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# Personalized approaches to cardiovascular care for the elderly-patient centered care

**Mohammed Hamed Alqahtani**

KSA, National Guard Health Affairs

**Abstract**---Introduction: The aging population in the United States is set to expand significantly by 2050, with over 80 million Americans aged 65 and older. This demographic faces complex health challenges, including high rates of cardiovascular diseases often accompanied by multimorbidity. Traditional disease-specific guidelines, which do not account for the multifaceted nature of aging, leave gaps in managing these conditions effectively. Aim: This review aims to propose a framework for integrating personalized, patient-centered approaches into cardiovascular care for the elderly. The focus is on addressing the unique needs of this population through comprehensive, goal-directed care. Methods: The review synthesizes current literature and guidelines from major cardiovascular and geriatric organizations, including the American College of Cardiology (ACC) and the European Society of Cardiology (ESC). It discusses the integration of patient goals, comprehensive geriatric assessments, and proactive management of aging-related risks, including polypharmacy, falls, and frailty. Results: The review highlights the importance of incorporating patient preferences and values into treatment decisions. It finds that goal-directed care, informed by comprehensive assessments and proactive management, can enhance treatment adherence, reduce low-value care, and improve overall quality of life for older adults with cardiovascular diseases. Conclusion: Implementing a patient-centered, goal-directed approach in cardiovascular care for the elderly is crucial for addressing the complexities of multimorbidity and aging. This approach emphasizes the need for tailored care plans, improved communication, and integration of digital health technologies to better meet the health goals of elderly patients.

**Keywords**---cardiovascular care, patient-centered care, elderly, multimorbidity, goal-directed care, geriatric assessment, polypharmacy, falls, frailty, digital health.

## Introduction

According to the United States Census Bureau, by 2050, over 80 million Americans will be aged 65 years or older [1]. Despite the prevalence of cardiovascular diseases among older adults, these conditions seldom occur in isolation [2]. Most elderly individuals experience multimorbidity, characterized by the presence of two or more chronic medical conditions [3], with nearly 20% managing six or more chronic conditions simultaneously [4]. Historically, disease-specific guidelines have offered treatment recommendations for individual conditions without considering their impact on other concurrent conditions [5]. Furthermore, clinical trials underpinning these guidelines often excluded older adults with multimorbidity, leaving the efficacy of these protocols for this complex population uncertain [5]. Additionally, numerous aging-related issues such as polypharmacy, frailty, cognitive decline, functional impairment, social isolation, mood disorders, and frequent falls complicate the application of disease-specific guidelines for this demographic.

Given the rapid expansion of the elderly population with cardiovascular disease and the inherent complexities of aging, there is a growing recognition of the need to approach cardiovascular care through an aging-informed lens [6]. Unlike disease-specific management strategies, patient-centered care focuses on directing all aspects of disease management towards achieving an individual's health and life objectives [7]. This comprehensive approach intentionally addresses the complexities of multimorbidity, and the physical, social, financial, cultural, and emotional challenges associated with aging, thereby creating personalized care plans aligned with the patient's expressed health goals. Effective patient-centered care involves defining health objectives, recognizing aging-related issues affecting prognosis and risk, and aligning treatment options with these goals.

In its 2012 Health Policy Statement, the American College of Cardiology (ACC) advocated for a heightened emphasis on patient-centered care within cardiovascular medicine, stressing improved clinician-patient communication, shared decision-making, and collaborative care planning [8]. However, guidance on integrating this patient-centered approach into routine care for cardiovascular patients has been limited. Utilizing a proposed framework for effective patient-centered cardiovascular care, this review article aims to offer practical recommendations for incorporating goal-directed care into clinical cardiovascular practice and to suggest future research directions supporting this approach.

**Goal Elicitation** The ACC, American Heart Association (AHA), and European Society of Cardiology (ESC) guidelines for cardiovascular disease management recommend incorporating patient preferences and values into treatment decisions [9][10][11]. Nevertheless, patient goals are infrequently articulated and not always actively solicited by physicians [12][13], and the guidelines lack detailed instructions on implementing this requirement. The process of eliciting patient preferences, values, and goals involves understanding the patient's perspective on their illness, asking open-ended questions to uncover their agenda, and engaging in focused listening. The subsequent step involves negotiating SMART goals—Specific, Measurable, Achievable, Realistic, and Time-bound—with available tools

[14]. Common goals among older adults with multiple chronic conditions often include family activities, shopping, exercise, and maintaining independence [15]. While concerns about unrealistic goals exist, they are relatively rare [15][16]. Another issue may be the limited time physicians can allocate to explore patient goals. Research indicates that fully developing goals requires an average of 20 to 30 minutes, typically facilitated by trained personnel rather than physicians [15]. Consequently, training staff to assist with goal definition may help alleviate the time burden on physicians. Ultimately, treatment adherence improves when plans align with expressed goals [16]. Although the specific benefits of goal elicitation for cardiovascular disease management remain underexplored, goal-directed care for multimorbid patients enhances satisfaction for both patients and physicians and may reduce low-value care [17][18][19].

**Understanding Prognosis in Relation to Aging-Related Conditions** Aging-related conditions often drive morbidity and mortality more significantly than cardiovascular disease alone. Recognizing the influence of aging-related factors on prognosis can inform goal elicitation and shared decision-making, ensuring that care aligns with goals and expectations are realistic. Comprehensive geriatric assessments evaluate aging-affected domains, including multimorbidity, polypharmacy, frailty, cognition, functional dependence, skin integrity, social support, and mood. These assessments identify risks for adverse outcomes (e.g., lack of social support affecting healthcare access) and highlight opportunities for targeted interventions (e.g., fall risk reduction through physical therapy). A collaborative interdisciplinary team approach is ideal for addressing aging-related impairments. If geriatric-specific information is not readily available in the medical record, it can be obtained from the patient's primary care provider, facilitating communication and coordination among team members toward goal attainment.

In the absence of a terminal diagnosis, geriatric assessment data can be used to estimate survival. Prognosis calculators, considering age, gender, medical comorbidities, and functional status, provide estimates of short-, intermediate-, and long-term mortality [20][21]. Geriatric domain impairments adversely affect outcomes in various cardiovascular contexts, including heart failure hospitalization [22][23], percutaneous coronary artery intervention [24], TAVR [25], and acute myocardial infarction [26]. Estimating survival can help physicians and patients discuss the risks and benefits of treatment options, manage expectations, align treatments with goals, and facilitate shared decision-making.

### **Proactively Addressing Aging-Related Risks**

Beyond facilitating prognosis assessments, recognizing geriatric syndromes uncovers opportunities for interventions that may enhance goal achievement. Proactive management of aging-related conditions can mitigate adverse events, improve quality of life, and ultimately lead to better outcomes. Examples of such interventions include: ensuring adequate social support for cognitively impaired patients who may struggle with medication adherence, referring older adults who screen positive for depression for further assessment and management, and offering telehealth services for those facing transportation challenges. While all

elements of the geriatric assessment are crucial for comprehensive management of older adults, polypharmacy, falls, and frailty are particularly significant in the context of cardiovascular disease. The following sections highlight the importance of these three domains in patient-centered geriatric cardiovascular care.

### **Polypharmacy**

Polypharmacy is highly prevalent among older adults with cardiovascular disease. Over 50% of patients with atrial fibrillation are prescribed five or more medications [27], and more than 75% of patients with any form of heart failure receive ten or more medications [28]. Polypharmacy in these populations is associated with increased risks of adverse events, including falls, significant bleeding, hospitalization, and mortality [27][29]. Deprescribing involves simplifying medication regimens to reduce adverse effects and optimize outcomes that align with patient priorities. Although many patients are interested in reducing their medication load under clinician guidance [30], consensus guidelines for deprescribing are lacking. Moreover, while some medications with known adverse side effects, such as benzodiazepines and anticholinergics, are strongly discouraged in older adults [31], the balance between benefit and harm is less clear for other medications, including several cardiovascular drugs. For instance, the benefit of statins for primary cardiovascular disease prevention in older adults remains uncertain [32]. Discontinuing statins amidst polypharmacy may increase the risk of heart failure hospitalization and adverse cardiovascular events [33], creating ambiguity about the best course of action. Similarly, beta-blockers offer survival benefits following myocardial infarction in the short term [34], but their benefits diminish over time [35]. Unintended side effects of these medications, such as fatigue, reduced physical capacity [36], and functional decline [37], may negatively affect quality of life. Given the heightened risk of adverse effects with aging, questions also arise regarding the duration of cardiovascular medication use [38]. Clinical trials typically offer limited data beyond a few years, contributing to uncertainty about long-term cardiovascular pharmacotherapy [38]. Patient-centered care facilitates navigating these uncertainties by identifying potentially harmful medications and exploring deprescribing opportunities [39]. A recently published framework for deprescribing both cardiovascular and non-cardiovascular medications proposes a stepwise process, starting with a careful medication review, followed by assessing risks for adverse drug events, evaluating and prioritizing medications for discontinuation, and implementing careful monitoring [40]. Ongoing research will further elucidate best practices for deprescribing.

### **Falls**

Falls are the leading cause of injury and injury-related death in adults aged 65 and older [41]. Among older adults with cardiovascular disease, the incidence of falls is notably high, with 34% of those with coronary artery disease and 43% of those with congestive heart failure experiencing falls, compared to 12% of community-dwelling older adults without comorbidities [42]. Fall risk assessment tools for community-dwelling older adults are readily available and are based on simple factors such as previous falls, mobility impairments, medications, and cognitive status [43]. Individuals at increased risk for falls can benefit from

referrals to multidimensional physical therapy programs that improve balance, strength, and mobility, thereby reducing fall risk [44]. However, guidelines for managing medication in this context are lacking. A common dilemma for cardiologists involves managing patients with atrial fibrillation who have a history of falls. Although falls are a frequent reason for withholding anticoagulation in these patients [45], those at higher fall risk are also at greater risk for stroke due to their age and comorbidities. The patient's pre-specified goals should guide risk/benefit discussions about anticoagulation. For instance, a family might choose to forego anticoagulation for an 85-year-old woman with dementia, atrial fibrillation, functional impairments, and frequent falls to minimize physician visits and avoid hospitalization. Conversely, another patient might accept the risk of fall-related bleeding complications to reduce the risk of a debilitating stroke that threatens physical function and independence. Clearly defined patient-prioritized goals are crucial for navigating such treatment uncertainties.

### **Frailty**

Frailty, characterized by fatigue, weakness, and wasting, reduces resilience to medical stressors. There is a bidirectional relationship between frailty and cardiovascular disease: cardiovascular disease increases the risk of frailty, while frail individuals face higher risks of cardiovascular events [46]. While a comprehensive review of frailty and cardiovascular disease is beyond the scope of this article, it is discussed extensively elsewhere [46][47]. Briefly, up to 60% of patients with cardiovascular disease meet the criteria for physical frailty, compared to 10% of community-dwelling older adults. Frailty is associated with poorer outcomes after nearly every cardiovascular procedure [47][48]. Although numerous frailty assessments exist [49], simpler tools such as the Essential Frailty Tool [50] or the Clinical Frailty Scale [51] can effectively determine frailty status and its impact on procedural outcomes, facilitating important risk/benefit conversations. The challenge lies in providing effective interventions to mitigate frailty-related risks. While physical therapy and nutritional supplements may improve frailty, their impact on procedural outcomes is not fully understood [52]. Given the elevated risks associated with frailty, frailty assessments are a crucial element of patient-centered, goal-directed care. Additionally, the emerging concept of cognitive frailty—defined as the presence of physical frailty and cognitive impairment not meeting dementia criteria [53]—suggests a role for cognitive assessments in identifying subtle cognitive changes in older adults. Ongoing research into physical and cognitive frailty aims to identify interventions that enhance resilience in the face of cardiovascular disease or procedures.

### **Aligning Treatment with Quality of Life Goals in Cardiovascular Disease**

For older adults, prioritizing quality of life (QoL) goals is essential, especially when managing cardiovascular disease. Unfortunately, cardiovascular disease-specific guidelines often emphasize clinical trial outcomes that may not fully account for QoL, particularly for older adults with geriatric syndromes. These guidelines usually focus on survival outcomes, potentially overlooking the nuanced needs of older patients. To achieve optimal patient-centered care, treatment options must align with QoL goals through shared decision-making, considering that formal data on QoL-focused treatment options may be limited.

## **Integrating QoL into Cardiovascular Management**

Recent literature increasingly emphasizes QoL endpoints, which can enhance patient-centered outcomes in cardiovascular care. For instance, defining a "good" outcome after cardiovascular procedures now incorporates meaningful QoL improvements alongside survival. Studies show that about two-thirds of older adults at moderate to high risk for transcatheter aortic valve replacement (TAVR) experience "good" outcomes six months post-procedure [54][55]. However, frailty can reduce these positive outcomes to approximately 50% [55]. Similarly, a trial investigating rate control options for atrial fibrillation found that patients on digoxin reported greater QoL improvements at one year compared to those on beta-blockers, without increased adverse events [56]. Additionally, a transitional rehabilitation program after heart failure hospitalization, targeting patients with frailty and other geriatric syndromes, showed significant QoL gains [57]. This emerging focus on QoL, despite not being standard in current cardiovascular guidelines, supports the advancement of patient-centered care.

It is important to note that standardized QoL measures used in clinical trials do not always reflect individual patient-reported goals. For example, the Kansas City Cardiomyopathy Questionnaire (KCCQ) assesses the impact of heart failure symptoms on daily activities but does not capture personal goals like attending family events or performing specific physical tasks [58]. Future research should explore the relationship between standardized QoL measures and patient-reported goal achievement to better apply the literature to patient care.

## **Role of Palliative Care in Cardiovascular Management**

Palliative care can significantly improve QoL for cardiovascular patients, addressing symptoms and issues that persist despite optimal treatment. For heart failure patients, palliative care addresses symptoms such as depression, pain, and existential distress [59][60][61]. The ACC/AHA and ESC guidelines for heart failure recommend integrating palliative care [62][63], yet referrals are often made too late in the disease course, and cardiologists are less likely to initiate them [64]. Given the prevalence of geriatric syndromes and their impact on QoL, expanding palliative care to other cardiovascular conditions beyond heart failure could benefit a broader patient population [65].

## **Shared Decision-Making**

Shared decision-making involves patients and their families in the treatment decision process, ensuring they are informed about the benefits, risks, and burdens of various options. This approach can lead to better adherence, higher patient satisfaction, improved outcomes, and reduced healthcare costs [67]. However, barriers such as perceived lack of time often hinder its implementation [68]. Despite this, shared decision-making may only slightly increase consultation time, and strategies such as using scenario examples and addressing primary concerns can optimize this process [69]. Decision aids, including printed materials or videos, can enhance communication, improve patient knowledge, and satisfaction [70]. Several validated decision aids exist for cardiovascular patients, addressing issues such as low-risk chest pain [71], anticoagulation in atrial

fibrillation [72], and left ventricular assist device implantation [73][74][75]. For cardiologists, the challenge is integrating the additional risks posed by geriatric syndromes into the shared decision-making process. Involving the patient's primary care physician and other clinical team members can help clarify risks and define expected outcomes, ensuring high-quality, goal-directed management decisions.

### **Optimizing Access to Care and the Growing Significance of Digital Health Technology**

For older adults facing challenges such as limited mobility, inadequate social support, or difficulties with transportation, enhancing access to healthcare through innovative digital technologies holds significant promise for improving care delivery. Digital health, often referred to as mobile health (mHealth), encompasses the provision and exchange of healthcare services via mobile platforms. This includes telehealth services (such as video or telephone consultations with interdisciplinary teams), remote patient monitoring, and wearable technologies. These tools address barriers like transportation issues, geographic limitations, and lack of access in underserved communities. Digital health technologies have proven effective in primary and secondary disease prevention, chronic disease management, acute exacerbations of chronic illnesses, and palliative care [76]. The COVID-19 pandemic accelerated the adoption of digital health as a viable care approach, further bolstered by changes in reimbursement policies from the Centers for Medicaid and Medicare Services, which now provide equivalent reimbursement for telehealth and in-person visits.

For older adults, the challenge extends beyond merely adopting health technology to integrating “gerotechnology”—technology specifically designed to enhance patient-centered care and facilitate goal attainment [77]. Historically, digital health technologies have been underutilized among older adults due to factors such as patient preference, physical or cognitive limitations, non-aging-inclusive technology, and assumptions by providers about older adults' preferences. However, with 61% of individuals over 65 owning smartphones and using them predominantly for health information after making calls [78], this population is increasingly ready for digital health interventions. Telehealth utilization among older adults has been linked to decreased secondary care use (e.g., hospitalizations), reduced overall healthcare utilization [79], lower mortality risk [80], and, for some subpopulations like those with heart failure, improved QoL [81]. Efforts are ongoing to expand telehealth into cardiac rehabilitation, with initial findings indicating that this approach is both safe and effective [82]. As the population of older adults with chronic diseases grows, gerotechnology represents a key opportunity to overcome common barriers, enhance access to care, and promote wellness, independence, and goal attainment [83].

### **Conclusion and Future Directions**

Delivering patient-centered care for older adults with cardiovascular disease necessitates a comprehensive, interdisciplinary approach that begins with understanding the patient's goals and directing care towards achieving these goals through shared decision-making. Examples of patient-centered, goal-

directed care for older adults with common cardiovascular conditions can be illustrated as follows:

An 84-year-old man with severe aortic stenosis, experiencing generalized fatigue, has comorbid conditions including hypertension, diabetes, and atrial fibrillation. His primary goal is to alleviate fatigue sufficiently to participate in family gatherings. Given his frailty and dependence on others for daily activities, his prognosis includes a high risk of poor outcomes and reduced QoL following transcatheter aortic valve replacement [54]. His fatigue is likely due to frailty and depression rather than solely from aortic stenosis. Recommended interventions include physical therapy for frailty and psychiatric support for depression. Cardiology video consultations are used to address cardiovascular issues and optimize the treatment plan.

An 89-year-old woman with atrial fibrillation who feels well has comorbid heart failure with preserved ejection fraction, hypertension, chronic obstructive pulmonary disease, and arthritis. Her goal is to maintain independence and cook dinner for herself four times a week despite balance issues and a fear of falling. With a history of falls and urinary urgency, her prognosis indicates a high risk of recurrent falls and potential complications from anticoagulation therapy. The approach involves anticoagulation to prevent stroke and physical therapy to address fall risk. Telehealth consultations are used to monitor progress and manage safety with respect to anticoagulation.

A 79-year-old man with ischemic cardiomyopathy and reduced ejection fraction, who experiences shortness of breath with minimal exertion, seeks to remain at home with 24-hour care and avoid recurrent hospitalizations. Comorbidities include hypertension, coronary artery disease, and chronic kidney disease. His frailty, cognitive impairment, and dependence on others for daily activities contribute to a significant mortality risk. The management plan includes guideline-directed medical therapy to prevent hospitalizations, consideration of palliative care to reduce hospital admissions, and possible deactivation of an implantable cardioverter defibrillator to avoid unnecessary interventions. Telemonitoring services are used to track fluid status and treatment tolerance.

Despite progress, systematic incorporation of goal-directed strategies into cardiovascular care faces challenges. Current data inadequately supports a goal-directed care approach due to a lack of standardized goal definitions, absence of goal-attainment measures in trials, and insufficient research involving older adults with aging-related issues. Additionally, gaps in understanding the interplay between aging-related conditions and cardiovascular disease, along with barriers such as limited training in communication and inadequate reimbursement models, hinder the adoption of goal-directed care [83]. Addressing these challenges through interdisciplinary research and enhancing communication, palliative care integration, and digital health technology will help develop a stronger foundation for implementing goal-directed care in older adults with cardiovascular disease.



## Conclusion

The integration of personalized, patient-centered approaches into cardiovascular care for the elderly represents a significant advancement in managing the complexities associated with aging and multimorbidity. Traditional cardiovascular guidelines often fall short for older adults, as they typically focus on disease-specific outcomes without adequately addressing the interplay of multiple chronic conditions and the broader implications of aging. A patient-centered approach, as outlined in this review, advocates for a shift from merely managing individual diseases to aligning care with the overall health and life goals of the patient. This involves actively engaging patients in defining their goals, incorporating comprehensive geriatric assessments, and tailoring interventions to address the unique challenges posed by aging, such as polypharmacy, frailty, and fall risks. Effective goal elicitation and shared decision-making enhance treatment adherence and satisfaction, while proactive management of aging-related risks can mitigate adverse events and improve quality of life. The application of digital health technologies, including telehealth and remote monitoring, further supports this approach by overcoming barriers related to mobility and access. Despite progress, the systematic adoption of goal-directed strategies in cardiovascular care faces challenges, including gaps in research, lack of standardized goal definitions, and barriers related to communication and reimbursement. Addressing these challenges through interdisciplinary research, improved training, and policy adjustments will be essential for advancing patient-centered care. In conclusion, personalized care that aligns with the patient's goals and considers the multifaceted nature of aging holds promise for enhancing cardiovascular management in the elderly. Future research should focus on developing robust frameworks for goal attainment and integrating comprehensive assessments into routine care to better serve this growing population.

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