



Holistic Cardiovascular Risk Assessment and Family-Centered Management of Hypertension and Hyperlipidemia: A Case Report

Tessa SJ^{1*}, Jafkan Dwifide DK², Naya Farikhah², Ni Made Dwi Oktaria², Nihlah Fitriah², Arpana Dixit³

¹ Faculty of Medicine, Malahayati University Bandar Lampung, Indonesia

² Medical Study Program, Malahayati University Bandar Lampung, Indonesia

³ Department of Basic Sciences and Humanities, Pranveer Singh Institute of Technology, Kanpur, Uttar Pradesh, India

* Correspondence: tessasj12@gmail.com

Article History

Received : 12 April 2026

Revised : 14 June 2026

Accepted : 23 October 2026

Available Online : 31 October 2026

Keywords:

hypertension;
hyperlipidemia;
cardiovascular risk assessment;
family-centered care;
lifestyle modification.

To cite this article: Sj, T., DK, J. D., Farikhah, N., Oktaria, N. M. D., Fitriah, N., & Dixit, A. (2026). Holistic cardiovascular risk assessment and family-centered management of hypertension and hyperlipidemia: A case report. *Biomedical Research and Theory Letters*, 2(2), 48–57.
<https://doi.org/10.58524/btrl.v2i2.189>

Abstract

Hypertension and hyperlipidemia are major modifiable risk factors for cardiovascular disease, particularly when accompanied by obesity, unhealthy dietary habits, and insufficient physical activity. Effective management requires an integrated approach that addresses clinical conditions, behavioral factors, and family support. This case report describes the application of holistic cardiovascular risk assessment and family-centered management in a patient with long-standing hypertension and hyperlipidemia in a primary healthcare setting. A 50-year-old female with hypertension diagnosed at the age of 39 and a history of hyperlipidemia underwent a comprehensive family medicine assessment at Ardhito Medika Clinic, Bandar Lampung, Indonesia, on June 5, 2026. Clinical examination revealed a blood pressure of 125/80 mmHg, heart rate of 80 beats/min, respiratory rate of 18 breaths/min, and body temperature of 36.6°C. Anthropometric measurements showed a weight of 69 kg and height of 158 cm, corresponding to a body mass index of 27.6 kg/m². Laboratory findings indicated a total cholesterol concentration of 365 mg/dL. The patient reported regular use of amlodipine 10 mg, candesartan 8 mg, and simvastatin 5 mg. Identified cardiovascular risk factors included a family history of hypertension, frequent consumption of high-salt and high-fat foods, and insufficient physical activity. Family assessment using the Family APGAR instrument yielded a score of 10, indicating highly functional perceived family relationships, while the SCREEM assessment suggested generally supportive family resources. A family-centered intervention was provided through individualized education and behavioral counseling based on the 5A and 5R frameworks. Counseling focused on dietary sodium and fat reduction, increased physical activity, medication adherence, weight management, and regular cardiovascular risk monitoring. Family members were involved in supporting healthier household dietary practices and reinforcing recommended lifestyle modifications. The recorded blood pressure was within a controlled range at the documented assessment, despite the presence of multiple cardiovascular risk factors and markedly elevated total cholesterol. The patient reported regular medication use and demonstrated favorable perceived family functioning. However, serial blood pressure measurements, follow-up lipid profiles, and standardized pre- and post-intervention behavioral assessments were not available to establish the effectiveness of the counseling intervention. This case highlights the value of holistic cardiovascular risk assessment and family-centered counseling in identifying modifiable risk factors among patients with hypertension and hyperlipidemia. Integrating clinical evaluation, family functioning assessment, and individualized lifestyle counseling may support comprehensive primary healthcare management. Nevertheless, structured follow-up and objective clinical measurements are necessary to evaluate sustained cardiovascular risk reduction and intervention outcomes.



Copyright : © 2026 The Author(s). Published by FoundAE (Foundation of Advanced Education). This article is published under the terms of the Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0), <https://creativecommons.org/licenses/by-sa/4.0/>.

1. Introduction

Hypertension and hyperlipidemia are major modifiable risk factors for cardiovascular morbidity and mortality worldwide. Both conditions contribute substantially to the development and progression of atherosclerotic cardiovascular disease, including coronary artery disease, ischemic stroke, and peripheral arterial disease. Hypertension is characterized by persistently elevated arterial blood pressure, whereas hyperlipidemia involves abnormalities in circulating lipid concentrations that may accelerate atherosclerotic processes. According to the World Health Organization (WHO, 2025), hypertension affects approximately one-third of adults aged 30–79 years globally, while effective blood pressure control remains inadequate in many populations. The coexistence of hypertension and lipid abnormalities presents additional

challenges because cardiovascular risk is influenced by the combined effects of multiple metabolic and hemodynamic factors rather than a single clinical parameter. Consequently, contemporary clinical recommendations emphasize comprehensive cardiovascular risk assessment, early identification of modifiable risk factors, and individualized prevention strategies (McEvoy et al., 2024).

The interaction between hypertension and hyperlipidemia is particularly important in understanding the development of cardiovascular complications. Persistent elevation of blood pressure increases mechanical stress on vascular walls and may contribute to endothelial dysfunction and vascular remodeling. Concurrently, elevated concentrations of atherogenic lipoproteins promote lipid accumulation within the arterial intima and contribute to atherosclerotic plaque formation. When these conditions coexist, the resulting cardiovascular risk requires integrated clinical assessment and management. The 2025 focused update of the European Society of Cardiology and European Atherosclerosis Society guidelines emphasizes the importance of lipid-lowering strategies based on overall cardiovascular risk and individual clinical characteristics (Mach et al., 2025). Similarly, the American College of Cardiology and American Heart Association guidelines recommend comprehensive assessment of traditional cardiovascular risk factors and shared decision-making to guide preventive interventions (Arnett et al., 2019). These recommendations highlight the importance of evaluating blood pressure and lipid abnormalities together, particularly among patients with additional metabolic and behavioral risk factors.

Obesity, unhealthy dietary patterns, and insufficient physical activity are important contributors to cardiovascular risk and may complicate the long-term management of hypertension and hyperlipidemia. Excess adiposity is associated with metabolic disturbances, altered vascular regulation, and increased cardiovascular risk. Dietary patterns characterized by excessive sodium intake, high saturated fat consumption, and inadequate fruit and vegetable intake may further contribute to unfavorable blood pressure and lipid profiles. Evidence from the Dietary Approaches to Stop Hypertension (DASH) trial demonstrated that dietary patterns emphasizing fruits, vegetables, and low-fat dairy products can reduce blood pressure (Appel et al., 1997). Subsequent research showed that reducing dietary sodium intake provides additional blood pressure benefits, particularly when combined with the DASH dietary pattern (Sacks et al., 2001). Regular physical activity also contributes to cardiovascular risk management. A systematic review and meta-analysis by Cornelissen and Smart (2013) demonstrated that structured exercise training can reduce resting blood pressure across different populations. These findings support the integration of nutritional counseling, weight management, and physical activity recommendations into comprehensive cardiovascular prevention.

Despite the availability of effective pharmacological therapies, sustained cardiovascular risk management frequently remains challenging because of difficulties maintaining medication adherence and recommended lifestyle behaviors. Patients with chronic conditions may require long-term antihypertensive and lipid-lowering therapy, regular medical examinations, and continued behavioral modification. However, individual beliefs, treatment complexity, daily routines, and social circumstances may influence adherence to medical recommendations. Burnier and Egan (2019) emphasized that medication adherence is a multidimensional challenge in hypertension management, involving patient-related, treatment-related, and healthcare system factors. Furthermore, Conn et al. (2015), through a systematic review and meta-analysis, demonstrated that interventions targeting medication adherence may improve treatment-related behaviors among patients with hypertension. These findings suggest that successful chronic disease management requires more than medication prescription alone and should incorporate education, behavioral support, and strategies addressing patient-specific barriers.

Family medicine offers a comprehensive framework for managing chronic cardiovascular conditions by integrating biological, psychological, social, behavioral, and environmental perspectives. This approach recognizes that individual health behaviors are influenced not only by personal knowledge and motivation but also by family relationships, household routines, cultural practices, and access to healthcare resources. Family members may contribute to treatment adherence by providing emotional support, assisting with medication schedules, encouraging clinical follow-up, and promoting healthier dietary and physical activity practices. Evidence from a systematic review and meta-analysis by Kebebew et al. (2026) suggests that family-based interventions can support hypertension self-management and improve blood pressure outcomes compared with usual care, although intervention characteristics and treatment effects vary across studies. Similarly, Bosworth et al. (2009) demonstrated the potential value of structured self-management interventions in supporting hypertension control. These findings highlight the relevance of integrating family participation and individualized behavioral support into primary healthcare management, particularly when patients experience difficulties sustaining recommended lifestyle modifications.

Structured family assessment can assist healthcare professionals in identifying family strengths, available resources, and potential barriers to chronic disease management. The Family APGAR instrument, developed by Smilkstein (1978), evaluates five dimensions of perceived family functioning: Adaptation, Partnership, Growth, Affection, and Resolve. Subsequent research provided evidence supporting its validity and reliability as a practical screening instrument for assessing satisfaction with family functioning (Smilkstein et al., 1982). In family medicine practice, the assessment of family relationships may be complemented by broader evaluation of social, cultural, religious, economic, educational, and medical resources through the SCREAM framework. Such assessments may help clinicians understand how family circumstances influence healthcare decisions, dietary habits, and the feasibility of recommended lifestyle modifications. Nevertheless, favorable family functioning should not be interpreted as direct evidence of optimal medication adherence or improved clinical outcomes. Rather, these instruments provide contextual information that may guide individualized counseling and family-centered care.

Behavioral counseling represents another important component of comprehensive cardiovascular risk management. Structured counseling approaches can help healthcare professionals explore patients' understanding of chronic diseases, identify barriers to behavior change, and establish realistic self-management goals. The 5A framework provides a structured process for clinical communication and behavioral support, whereas the 5R framework emphasizes the relevance of behavioral change, perceived risks, expected rewards, potential roadblocks, and repeated motivational reinforcement. These frameworks have been extensively described in tobacco-use counseling and related behavioral interventions (Fiore et al., 2008). Their principles may be adapted to discussions concerning dietary modification, physical activity, treatment adherence, and continued cardiovascular risk monitoring, although such adaptation should not be considered evidence of validated hypertension-specific effectiveness. In a family-centered setting, individualized counseling may be strengthened by involving household members in identifying practical barriers and developing sustainable lifestyle strategies. Transparent reporting of counseling procedures and follow-up outcomes is therefore essential when describing the application of these approaches in clinical case reports (Gagnier et al., 2013).

The present case report describes the holistic cardiovascular risk assessment and family-centered management of a 50-year-old woman with a history of hypertension and hyperlipidemia who received primary healthcare services at Ardhito Medika Clinic, Bandar Lampung, Indonesia. The patient had a documented blood pressure of 125/80 mmHg, a body mass index of approximately 27.6 kg/m², and a total

cholesterol concentration of 365 mg/dL. Additional cardiovascular risk factors included a family history of hypertension, frequent consumption of high-salt and high-fat foods, and insufficient physical activity. Although the patient reported regular medication use and healthcare attendance, persistent lifestyle-related challenges remained. Family assessment indicated highly functional perceived family relationships, with a Family APGAR score of 10, and generally supportive family resources based on the reported SCREEM findings. These characteristics provide an opportunity to examine the integration of clinical risk assessment, family functioning, health-related behaviors, and individualized counseling in the management of coexisting hypertension and hyperlipidemia. Therefore, this case report aims to describe the application of a holistic family medicine approach to identifying modifiable cardiovascular risk factors and incorporating family support into patient-centered management, while emphasizing the importance of objective monitoring and structured follow-up for evaluating clinical outcomes.

2. Materials and Methods

2.1. Study Design, Clinical Setting, and Data Collection

This study was conducted as a descriptive, single-patient clinical case report examining the application of holistic cardiovascular risk assessment and family-centered management in a patient with hypertension and hyperlipidemia. The case was documented as part of the Family Medicine educational program conducted by medical students from the Faculty of Medicine, Malahayati University, Bandar Lampung, Indonesia. The clinical and family assessment was undertaken on June 5, 2026, through a home visit and healthcare-related activities associated with Ardhito Medika Clinic, Way Halim, Bandar Lampung. The report was structured with reference to the CARE (CAsE REport) reporting framework, which emphasizes transparent documentation of patient information, clinical findings, diagnostic assessments, therapeutic interventions, and follow-up outcomes (Riley et al., 2017).

The patient was a 50-year-old woman with a history of hypertension beginning at approximately 39 years of age and a reported diagnosis of hyperlipidemia. Data collection involved direct patient interviews (autoanamnesis), interviews involving family members, physical examination, observation of the home environment, and review of available clinical information. The assessment was intended to identify biological, psychological, social, cultural, and environmental factors potentially influencing cardiovascular health and long-term disease management. The collected information included the patient's medical history, family history of chronic disease, medication use, dietary practices, physical activity, healthcare utilization, perceived family support, and behavioral barriers to lifestyle modification.

The clinical assessment documented blood pressure, heart rate, respiratory rate, body temperature, height, weight, and total cholesterol concentration. Blood pressure was recorded as 125/80 mmHg, with a heart rate of 80 beats/min, respiratory rate of 18 breaths/min, and body temperature of 36.6°C. Height and weight were recorded as 158 cm and 69 kg, respectively. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared, yielding approximately 27.6 kg/m². Interpretation of BMI in Asian populations requires consideration of population-specific cardiometabolic risk because increased metabolic risk may occur at lower BMI values than those traditionally used in general international classifications (WHO Expert Consultation, 2004).

The patient's reported total cholesterol concentration was 365 mg/dL. This measurement was included as an available indicator of lipid-related cardiovascular risk. However, the original documentation did not specify the laboratory method, fasting status, specimen collection date, or concentrations of low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides. Consequently, the lipid assessment was limited to the reported total cholesterol value. Contemporary cholesterol management guidelines emphasize the importance of comprehensive lipid assessment and individualized cardiovascular risk evaluation when determining appropriate management strategies (Grundey et al., 2019).

The available report did not specify the blood pressure measurement device, cuff size, patient positioning, resting period, or number of measurements obtained. These details are relevant because standardized blood pressure measurement procedures are essential for accurate clinical interpretation and hypertension management (Muntner et al., 2019). Therefore, the reported value was treated as a documented clinical observation rather than evidence of sustained blood pressure control. No additional measurements or diagnostic procedures were assumed beyond those explicitly described in the original clinical account.

2.2. Holistic Family Assessment and Counseling Intervention

The family medicine assessment incorporated a biopsychosocial approach to identify clinical risk factors and contextual influences on cardiovascular disease management. Biological assessment addressed the patient's history of hypertension and hyperlipidemia, anthropometric characteristics, current and previous medication use, and reported cardiovascular risk factors. Behavioral assessment focused on dietary habits, physical activity, medication-taking behavior, and routine healthcare attendance. Psychological and social considerations included perceived disease severity, motivation for lifestyle modification, family relationships, and practical barriers to maintaining recommended health behaviors. Family functioning was evaluated using the Family APGAR instrument, which examines Adaptation, Partnership, Growth, Affection, and Resolve. The instrument was used to describe the patient's perceived family functioning and identify potential family resources relevant to chronic disease management. The original report documented a total Family APGAR score of 10, indicating highly functional perceived family relationships. However, individual item responses were not available, limiting further interpretation of specific family functioning dimensions.

A SCREEM assessment was also described as part of the holistic evaluation, encompassing Social, Cultural, Religious, Economic, Educational, and Medical resources. This assessment was intended to identify family-related strengths and potential barriers influencing healthcare access, medication management, dietary practices, and lifestyle modification. The original case report characterized these resources as generally favorable but did not present complete domain-specific responses or quantitative scoring results. Accordingly, the SCREEM findings were retained as qualitative observations rather than treated as independently validated numerical outcomes. A family genogram was included in the reported assessment approach, although a complete diagram was not available for verification.

The counseling intervention was organized around principles of patient-centered communication and behavioral change. The primary framework was the 5A model, consisting of Assess, Advise, Agree, Assist, and Arrange. This model provides a structured approach for

identifying health-related behaviors, offering individualized recommendations, establishing mutually acceptable goals, supporting practical behavior-change strategies, and arranging continuity of care. Its application to multiple health behaviors in primary care has been discussed by Glasgow et al. (2004), while Glasgow et al. (2006) further described approaches for evaluating the delivery of the five components in patient-centered counseling. In the present case, the counseling process began by exploring the patient's medical history, understanding of hypertension and hyperlipidemia, treatment practices, and perceived cardiovascular risk factors. Particular attention was given to long-standing dietary habits involving frequent consumption of high-salt and high-fat foods, including traditional foods commonly consumed within the household. The patient reported difficulty consistently modifying these habits despite recognizing their potential health consequences. Insufficient physical activity was also identified, with walking reported approximately once per week.

Individualized counseling addressed the importance of continued medical treatment, dietary sodium reduction, lower intake of foods rich in saturated fat, increased consumption of fruits and vegetables, appropriate physical activity, weight management, and routine medical follow-up. Dietary recommendations emphasized gradual modifications that could be incorporated into existing household practices, including healthier ingredient selection and food preparation methods. Physical activity counseling encouraged more regular walking and other appropriate exercise according to the patient's capabilities. Evidence-based physical activity recommendations provide a useful framework for counseling adults with chronic health conditions, although activity prescriptions should be individualized according to functional status and clinical circumstances (Bull et al., 2020).

The original manuscript also described the use of the 5R framework, consisting of Relevance, Risks, Rewards, Roadblocks, and Repetition. These components were applied to discussions concerning the personal importance of cardiovascular risk management, potential complications of uncontrolled hypertension and dyslipidemia, anticipated benefits of healthier behaviors, barriers to lifestyle modification, and reinforcement of counseling messages. The 5R framework was therefore described as an adapted motivational counseling approach rather than as an independently validated intervention for hypertension or hyperlipidemia. The counseling activities incorporated principles related to motivational interviewing, including exploration of patient motivation, recognition of behavioral barriers, and encouragement of achievable lifestyle changes. Motivational interviewing has been evaluated as an approach for improving health-related behaviors across different clinical contexts (Rubak et al., 2005). However, the original report did not document the use of a formal motivational interviewing fidelity instrument or standardized assessment of counseling delivery.

Family members were involved in discussions concerning dietary choices, medication adherence, physical activity, and long-term healthcare attendance. Their involvement focused on encouraging healthier meals at home, providing reminders regarding prescribed treatment, supporting regular physical activity, and reinforcing routine cardiovascular monitoring. These activities reflected a collaborative approach to chronic disease self-management, in which patients and families participate in addressing medical, behavioral, and everyday practical challenges. Lorig and Holman (2003) emphasized that chronic disease self-management encompasses medical management, role management, emotional management, problem-solving, and collaborative relationships with healthcare professionals. The intervention was documented as a combination of health education, individualized counseling, family participation, and recommendations for continued self-monitoring. No independent quantitative assessment of counseling intensity, intervention fidelity, or family participation was available. Accordingly, the intervention was described according to the activities reported rather than classified as a standardized or experimentally validated treatment program.

2.3. Clinical Evaluation, Follow-up, and Ethical Considerations

The evaluation focused on clinical characteristics, identified cardiovascular risk factors, family functioning, reported medication adherence, counseling activities, and available information regarding follow-up. The principal clinical variables included blood pressure, anthropometric measurements, total cholesterol concentration, reported medication use, dietary behavior, and physical activity. Family assessment outcomes included the total Family APGAR score and qualitative SCREEM findings. The original manuscript described plans for regular clinic attendance, home visits, blood pressure self-monitoring, medication adherence monitoring, dietary evaluation, and physical activity tracking. These activities were intended to support continued cardiovascular risk management and reinforce recommended lifestyle modifications. However, the complete number and timing of follow-up encounters were not documented, and no serial blood pressure measurements, follow-up lipid profiles, repeated anthropometric measurements, or standardized pre- and post-intervention behavioral assessments were provided.

Consequently, the present case report did not employ statistical hypothesis testing or comparative effectiveness analysis. The available observations were presented descriptively, without attempting to establish a causal relationship between the counseling intervention and subsequent clinical improvement. This approach is consistent with the purpose of a clinical case report, which primarily documents individual patient experiences, clinical reasoning, interventions, and observed outcomes rather than determining intervention efficacy (Riley et al., 2017). The absence of repeated clinical measurements was considered an important reporting limitation. Although the original case report described favorable medication adherence, motivation, and family support, these characteristics were not measured using standardized longitudinal instruments. Similarly, the documented blood pressure of 125/80 mmHg and total cholesterol concentration of 365 mg/dL could not be interpreted as pre- and post-intervention comparisons. The reported cardiovascular risk factors and family functioning assessments therefore provided descriptive information for individualized clinical management rather than evidence of intervention-associated risk reduction.

For transparent reporting, the distinction between completed interventions and planned follow-up activities was maintained throughout the manuscript. The authors should verify the clinical records to determine whether additional appointments, blood pressure readings, lipid measurements, or counseling assessments were performed but omitted from the original report. Any additional information should be incorporated only if supported by verifiable documentation. Patient confidentiality should be maintained by using a non-identifying case designation and excluding personally identifiable information from the published manuscript. Written informed consent for publication and any applicable institutional ethical review requirements must be confirmed and documented by the authors before submission. The original manuscript did not provide sufficient information to verify the status of publication consent or institutional ethics approval. Ethical reporting should also ensure that any future inclusion of a family genogram, clinical photographs, or identifiable family history receives appropriate authorization.

3. Results and Discussion

3.1. Clinical Characteristics and Cardiovascular Risk Profile

A 50-year-old female patient with a history of hypertension since approximately 39 years of age underwent a comprehensive family medicine assessment on June 5, 2026, within the service area of Ardhito Medika Clinic, Way Halim, Bandar Lampung, Indonesia. The patient had a history of hyperlipidemia and reported regular attendance at medical consultations and continued use of prescribed medications. The assessment aimed to identify clinical and behavioral risk factors associated with cardiovascular health and evaluate the role of family support in long-term disease management. At the documented examination, the patient was conscious, oriented, and in generally good condition. Blood pressure was 125/80 mmHg, heart rate was 80 beats/min, respiratory rate was 18 breaths/min, and body temperature was 36.6°C. The blood pressure measurement indicated relatively controlled values during the assessment, although the available records did not include repeated measurements sufficient to establish sustained blood pressure control. Furthermore, the historical blood pressure readings supporting the original diagnosis of Grade I hypertension were not provided.

Anthropometric examination revealed a body weight of 69 kg and height of 158 cm, corresponding to a calculated body mass index (BMI) of 27.6 kg/m². This finding indicated excess body weight and suggested increased cardiometabolic risk. The classification of obesity depends on the diagnostic criteria applied, particularly in Asian populations, where elevated metabolic risk may occur at lower BMI values than those traditionally used in international classifications. The available laboratory information indicated a total cholesterol concentration of 365 mg/dL, representing marked hypercholesterolemia. However, concentrations of low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides were not reported. The absence of these measurements limited the ability to characterize the specific lipid abnormality, estimate atherosclerotic cardiovascular risk comprehensively, or evaluate the adequacy of lipid-lowering treatment.

The patient's reported medications included amlodipine 10 mg, candesartan 8 mg, and simvastatin 5 mg. The original case description indicated regular medication use, but a standardized adherence assessment was not documented. The reported simvastatin dose and the timing of the cholesterol measurement relative to treatment initiation were also unspecified, limiting interpretation of the relationship between lipid-lowering therapy and the observed cholesterol concentration. Additional clinical history included reported palpitations and gastritis. General examination of the respiratory, abdominal, and extremity systems revealed no significant abnormalities, while neurological examination showed preserved muscle strength and no reported pathological reflexes. A comprehensive cardiovascular diagnostic evaluation, including electrocardiography or additional cardiovascular investigations, was not described. Family history revealed a substantial burden of hypertension among first-degree relatives. Six of the patient's nine siblings were reported to have hypertension, including one sibling with concomitant diabetes mellitus. This family history represented an important non-modifiable cardiovascular risk consideration, although the available information was insufficient to establish a specific hereditary disorder. The principal clinical and cardiovascular risk findings are summarized in **Table 1**.

Table 1. Demographic Characteristics, Clinical Findings, and Cardiovascular Risk Profile of the Patient

Parameter	Documented finding	Clinical interpretation
Age / sex	50 years / Female	Adult patient
Hypertension history	Since age 39	Long-standing hypertension
Blood pressure	125/80 mmHg	Single recorded measurement
Heart rate	80 beats/min	Within usual resting range
Respiratory rate	18 breaths/min	Within usual resting range
Body temperature	36.6°C	Afebrile
Height	158 cm	Anthropometric measurement
Body weight	69 kg	Anthropometric measurement
BMI	27.6 kg/m ²	Excess body weight; classification depends on criteria
Total cholesterol	365 mg/dL	Marked hypercholesterolemia
LDL-C, HDL-C, triglycerides	Not reported	Lipid characterization incomplete
Amlodipine	10 mg	Reported antihypertensive medication
Candesartan	8 mg	Reported antihypertensive medication
Simvastatin	5 mg	Reported lipid-lowering medication; verify dose
Family history	Six of nine siblings had hypertension	Family cardiovascular risk burden
Dietary habits	Frequent high-salt and high-fat foods	Modifiable risk factor
Physical activity	Walking approximately once weekly	Insufficient regular activity

Note: Findings are derived from the original case report. No undocumented laboratory results or serial clinical measurements have been added. BMI = body mass index; LDL-C = low-density lipoprotein cholesterol; HDL-C = high-density lipoprotein cholesterol.

3.2. Holistic Assessment and Family Function

The holistic family medicine assessment identified multiple biological, behavioral, psychological, and family-related factors associated with the patient's long-term cardiovascular risk. From a biological perspective, the principal concerns were a history of hypertension, marked hypercholesterolemia, excess body weight, and a substantial family history of hypertension. Although blood pressure was relatively controlled at the documented examination, the coexistence of these risk factors suggested a need for continued comprehensive cardiovascular evaluation.

The behavioral assessment revealed dietary practices characterized by frequent consumption of foods perceived by the patient as high in salt and fat. The patient reported previously consuming traditional Palembang foods, including pempek and other oily or salty preparations, almost daily. She acknowledged that changing these dietary habits was difficult because they had become established over time and were influenced by household and social eating patterns. However, the sodium and fat content of individual foods was not quantitatively assessed; therefore, these dietary findings were based on patient-reported food habits rather than nutrient intake measurements.

Physical activity was also limited, with the patient reporting walking approximately once weekly. Although she expressed awareness of the importance of exercise and lifestyle management, the available information indicated difficulty maintaining regular physical activity. No standardized physical activity questionnaire, exercise log, or objective activity measurement was documented. Psychologically, the patient appeared motivated to maintain her health and avoid complications associated with hypertension, particularly given the reported family history of chronic disease. Nevertheless, the assessment identified differences between awareness of recommended health practices and the ability to implement them consistently. These observations suggested that behavioral counseling needed to address practical barriers rather than focus solely on providing general health information. Family functioning was evaluated using the Family APGAR instrument, yielding a total score of 10 out of 10. This score indicated highly functional perceived family relationships according to the conventional interpretation of the instrument. However, the original manuscript did not present individual scores for Adaptation, Partnership, Growth, Affection, and Resolve. Therefore, the relative contributions of individual family functioning domains could not be evaluated. The SCREEM assessment described generally favorable social, cultural, religious, economic, educational, and medical resources. Family members were reported to provide support through medication reminders, encouragement of healthier dietary practices, and assistance with routine healthcare attendance. However, the complete domain-specific assessment findings were not provided, limiting detailed interpretation of family resources and potential barriers.

Observation of the home environment indicated generally favorable living conditions, including adequate ventilation, lighting, sanitation, and household cleanliness. These findings provided contextual information about the patient's living environment but did not establish a direct relationship with blood pressure or lipid concentrations. The results suggest that favorable perceived family functioning coexisted with persistent behavioral challenges. Thus, strong family support should be regarded as a potential resource for cardiovascular self-management rather than direct evidence of successful lifestyle modification or improved clinical outcomes. The principal holistic assessment findings are presented in **Table 2**.

Table 2. Holistic Cardiovascular Risk Assessment, Family Function, and Behavioral Barriers

Assessment domain	Documented findings	Potential relevance to management
Biological	Hypertension, high cholesterol, excess body weight	Integrated cardiovascular risk evaluation
Family history	Multiple siblings with hypertension	Non-modifiable risk consideration
Dietary habits	Frequent salty and fatty foods	Individualized dietary counseling
Physical activity	Walking about once weekly	Activity planning
Psychological	Motivation to avoid complications	Behavioral counseling
Family APGAR	Total score 10/10	Favorable perceived family functioning
SCREEM	Generally supportive resources	Potential support for self-management
Medication behavior	Regular medication use reported	Adherence reinforcement and verification
Household environment	Adequate ventilation, lighting, sanitation	Contextual family assessment
Social and cultural habits	Difficulty changing established eating patterns	Culturally appropriate counseling

Note: Family APGAR is presented as the reported total score. Detailed SCREEM domain scores, validated dietary measures, and objective activity records were unavailable.

3.3. Family-Centered Counseling and Documented Outcomes

The intervention emphasized comprehensive cardiovascular risk management through individualized education, behavioral counseling, and family participation. Counseling addressed hypertension and hyperlipidemia, medication adherence, dietary modification, physical activity, weight management, and regular medical follow-up. The five-component behavioral counseling approach described in the original manuscript involved assessment of the patient's health behaviors and perceived risk factors, provision of individualized advice, discussion of readiness and practical goals, assistance in developing feasible strategies, and planning for continued monitoring. These activities were intended to facilitate communication between the healthcare team, the patient, and family members. Dietary counseling focused on reducing excessive sodium and fat intake, improving food selection, increasing fruit and vegetable consumption, and adopting healthier preparation methods. The patient was encouraged to modify established dietary practices gradually rather than rely on abrupt changes that might be difficult to maintain. Counseling also addressed the influence of family meals and social gatherings on dietary adherence. Physical activity counseling included encouragement to increase regular walking and participate in appropriate light exercise. The recommendations emphasized gradual improvement in activity frequency according to the patient's capabilities. Weight management was also discussed as part of the broader strategy for reducing cardiovascular risk.

Family members were encouraged to participate in preparing healthier meals, reminding the patient to take prescribed medications, supporting regular physical activity, and facilitating routine healthcare appointments. The counseling process incorporated motivational elements concerning the relevance of cardiovascular risk reduction, potential complications, expected benefits of healthy behavior, practical obstacles, and reinforcement of recommendations. The documented clinical findings included blood pressure of 125/80 mmHg and total cholesterol of 365 mg/dL. The original report described favorable medication adherence, family support, motivation, and patient understanding. However, no standardized pre- and post-counseling assessments were available to determine whether these characteristics improved following intervention. Similarly, the source manuscript referred to continued counseling and follow-up arrangements but did not present complete dates, numbers of follow-up visits, serial blood pressure readings, repeated lipid measurements, or objectively measured lifestyle changes. Consequently, intervention effectiveness could not be established from the available clinical information. The principal documented outcome

was the completion of a holistic clinical and family assessment accompanied by individualized cardiovascular risk counseling and family engagement. The available results demonstrate the identification of relevant risk factors and the application of a family-centered management strategy, rather than verified reductions in blood pressure, cholesterol concentration, or cardiovascular risk following the intervention.

3.4. Integrated Cardiovascular Risk Assessment in Hypertension and Hyperlipidemia

The present case illustrates the importance of evaluating multiple cardiovascular risk factors in patients with established hypertension and hyperlipidemia. Although the patient's blood pressure was 125/80 mmHg at the documented examination, the markedly elevated total cholesterol concentration, excess body weight, family history of hypertension, and unfavorable lifestyle patterns indicated the presence of additional cardiovascular concerns. These findings emphasize that a relatively controlled blood pressure measurement does not necessarily indicate comprehensive cardiovascular risk control. The coexistence of hypertension and dyslipidemia is clinically important because both conditions contribute to vascular dysfunction and the development of atherosclerotic cardiovascular disease. Contemporary European Society of Cardiology recommendations emphasize cardiovascular risk assessment based on multiple clinical characteristics rather than blood pressure alone (McEvoy et al., 2024). Similarly, lipid management guidelines recommend treatment strategies informed by overall cardiovascular risk, lipid characteristics, and individual patient circumstances (Mach et al., 2025).

In the present case, total cholesterol reached 365 mg/dL, a finding that warrants particular clinical attention. However, the absence of LDL-C, HDL-C, and triglyceride measurements prevented detailed characterization of the lipid abnormality. Total cholesterol alone cannot establish the concentration of atherogenic lipoproteins, determine whether familial hypercholesterolemia is present, or establish whether a specific LDL-C treatment target has been achieved. The 2018 AHA/ACC cholesterol management guideline emphasizes lipid evaluation, risk assessment, and appropriate selection of lipid-lowering interventions (Grundy et al., 2019). The 2025 ESC/EAS focused update further reinforces risk-based lipid management and the role of LDL-C-lowering treatment in cardiovascular prevention (Mach et al., 2025). Accordingly, a complete lipid profile and verification of the patient's treatment history would be important for interpreting the reported cholesterol concentration.

The patient reported taking simvastatin 5 mg, but the original manuscript did not specify when treatment began, whether the dose was verified, or whether the cholesterol measurement was obtained before or during therapy. Therefore, the present report cannot establish inadequate treatment response or medication non-adherence. Nevertheless, the combination of marked hypercholesterolemia and an incompletely documented lipid-lowering regimen highlights the importance of medication reconciliation and individualized cardiovascular risk assessment. Similarly, the original classification of Grade I hypertension should be distinguished from the recorded blood pressure during the home visit. The available records did not provide historical measurements supporting the initial severity classification. Thus, the clinical interpretation should remain limited to established hypertension with a documented blood pressure of 125/80 mmHg at the reported assessment.

Overall, this case demonstrates that comprehensive cardiovascular management should integrate blood pressure evaluation, lipid assessment, anthropometric characteristics, family history, lifestyle factors, and medication review rather than relying on an isolated clinical parameter.

3.5. Excess Body Weight, Dietary Behavior, and Physical Activity

Excess body weight and unfavorable lifestyle patterns were important modifiable cardiovascular risk factors identified during the holistic assessment. The patient's calculated BMI was approximately 27.6 kg/m², indicating excess body weight under conventional international BMI classifications. However, interpretation of BMI requires consideration of the population and classification framework used. The WHO Expert Consultation (2004) recognized that cardiometabolic risks may occur at comparatively lower BMI values in Asian populations and proposed additional public health action points, including 23.0 and 27.5 kg/m². Therefore, BMI should be interpreted alongside other clinical risk factors rather than used as an isolated indicator of metabolic health.

The patient's dietary history revealed frequent consumption of foods described as high in sodium and fat. These practices were influenced by long-standing preferences and household eating patterns, making dietary modification a relevant target for individualized counseling. Evidence from the Dietary Approaches to Stop Hypertension trial demonstrated that dietary patterns emphasizing fruits, vegetables, and reduced saturated fat can improve blood pressure outcomes (Appel et al., 1997). Subsequent findings indicated that reducing sodium intake in combination with the DASH dietary pattern provides additional blood pressure benefits (Sacks et al., 2001).

However, the present case did not include a formal dietary assessment, quantified sodium intake, or nutritional analysis of the patient's commonly consumed foods. Consequently, the relationship between specific dietary practices and the observed blood pressure or cholesterol concentration cannot be established directly. The dietary findings should instead be interpreted as patient-reported behavioral risk factors that may be addressed through counseling. Physical inactivity represented another important consideration. The patient reported walking approximately once weekly, suggesting that regular physical activity was limited. Cornelissen and Smart (2013), through a systematic review and meta-analysis, demonstrated that structured exercise training can reduce resting blood pressure. The World Health Organization guidelines also emphasize the benefits of regular physical activity for cardiovascular and general health (Bull et al., 2020).

In the present case, counseling encouraged increased walking and appropriate light exercise. Nevertheless, exercise frequency, duration, intensity, and adherence were not documented through standardized measurements after the intervention. Therefore, although physical activity counseling was consistent with established cardiovascular prevention principles, the case does not demonstrate that the intervention resulted in objectively improved fitness or blood pressure reduction. These findings highlight the importance of developing realistic lifestyle recommendations based on the patient's habitual behaviors, personal preferences, and available family support. In family medicine, dietary and physical activity recommendations may be more practical when incorporated into daily household routines rather than communicated solely as general clinical instructions.

3.6. Family Function, Medication Adherence, and Behavioral Counseling

Family involvement was a central feature of the management approach described in this case. The patient obtained a Family APGAR

score of 10, indicating highly functional perceived family relationships. The Family APGAR instrument was developed as a brief measure of family functioning and evaluates Adaptation, Partnership, Growth, Affection, and Resolve (Smilkstein, 1978). Subsequent validation research supported its usefulness in assessing perceived family relationships in clinical settings (Smilkstein et al., 1982). Despite the favorable family functioning score, the patient continued to experience difficulty maintaining recommended dietary habits and regular physical activity. This finding highlights an important distinction between perceived family support and actual adherence to health-related behaviors. Strong family relationships may provide emotional and practical resources, but they do not independently establish effective cardiovascular risk management.

The SCREEM assessment suggested generally favorable resources across social, cultural, religious, economic, educational, and medical dimensions. However, the absence of detailed domain-specific findings limited the ability to determine which resources were most influential in the patient's disease management. Therefore, the reported SCREEM findings were interpreted as contextual information supporting individualized counseling rather than quantitative evidence of intervention effectiveness. Previous research has demonstrated that structured self-management interventions may contribute to improved hypertension outcomes. Bosworth et al. (2009) evaluated interventions targeting hypertension self-management, while Conn et al. (2015) identified potential benefits of interventions designed to improve medication adherence. Burnier and Egan (2019) further emphasized that adherence is influenced by interactions among patient characteristics, treatment requirements, and healthcare-related factors.

These findings provide a scientific rationale for involving family members in medication reminders, dietary planning, and healthcare follow-up. However, the present case relied on reported medication-taking behavior rather than standardized adherence measures. Consequently, the available data do not establish whether family participation improved medication adherence following counseling. The behavioral counseling process incorporated components of the 5A framework and the 5R motivational approach. Glasgow et al. (2004) described principles for integrating interventions targeting multiple health behaviors into primary care, while Glasgow et al. (2006) emphasized the importance of evaluating the delivery of patient-centered counseling. These approaches support structured discussions regarding health behaviors, perceived barriers, individualized goals, and follow-up planning.

Nevertheless, the methodological distinction between the frameworks should be maintained. The 5A approach described in the original manuscript was not consistently defined, and the 5R framework is traditionally associated with tobacco-use counseling. Therefore, the present application should be described as an adaptation of behavioral counseling principles rather than a standardized, validated intervention specifically designed for concurrent hypertension and hyperlipidemia. Motivational interviewing principles may also contribute to patient-centered behavior change by exploring motivation and helping individuals address barriers to recommended behaviors. Rubak et al. (2005) reported evidence supporting motivational interviewing across several clinical contexts. However, because the present report did not include a standardized motivational interviewing assessment or intervention fidelity evaluation, the effectiveness of these techniques cannot be determined. The educational contribution of this case is therefore primarily the integration of clinical risk evaluation, family functioning assessment, and individualized counseling in a primary healthcare setting. The observed family support may represent a practical resource for future cardiovascular risk management, but sustained improvement requires confirmation through objective follow-up measurements.

3.7. Clinical Implications, Study Limitations, and Future Perspectives

The present case demonstrates the practical relevance of integrating clinical evaluation, family assessment, and behavioral counseling in the management of concurrent hypertension and hyperlipidemia. The combination of a documented blood pressure of 125/80 mmHg, markedly elevated total cholesterol, excess body weight, and persistent lifestyle-related risk factors illustrates the importance of evaluating cardiovascular health comprehensively rather than focusing exclusively on blood pressure control. Several limitations must be acknowledged. First, this report describes a single patient, limiting the generalizability of its observations. Second, the absence of historical and serial blood pressure measurements prevented evaluation of long-term hypertension control or changes following counseling. Third, the lipid assessment was limited to total cholesterol, without LDL-C, HDL-C, or triglyceride measurements. This restricted comprehensive evaluation of dyslipidemia and the adequacy of lipid-lowering management.

Fourth, although medication use was reported, the timing, duration, and verification of the lipid-lowering regimen were insufficiently documented. Fifth, family functioning was summarized using a total APGAR score, while detailed SCREEM findings and individual APGAR responses were unavailable. Sixth, dietary habits, physical activity, medication adherence, and counseling-related behavioral outcomes were not assessed using standardized longitudinal measures. Finally, the frequency and duration of completed follow-up visits were not clearly established. These limitations are particularly important when interpreting the reported benefits of the family medicine intervention. Although the patient received education and counseling, the available information does not demonstrate that the intervention reduced blood pressure, improved lipid concentrations, produced sustained weight loss, or changed medication adherence. Therefore, the findings should be understood as a descriptive account of cardiovascular risk identification and family-centered management rather than evidence of therapeutic effectiveness.

From a clinical perspective, the case highlights several priorities for continued care. These include verification of the complete lipid profile, review of cardiovascular medications, repeated blood pressure measurements, assessment of additional cardiovascular risk factors, and structured monitoring of dietary and physical activity changes. A standardized follow-up approach would provide more reliable information regarding the patient's response to medical and behavioral interventions. Home blood pressure monitoring may also support long-term hypertension management when integrated with appropriate clinical follow-up. Muntner et al. (2019) emphasized the importance of accurate blood pressure measurement, while evidence from chronic disease self-management research supports the value of structured patient participation and ongoing behavioral support (Lorig & Holman, 2003). The principal contribution of this case is the demonstration of how a holistic family medicine approach can identify interacting clinical, behavioral, and family-related factors in a patient with hypertension and hyperlipidemia. Integrating these factors into individualized counseling may support comprehensive primary healthcare, provided that subsequent clinical outcomes are evaluated using appropriate objective measurements and transparent documentation.

4. Conclusions

This case report highlights the importance of integrating holistic cardiovascular risk assessment and family-centered care in the management of patients with coexisting hypertension and hyperlipidemia. The 50-year-old female patient had a history of long-standing hypertension, markedly elevated total cholesterol (365 mg/dL), and a body mass index of 27.6 kg/m², accompanied by modifiable cardiovascular risk factors, including high-salt and high-fat dietary habits and insufficient physical activity. Although the documented blood pressure was 125/80 mmHg, the presence of multiple cardiovascular risk factors emphasized the need for comprehensive evaluation beyond blood pressure control alone. The Family APGAR score of 10 indicated highly functional perceived family relationships, while the SCREEM assessment suggested the availability of supportive family resources. Individualized counseling using the adapted 5A–5R framework addressed medication adherence, dietary modification, physical activity, and family involvement in long-term disease management. However, the absence of serial blood pressure measurements, follow-up lipid profiles, and standardized behavioral assessments prevented a definitive evaluation of intervention effectiveness. Overall, this case demonstrates the practical value of integrating clinical risk evaluation, family functioning assessment, and individualized lifestyle counseling in primary healthcare. Continued lipid monitoring, medication review, structured follow-up, and objective assessment of behavioral changes are essential for evaluating sustained cardiovascular risk management.

Author Contributions: Conceptualization, T.S.; methodology, T.S. and J.D.D.; investigation, J.D.D., N.F., A.D., and N.Fi.; data curation, J.D.D. and N.F.; formal analysis, T.S., J.D.D., and N.M.D.O.; writing—original draft preparation, J.D.D., N.F., N.M.D.O., and AD.; writing—review and editing, T.S., J.D.D., N.F., N.M.D.O., and N.Fi.; supervision, T.S. All authors have read and approved the final version of the manuscript.

Funding: This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Clearance: Not applicable. Ethical clearance was not required for this case report as it involved routine clinical management without experimental intervention.

Informed Consent Statement: Written informed consent has been obtained from the patient's guardian to publish this case report, including clinical details and images.

Data Availability Statement: All data supporting the findings of this study are contained within the article. No additional datasets were generated or analyzed.

Acknowledgments: The authors would like to express their sincere gratitude to the Faculty of Medicine, Malahayati University, Bandar Lampung, Indonesia, for its academic guidance and support during the preparation of this case report. Appreciation is also extended to the healthcare professionals at Ardhito Medika Clinic, Way Halim, Bandar Lampung, for their cooperation in facilitating clinical assessment and family medicine activities. The authors acknowledge the patient and her family for their participation and cooperation during the home visit, interviews, clinical assessment, and counseling activities.

Conflicts of Interest: The authors declare that there are no conflicts of interest regarding the publication of this article.

References

- Appel, L. J., Moore, T. J., Obarzanek, E., Vollmer, W. M., Svetkey, L. P., Sacks, F. M., Bray, G. A., Vogt, T. M., Cutler, J. A., Windhauser, M. M., Lin, P.-H., & Karanja, N. (1997). A clinical trial of the effects of dietary patterns on blood pressure. *The New England Journal of Medicine*, 336(16), 1117–1124. <https://doi.org/10.1056/NEJM199704173361601>
- Arnett, D. K., Blumenthal, R. S., Albert, M. A., Buroker, A. B., Goldberger, Z. D., Hahn, E. J., Himmelfarb, C. D., Khera, A., Lloyd-Jones, D. M., McEvoy, J. W., Michos, E. D., Miedema, M. D., Muñoz, D., Smith, S. C., Virani, S. S., Williams, K. A., Sr., Yeboah, J., & Ziaeian, B. (2019). 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology*, 74(10), e177–e232. <https://doi.org/10.1016/j.jacc.2019.03.010>
- Bosworth, H. B., Olsen, M. K., Grubber, J. M., Neary, A. M., Orr, M. M., Powers, B. J., Adams, M. B., Svetkey, L. P., Reed, S. D., Li, Y., Dolor, R. J., & Oddone, E. Z. (2009). Two self-management interventions to improve hypertension control: A randomized trial. *Annals of Internal Medicine*, 151(10), 687–695. <https://doi.org/10.7326/0003-4819-151-10-200911170-00148>
- Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J.-P., Chastin, S., Chou, R., Dempsey, P. C., DiPietro, L., Ekelund, U., Firth, J., Friedenreich, C. M., Garcia, L., Gichu, M., Jago, R., Katzmarzyk, P. T., ... Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, 54(24), 1451–1462. <https://doi.org/10.1136/bjsports-2020-102955>
- Burnier, M., & Egan, B. M. (2019). Adherence in hypertension. *Circulation Research*, 124(7), 1124–1140. <https://doi.org/10.1161/CIRCRESAHA.118.313220>
- Conn, V. S., Ruppar, T. M., Chase, J.-A. D., Enriquez, M., & Cooper, P. S. (2015). Interventions to improve medication adherence in hypertensive patients: Systematic review and meta-analysis. *Current Hypertension Reports*, 17(12), Article 94. <https://doi.org/10.1007/s11906-015-0606-5>
- Cornelissen, V. A., & Smart, N. A. (2013). Exercise training for blood pressure: A systematic review and meta-analysis. *Journal of the American Heart Association*, 2(1), e004473. <https://doi.org/10.1161/JAHA.112.004473>
- Fiore, M. C., Jaén, C. R., Baker, T. B., Bailey, W. C., Benowitz, N. L., Curry, S. J., Dorfman, S. F., Froelicher, E. S., Goldstein, M. G., Heaton, C. G., Henderson, P. N., Heyman, R. B., Koh, H. K., Kottke, T. E., Lando, H. A., Mecklenburg, R. E., Mermelstein, R. J., Mullen, P. D., Orleans, C. T., ... Wewers, M. E. (2008). Treating tobacco use and dependence: 2008 update. U.S. Department of Health and Human Services, Public Health Service.
- Gagnier, J. J., Kienle, G., Altman, D. G., Moher, D., Sox, H., & Riley, D. (2013). The CARE guidelines: Consensus-based clinical case reporting guideline development. *Journal of Medical Case Reports*, 7, Article 223. <https://doi.org/10.1186/1752-1947-7-223>
- Glasgow, R. E., Emont, S., & Miller, D. C. (2006). Assessing delivery of the five 'As' for patient-centered counseling. *Health Promotion International*, 21(3), 245–255. <https://doi.org/10.1093/heapro/dal017>

- Glasgow, R. E., Goldstein, M. G., Ockene, J. K., & Pronk, N. P. (2004). Translating what we have learned into practice: Principles and hypotheses for interventions addressing multiple behaviors in primary care. *American Journal of Preventive Medicine*, 27(2 Suppl.), 88–101. <https://doi.org/10.1016/j.amepre.2004.04.019>
- Grundy, S. M., Stone, N. J., Bailey, A. L., Beam, C., Birtcher, K. K., Blumenthal, R. S., Braun, L. T., de Ferranti, S., Faiella-Tommasino, J., Forman, D. E., Goldberg, R., Heidenreich, P. A., Hlatky, M. A., Jones, D. W., Lloyd-Jones, D., Lopez-Pajares, N., Ndumele, C. E., Orringer, C. E., Peralta, C. A., ... Yeboah, J. (2019). 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*, 139(25), e1082–e1143. <https://doi.org/10.1161/CIR.0000000000000625>
- Kebebew, G. M., Diriba, D. C., Killackey, T., Owadally, T., & Parry, M. (2026). Family-based interventions on self-management behaviours and blood pressure control in individuals with hypertension: A systematic review and meta-analysis. *BMC Public Health*, 26, Article 1709. <https://doi.org/10.1186/s12889-026-27203-9>
- Lorig, K. R., & Holman, H. (2003). Self-management education: History, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine*, 26(1), 1–7. https://doi.org/10.1207/S15324796ABM2601_01
- Mach, F., Koskinas, K. C., Roeters van Lennep, J. E., Tokgözoğlu, L., Badimon, L., Baigent, C., Benn, M., Binder, C. J., Catapano, A. L., De Backer, G. G., Delgado, V., Fabin, N., Ference, B. A., Graham, I. M., Landmesser, U., Laufs, U., Mihaylova, B., Nordestgaard, B. G., Richter, D. J., & Sabatine, M. S. (2025). 2025 focused update of the 2019 ESC/EAS guidelines for the management of dyslipidaemias. *Atherosclerosis*, 409, Article 120479. <https://doi.org/10.1016/j.atherosclerosis.2025.120479>
- McEvoy, J. W., McCarthy, C. P., Bruno, R. M., Brouwers, S., Canavan, M. D., Ceconi, C., Christodorescu, R. M., Daskalopoulou, S. S., Ferro, C. J., Gerds, E., Hanssen, H., Harris, J., Lauder, L., McManus, R. J., Molloy, G. J., Rahimi, K., Regitz-Zagrosek, V., Rossi, G. P., Sandset, E. C., ... Touyz, R. M. (2024). 2024 ESC guidelines for the management of elevated blood pressure and hypertension. *European Heart Journal*, 45(38), 3912–4018. <https://doi.org/10.1093/eurheartj/ehae178>
- Muntner, P., Shimbo, D., Carey, R. M., Charleston, J. B., Gaillard, T., Misra, S., Myers, M. G., Ogedegbe, G., Schwartz, J. E., Townsend, R. R., Urbina, E. M., Viera, A. J., White, W. B., & Wright, J. T., Jr. (2019). Measurement of blood pressure in humans: A scientific statement from the American Heart Association. *Hypertension*, 73(5), e35–e66. <https://doi.org/10.1161/HYP.0000000000000087>
- Riley, D. S., Barber, M. S., Kienle, G. S., Aronson, J. K., von Schoen-Anger-er, T., Tugwell, P., Kiene, H., Helfand, M., Altman, D. G., Sox, H., Werthmann, P. G., Moher, D., Rison, R. A., Shamseer, L., Koch, C. A., Sun, G. H., Hanaway, P., Sudak, N. L., Kaszkin-Bettag, M., ... Gagnier, J. J. (2017). CARE guidelines for case reports: Explanation and elaboration document. *Journal of Clinical Epidemiology*, 89, 218–235. <https://doi.org/10.1016/j.jclinepi.2017.04.026>
- Rubak, S., Sandbaek, A., Lauritzen, T., & Christensen, B. (2005). Motivational interviewing: A systematic review and meta-analysis. *British Journal of General Practice*, 55(513), 305–312.
- Sacks, F. M., Svetkey, L. P., Vollmer, W. M., Appel, L. J., Bray, G. A., Harsha, D., Obarzanek, E., Conlin, P. R., Miller, E. R., Simons-Morton, D. G., Karanja, N., Lin, P.-H., Aickin, M., Most-Windhauser, M. M., Moore, T. J., Proschian, M. A., & Cutler, J. A. (2001). Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *The New England Journal of Medicine*, 344(1), 3–10. <https://doi.org/10.1056/NEJM200101043440101>
- Smilkstein, G. (1978). The family APGAR: A proposal for a family function test and its use by physicians. *The Journal of Family Practice*, 6(6), 1231–1239.
- Smilkstein, G., Ashworth, C., & Montano, D. (1982). Validity and reliability of the family APGAR as a test of family function. *The Journal of Family Practice*, 15(2), 303–311.
- WHO Expert Consultation. (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *The Lancet*, 363(9403), 157–163. [https://doi.org/10.1016/S0140-6736\(03\)15268-3](https://doi.org/10.1016/S0140-6736(03)15268-3)
- World Health Organization. (2017). WHO STEPS surveillance manual: The WHO STEPwise approach to chronic disease risk factor surveillance. <https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps/manuals>
- World Health Organization. (2025). Hypertension. <https://www.who.int/news-room/fact-sheets/detail/hypertension>