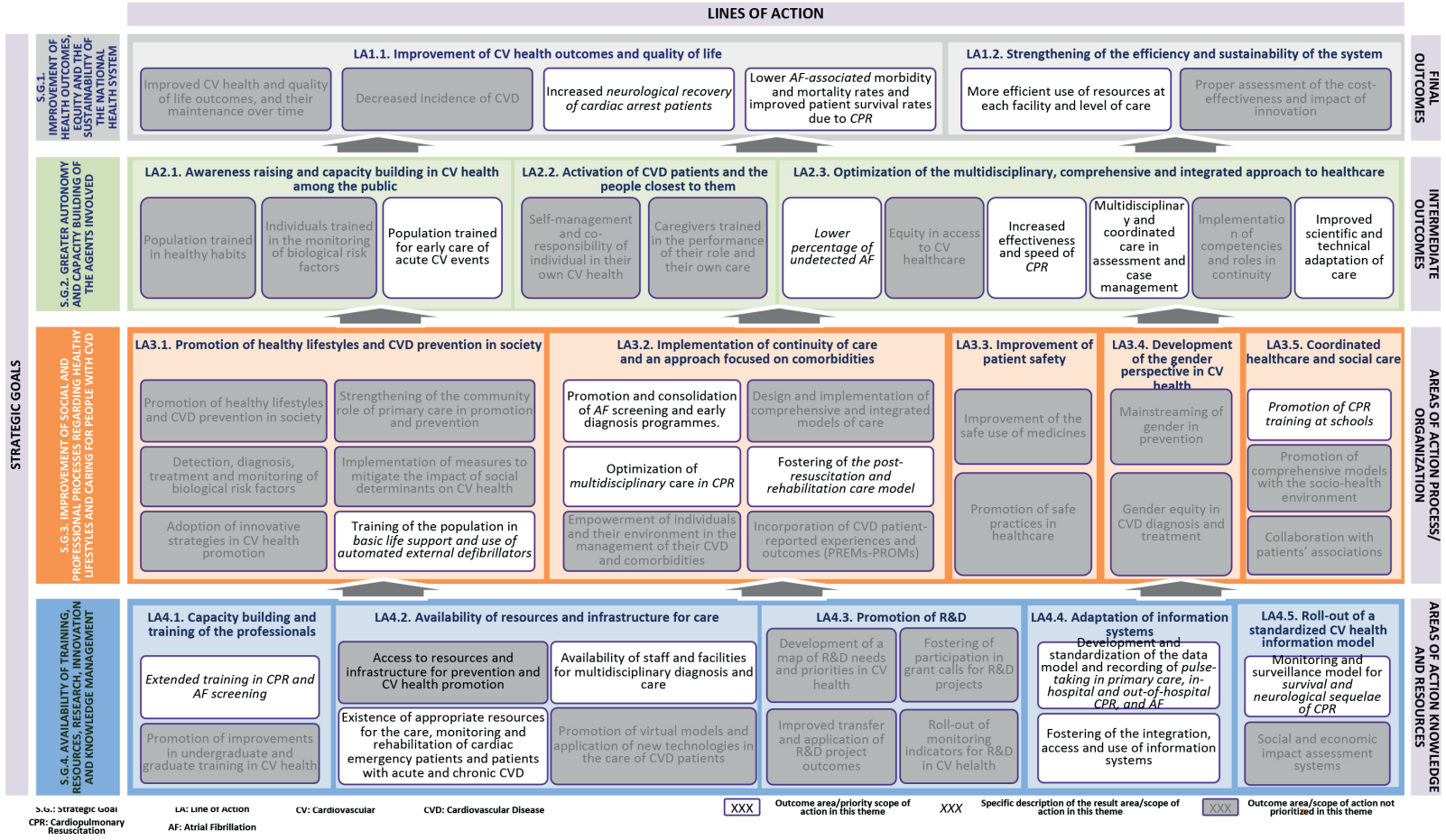
Source: Ministry of Health

Figure 30. Specific Strategic Map for Valvular Heart Disease



Source: Ministry of Health

Figure 31. Specific Strategic Map for Arrhythmia



Source: Ministry of Health

7.3 Overview from the perspective of the CVHS's themes

The CVHS's general strategic map provides a comprehensive and integrated overview of the priorities for action and the intermediate and final outcomes desired, as well as facilitating understanding of the relationship and impact that the different aspects have on each other to achieve the intended goals.

The use of the strategic map also makes it possible to identify and contextualize the priority action areas and outcomes desired, from the perspective of each specific theme. For each theme, this perspective makes it possible to:

- Ensure the consistency of the approaches based on the identification of critical points
- Determine the relationship between the actions and outcomes corresponding to each theme
- Ensure coherence with the rest of the strategy
- Promote the actions proposed in an effective and efficient manner, identifying the relationships and impacts of certain actions with respect to others, as well as other themes

The CVHS's strategic map is intended both as a tool for the present, facilitating the adoption, roll-out, promotion and evaluation of actions and their outcomes, and for the future, providing a model for the analysis and design of the strategy that allows for the diagnosis, development and updating of the CVHS itself, through the re-evaluation of existing themes, as well as the incorporation of new themes, such as other cardiovascular diseases.

The CVHS has 7 individual strategic maps relating to the cross-cutting themes requiring specific action, namely:

- Promotion, prevention and citizen capacity building
- Knowledge management, research and innovation
- Equity and gender in cardiovascular health
- Ischaemic heart disease
- Heart failure
- Valvular heart disease
- Arrhythmia

In each of these maps, the action areas and priority outcomes priorities for each theme have been highlighted. To aid understanding, their wording has also been adjusted to appropriately represent the specific aspects considered within each theme, in accordance with the critical points, general and specific goals, actions and indicators described above.

Appendix I. Acronyms and abbreviations

A	Arrhythmia
ACT	Action
AED	Automated External Defibrillator
AEMPS	Spanish Agency of Medicines and Medical Devices
AF	Atrial Fibrillation
AMAT	Association of Mutual Insurance Companies for Occupational Accidents
AMI	Acute myocardial infarction
AoS	Aortic Stenosis
BDCAP	Primary Care Clinical Database
BLS	Basic Life Support
BMI	Body Mass Index
CHD	Coronary Heart Disease
CISNS	National Health System's Interterritorial Council
CONTASIST	Continuity of Care
CS	Cardiogenic Shock
CVD	Cardiovascular Disease
CVHS	Cardiovascular Health Strategy
CVRF	Cardiovascular Risk Factor
DALYs	Disability-Adjusted Life Years
DM	Diabetes Mellitus
ECG	Electrocardiogram
ECMO	Extracorporeal Membrane Oxygenation
EESE	European Health Survey in Spain
EHR	Electronic Health Record
ENSE	Spanish National Health Survey
ENSPG	National Health Survey of the Roma Population
EQGEN	Equality and Gender
ESTUDES	Survey on Drug Use in Secondary Education in Spain
FDA	Food and Drug Administration
GBD	Global Burden of Disease
GDP	Gross Domestic Product
GG	General Goal
HBP	High Blood Pressure
HF	Heart Failure
HSBC	Health Behaviour in School-aged Children
ICD	Implantable Cardioverter Defibrillator
ICT	Information and Communication Technology
IHME	Institute for Health Metrics and Evaluation
INE	National Statistics Institute
INFSCV	Information on Cardiovascular Health
ISCIII	Carlos III Health Institute
KMRI	Knowledge Management, Research and Innovation
MBDS	Minimum Basic Data Set

NAOS	Nutrition, Physical Activity and Prevention of Obesity Strategy
NSTE-ACS	Non-ST-elevation acute coronary syndrome
NSTEMI	Non-ST-elevation myocardial infarction
OHCA	Out-of-hospital cardiac arrest
PCI	Percutaneous Coronary Intervention
PREM	Patient-Reported Experience Measure
PROM	Patient-Reported Outcome Measure
R&D	Research, Development and Innovation
SEC	Spanish Cardiology Society
SEMI	Spanish Society of Internal Medicine
SG	Specific Goal
STE-ACS	ST-elevation acute coronary syndrome
STEMI	ST-elevation myocardial infarction
TR	Cross-cutting
WHO	World Health Organization

Appendix II. Additional information of interest on the approach to cardiovascular health in Spain

In addition to the indicators identified for the Cardiovascular Health Strategy, information on the following is also considered to be of interest in terms of providing a panoramic view of the status and evolution of cardiovascular health and the approach towards it in Spain, and it is therefore propose said the periodic analysis and assessment of this information, in accordance with the sources and data available[24]:

- Daily recreational screen time in the paediatric population
- Prevalence of sedentary leisure time
- Prevalence of daily consumption of fresh fruit
- Prevalence of daily consumption of salads and vegetables
- Prevalence of overweight
- Prevalence of obesity
- Prevalence of alcohol consumption above low-risk limits in adults
- Existence of pulse-taking training programmes for the school-age population
- Prevalence of ischaemic heart disease in primary care
- Percentage of people with high blood pressure receiving antihypertensive treatment
- Percentage of people with controlled blood pressure receiving antihypertensive treatment
- Prevalence of patients with ischaemic heart disease, adjusted for risk of an acute event
- Comorbidity profile of CHD patients
- Hospitalization rate for CHD
- Access time to intensive care for CHD patients
- Age-adjusted mortality rate for CHD
- Hospitalization rate for AMI
- Comorbidity profile of AMI patients
- Access time to intensive care for AMI patients
- Percentage of population covered by "Heart Attack Code" initiatives
- Comorbidity profile of heart failure patients
- Age-adjusted mortality rate for heart failure
- Access time to intensive care for heart failure patients
- Hospitalization rate for heart failure
- Hospitalization rate for cardiogenic shock
- Comorbidity profile of cardiogenic shock patients
- Access time to intensive care for cardiogenic shock patients

[24] The information will be disaggregated by gender, risk and age, as well as by other determinants of inequality where applicable and available.

- Age-adjusted mortality rate for cardiogenic shock
- Percentage of population covered by “Code Shock” initiatives
- Prevalence of valvular heart disease, including severe aortic stenosis
- Comorbidity profile of valvular heart disease patients
- Hospitalization rate for valvular heart disease
- Access time to intensive care for valvular heart disease patients
- Age-adjusted mortality rate for valvular heart disease
- Prevalence of atrial fibrillation
- Prevalence of sequelae attributable to atrial fibrillation
- Comorbidity profile of atrial fibrillation patients
- Hospitalization rate for atrial fibrillation
- Access time to intensive care for atrial fibrillation patients
- Age-adjusted mortality rate for atrial fibrillation

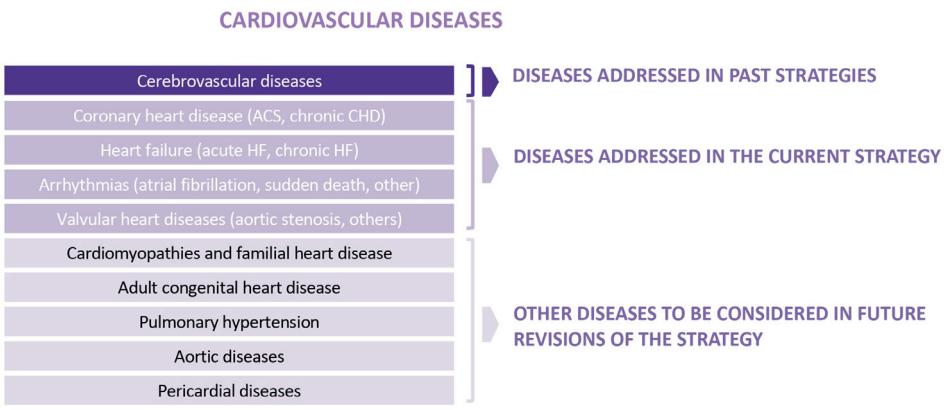
Appendix III. Methodology for preparing the Strategy

Explanatory note: Why does the cardiovascular disease section of the CVHS not include cerebrovascular disease and peripheral vascular disease?

The specific section of the Cardiovascular Health Strategy devoted to cardiovascular disease care covers the four conditions that have the greatest impact on society due to their high incidence, prevalence, morbidity and mortality and cost: ischaemic heart disease (with a prevalence of 2.4%) [58], heart failure (with a prevalence of 1.1% in the general population) [58], arrhythmias (the most common of which is atrial fibrillation, present in 1-2% of the population) and valvular heart disease (with a prevalence of over 12% among the over-75s).

Despite their enormous significance in both social and health terms, cerebrovascular diseases and peripheral vascular disease are not included in this Strategy even though their pathophysiology is the same as that of ischaemic heart disease (and the sections on health promotion and primary prevention are pertinent to both) and, therefore, it would make sense to include them in the set of cardiovascular diseases included in the CVHS. However, the care required and provided for these diseases is very different, not only in terms of the diagnostic and therapeutic procedures used, but also of the professionals who attend to these patients. Cerebrovascular disease, in fact, is already the subject of another strategy (the National Health System's Stroke Strategy). Finally, it is important to note that the CVHS does not provide an exhaustive overview of all CVDs and there are plans to develop specific strategies to address these diseases in the future.

Figure 32. Cardiovascular diseases included in the Cardiovascular Health Strategy



Source: Ministry of Health

Once the action areas and themes had been defined, the sequence of steps for the design of the Cardiovascular Health Strategy (CVHS) was structured as follows:

I. Identification, justification and prioritization of critical points in cardiovascular health
II. Definition of the collaborative working model
III. Definition of the goals, actions, outcomes and indicators of the CVHS
IV. Design of a strategic map offering an overview of the strategy
V. Development of an implementation-monitoring scorecard

The actions carried out were:

1. Creation of specific multidisciplinary working groups (both vertical and cross-cutting), one for each of the Strategy's themes, on 1 September 2018.

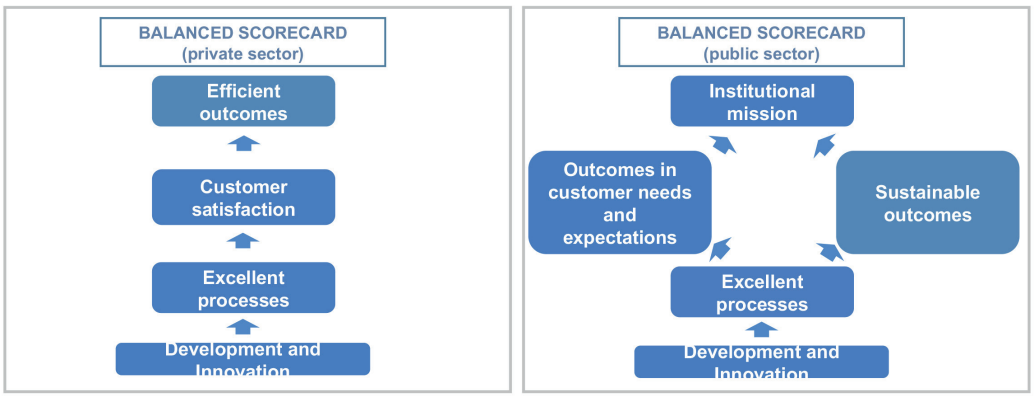
Figure 33. From intentions to effects

Source: Ministry of Health

2. First face-to-face meeting at the Ministry of Health on 10 October 2018, for the initial identification of critical points by area of action. The nominal group technique was used at this meeting.
3. Prioritization of critical points, carried out using an abbreviated version of the Hanlon Method (the assessment criteria applied included the magnitude and severity of the disease in question, the effectiveness of the actions proposed to address the health problem, and the feasibility of these actions).
4. Suggestion of strategic goals and actions to be proposed to the Institutional Committee.
5. Creation of the Technical Committee (formed by representatives of the main scientific societies, patient associations and experts) and the Institutional Committee (formed by representatives of Spain's Autonomous Communities and the different ministries). Creation of both committees on 26 April 2019.
6. Presentation of the CVHS to the Technical and Institutional Committees at the Ministry of Health: Analysis and discussion of all critical points on 26 April 2019.

7. Compilation and revision of all the contributions received on the critical points and design of a draft version of a global strategic map and of a specific strategic map for each theme.

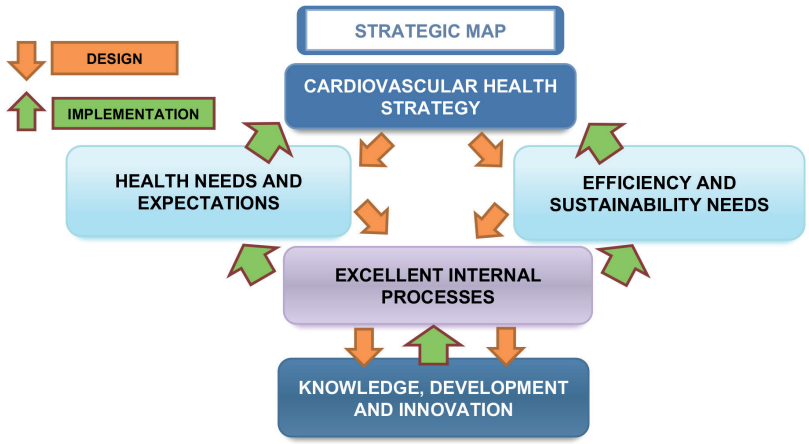
Figure 34. Balanced Scorecard of the Cardiovascular Health Strategy



Source: Ministry of Health

8. Initial definition, by each multidisciplinary group, of actions to improve cardiovascular care that have already produced significant impacts on cardiovascular health outcomes.
9. Commencement of the final phase of the definition of indicators, following resubmission to the Institutional and Technical Committees for suggestions and approval of the model (11 February 2021 and 25 February 2021, respectively).
10. Validation of indicators by the Technical and Institutional Committees.

Figure 35. Conceptual model for monitoring and evaluation

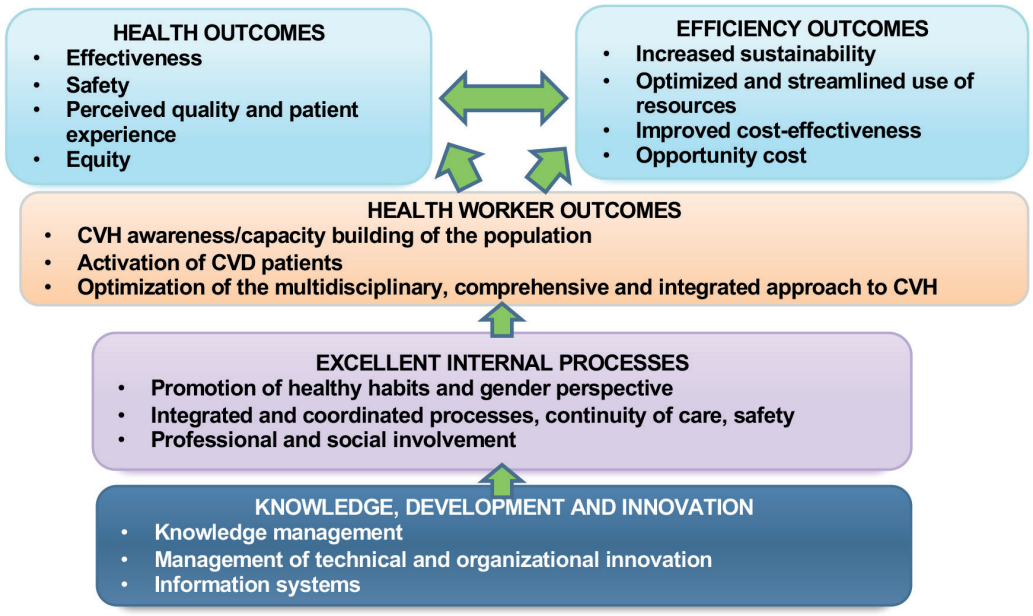


Source: Ministry of Health

11. Fine-tuning of the global strategic map and of the specific strategic maps by theme with the inputs and suggested changes.
12. Validation of the final report by the Technical and Institutional Committees.

A synopsis of the method used to prepare the strategic maps based on the critical points, the strategic goals and initial actions proposed by the Working Groups is provided in Appendix V.

Figure 36. Design of the CVHS Scorecard



Source: Ministry of Health

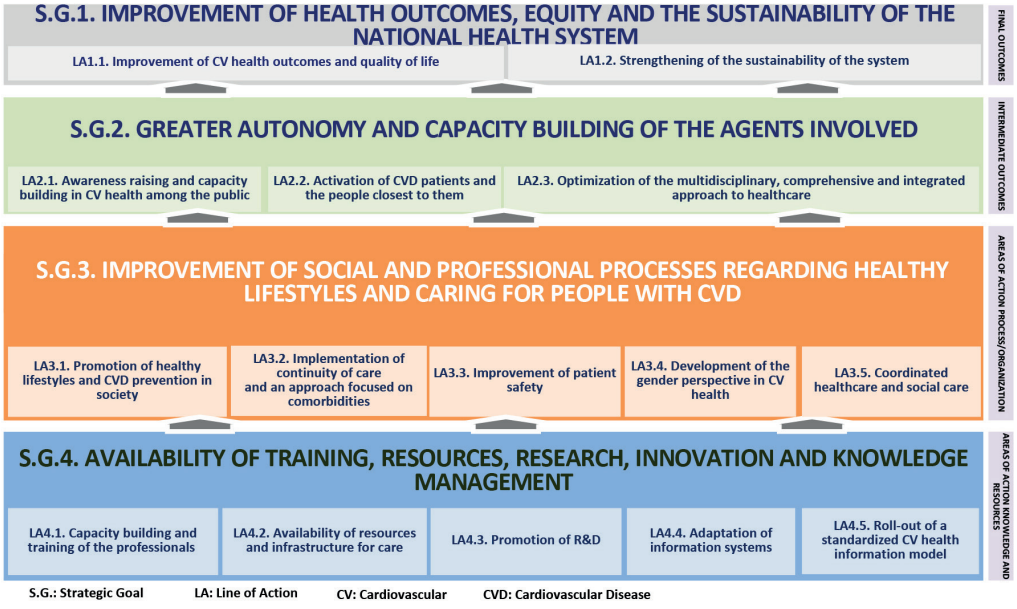
Appendix IV. Synopsis of the design of the strategic maps based on the critical points

The methodological development of the Strategy was based on a very precise definition of critical points, decided on from a multidisciplinary perspective and with the participation of patients and citizens. The richness and complexity of the contents and the need to establish an explicit and flexible monitoring and evaluation model made it advisable to adopt a model interlinking the different layers of the Strategy (Figure 33).

Therefore, a strategic map was designed based on the critical points, strategic goals and initial actions proposed by the Working Groups following the model proposed years ago by Kaplan and Norton at the Harvard Business School (268), which stemmed from an initial Balanced Scorecard construct (269). The first valuable component of this structure is that it allows the definition of "perspectives", or points of view, to be considered in industrial or corporate processes. Two of them define outcomes, from the viewpoint of customer satisfaction and from that of the profitability of products or services, as understood by financiers. The other two perspectives consider the processes, which must be excellent to obtain these outcomes, and how to provide input for the processes so that they are sustained over time, fundamentally through knowledge and innovation.

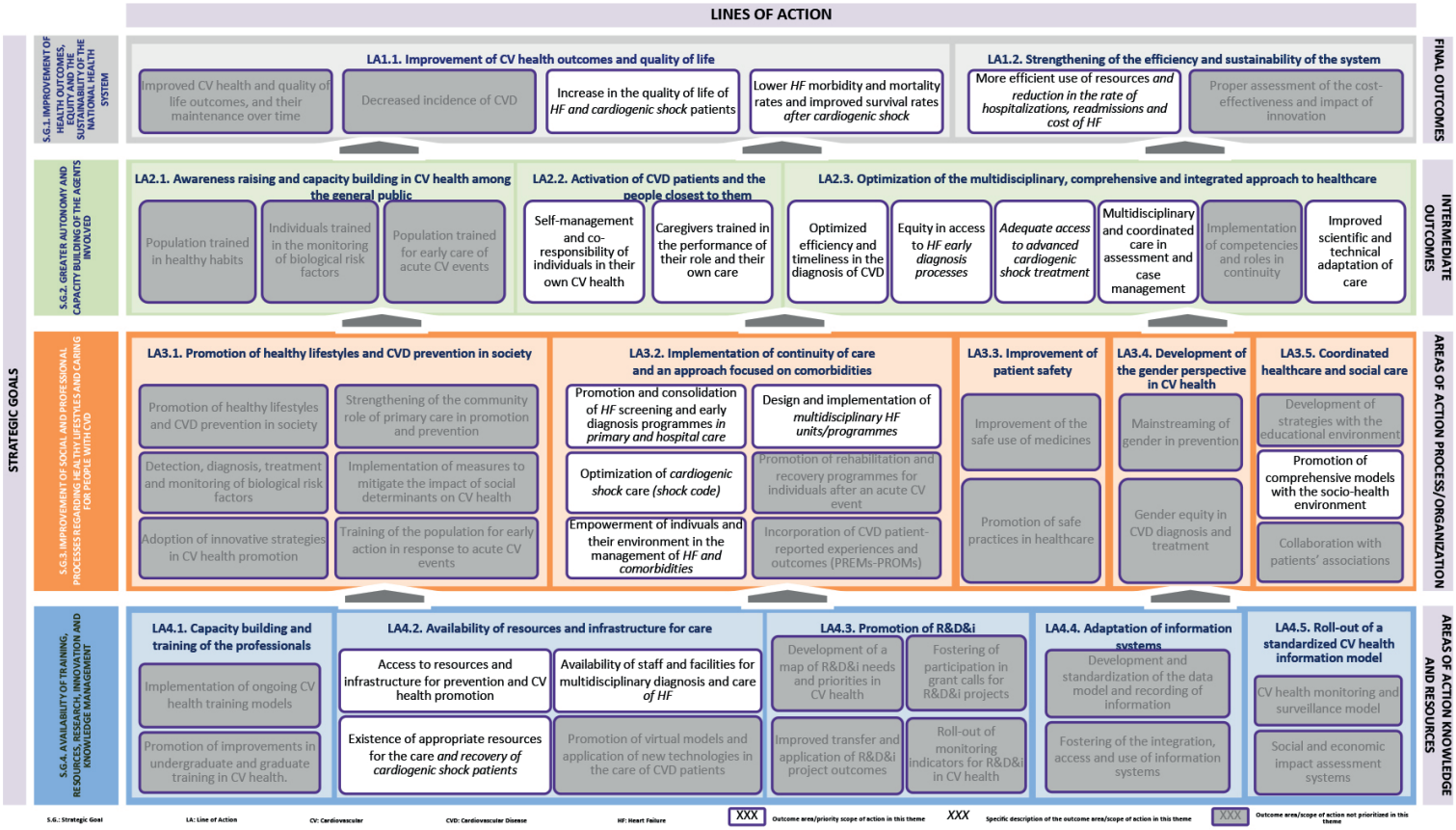
Its design, which was conceived for industry and private corporations, where the goal is to obtain profits from the product or service, has been transformed in the public sphere and in

Figure 37. Global Strategic Map of the CVHS



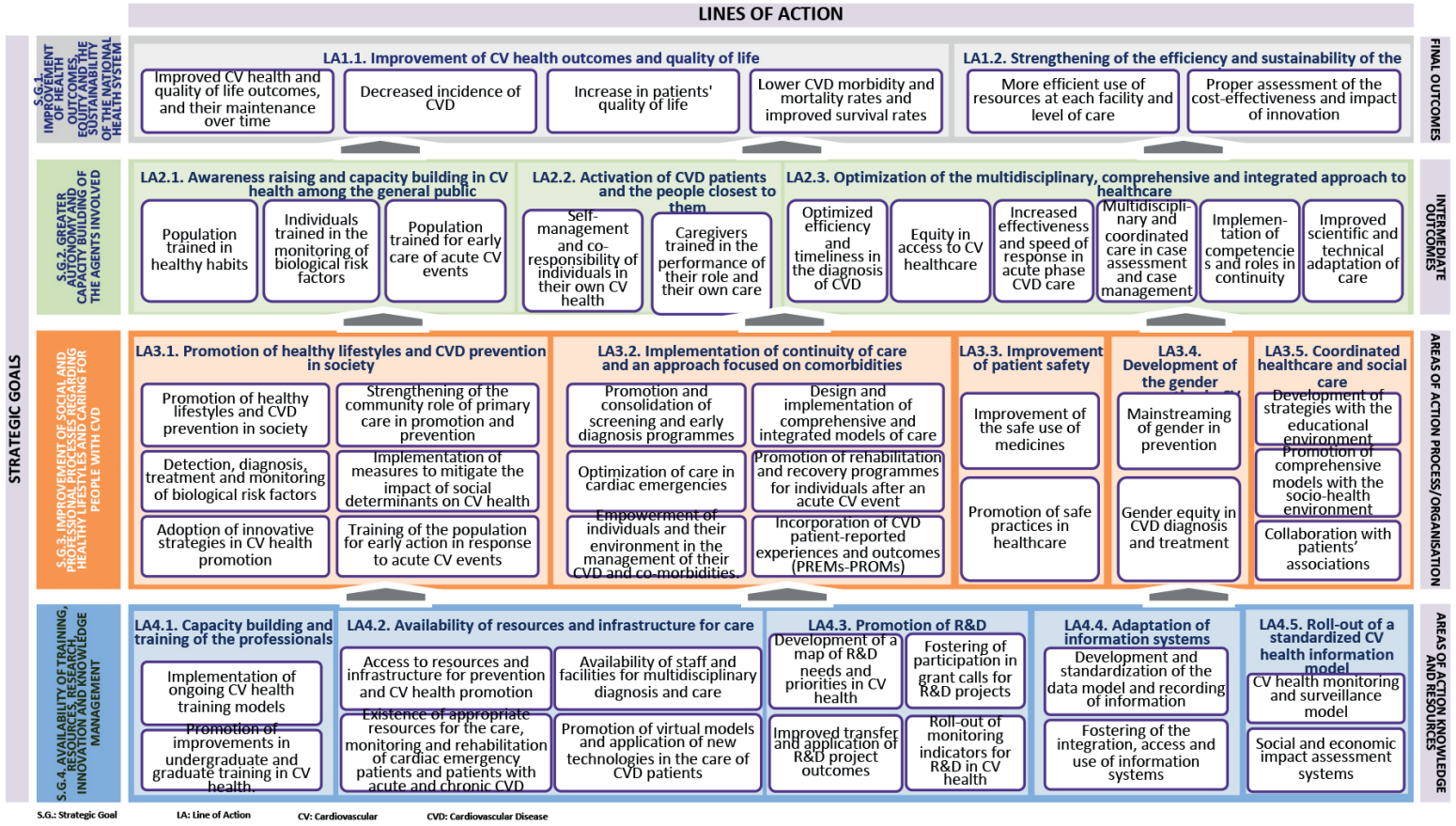
Source: Ministry of Health

Figure 38. Specific Strategic Map for Heart Failure



Source: Ministry of Health

FFigure 39. Global Strategic Map of the CVHS-Details of the action lines



Source: Ministry of Health

non-profit institutions into a pentagonal model, in which the pinnacle is the fulfilment of the institutional mission, which requires that the goals of satisfying the needs and expectations of the clients be achieved whilst complying with budgetary limitations. Graphically, they could be represented as follows:

Intuitively, the researchers and their clients considered the possibility of using the scorecard model as a strategic tool (strategic map) which, starting from the definition of the desired outcomes, would enable the design of the processes necessary to obtain them. This is the second great strength of the model: its dialectical capacity to move between abstract aspects (goals or strategies) and specific ones (outcomes or tasks). The design process is top-down (from Outcomes to Processes), while implementation must be bottom-up (from Processes to Outcomes).

This is the methodology used to design the strategic maps of the CVHS.

In applying the key elements distilled from the institutional and working group approaches, it was necessary to establish a stepping-stone between the process outcomes and the Strategy's final outcomes. This step addressed the need to confirm that the key processes put in place to achieve the desired outcomes had been internalized by the key actors in the process: civil society for cardiovascular health concepts; patients and their environment as regards cardiovascular disease; and health professionals in both cases. Hence the map's conceptual outline:

Applying these criteria to the CVHS, each of the four layers shown describes a **strategic goal:**

S.G.1. Improvement of health outcomes, equity and the sustainability of the National Health System

S.G.2. Greater autonomy and capacity building of the agents involved

S.G.3. Improvement of social and professional processes regarding healthy lifestyles and caring for people with CVD

S.G.4. Availability of training, resources, research, innovation and knowledge management

Action lines have been defined for each Strategic Goal and grouped by shared criteria.

The action lines common to all the Strategy's themes are as follows:

- ***S.G.1. Improvement of health outcomes, equity and the sustainability of the National Health System***
  - AL1.1. Improvement of cardiovascular health outcomes and quality of life
  - ALLA1.2. Strengthening of the sustainability of the system
- ***S.G.2. Greater autonomy and capacity building of the agents involved***
  - AL2.1. Awareness raising and capacity building in cardiovascular health among the public
  - AL2.2. Activation of CVD patients and the people closest to them
  - AL2.3. Optimization of the multidisciplinary, comprehensive and integrated approach to healthcare
- ***S.G.3. Improvement of social and professional processes regarding healthy lifestyles and caring for people with CVD***
  - AL3.1. Promotion of healthy lifestyles and cardiovascular disease prevention in society
  - AL3.2. Implementation of continuity of care and an approach focused on comorbidities
  - AL3.3. Improvement of patient safety

- AL3.4. Development of the gender perspective in cardiovascular health
- AL3.5. Coordinated healthcare and social care

- ***S.G.4. Availability of training, resources, research, innovation and knowledge management***
  - AL4.1. Capacity building and professional training
  - AL4.2. Availability of resources and infrastructure for care
  - AL4.3. Promotion of R&D
  - AL4.4. Adaptation of information systems
  - AL4.5. Roll-out of a standardized cardiovascular health information model

Thus, the action lines form two groups, with five action lines focused on outcomes (two aimed at global final outcomes and three at intermediate outcomes concerning critical agents) and 10 action lines associated with processes, organization, resources and structure. The global CVHS strategic map is thus as follows:

This model has been applied to each theme and the areas prioritized for each theme in the framework of the CVHS have been placed in each line of action.
In this example, due to the prioritization model, each individual map does not need to include all the strategic and/or general goals. Finally, the sharing of strategic lines means that by merging the individual maps we can obtain the Global Strategic Map of the CVHS, which encompasses:

- **4 strategic goals**
- **5 outcome-focused action lines with 17 areas of expected outcomes**
- **10 process-focused action lines with 33 proposed action areas**

Appendix V. Equity checklist

To verify whether an initiative includes an equity perspective, the following checklist is proposed.

- Includes specific goals to reduce health inequalities.
- Considers different determinants of equity such as gender, socio-economic level, educational attainment, ethnicity, rural/urban environment, disadvantaged groups, and is open to public participation and intersectoral work.
- The situation analysis includes an equity perspective: at a minimum, data is disaggregated by sex, age and socio-economic status based on occupation, educational attainment, employment status or income level.
- Includes specific actions to address health inequalities identified in the situation analysis.
- Includes positive actions aimed at vulnerable groups or groups with differentiated needs detected in the situation analysis phase with an equity perspective.
- The design and implementation of the initiative include an explicit gender approach.
- Includes specific actions that entail working with sectors other than the health sector (intersectoral work).
- Includes specific initiatives to incorporate the participation of the target population.

Appendix VI. Index of figures

Appendix VII. Bibliography

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Cardiovascular diseases are the leading cause of mortality and the second leading cause of hospitalisation in Spain. They impose a high healthcare cost and an enormous burden on patients and their families, and are one of the greatest challenges for the National Health System.

The high prevalence of cardiovascular diseases and their risk factors, as well as their current impact on health, quality of life and economic and social consequences, make cardiovascular health a major social and health challenge.

The Cardiovascular Health Strategy (CVHS) of Spain's National Health System responds to the need to incorporate new perspectives on cardiovascular health with an approach that seeks not only to limit the impact of these diseases, but also to prevent their onset.

The CVHS approach incorporates a comprehensive, multidisciplinary, coordinated and person-centred health care perspective, with special attention to health inequalities, particularly gender as an axis of cardiovascular health inequality.

The CVHS has been organised into two transversal and seven specific themes. Given their importance and impact, four of these themes have been dedicated to specific CVDs: ischaemic heart disease, heart failure, arrhythmia/sudden death and valvular heart disease. In total, 130 specific actions have been defined for improving the population's cardiovascular health. Specific indicators have also been included to evaluate the Strategy and assess its reach in the coming years.

This ESCAV has been developed through a broad multidisciplinary work process involving different experts, health and non-health professionals, managers and patients.

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