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The Contribution of Health Information Professionals, Public Health Specialists, and Medical Secretaries to Cardiovascular Disease Prevention Programs.

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Abstract

Background: Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality among older adults in Europe. Population ageing has increased the burden of cardiovascular conditions and highlighted challenges related to multimorbidity, frailty, cognitive impairment, and inequalities in healthcare access. However, older individuals remain underrepresented in clinical research, limiting the evidence available to guide their management.

Aim: This review examines the epidemiology, diagnostic challenges, treatment limitations, and prevention of CVD among older adults in Europe, with particular attention to frailty, rehabilitation, social inequalities, and multidisciplinary healthcare delivery.

Methods: A narrative review of the available literature was conducted to discuss demographic trends, cardiovascular risk factors, clinical presentations, diagnostic approaches, pharmacological and invasive treatments, lifestyle interventions, and healthcare-related outcomes in older populations.

Results: CVD prevalence and associated healthcare demands increase with advancing age. Underrepresentation in randomized clinical trials limits the applicability of treatment recommendations to older patients. Age-related physiological changes, atypical symptoms, and limitations in cardiovascular risk prediction complicate diagnosis. Multimorbidity, polypharmacy, and cognitive impairment further influence treatment safety and adherence. Evidence regarding invasive cardiovascular interventions in frail older patients remains mixed, supporting individualized treatment decisions. Prevention requires appropriate pharmacological management, nutritional support, smoking cessation, and physical activity. Frailty assessment and cardiac rehabilitation can support functional independence. Socioeconomic disadvantage, geographical barriers, and social isolation further contribute to inequalities in cardiovascular outcomes.

Conclusion: Effective cardiovascular care requires an integrated approach that considers biological ageing, functional status, comorbidities, and patient preferences. Greater inclusion of older adults in clinical trials and stronger multidisciplinary services are essential to improve outcomes and reduce inequalities.

Keywords: Cardiovascular disease; Older adults; Ageing; Frailty; Cardiovascular prevention; Multimorbidity; Polypharmacy; Cardiac rehabilitation; Healthcare inequalities; Europe.

Introduction

The United Nations (UN) Decade of Healthy Ageing (2021–2030) was established in response to the rapid growth of the global older population and the increasing need to improve health and quality of life in later years. Projections indicate that the proportion of individuals aged over 60 years will nearly double by 2050, creating substantial demands on healthcare systems and social services [1]. As the world approaches the midpoint of this initiative,

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addressing inequalities in access to timely and effective cardiovascular disease (CVD) prevention, diagnosis, and treatment among older adults has become increasingly important. CVD remains the leading cause of death worldwide, and its contribution to overall mortality increases with advancing age [2]. Despite this burden, the UN Healthy Ageing action plan recognizes that many healthcare systems remain inadequately prepared to address the complex health needs of older populations, including the prevention and management of cardiovascular conditions [1]. Older adults frequently experience multiple chronic diseases, functional limitations, polypharmacy, and age-related physiological changes that complicate cardiovascular assessment and treatment. These factors may influence clinical decision-making, treatment tolerance, medication adherence, and recovery. Furthermore, age-related inequalities in healthcare access can result in delayed diagnosis, insufficient risk-factor management, and differences in treatment outcomes. Improving cardiovascular care therefore requires integrated healthcare services that consider patients' clinical conditions, functional status, and individual treatment needs rather than relying on chronological age alone. The COVID-19 pandemic further demonstrated the vulnerability of older individuals, particularly those with pre-existing cardiovascular conditions. Cardiovascular complications, including myocardial injury, were among the recognized complications of COVID-19 and were associated with increased mortality, particularly among older patients [3]. The pandemic exposed weaknesses in healthcare preparedness and highlighted the importance of maintaining access to cardiovascular assessment, treatment, and follow-up during public health emergencies. These challenges reinforce the need for healthcare strategies that prioritize cardiovascular health throughout ageing. Strengthening preventive services, improving early diagnosis, ensuring equitable access to evidence-based treatment, and coordinating multidisciplinary care are essential steps toward reducing CVD-related morbidity and mortality among older adults. Addressing these priorities is also necessary to achieve the objectives of the UN Decade of Healthy Ageing and improve cardiovascular outcomes in ageing populations.

Demography and CVD Epidemiology in Europe

Europe has experienced substantial demographic changes over recent decades, characterized by population ageing, declining birth rates, and increased life expectancy. These developments have transformed the traditional population pyramid, which previously had a broad base of younger individuals, into a more balanced structure with progressively larger proportions of older adults [4]. Improvements in healthcare delivery, economic development, living conditions, disease prevention, and public health interventions have contributed to longer survival and an increasing number of individuals reaching advanced ages. United Nations Population Division data demonstrate a considerable increase in the proportion of Europeans aged over 75 years between 1990 and 2024. Among men, this proportion increased from 1.8% to 3.6%, while among women it increased from 3.8% to 5.8%. In absolute numbers, the male population aged over 75 increased from 12.7 million to 26.4 million, whereas the corresponding female population increased from 27.4 million to 42.9 million. These figures illustrate the growing demand for healthcare services capable of addressing age-related chronic diseases and complex clinical needs. The larger number of older women also reflects differences in life expectancy between sexes and has important implications for cardiovascular healthcare planning.

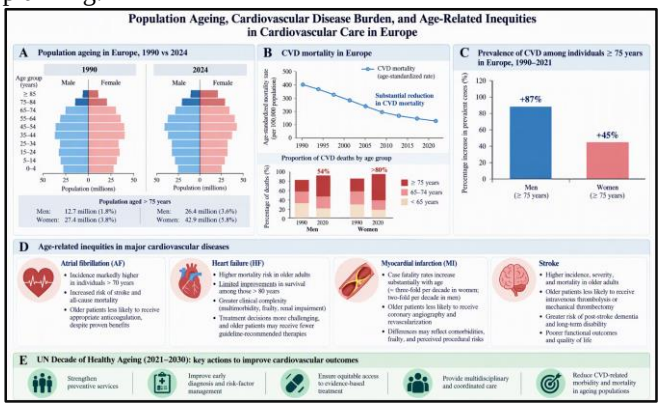


Figure-1: Population age, Cardiovascular burden, and Age-related inequalities.

Cardiovascular disease (CVD) has remained the leading cause of death in Europe during the period of demographic transition [5]. Nevertheless, improvements in cardiovascular prevention, diagnosis, and treatment have contributed to substantial reductions in CVD mortality. Advances in pharmacological therapy, interventional cardiology, cardiac surgery, rehabilitation, and risk-factor management, together with population-level public health initiatives, have improved survival among patients with cardiovascular conditions [6]. Consequently, fewer individuals die prematurely from CVD, and a greater proportion of cardiovascular deaths now occur at advanced ages. This shift is particularly evident among people aged 75 years and older. More than 80% of CVD deaths among women and approximately 54% among men occur in this age group. These differences highlight the importance of considering sex-specific patterns when evaluating cardiovascular mortality and planning preventive interventions. Although declining mortality represents a major achievement, reductions in mortality have exceeded reductions in morbidity. Consequently, more individuals survive with established cardiovascular conditions and require

long-term treatment, monitoring, and rehabilitation. The prevalence of CVD among older Europeans has therefore increased considerably. Between 1990 and 2021, the number of prevalent CVD cases increased by more than 87% among men aged 75 years and older and by more than 45% among women in the same age group. These increases reflect both population ageing and improved survival following cardiovascular events. The resulting burden includes greater demand for medication management, specialist consultations, hospital admissions, and long-term care.

These demographic and epidemiological changes have important implications for healthcare systems. Older patients frequently present with multimorbidity, frailty, functional limitations, and complex medication requirements, which may complicate cardiovascular treatment. Furthermore, evidence of inequalities in treatment approaches and outcomes among older patients raises concerns about equitable access to evidence-based care. Healthcare strategies must therefore address both the increasing prevalence of CVD and age-related disparities in diagnosis, treatment, and follow-up. Strengthening preventive services and developing individualized care pathways are essential to improving cardiovascular outcomes in Europe's ageing population.

Inequities in Types of CVD

Age-related inequalities in cardiovascular disease (CVD) are evident across several major conditions, including atrial fibrillation (AF), heart failure (HF), myocardial infarction (MI), and stroke. Older adults often experience higher disease incidence, greater clinical complexity, and poorer outcomes. Despite their increased cardiovascular risk, they may receive fewer evidence-based interventions than younger patients, contributing to disparities in treatment and survival. Atrial fibrillation becomes increasingly common with advancing age, with substantially higher incidence among individuals aged over 70 years than among those younger than 50 years. Older patients with AF also face increased risks of stroke and all-cause mortality [7]. Appropriate anticoagulation is essential for reducing thromboembolic complications in this population. Findings from the GARFIELD-AF registry demonstrated that anticoagulant treatment among older patients was associated with lower mortality and stroke risks without a corresponding increase in major bleeding events [8]. These findings support the importance of assessing anticoagulation according to individual thromboembolic and bleeding risks rather than chronological age alone. Heart failure presents another major challenge. Although mortality has declined among patients with HF, improvements have been less pronounced among individuals aged over 80 years, despite their higher baseline mortality risk. Limited progress in survival has been observed in this age group over the past 25 years [9]. Older patients frequently have multimorbidity, frailty, renal impairment, and altered physiological responses, which complicate treatment selection and may influence therapeutic effectiveness [10]. These factors emphasize the need for individualized treatment strategies and closer clinical monitoring.

Age-related inequalities are also evident following MI. Case fatality rates increase substantially with age, with mortality reportedly rising three-fold for each decade among women and two-fold among men [11]. Nevertheless, older patients are less likely to receive recommended pharmacological treatments and invasive procedures, including coronary angiography and revascularization [12]. Differences in treatment access may reflect concerns about complications, comorbidities, frailty, and perceived procedural risks. Stroke represents an additional source of disability and mortality among older adults. Advanced age is associated with increased stroke incidence, severity, and mortality [13]. Older patients are less likely to receive intravenous thrombolysis or mechanical thrombectomy and may experience poorer outcomes following these interventions [14]. Survivors also face a greater likelihood of cognitive impairment, including post-stroke dementia, and substantial reductions in quality of life [15]. Collectively, these findings demonstrate the need to reduce age-related treatment disparities through individualized assessment, equitable access to evidence-based interventions, and coordinated cardiovascular care.

Underrepresentation of Older Adults in Randomized Clinical Trials:

Tailoring cardiovascular disease (CVD) prevention and management to older adults remains challenging because much of the available clinical evidence originates from studies involving younger populations. Individuals aged over 75 years are particularly underrepresented in randomized clinical trials (RCTs), despite having a higher prevalence of CVD and being more likely to require cardiovascular interventions [16]. This gap limits the generalizability of trial findings and creates uncertainty about the effectiveness and safety of established treatments in older patients. Evidence also indicates that age restrictions vary across research fields, with CVD trials increasingly applying upper age limits across successive trial phases, whereas cancer trials tend to impose fewer restrictions [17]. The limited participation of older adults has contributed to insufficient evidence-based recommendations for diagnosing and treating CVD in this population [18]. Current clinical practice guidelines often provide limited age-specific guidance, leaving clinicians uncertain about appropriate treatment intensity, therapeutic targets, and the balance between potential benefits and adverse effects [19]. Consequently, treatment decisions may rely on evidence derived from younger patients whose physiological status, disease burden, and responses to medication differ

from those of older individuals. This may result in inappropriate treatment selection, insufficient monitoring, or the avoidance of potentially beneficial interventions.

Several factors contribute to the exclusion of older adults from RCTs. Multimorbidity, frailty, cognitive impairment, functional limitations, and dependence on long-term care can make participation difficult. These characteristics are common in older populations and should therefore be considered representative features rather than automatic reasons for exclusion. Trial protocols that exclude individuals with multiple chronic conditions or complex medication regimens risk producing findings that are poorly applicable to routine clinical practice. Furthermore, polypharmacy increases the potential for drug interactions and adverse reactions, making careful assessment of medication dosage, tolerability, and treatment-related complications essential. Improving representation requires changes in trial design, recruitment, and delivery. Although no general legal or regulatory requirement specifies a minimum proportion of older participants, researchers should adopt recruitment strategies that reflect the demographic and clinical characteristics of the population likely to receive the intervention. Selecting research sites that include community settings, outpatient services, and long-term care facilities may improve access. Unjustified exclusion criteria should also be reduced to permit the participation of patients with multimorbidity and frailty. Pragmatic trial designs, including embedded and decentralized approaches, can further reduce travel requirements, administrative demands, and the burden of participation [20]. Finally, researchers should report treatment outcomes according to age groups and relevant clinical characteristics. Subgroup analyses can clarify differences in treatment effectiveness, safety, and tolerability across older populations [21]. These measures would strengthen the evidence base and support more individualized cardiovascular care. Increasing the inclusion of older adults in RCTs is therefore essential to developing reliable clinical recommendations and reducing age-related inequalities in CVD prevention and management.

Diagnostic Challenges:

Diagnosing cardiovascular disease (CVD) in older adults presents several challenges because conventional diagnostic approaches cannot always be applied to this population without modification. Age-related physiological changes, atypical clinical presentations, multimorbidity, and increased procedural risks can affect the accuracy and interpretation of diagnostic investigations. Furthermore, the absence of age-specific reference ranges for several clinical parameters and risk prediction tools limits the ability to identify individuals at increased cardiovascular risk [22]. These limitations may contribute to delayed diagnosis, inappropriate risk classification, and inequalities in access to diagnostic services.

Risk Scores

Identifying older adults at risk of major adverse cardiovascular events (MACE) is essential for effective prevention. However, most established cardiovascular risk prediction models were developed using younger populations and have limited accuracy in older individuals [22,23]. Their predictive performance may decline with advancing age, partly because age itself contributes substantially to calculated risk and can reduce the relative influence of traditional risk factors [24]. The SCORE2 Older Persons (SCORE2-OP) model represents an important development in cardiovascular risk assessment for older populations. Nevertheless, risk estimation remains challenging because cholesterol, blood pressure, and body mass index may have weaker predictive associations with cardiovascular outcomes in advanced age, a phenomenon described as reverse epidemiology [25]. Risk assessment may therefore benefit from incorporating additional clinical and socioeconomic variables. Renal function is an independent predictor of myocardial infarction (MI) risk in older adults, making early identification of renal impairment important for detecting individuals at increased risk of coronary heart disease (CHD) [26]. Socioeconomic status (SES) should also be considered because financial disadvantages and social deprivation are associated with higher cardiovascular risk and reduced access to preventive screening. Excluding these factors may underestimate risk among vulnerable populations, particularly individuals living in deprived areas [27,28].

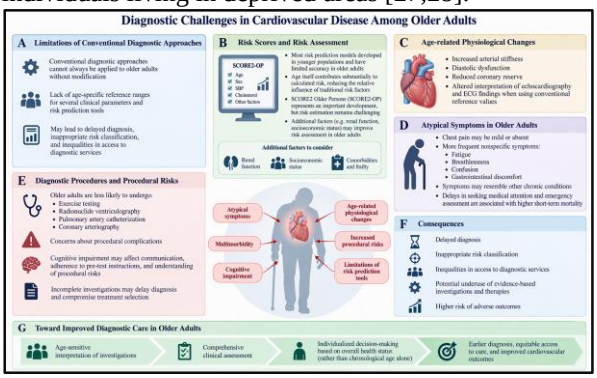


Figure-2: Diagnostic Challenges of cardiovascular diseases among older patients.

Physiological Changes and Symptoms

Ageing produces cardiovascular changes that influence the interpretation of diagnostic investigations. Increased arterial stiffness, diastolic dysfunction, and reduced coronary reserve can alter clinical findings and complicate the assessment of cardiovascular abnormalities. These changes may affect the diagnostic accuracy of commonly used investigations, including echocardiography and electrocardiography (ECG), particularly when

conventional reference values are applied without considering age-related variation [29]. Clinical presentation also differs in older patients. Chest pain may be mild or absent because of reduced pain perception, cognitive impairment, or other age-related factors [30]. Instead, patients may experience fatigue, breathlessness, confusion, or gastrointestinal discomfort. These nonspecific manifestations can resemble symptoms of other chronic conditions, making it difficult to identify the underlying cardiovascular cause. Older patients presenting with atypical symptoms may also experience delays in seeking medical attention and receiving emergency assessment. Such delays have been associated with higher one-month mortality compared with patients presenting with typical cardiovascular symptoms [29–31].

Diagnostic Procedures

Procedural risks further influence diagnostic decision-making. Older adults are less likely to undergo investigations such as exercise testing, radionuclide ventriculography, pulmonary artery catheterization, and coronary arteriography because of concerns about complications [32,33]. Cognitive impairment may also affect communication, adherence to pre-test instructions, and understanding of procedural risks. Consequently, incomplete investigations may delay diagnosis and compromise treatment selection. Improving diagnostic care requires age-sensitive interpretation, comprehensive clinical assessment, and decisions that consider individual health status rather than chronological age alone [18].

Treatment

Older adults with cardiovascular disease (CVD) are less likely to receive guideline-directed treatment than younger patients. This difference reflects the complexity of age-related physiological changes, multimorbidity, frailty, cognitive impairment, and the increased risk of treatment-related complications. Consequently, therapies with established benefits in reducing cardiovascular morbidity and mortality may be underused or prescribed at lower doses than recommended. Individualized treatment strategies and appropriate dose adjustments are therefore essential to improve therapeutic effectiveness while maintaining patient safety [30]. Age-related changes in body composition, cardiovascular function, and organ activity influence drug absorption, distribution, metabolism, and elimination. These pharmacokinetic changes occur alongside alterations in pharmacodynamic responses, which affect how older patients respond to specific drug concentrations. Reduced renal and hepatic function, changes in body fat and water distribution, and increased sensitivity to certain medications can increase the risk of adverse drug reactions and toxicity. These considerations are particularly important when prescribing cardiovascular medications to patients with multiple chronic conditions, as the same dose may produce different clinical effects across age groups [34].

Multimorbidity represents another major challenge in cardiovascular treatment. More than two thirds of older adults have multiple chronic conditions, and multimorbidity is highly prevalent among patients with chronic CVD [35]. The coexistence of hypertension, diabetes, renal impairment, respiratory disease, and other conditions complicates treatment selection and increases the likelihood of competing therapeutic priorities. Patients with multiple diseases also face a greater risk of unintentional medication discrepancies during hospital admission, particularly when several healthcare providers are involved in their care [36]. Furthermore, individuals with a higher comorbidity burden are less likely to undergo invasive diagnostic and therapeutic procedures, potentially limiting access to interventions that could improve clinical outcomes [37]. Polypharmacy is closely associated with multimorbidity and is particularly common among older cardiovascular patients. One study reported that 95% of older patients experienced polypharmacy, 69% had hyper-polypharmacy, and 78% had at least one severe potential drug–drug interaction [38]. The concurrent use of multiple medications increases the risk of adverse reactions, reduces adherence, and may negatively affect quality of life. It is also associated with higher rates of hospitalization and mortality [39]. Patients taking five or more medications have an estimated 88% risk of experiencing an adverse drug reaction. These reactions may include renal insufficiency, malnutrition, metabolic disturbances, bleeding, and other geriatric complications [40]. The use of potentially inappropriate medications is also common among older people living in long-term care facilities, highlighting the need for regular medication review and deprescribing when clinically justified [41].

Cognitive impairment further complicates CVD management. Dementia prevalence increases substantially with advancing age among European populations, rising from an estimated 0.15% among individuals aged 60–65 years to 21.31% among those aged 85–90 years and 44.70% among individuals older than 95 years [42]. Cardiovascular conditions, including hypertension, coronary heart disease (CHD), atrial fibrillation (AF), and heart failure (HF), are associated with cognitive decline and may contribute to dementia development [43]. In turn, cognitive impairment can interfere with medication adherence, symptom recognition, dietary modifications, and other self-management activities. Treatment plans may therefore require simplified medication schedules, caregiver involvement, regular follow-up, and clear communication to support adherence and continuity of care. Invasive cardiovascular treatment also requires careful consideration of age, frailty, and individual risk. Cardiac surgery, including coronary artery bypass

grafting, aortic valve replacement, mitral valve surgery, and aortic procedures, can produce favorable outcomes in older patients considered suitable candidates [44]. However, postoperative recovery may be complicated by frailty, reduced mobility, and a higher risk of complications. Although early mobilization can shorten hospital stays and improve recovery, achieving this in older patients may be difficult [45]. Older surgical patients also experience higher postoperative mortality and treatment costs, requiring careful preoperative assessment and appropriate postoperative support [46,47].

Evidence regarding invasive coronary treatment in older adults remains mixed. The FIRE trial demonstrated that complete revascularization improved outcomes compared with culprit-lesion-only treatment in patients older than 75 years with ST-elevation or non-ST-elevation myocardial infarction (NSTEMI) and multivessel disease [48]. In contrast, the SENIOR-RITA trial found no significant reduction in the composite outcome of cardiovascular death or nonfatal myocardial infarction with a routine invasive strategy compared with conservative management in older patients with NSTEMI, although nonfatal myocardial infarction occurred less frequently in the invasive group [49]. Similarly, a trial involving patients with NSTEMI and a Clinical Frailty Scale score of at least 4 found that routine invasive treatment did not increase the number of days alive and out of hospital during the year following discharge, supporting a conservative approach with close monitoring in selected frail patients [50]. The After Eighty study reported that invasive management reduced myocardial infarction and the need for urgent revascularization among patients older than 80 years with non-ST-elevation acute coronary syndrome (NSTE-ACS). Although reductions in stroke and all-cause mortality were not statistically significant, major bleeding rates were similar between treatment groups [51]. A subsequent meta-analysis also found no significant reduction in the combined risk of all-cause mortality and myocardial infarction within one year with routine invasive treatment. However, invasive management reduced recurrent myocardial infarction and the need for urgent revascularization [52]. Collectively, these findings support individualized treatment decisions that consider frailty, comorbidities, functional status, patient preferences, and expected clinical benefit rather than chronological age alone.

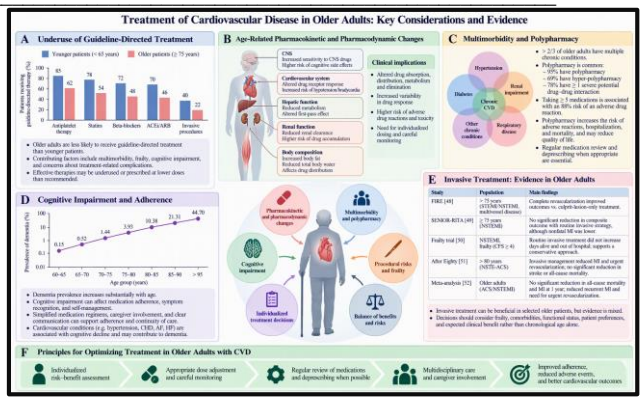


Figure-3: Treatment of Cardiovascular diseases in older patients.

Prevention

Preventing cardiovascular disease (CVD) in older adults requires strategies that account for ageing, multimorbidity, frailty, and differences in treatment tolerance. Although primary prevention measures, including antihypertensive medications, statins, and lifestyle modifications, provide cardiovascular benefits across age groups, risk assessment and treatment decisions must be adapted to older patients. Particular attention should be given to avoiding overtreatment and balancing preventive benefits against adverse effects and competing health priorities [53,54]. Atherosclerotic cardiovascular disease (ASCVD) develops gradually and may remain asymptomatic for several years. Advances in genomic research and cardiovascular imaging offer opportunities for earlier identification of individuals at increased risk. Genomic approaches can identify inherited susceptibility involving cholesterol metabolism, inflammation, and other cardiovascular pathways [55,56]. Meanwhile, imaging techniques can detect arterial plaque and calcification before clinical symptoms develop, providing additional information beyond conventional risk factors [57]. Combining these approaches may support more targeted prevention, although their clinical application should consider patient characteristics, expected benefits, and the potential burden of further investigations.

Pharmacological prevention requires careful evaluation in older populations. Statins can reduce major adverse cardiovascular events (MACE) and have demonstrated cost-effectiveness in older patients. Their use may also reduce cardiovascular complications and prolonged hospitalization [58,59]. However, increased susceptibility to adverse effects necessitates individualized prescribing and regular monitoring [58]. Aspirin presents a different consideration. Although it remains useful for secondary cardiovascular prevention, its role in primary prevention among healthy older adults is limited by bleeding risk. The ASPREE trial demonstrated that low-dose aspirin increased major hemorrhage without significantly reducing

cardiovascular events compared with placebo [60]. Therefore, preventive medication should be prescribed according to established indications and individual cardiovascular and bleeding risks. Lifestyle modification remains central to cardiovascular prevention. Smoking cessation reduces cardiovascular mortality and improves cognitive function and quality of life in older adults [61]. Evidence suggests that stopping smoking at approximately 65 years may extend life expectancy by 1.4–2 years in men and 2.7–3.7 years in women [62]. These findings demonstrate that smoking cessation remains beneficial even when initiated later in life.

Nutrition is another essential component of prevention. A balanced diet can support blood pressure and glucose control, reduce cardiovascular risk, and preserve muscle mass and functional capacity. However, malnutrition remains an important concern among older adults. A meta-analysis using the Mini Nutritional Assessment reported malnutrition in 3.1% of community-dwelling individuals older than 60 years, while 26.5% were at risk. Prevalence increased across healthcare settings, reaching 22.0% among hospitalized patients and 28.7% in long-term care facilities [63]. Another European meta-analysis reported protein-energy malnutrition risk in 28.0% of hospitalized adults older than 65 years, 17.5% of residential care residents, and 8.5% of community-dwelling individuals. Higher rates were associated with age above 80 years, female sex, and comorbidities [64]. These findings support routine nutritional screening using standardized assessment tools. The World Health Organization recommends dietary approaches that address the nutritional requirements of ageing, including adequate protein, fruits, vegetables, and dairy products. Older adults should also maintain sufficient intake of potassium, calcium, vitamin D, fibre, and vitamin B12 while limiting sodium, saturated fats, and added sugars. Adequate hydration is important because thirst perception often declines with age [65]. Nutritional interventions should also consider income, social support, oral health, and access to suitable food.

Physical activity improves cardiovascular function, muscle strength, balance, and functional independence. For adults aged 65 years and older, WHO guidelines recommend at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity weekly, alongside muscle-strengthening activities on at least two days. Balance and strength exercises should be included on at least three days per week to reduce falls and maintain mobility. Older adults should also minimize sedentary behaviour [66]. Exercise programmes can improve physical function among residents of long-term care facilities [67]. Nevertheless, data from the European Health Interview Survey showed that only 7.4% of EU residents aged 65 years or older met the combined recommendations for aerobic and muscle-strengthening activity [68]. This gap highlights the need for accessible exercise programmes adapted to individual abilities. Preventive interventions should begin early and continue throughout life because cardiovascular risk accumulates over time. Shared decision-making helps older patients and clinicians balance treatment benefits, adverse effects, and personal priorities [69]. Social networks and community support may also improve self-efficacy and participation in lifestyle interventions, particularly among older adults with low socioeconomic status [70]. Emerging gerotherapeutic approaches aim to reduce age-related biological deterioration and extend health span. These include pharmacological strategies such as metformin, senolytic agents, nicotinamide adenine dinucleotide boosters, and mammalian target of rapamycin inhibitors, alongside exercise and dietary interventions. However, large-scale clinical trials remain necessary to establish their effectiveness and safety in cardiovascular prevention [71].

Frailty is particularly relevant to preventive cardiovascular care because it reflects reduced physiological reserve and increased vulnerability to illness and stress [72]. European SHARE data demonstrate a progressive increase in frailty with age. Among individuals aged 50–64 years, frailty prevalence was 3.0%, compared with 16.0% among those aged 75–84 years and 32.8% among individuals older than 85 years [73]. Frailty also varies according to socioeconomic circumstances, with substantially higher rates reported among older populations in countries with lower gross domestic product per capita [72]. Its association with CVD, diabetes, dementia, falls, and sarcopenia makes routine assessment important [74–77]. Both frailty and prefrailty are associated with increased cardiovascular mortality, while frailty independently predicts mortality within one year among patients with CVD [78,79]. Assessment can guide treatment intensity and identify opportunities for interventions aimed at improving physical function. It should support individualized care rather than serve as a reason to withhold treatment. However, the lack of consensus regarding the most appropriate assessment tool remains an obstacle to routine implementation, reinforcing the need for further clinical trials [74,80]. Cardiac rehabilitation provides another opportunity to reduce cardiovascular risk and improve functional outcomes. Despite its benefits, participation among older adults remains limited, particularly among those with frailty [81]. Rehabilitation can improve physical capacity, cardiovascular health, psychological well-being, and quality of life while reducing the risk of subsequent events. Older patients also have higher withdrawal rates, making it important to identify barriers and develop programmes that accommodate their functional limitations and individual needs [82].

Prevention and treatment decisions should ultimately reflect biological age, functional status, life expectancy, and patient preferences rather than chronological age alone. A conservative approach may be appropriate for some frail individuals when invasive treatment offers limited expected benefit or may compromise quality of life [83,84]. Outcomes should therefore extend beyond mortality to include symptom control, cognitive function, independence, medication tolerance, hospitalization, and quality of remaining life [83–86]. Collaboration between cardiologists, geriatricians, primary care professionals, and other healthcare providers supports comprehensive management of multimorbidity, frailty, and cognitive decline [86]. Advance care planning and palliative services may also help align treatment with patient preferences, including decisions to prioritize comfort and home-based care [83–88]. Social and economic inequalities further influence preventive care. Poverty, limited healthcare resources, and geographical barriers can restrict access to medications, nutritional support, screening, and specialist services. Rural residents may experience delays because of long distances to healthcare facilities [89,90]. Cardiovascular inequalities also vary across Europe, with resource limitations and austerity measures affecting access in parts of Southern Europe, while substantial inequalities in mortality and healthcare provision persist in Central and Eastern Europe [5,91,92]. Social isolation compounds these difficulties and is associated with increased cardiovascular events and mortality among older adults [93]. Family caregivers and community services provide important physical, emotional, and practical support, particularly after hospital discharge. However, informal caregivers may experience substantial health, emotional, and financial burdens, especially when they are themselves older. Community health workers and respite care can help reduce these pressures and strengthen continuity of care [94,95]. Addressing these determinants is essential to making cardiovascular prevention accessible and effective across older populations.

Roles of Public Health, Health Information Management, and Medical Secretaries

Public health professionals play an important role in preventing cardiovascular disease (CVD) and reducing inequalities among older adults. Their responsibilities include developing population-based prevention programmes, promoting healthy lifestyles, and improving access to cardiovascular screening and early diagnosis. Smoking cessation campaigns, nutritional education, physical activity programmes, and hypertension screening can help reduce cardiovascular risk and preserve functional independence. Public health initiatives should also address socioeconomic factors, including poverty, social isolation, and limited access to healthcare, which disproportionately affect vulnerable older populations. Collaboration with primary care services, community organizations, and social care providers can support early intervention and continuity of cardiovascular care. Health information management contributes to the coordination and quality of cardiovascular services through accurate collection, storage, analysis, and reporting of clinical data. Electronic health records allow healthcare professionals to review medical histories, cardiovascular risk factors, comorbidities, medication use, diagnostic results, and previous interventions. These records are particularly important for older patients with multimorbidity and polypharmacy, as they facilitate medication reconciliation, reduce duplication of investigations, and support clinical decision-making. Health information systems can also monitor treatment outcomes, hospital admissions, readmissions, and complications. At the population level, cardiovascular registries and epidemiological databases help identify regional inequalities, evaluate prevention programmes, and guide healthcare resource allocation. Maintaining data accuracy, confidentiality, and interoperability is essential for effective information exchange between healthcare settings.

Medical secretaries support the administrative organization of cardiovascular services and facilitate communication between patients and healthcare professionals. Their responsibilities include scheduling consultations, coordinating diagnostic appointments, maintaining medical documentation, processing referrals, and organizing follow-up visits. These functions are particularly relevant to older adults who may require repeated assessments, rehabilitation, medication reviews, and multidisciplinary consultations. Medical secretaries can also help patients and caregivers understand appointment arrangements, access relevant medical records, and navigate referral pathways. Accurate documentation and timely communication reduce administrative delays and support continuity of care. Integration of these three professional roles can strengthen cardiovascular prevention and management in ageing populations. Public health professionals address population-level risk and inequalities, health information specialists support evidence-based decisions through reliable clinical data, and medical secretaries facilitate the efficient delivery of healthcare services. Their coordinated contribution can improve access, continuity, and quality of cardiovascular care while supporting the functional independence and quality of life of older adults.

Conclusion:

Cardiovascular disease in older adults represents a major healthcare challenge in Europe, requiring approaches that extend beyond conventional disease management. Age-related

physiological changes, multimorbidity, frailty, cognitive impairment, and polypharmacy influence diagnosis, treatment safety, and long-term outcomes. Underrepresentation in clinical trials further limits the evidence available to guide clinical decisions. Effective management should combine individualized pharmacological and invasive treatment with lifestyle modification, nutritional support, frailty assessment, and cardiac rehabilitation. Decisions should consider functional capacity, quality of life, life expectancy, and patient preferences rather than chronological age alone. Public health initiatives, reliable health information systems, and coordinated administrative services can improve prevention, access, and continuity of care. Greater representation of older adults in research and stronger collaboration between cardiologists, geriatricians, primary care professionals, and other healthcare providers are essential to achieving equitable, patient-centred cardiovascular care.

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