Best Practices for **Heart Disease and Stroke**

A Guide to Effective Approaches and Strategies

National Center for Chronic Disease Prevention and Health Promotion
Division for Heart Disease and Stroke Prevention

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Executive Summary

Heart disease and stroke continue to place hardships on the United States' physical and economic health.

Approximately 930,000 lives are lost each year to cardiovascular disease (CVD), costing the nation billions of dollars each year.[1,2] State and local health department leaders, health workers, and policymakers recognize the mounting burdens of heart disease and stroke, and they have acted to mitigate these impacts through programs and policies. However, despite these efforts, system-based barriers still impede progress toward reducing complications, deaths, and costs associated with heart disease and stroke.

The Centers for Disease Control and Prevention's (CDC) Division for Heart Disease and Stroke Prevention's (DHDSP) mission is to "provide public health leadership to improve cardiovascular health for all, reduce the burden, and eliminate disparities associated with heart disease and stroke."[3] It advances these goals by addressing health equity, focusing on priority populations, and strategically engaging partners. DHDSP works with all 50 states and D.C. to improve cardiovascular health for all by providing technical assistance, funding opportunities, and publishing resources that guide or inform public health action.[3] In addition to supporting state and local public health leaders, DHDSP develops resources for clinicians, community health workers, pharmacists, and other health workers who are critical to implementing heart disease and stroke prevention and management interventions. As part of their portfolio of work, the *Best Practices Guide for Heart Disease and Stroke* (formerly the *Best Practices Guide for Cardiovascular Disease Prevention Programs*) is one of the many resources intended for the audiences mentioned above.

Originally published in 2017, the *Best Practices Guide for Heart Disease and Stroke* aims to showcase evidence-based interventions that address the continuum of cardiovascular and cerebrovascular health, from preventing and/or controlling risk factors to addressing a patients' health after experiencing a cardiac event. This second iteration of the Guide includes updated evidence reviews for the original eight strategies, along with adding new content to the Guide.

The current Guide uses the same processes applied when developing the 2017 version. New strategies were identified through the recommendations of end users, funding recipients, evaluators, content subject matter experts, and program specialists and align with the priorities of DHDSP. Each selected strategy was vetted by a DHDSP work group, and evidence was reviewed by subject matter experts with in-depth knowledge of the proposed strategies, research methods, program delivery, and related evaluation findings.

New content includes:

- **10 additional** evidence-based strategies.
- **A health equity impact summary** section for each strategy.
- **A section on** the importance of evaluation.

This publication describes the strength of evidence behind each strategy and the reported outcomes related to CVD prevention and management. It also highlights the public health and economic impacts of each strategy, including whether it improves health outcomes and health equity. In addition, it provides important issues related to the implementation of each strategy, including settings in which the strategies have been implemented, resources available to support implementation, and policy- and law-related considerations. Additionally, Best Practice in Action Stories highlight specific programs or initiatives where the strategies have been successfully implemented. Following the strategy descriptions, the publication includes a section for conducting evaluation which outlines the six steps featured in CDC's Framework for Program Evaluation that can be applied to all strategies.

Lastly, this publication includes several appendices with additional information. Appendix A provides a summary of the evidence of effectiveness for each strategy. Appendix B explains the Rapid Synthesis and Translation Process, which was one of the methods used to develop this publication. Appendix C provides details about the Continuum of Evidence of Effectiveness, which is an interactive, online tool that was used to assess and rate the strength of evidence for each strategy. Appendix D is a glossary of important terms used in this publication.

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A New Approach to Best Practices

A New Approach to Best Practices

Heart disease and stroke are among the most widespread and costly health problems facing the United States today.

The impact of these conditions is well known; together, heart disease, stroke, and other cardiovascular diseases claim more than 930,000 lives in the United States each year.[1] Although the trends in deaths appeared to decline in many states from 2011 to 2019, rates are once again on the rise.[2]

	Death Rates From 2019 to 2020	**Medical Cost** From 2017 to 2018
Heart Disease	Age-adjusted death rates increased for heart disease by ▲4.1% (165.1 to 168.2)	Total medical expenses increased by ▲$228.7 Billion annually in direct and indirect costs
Stroke	Age-adjusted death rates increased for stroke by ▲4.9% (37.0 to 38.8)	Total medical expenses increased by ▲$33.4 Billion annually in direct medical costs; ▲$19.4 Billion annually in indirect costs

From 2019 to 2020, age-adjusted death rates increased for heart disease by 4.1% (165.1 to 168.2) and for stroke by 4.9% (37.0 to 38.8).[3] These conditions place a heavy toll not only on the nation's physical health but also on its economic health. Total medical expenses for heart disease cost $228.7 billion annually in direct and indirect costs in 2017–2018.[4] In the same years, stroke costs were estimated at $33.4 billion annually in direct medical cost and $19.4 billion annually in indirect costs (from premature mortality).[4]

Statistics may convey the magnitude of the problem, but they do little to show the devastating impact it has on individuals, their loved ones, and people in the United States as a whole. Likewise, disparities in heart disease and stroke are driven by many factors and are not experienced equally by all in society.

Evidence shows that mental health disorders—such as depression, anxiety, and posttraumatic stress disorder—can develop after heart failure, stroke, or heart attack. On the other hand, persons with preexisting mental health disorders may engage in harmful behaviors, such as smoking, being inactive, or failing to take their prescribed medications, that place them at greater risk for developing a heart condition or experiencing a stroke.[5] The toll heart disease and stroke can have on an individual's caregivers can also be daunting; family caregivers have been found to be at higher risk than the general population for many health problems related to stress, depression, stroke, and heart disease.[6] Many caretakers spend so much of their time taking care of their loved ones that they forget to take care of themselves, compromising their own health in the process.

The facts are clear: Heart disease and stroke touch the lives of many people in the Unites States, but what can be done to address the issue?

A comprehensive public health approach begins with working to prevent risk factors (e.g., smoking, inactivity, being overweight) as well as preventing, managing, and ensuring responsive care for complications related to heart disease and stroke. Many people who are at risk for, are affected by, or have suffered from complications due to heart disease and stroke struggle to maintain and make improvements to their health, especially in controlling their blood pressure and cholesterol levels. According to the American Heart Association (AHA), hypertension—also known as high blood pressure—was the primary or contributing cause of death for more than half a million deaths in the United States.[7] Hyperlipidemia, or high cholesterol levels, affects nearly 94 million adults aged 20 years or older in the United States.[8] There are many evidence-based strategies that address hypertension and hyperlipidemia and that are shown to be effective in preventing the onset or mitigating the harm of heart disease and experiencing a stroke.

Unfortunately, despite the availability of such solutions, there are barriers to successful implementation, impeding our nation's progress. Lack of access to care (financially and/or geographically), insufficient numbers of health workers, and siloed health care delivery systems are all barriers to improving cardiovascular health for all.[9] In addition, structural racism, discrimination, stigma, and longstanding disenfranchisement negatively impact many underserved communities, including people with disabilities, members of the LGBTQ+ community, women, people who are incarcerated or without homes, those living in rural or frontier settings, and communities of color.[10]

CDC is the nation's leading health agency that aims to promote and protect the health of all Americans. CDC's Division for Heart Disease and Stroke Prevention (DHDSP) supports all 50 states and the District of Columbia to improve cardiovascular health for all, reduce the burden of cardiovascular disease (CVD), and eliminate disparities associated with heart disease and stroke. DHDSPs portfolio of work includes resources, guides, factsheets, and funded programs that are meant to guide public health action.

This publication, the *Best Practices Guide for Heart Disease and Stroke*, aims to support decision making by translating complex evidence into specific actions end users can take to address heart disease, stroke, and other cardiovascular conditions within their own practice and communities.

What's New?

Evidence-Based Approaches and Strategies

DHDSP continues to research and publish resources focused on heart disease and stroke prevention and management to fulfill their mission. Previously organized by the Key Domains of Chronic Disease and Health Promotion, strategies included in this second iteration of the Guide are grouped by commonalities they share in action. The project team, subject matter experts, and partners used an iterative process to identify the groupings, exemplify the distinctions, and highlight the overlap between strategies and strategy implementation. They serve as the overarching approaches public health practitioners can take to prevent and manage heart disease and stroke.

Strategies selected based on a rigorous review process include:

New strategies to the Best Practices Guide for Heart Disease and Stroke.

Coordinating Services for Cardiovascular Events

These strategies explore aspects of the medical care provided following a cardiovascular or cerebrovascular event.

- Cardiac Rehabilitation to Support Recovery From Cardiac Events
- Emergency Medical Service Systems for Stroke Treatment
- Public Access Defibrillation
- Stroke Center Certification

Engaging Organizations to Promote Cardiovascular Health

These strategies explore activities and approaches for promoting cardiovascular and cerebrovascular health.

- Reducing Sodium to Prevent and Manage Hypertension
- Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

Implementing Technology-Based Strategies to Optimize Cardiovascular Care

These strategies utilize technology to inform clinical decision making to support patients in maintaining their cardiovascular and cerebrovascular health.

- Clinical Decision Support Systems
- Telehealth

Leveraging Community and Clinical Public Health Workforces

These strategies leverage and combine different sectors of the health workforce to provide high-quality care to prevent and/or manage complications from heart disease and stroke.

- Community Health Workers
- Community Paramedicine
- Collaborative Practice Agreements to Enable Collaborative Drug Therapy Management
- Community Pharmacists and Medication Therapy Management
- Tailored Pharmacy-Based Interventions to Improve Medication Adherence
- Team-Based Care to Improve High Blood Pressure Control

Supporting Patients in Cardiovascular Disease Self-Management

These strategies enable patients to better manage their conditions by expanding access to medical care and through support, counseling, tools, and education.

- Lifestyle Modification Programs to Control Hypertension
- Reducing Out-of-Pocket Costs for Medications
- Self-Management Support and Education
- Self-Measured Blood Pressure Monitoring With Clinical Support

Evidence-Based Approaches and Strategies continued

Similar to the strategies included in the first version of the Guide, many of these strategies aim to prevent and manage complications related to heart disease and stroke by lowering or controlling hypertension and hyperlipidemia. Although the overall intent behind the recommended strategies is the same, their application to health is more comprehensive and farther reaching. For example, cardiac rehabilitation is a strategy that supports patients who are recovering from a cardiac event, such as a heart attack or stroke. The goal is to help patients maintain good health to prevent another life-threatening cardiac event. Prevention and management still compose the foundation of this strategy, but the point at which a patient's health is addressed is different based on where they fall on the continuum of care. In other words, prevention and management strategies will vary depending on the appropriate level of care a patient needs to reduce their risk of illness and sustain good health. This second iteration of the Guide applies a more holistic approach to improve population health outcomes across the continuum of care.

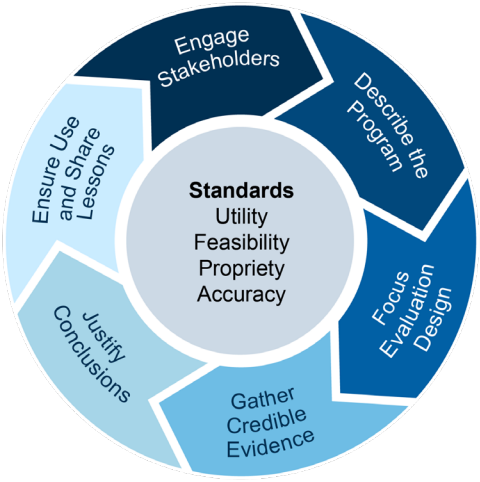
In addition, *Best Practices* have been expanded to include *Leading Practices*, which includes strategies that demonstrate evidence of favorable health outcomes, through rigorous assessment and systematic reviews, and potential for future impact. In comparison, leading strategies demonstrate a growing body of evidence of effectiveness and show some promise for future impact. Nonetheless, leading strategies are included in the Guide as evidence is growing in these areas. See Appendix A for a summary distinguishing the best strategies and leading strategies included in this Guide.

Advancing Health Equity

Health disparities and health equity are intertwined; *health disparities* refers to a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage, whereas *health equity* is the opportunity for everyone to attain the highest level of their health potential, regardless of age, race, ethnicity, or geography.[11] Although reducing health disparities is a component to achieving health equity, it does not capture the underlying factors beyond a particular group or community.[12] To best align with organizational and national efforts to advance health equity, the second iteration of the Best Practices Guide replaces the Health Disparity Impact subsection under Evidence of Impact with a Health Equity Impact subsection. The shift in focus aims to use a health equity lens to better capture the underlying social and structural factors that create disparities in health among racial, ethnic, and socioeconomic groups and understand why they occur.[13] Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities. As it relates to evidence-based interventions addressing heart disease and stroke prevention and management, applying a health equity lens can help our intended audiences better understand and align their implementation efforts towards promoting the health of all populations.

Factoring in Evaluation

DHDSP identifies and encourages uptake of best practices for heart disease and stroke prevention and control. To enhance the reach, uptake, and application of best practice strategies, evaluation becomes crucial to identifying areas of both progress and improvement. Evaluation is a systematic process of collecting information to understand what an intervention does, what it achieves, and how it can be improved.[14,15] In the context of law, information derived from evaluation may inform and improve policy development, adoption, implementation, and effectiveness by adding to the evidence base for policy interventions. The *Best Practices Guide for Heart Disease and Stroke's* Evaluation section highlights the ways in which evaluators can measure their program's impact by using CDC's Framework for Program Evaluation. This six-step guide walks users through ways they can engage partners, update methods, and translate findings into meaningful information for dissemination.



Centers for Disease Control and Prevention. Framework for program evaluation in public health. MMWR 1999;48 (No. RR-11)

Intended Audience

The Best Practices Guide for Heart Disease and Stroke is intended for state and local health departments, decision makers, public health professionals, clinicians, and others with an interest in implementing effective strategies to improve cardiovascular and cerebrovascular health.

The organization of sections was guided by the varied knowledge levels, disciplines, and style preferences of the intended audience. The authors sought out interventions and strategies effective in preventing and managing complications related to heart disease and stroke from both research and practice settings including those that are not yet widely used or considered standard practice. Each selected strategy is accompanied by brief evidence of impact and effectiveness summaries, along with a "Considerations for Implementation" section, which includes relevant links to resources. In addition to the strategy summaries, this publication provides several appendices with additional information, including a glossary of important terms (Appendix D).

Guide Development

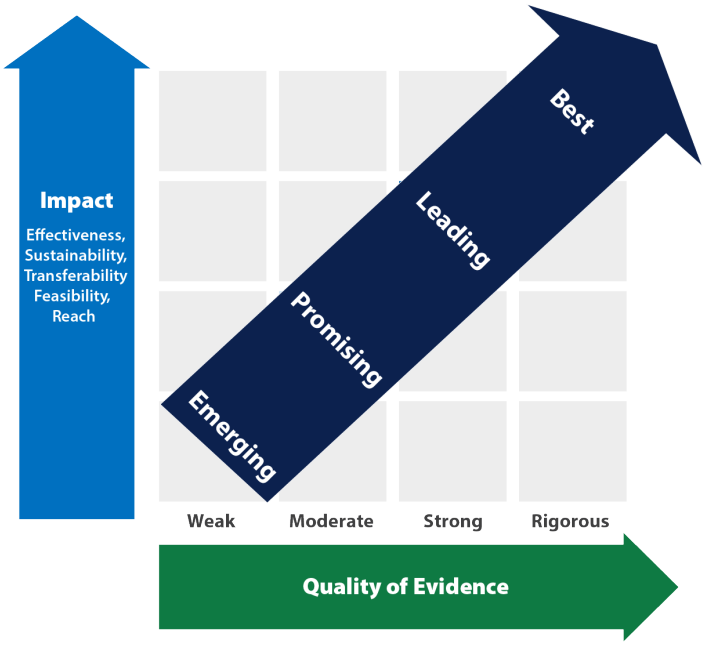
The strategies presented in this publication were identified and confirmed through an extensive review process, with input from subject matter experts (SMEs) and practice partners both within and external to CDC. Internally, strategies were reviewed and vetted by DHDSP senior leadership and staff in DHDSP's Program Development and Services Branch, Epidemiology and Surveillance Branch, Applied Research and Evaluation Branch, Million Hearts® team, and Office of Policy, External Relations, and Communications. Strategies that extended beyond DHDSP's direct purview were reviewed by staff in the CDC's Division of Population Health and Division of Nutrition, Physical Activity, and Obesity. The authors also worked with academics, practice partners, and program directors outside of CDC with expertise in chronic care delivery, CVD prevention and control, and public health program management.

In addition to the review process, the *Best Practices Guide for Heart Disease and Stroke* was conceptualized and developed using several theoretical models. The concept of identifying public health best practices for heart disease and stroke prevention and management was primarily guided by the Best Practices Framework developed by a CDC work group.[16] This framework also guided how the strategies were selected, impacts reported, and considerations for implementation described.

Best Practices Framework

According to the Best Practices Framework (Figure 1), strategies considered best practices should be evidence based, be supported by high-quality evidence, and demonstrate a positive impact in terms of effectiveness, reach, feasibility, sustainability, and transferability.[16] Where a particular practice falls on the Best Practices continuum at any point in time is dependent on the evidence available at that point. Thus, "best practice" is not a static designation but one that can change as new evidence becomes available. Practices can be categorized as emerging, promising, leading, or best.

Figure 1. A Conceptual Framework for Planning and Improving Evidence-Based Practices



Other Guiding Frameworks

In addition to using the Best Practices Framework to develop this publication, the Rapid Synthesis and Translation Process (RSTP) was adapted.[17] For more information on RSTP, see Appendix B. RSTP provides a structure for working with SMEs and practice partners to develop an evidence-based translation product. In addition, for each strategy, two evidence reviewers used an interactive, online tool called the Continuum of Evidence of Effectiveness to assess and rate the strength of evidence for each proposed best practice.[18] For more information about this tool, see Appendix C.

Interpreting the Results: Best Practice Strategy Template

Information collected and assessed through the review process was used to identify effective strategies, or best practices, for heart disease and stroke prevention and management. The evidence was then summarized using a standard template for each strategy. The sample template presented on the following pages highlights information provided for each strategy and how this information is organized.

This box provides a **short summary of the findings** for the strategy.

Engaging Organizations to Promote Cardiovascular Health

LOWER SODIUM

Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

Best Strategy

Workplace health Promotion (WHP) is a coordinated and comprehensive set of activities and strategies for promoting and protecting health at the workplace. These can include programs, policies, benefits, environmental supports, and links to the surrounding community. A coordinated and systematic approach to workplace health includes assessment, program planning and management, implementation, and evaluation. A comprehensive WHP program addresses multiple risk factors and health conditions simultaneously. Key to WHP programs is a culture of health that permeates all aspects of an organization and approaches employee health in a holistic matter, rather than in a siloed, one-size-fits-all approach. Examples include health screening and risk assessment programs, providing health education programs, and integrating WHP programs into an organization's structure through health benefits plans, incentives to participate in programs, and well-designed communication of services and programs. WHP programs can positively impact employee health and morale, improve organization productivity and culture, and prevent disease and sustain health amongst employers, workers, their families, and their communities.[1-3]

A WHP program can contain a number of other strategies highlighted in this Best Practices Guide, including lifestyle modification programs to control hypertension, sodium reduction, self-monitoring of blood pressure, self-management programs, public access defibrillation, and reducing out-of-pocket costs.

Summary

WHP is a coordinated and comprehensive set of activities and strategies for promoting and protecting health in the workplace.

Best Practice in Action
Name: Nabholz Wellness Program
Location: Arkansas, Kansas, Mississippi, Missouri, and Oklahoma

Evidence of Effectiveness

Effect | Implementation Guidance | Research Design
Internal Validity | Independent Replication | External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact | Health Equity Impact | Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

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A **brief description of the strategy** starts each section.

These boxes provide **summary ratings indicating the strength of research evidence** behind the strategy.

The Health Equity Impact section describes the evidence from the research literature and provides a rationale for the rating for health disparity impact. The rating indicates whether the strategy is effective among the populations with the most need or has the potential to reduce health disparities.

The reviewers **used the Continuum of Evidence of Effectiveness** to assess the quality of the research evidence available and the effectiveness of each strategy according to six dimensions. The interactive continuum tool summarized their rating for each dimension, and we have summarized those results in a table like the sample shown on the previous page. See Appendix A for a summary of the ratings for all strategies.

Engaging Organizations to Promote Cardiovascular Health
Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

LOWER BODIUM

Evidence of Effectiveness

The evidence base for implementing WHP programs is very strong. Literature shows WHP programs to be effective, demonstrating internal and external validity. Based on strong evidence for effectiveness, health risk assessments with feedback when combined with health education programs is recommended by the Community Preventive Services Task Force (CPSTF).[3] This strategy has been partially replicated in real-world settings but not evaluated, which shows limited reliability of impact. Several randomized controlled trials have been conducted and show positive results from implementing WHP programs to reduce heart disease and stroke morbidity and mortality. Several organizations, such as the National Alliance of Healthcare Purchaser Coalitions, the AHA, and CDC, have developed resources for planning, implementing, and evaluating WHP programs.

Evidence of Impact

Health Impact

A systematic review by the CPSTF found that health risk assessment screening programs with feedback improve high blood pressure and total cholesterol control (median decrease of 1.8/2.6 mm Hg and 4.8 mg/dL, respectively).[3] In addition, programs with multiple components, policies, and environmental supports can lead to lower prevalence for high blood pressure and high cholesterol.[4]

WHP programs have also been found to reduce employee weight, increase physical activity, and improve nutrition—all conditions associated with heart disease and stroke.[5]

Health Equity Impact

Strong evidence supports the effectiveness of WHP programs targeting smoking cessation, healthy nutrition, physical activity, and weight loss among minority-owned businesses.[6] Research has also shown a positive impact on systolic and diastolic blood pressure levels among African Americans.[7]

Employees with lower education levels may benefit from WHP programs, but more issues related to access may affect adoption, health care usage, and effectiveness.[8]

Additional research is needed to examine the adoption and engagement among ethnically diverse women in low socioeconomic positions.[9,10]

Economic Impact

WHP programs have been shown to lower health and productivity-related costs. Employers could yield a $3–$15 return on investment (ROI) for each dollar invested.[11,12] A meta-analysis estimates a $3.27 decrease in medical costs for every dollar spent.[12] In addition to the economic benefits, the value on investment is also an important outcome for WHP programs.[13] Evidence demonstrates WHP programs reduce absenteeism and increase productivity.[12] The strongest economic data exist for addressing hypertension and high cholesterol. However, data for related lifestyle risks, such as healthy weight and diet, are weaker.

► *WHP programs can positively impact employee health and morale, improve organization productivity and culture, and prevent disease and sustain health amongst employers, workers, their families, and their communities.*

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The Health Impact section describes the evidence from the research literature and provides a rationale for the rating for health impact. The rating indicates whether the strategy achieves one or more desired outcomes related to CVD prevention—such as lowered blood pressure, increased adherence to blood pressure medication, or decreased disease and death.

The Continuum of Evidence of Effectiveness cannot directly assess a strategy's potential for public health impact, which is an important component of a best practices designation. To assess the **Evidence of Impact**, reviewers examined the research literature for evidence of a strategy's potential to improve health, reduce health disparities, and show economic sustainability. They assigned ratings for each of these categories.

The Economic Impact section describes the evidence available on a variety of economic factors, including overall cost-effectiveness; cost savings to health systems, patients, or other payers; net benefit; and return on investment (ROI). The economic impact rating reflects the degree to which evidence exists that the strategy can have a positive economic impact. Cost figures shown in this section are examples of possible impact according to the best available evidence. All costs are adjusted to 2015 US dollars using the price index for personal consumption expenditures prepared by the Bureau of Economic Analysis in the US Department of Commerce.

Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

Best Practice in Action Story

The Nabholz Wellness Program is a benefits program designed to promote employee health. Serving several locations across the Central and Eastern United States, the program employs a trained wellness team including a physician, personal trainer, medical assistant, and registered dietitian. The comprehensive program offers health screenings, provides education, integrates workplace health promotion into its structure, uses a holistic approach to health, and continuously evaluates its efforts. Nabholz, through its self-funded insurance, covers 100% of the health insurance premium for employees who complete annual health screenings and provides incentives to those who meet blood pressure, cholesterol, blood glucose, weight, and tobacco use goals. The wellness team also travels to the company's sites to provide tailored education and specific steps to improve health to employees and their family members. In addition, Nabholz leaders have committed financial and personnel resources to maintaining the program and creating a supportive environment though regular communication and program participation. The wellness team uses employee feedback to shape the program and tailor it to employee needs. Ninety-nine percent of employees completed screenings each year between 2010 and 2017. Between 2011 and 2017, the program saw an increase from 34% to 82% of employees meeting at least four biometric targets.

For more information

Website: https://nabholz.com/careers/benefits/
Phone: 877-622-4659

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This section describes the strategy as it is being applied in a specific community, clinical, or health care setting. It provides contact information, results and clinical outcomes, and an assessment of factors that affect implementation and sustainability. This information can be useful to state and local health departments, decision makers, public health professionals, and related stakeholders.

This section provides information about the implementation of each strategy, including settings, implementation guidance, resources, and policy and law-related considerations.

Icons serve as navigation in the strategy sections in this guide.

Settings in which the strategy was successfully implemented.

Current, high-level considerations related to policy and laws relevant to implementing the strategy.

Current implementation guidance available to assist with implementation of the strategy.

Available resources, such as guides, examples, and guidelines that support implementation of the strategy.

Engaging Organizations to Promote Cardiovascular Health
Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

Four Considerations for Implementation

1 Settings

WHP programs targeting CVD have been successfully implemented in small, medium, large businesses across multiple industries, including health care and social assistance; local, state, and federal public administration; agriculture; and education services throughout the United States.

2 Policy- and Law-Related Considerations

Many strategies in WHP programs that involve policy are unique to the organizational level (i.e., the workplace). In addition, federal policies promote and govern WHP programs and improve health at the population level.[14,15] Examples include:

- The Employee Retirement Income Security Act of 1974, which sets minimum standards for most voluntarily established retirement and health plans in private industry to provide protection for individuals in these plans.[16]
- The Genetic Information Nondiscrimination Act of 2008.[17]

State policies also exist to support WHP programs. In 2017, CDC's Division for Heart Disease and Stroke Prevention conducted a study to understand these state laws. The study found that the laws had several common components that can support program implementation and positively support employee health[18]:

- Incentives for employees who participate in or meet goals associated with WHP program activities.
- Environmental supports, such as AEDs at worksites.
- Grants and tax incentives to businesses that develop or maintain WHP programs.
- Guidance on how to implement a WHP program.
- Health promotion activities that target specific health conditions, like high blood pressure and high cholesterol.

3 Implementation Guidance

Resources for planning and implementing WHP programs include:

- Cardiovascular Health: Action Steps for Employers [PDF – 204K].[19]
- CDC's Million Hearts® Action Guide: Medication Adherence: Action Steps for Health Benefit Managers [PDF – 173K].[20]
- CDC's Workplace Health Model.[21]
- Employee Engagement in Health & Well-Being: Influencers, Outcomes, and Practice Considerations [PDF – 89.7K].[22]
- Reform in Action: Six Resources for Employers About Improving Health and Health Care for Employees.[23]
- How to Promote Heart Disease and Stroke Prevention in the Workplace.[24]

4 Additional Resources

Several federal and national organizations have developed resources to support WHP programs:

- A Purchaser's Guide to Clinical Preventive Services: Moving Science Into Coverage.[25]
- Workplace Health Promotion.[26]
- Compendium on the U.S. Surgeon General's Call-to-Action to Control Hypertension.[27]
- Workplace Health.[28]
- Life's Essential 8™.[29]

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Considerations for This Guide

The Guide should not be considered as official guidance from CDC, as it has several limitations.

First, the Guide does not consider the impact the COVID-19 pandemic has had on heart disease and stroke outcomes, the capacity of health systems to adopt or implement the evidence-based strategies, or the evolving policy landscape that may affect uptake, implementation, and adoption. Persons who have a diagnosed heart condition or have experienced a stroke are at greater risk for mild to severe health complications related to COVID-19.[19] Although the evidence suggests heart disease and stroke are affected by COVID-19 soon after infection, the exact relationship and longer-term impacts are not well established.[20]

Second, due to the approach used to select and assess the evidence, the Guide does not include every strategy found to be effective or used in practice.

Third, evidence is limited based on the available literature. If key data (e.g., economic factors) were not available at the time when the project team reviewed the evidence, then this information is not captured in the Guide.

Fourth, this publication provides only a condensed summary of the evidence available and may not capture potentially relevant information about each strategy's weaknesses and/or research limitations. Considering this, the Guide includes links to longer systematic reviews and meta-analyses when available to bridge any knowledge gaps.

Fifth, information on the economic impact of the strategies is presented using a variety of methods, which limits the ability to make direct comparisons across practices. The information presented should be read only as examples of the best available evidence demonstrating positive economic impact and should not be directly compared to examine the comparative effectiveness of the different practices.

Sixth, though linked implementation resources are available within each strategy, providing technical assistance or the cost of implementation is beyond the scope of this publication.

Lastly, the Guide provides a limited number of strategies that focus on preventing the risk factors for heart disease and stroke. These primordial prevention strategies, sometimes intended for children and adolescents, include addressing tobacco use, overweight and obesity, poor nutrition, lack of physical activity, poor quality of sleep, and prenatal and maternal risk factors.[21–23] To learn more about the areas, consider these CDC resources:

Maternal Health

- High Blood Pressure During Pregnancy.[24]
- Data on Pregnancy Complications, Hypertensive Disorders.[25]

Smoking

- Cessation Materials for Tobacco Control Programs.[26]
- Guidelines and Resources for Tobacco Control Programs.[27]
- Smoking & Tobacco Use: Youth Tobacco Prevention.[28]

Sleep Health

- How Does Sleep Affect Your Heart Health?[35]
- Sleep and Chronic Disease.[36]

Nutrition Physical Activity & Obesity

- Guidelines & Recommendations.[29]
- State and Local Strategies.[30]
- Physical Activity for Different Groups.[31]
- Prevention Strategies & Guidelines.[32]
- School Health Guidelines.[33]
- The Spectrum of Opportunities Framework for State-Level Obesity Prevention Efforts Targeting the Early Care and Education Setting [PDF – 666KB].[34]

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Coordinating Services for Cardiovascular Events

These strategies explore aspects of the medical care provided following a cardiovascular or cerebrovascular event, such as rehabilitation services and emergency medical care.

- **Cardiac Rehabilitation to Support Recovery From Cardiac Events**
- **Emergency Medical Service Systems for Stroke Treatment**
- **Public Access Defibrillation**
- **Stroke Center Certification**

Cardiac Rehabilitation to Support Recovery From Cardiac Events

Best Strategy

Cardiac rehabilitation is a supervised program that includes physical activity, health education, and counseling to help individuals recovering from a heart attack, heart failure, or other cardiac event that required surgery or medical care.[1] It includes exercise counseling and training, lifestyle education, and counseling to reduce stress.[2] Men and women, people of all ages, and people with varying levels of heart problems, can benefit from cardiac rehabilitation.[3–5] It can strengthen the heart and body after a heart attack, relieve post-cardiac event symptoms, relieve stress, improve mental health,[6] and build healthier habits (e.g., increased physical activity, quitting smoking, a heart-healthy diet).

Cardiac rehabilitation can be delivered by a team of professionals, including patients' health care teams, exercise and nutrition specialists, physical therapists, and counselors. Learn more about team-based care.

Cardiac rehabilitation programs have been successfully implemented in dedicated cardiac rehabilitation clinics and managed care systems.

Summary

Cardiac rehabilitation is a supervised program that includes physical activity, health education, and counseling to help anyone recovering from a heart attack, heart failure, or other cardiac event that required surgery or medical care.

Best Practice in Action
Name: Henry Ford Health System Cardiac Rehabilitation Program
Location: Detroit, Michigan

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

The evidence base for cardiac rehabilitation programs is strong. Some evidence demonstrates internal and external validity. Studies with single-group designs indicate positive impacts on blood pressure and cholesterol levels, reduced hospitalizations, and reduced death rates.[7–9] However, there is limited literature on the impacts on patients who have survived a stroke. Cardiac rehabilitation programs have been replicated at least once by independent parties in similar settings. Several organizations, such as the Agency for Healthcare Research and Quality, the Centers for Medicare & Medicaid Services, the National Institutes of Health, and CDC, have developed resources for cardiac rehabilitation programs.

Evidence of Impact

Health Impact

Cardiac rehabilitation programs have been shown to reduce systolic and diastolic blood pressure, increase high-density lipoprotein (HDL) cholesterol, and reduce the risk of a heart attack.[7,8] In addition, such programs can improve medication adherence, lessen depression, and reduce the risk for death following a heart attack.[10] A recent study also found that patients with depression and/or posttraumatic stress disorder are more likely to participate in cardiac rehabilitation programs than those without these conditions.[11] They have also reduced hospital admissions and improved quality of life.[11,12]

In recent studies, stroke survivors have seen benefits from cardiac rehabilitation programs in endurance and functional strength. However, additional research is needed to understand the pathways in which the programs affect stroke outcomes.[13]

► *Cardiac rehabilitation is a supervised program that includes physical activity, health education, and counseling to help individuals recovering from a heart attack, heart failure, or other cardiac event that required surgery or medical care.*

Health Equity Impact

Patients from rural communities, patients of African American and Hispanic descent, women, and patients with lower socioeconomic status are less likely than their counterparts to participate in cardiac rehabilitation programs.[14–17] Several issues may be driving this disparity, including the lack of cardiac rehabilitation centers in rural and urban areas, lower likelihood of referral by physicians, lack of health insurance, lack of transportation options, implicit biases among providers, and cost.[17] However, there is promising evidence showcasing significantly lower mortality among women and minorities who have been referred to a program.[3–5,16]

Economic Impact

Despite the limited number of economic studies, evidence suggests that cardiac rehabilitation is cost-effective, with ratios ranging from $1,065 to $71,755 per quality-adjusted life year (QALY).[18]

A systematic review of exercise-based cardiac rehabilitation programs has found that long-term hospital-based programs were cost-effective (with a net incremental cost of $430 and an incremental cost-effectiveness ratio [ICER] of $4,950), a home-based intervention resulted in $965 in cost savings, and center-based programs are cheaper than conventional care without exercise ($416 less).[19]

Best Practice in Action Story

Based in Detroit, the Henry Ford Cardiac Rehabilitation (CR) Program is a referral-based education and exercise program designed to care for patients recovering from a cardiac event. Leveraging the expertise of clinical exercise physiologists, registered dietitians, and physicians, the program focuses on risk reduction, supervised exercise, stress management, depression, and goal setting.[20] To address barriers to participation, physicians refer patients to a facility close to their home and for those not able to attend CR in person, Henry Ford offers a videoconferencing option. The program serves a predominantly older male African American population (average age of 61 years, 58% male, and 79% African American). In 2019, patients experienced, on average, a greater than 50% increase in fitness, which is associated with a reduced risk for future cardiac events. Patients also self-reported improved perceived health status (–0.56) and quality of life (–0.33) using the Dartmouth COOP instrument, and depression (–2.02) using the PHQ-9 instrument. For both the Dartmouth COOP and PHQ-9, lower scores are better. In 2021, time from discharge to starting the program was reduced to 24 days, compared to 28 to 30 days in years prior, due to earlier patient engagement. The program's coordinators also train other hospitals on how to design and implement a virtual cardiac rehabilitation program to advance reach and use.

For more information

Website: https://www.henryford.com/services/cardiology/support/cardiac-rehab

Four Considerations for Implementation

1 Settings

Cardiac rehabilitation programs have been successfully implemented in dedicated cardiac rehabilitation clinics and managed care systems (e.g., U.S. Department of Veterans Affairs clinics, Kaiser Permanente centers). Virtual cardiac rehabilitation programs have also shown to be potentially effective.[21,22]

2 Policy- and Law-Related Considerations

Efforts in legislation to expand payment options and access to cardiac rehabilitation programs are underway.

- In December 2021, CMS issued a final rule updating Medicare payment options under the Physician Fee Schedule that includes certain cardiac and intensive cardiac rehabilitation codes for telehealth through the end of calendar year 2023.[23]
- The Increasing Access to Quality Cardiac Rehabilitation Care Act (HR 3911) bill, originally introduced to the 116th Congress in July 2019, was reintroduced to 117th Congress in June 2021 to authorize physician assistants, nurse practitioners, and clinical nurse specialists to supervise cardiac, intensive cardiac, and pulmonary rehabilitation programs under Medicare.[24]
- The Increasing Access to Quality Cardiac Rehabilitation Care Act of 2021 (HR 1956) was introduced to the 117th Congress in March 2021 to authorize physician assistants, nurse practitioners, and advanced practice providers to begin supervising patients' day-to-day cardiac rehabilitation and would authorize advanced practice providers to order cardiac rehabilitation for patients, a function currently limited to physicians.[25]
- The SOS: Sustaining Outpatient Services Act (HR 3348) was also introduced to the 117th Congress in May 2021 to allow for the creation, relocation, or expansion of hospital outpatient cardiac rehabilitation programs at any on- or off-campus location without a Medicare payment reduction.[26]

3 Implementation Guidance

Resources for planning and implementing cardiac rehabilitation programs include:

- 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines.[27]
- Cardiac Rehabilitation Change Package.[28]
- TAKEheart.[29]
- Ethnocultural Diversity in Cardiac Rehabilitation.[30]
- Underutilization of Cardiac Rehabilitation in Women: Barriers and Solutions.[31]
- Cardiac Rehab Information for Physicians Webinar Series.[32]

4 Additional Resources

The Million Hearts® Cardiac Rehabilitation Collaborative is a national forum for multidisciplinary professionals who are working to achieve the goal of 70% cardiac rehabilitation participation in eligible patients.[33]

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Emergency Medical Service Systems for Stroke Treatment

Leading Strategy

Emergency medical services (EMS) systems refers to the coordinated delivery systems for emergency medical care for stroke treatment that may be organized on a local, regional, statewide, or nationwide basis using public or private resources. These systems are often comprised of multiple providers and agencies that work together to provide emergency medical care associated with prevention, treatment, and rehabilitation to patients.[1,2] These services are activated once a patient has been reported as having the signs and symptoms of a stroke. EMS providers include licensed and/or certified, dispatched responders who provide pre-hospital medical care, such as emergency medical responders, emergency medical technicians, and paramedics. Through their role, EMS providers are engaged in multiple practices, including providing pre-notification to the receiving hospital or facility; following patient screening, triage, and transport protocols; continuing stroke education; and making continuous quality improvements. This strategy summary focuses on EMS activities for stroke patients before they arrive at the hospital.

EMS systems for stroke have been successfully implemented in emergency departments (EDs) and local and state EMS agencies, stroke centers, and hospitals.

Summary

EMS refers to the delivery systems for emergency medical care for stroke treatment that may be organized on a local, regional, statewide, or nationwide basis by using public or private resources.

Best Practice in Action
Name: Barrow Emergency Stroke Treatment Unit
Location: Phoenix, Arizona

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported; Promising/Emerging; Unsupported; Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported; Moderate; Insufficient; No Evidence

Evidence of Effectiveness

The evidence base for implementing EMS for stroke treatment is shown to be strong and effective. The strategy has been broadly implemented across the United States. Randomized control trials and/or quasi-experimental designs are not feasible to evaluate EMS for stroke treatment, thereby limiting the internal validity. Based on its implementation in multiple communities, this strategy demonstrates external and ecological validity. Comprehensive implementation guidance is available to implement this strategy in different settings with fidelity.

Evidence of Impact

Health Impact

EMS systems for stroke treatment can increase patient access to appropriate stroke treatment, improve stroke recognition, reduce time to hospital admission and time to treatment, improve mortality rates, reduce time to rapid triage, and lead to positive EMS provider outcomes (including educational capacity, education outreach of EMS providers, and communication and coordination among 911 operators).[3–15]

Health Equity Impact

EMS interventions may improve health outcomes and access to care among persons living in rural areas. Specifically, EMS triage and transport to the appropriate stroke facility (both ground and air transport) are associated with improved access to care and health outcomes for populations living in rural areas.[13] However, research has shown Hispanic, Asian, and African American women are less likely to use emergency medical services in response to stroke signs and symptoms.[16]

Economic Impact

There is very limited research on the economic impact of EMS systems. One study found that written inter-facility transfer agreements and reimbursement coverage using strategies to improve efficiency, specifically drip-and-ship, have been linked to lower hospital charges.[15] More research is needed to understand the economic impact of EMS services for stroke care.

► *Emergency medical services (EMS) systems refers to the coordinated delivery systems for emergency medical care for stroke treatment that may be organized on a local, regional, statewide, or nationwide basis using public or private resources.*

Best Practice in Action Story

Exemplifying a partnership between health care and emergency response systems, the Barrow Neurological Institute and the Phoenix Fire Department established the Barrow Emergency Stroke Treatment Unit. It is a large emergency service vehicle designed to speed up the process in which strokes are diagnosed and treated.[17] This initiative is among the first of its kind to operate 24/7, 365 days a year in a metropolitan area with more than 1 million residents. Fire department responders work with 911 dispatchers to conduct an initial evaluation for a stroke and deploy the mobile stroke unit. Equipped with a portable lab and computed tomography (CT) scanner, a stroke-certified registered nurse and CT technician work with a vascular neurologist via videoconferencing to diagnose, triage, and transport stroke patients to the appropriate stroke facility. Between 2019 and 2021, the mobile stroke unit was dispatched an average of 1,064 times per year, with dispatch times ranging from 11.3 to 13.3 minutes. An average of 68 CT scans were performed in the mobile stroke unit and 122 patients were treated with tissue plasminogen activator within 25 to 28 minutes. By the end of 2022, the Barrow Emergency Stroke Treatment Unit is expected to add a second vehicle to the program to better serve the greater Phoenix area.

For more information

Website: https://www.barrowneuro.org/centers-programs/stroke/
Phone: 844-635-4320

Four Considerations for Implementation

1 Settings

EMS systems for stroke have been successfully implemented in emergency departments (EDs) and local and state EMS agencies, stroke centers, and hospitals.

2 Policy- and Law-Related Considerations

States with policies for EMS providers to share stroke pre-notifications with the receiving facility, EMS ground triage and air medical transport to appropriate stroke facilities, and inter-facility transfer to appropriate stroke facilities are supported by the best evidence for positive public health impact.[3]

3 Implementation Guidance

- Recommendations for Regional Stroke Destination Plans [PDF – 1.34M].[18]
- Get With The Guidelines® - Stroke Overview.[19]
- Implementation Strategies for Emergency Medical Services Within Stroke Systems of Care.[20]

4 Additional Resources

Some federal and national organizations have developed resources to support EMS for stroke treatment:

- Federal Interagency Committee on EMS.[21]
- National Association of Emergency Medical Technicians.[22]
- Prehospital/EMS Care.[23]
- Brain Attack Coalition.[24]
- Strategies for Building and Improving State Stroke Systems of Care: A Brief Guide for State Health Decision-Makers and Practitioners [PDF – 1.12M].[25]

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Public Access Defibrillation

Best Strategy

Public access defibrillation (PAD) programs and policies are in place to ensure that automated external defibrillators (AEDs) are available for immediate use by bystanders in the event of cardiac arrest. Cardiac arrest is associated with high morbidity and mortality, particularly when they occur outside of a hospital. A person's chance of survival improves dramatically if an AED and cardiopulmonary resuscitation (CPR) are implemented within minutes of the occurrence. PAD programs and policies are particularly cost-effective in locations where people have elevated rates or risk of cardiac events.[1] Increasing the availability of PADs and training potential lay bystanders is crucial for their effectiveness.[2–4]

The evidence for implementing PAD is strong. Studies demonstrate internal and external validity, and independent replication has yielded positive results.

Summary

PAD programs and policies ensure that automated external defibrillators (AEDs) are present for immediate use by bystanders in the event of cardiac arrest. They can substantially increase the likelihood of survival for out-of-hospital cardiac arrest, a sudden medical event that has high morbidity and mortality.

Best Practice in Action
Name: Statewide Public Access Defibrillation
Location: North Carolina

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

The evidence for implementing PAD is strong. Studies demonstrate internal and external validity, and independent replication has yielded positive results. There are limited instances of evaluation of replication. Several studies show the positive effect of PAD in improving survival following an out-of-hospital cardiac arrest (OHCA) in various settings.[5–6] Comprehensive implementation guidance is available to facilitate the adoption of this strategy by community members.[7–9]

Evidence of Impact

Health Impact

The use of AEDs by bystanders remains low (2%–5%) due to reasons such as lack of knowledge, unwillingness to use, and limited access to AEDs. Evidence about survival rates varies by study with some international studies reporting survival between 2% and 11%. One study found survival rates as high as 70% if AEDs are used within 2 minutes of collapse during the cardiac arrest.[5,6]

► *A person's chance of survival improves dramatically if an AED and cardiopulmonary resuscitation (CPR) are implemented within minutes of the occurrence.*

Health Equity Impact

Though there is limited research on the health equity impact of the PAD programs and policies nationally, there have been assessments of health equity in select U.S. cities and states. A study in Philadelphia, Pennsylvania, found that AED access was more likely in areas with higher median household incomes and higher paying jobs.[10] A study in Texas that analyzed Cardiac Arrest Registry to Enhance Survival (CARES) data found that there is a disproportionate need to improve rates of bystander CPR, AED use, and/or OHCA survival in neighborhoods with high unemployment, low education levels, high populations of Black or African American persons, and/or high populations of Hispanic or Latino persons.[11]

An analysis of a national database found that female patients were less likely to receive bystander AED assistance than male patients were; rural and frontier areas had less AED usage than more populated locations.[12]

Finally, a randomized sample of national demographic differences in PAD training status demonstrated that self-identified White and Black individuals were more likely to have AED training than Latino individuals; higher education was also positively associated with AED training within this sample.[13]

Economic Impact

Evidence suggests that that implementing PAD programs is cost-effective. A review in 2010 found that AEDs are most cost-effective when placed in areas with high frequency of cardiac arrest.[14] Another study found that AEDs, in addition to CPR, were more cost-effective than CPR alone. The CPR/AED group reported more cardiac arrest survivors than the CPR-only group and thus more cost savings. The CPR-only group saved a mean of $42,000, compared with a mean of $68,000 for the CPR/AED group. Defibrillation by bystanders was associated with a mean incremental cost of $46,700 per Quality-adjusted life year (QALY). The researchers believed that the cost-effectiveness of the AEDs and CPR group was influenced by the low incidence of cardiac arrest. Additionally, they noted concerns with ascertainment bias in the identification of cardiac arrests for the two groups (more likely to report and respond to cardiac arrest in the presence of an AED). The researchers concluded that the cost-effectiveness of AEDs for PAD may be greater when there are higher frequencies of cardiac arrests.[15] In contrast, a more recent study found that the number of cardiac arrests occurring in the presence of an AED had little impact on the cost-effectiveness, except at very low incidence. The study concluded that public AEDs are a cost-effective public health intervention in the United States, given that the AED strategy yielded an ICER of $53,797 per QALY gained.[2]

Best Practice in Action Story

Between 2010 and 2013, the HeartRescue Project implemented a training initiative in North Carolina to improve bystander and first-responder response to cardiac arrest prior to the arrival of emergency medical services. Bystanders were defined as those who had intervened but had not been dispatched, while first responders were those who responded officially as a part of a medical response team but were not designated to transport patients to the hospital (e.g., police officers, firefighters, rescue squads). The initiative involved statewide interventions including training the general population in the use of AEDs and training first responders in team-based CPR, including AED use and high-performance CPR. Following the initiative, researchers retrospectively analyzed data for 11 counties (2.7 million inhabitants) within the CARES, a voluntary, prospective clinical registry of patients with out-of-hospital cardiac arrest in the United States. The data demonstrated that first-responder defibrillation increased from 40.9% in 2010 to 52.1% in 2013. Also, the proportion of patients receiving bystander-initiated CPR and defibrillation was associated with greater likelihood of survivall.[16]

For more information

Website: http://www.heartrescueproject.com/

Four Considerations for Implementation

1 Settings

There is evidence that laws in states that require, authorize, or encourage AED placement in schools, workplaces, airports, fitness centers, and more improve OHCA outcomes.[3,17] PAD is most likely to be cost-effective in well-populated settings where there is high risk of OHCA. However, some studies have found a poor correlation between risk of OHCA by location and placement of AEDs.[6]

A systematic review reported that only 17%–26% of OHCAs occurred in areas suitable for AEDs. In 18% to 59% of cases, AEDs were found to be in inaccessible areas, and fewer were available outside of standard work hours.[6] Strategic placement of AEDs is crucial to areas with high incidence of OHCAs. Evidence suggests that the most socioeconomically deprived communities have the highest incidence of OHCA and the least availability of AEDs.[18]

2 Policy- and Law-Related Considerations

While all states have enacted some type of law pertaining to PAD, there is state variability in the types of PAD laws enacted. Broadly, these laws are related to[19]:

- Targeted AED site placement.
- Training anticipated responders.
- PAD coordinated with EMS.
- Emergency response plans.
- Routine maintenance and testing of AEDs.
- Ongoing PAD quality improvement and quality assurance monitoring.
- Limited liability.

3 Implementation Guidance

AHA guidelines recommend that AEDs be deployed in areas with a high likelihood of OHCAs and a reasonable probability of at least one AED use within 5 years.[20] In addition, AHA guidelines recommend that states adopt legislative approaches to support community lay rescuer PAD programs.[19] Guidance from AHA and other organizations include:

- Guidelines for Public Access Defibrillation Programs in Federal Facilities.[7]
- AED Implementation.[8]
- Strategies to Improve Cardiac Arrest Survival: A Time to Act.[9]

4 Additional Resources

- What Evidence Supports State Laws to Enhance Public Access Defibrillation? A Policy Evidence Assessment Report [PDF – 884K].[3]

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Stroke Center Certification

Best Strategy

Stroke center certification (SCC) recognizes a health care facility's achievement in delivering evidence-based stroke care. A health care facility can pursue basic or advanced (comprehensive) certification programs based on their infrastructure and resource capacities. The most common programs for stroke certification are for primary stroke centers (PSCs), comprehensive stroke centers (CSCs), and acute stroke-ready hospitals (ASRHs). PSCs have the infrastructure and demonstrated ability to stabilize and treat acute stroke patients.[1] CSCs are capable of a full spectrum of care for more seriously ill patients with stroke and cerebrovascular disease.[2] ASRHs are relatively new, focused on expanding evidence-based stroke care to patients unable to directly access a stroke center, often including patients who live in rural areas.[1] Certified stroke centers improve stroke-related health outcomes, delivery of stroke care, and patient care coordination, all while reducing health care costs. Regardless of the type of program a facility pursues, certification can help community and emergency services personnel (community health workers, paramedics, emergency medical technicians) best route their patients to appropriate centers of care for stroke.

Certified stroke centers improve stroke-related health outcomes, delivery of stroke care, and patient care coordination, all while reducing health care costs.

Summary

Stroke center certification recognizes a health care facility's achievement in delivering evidence-based stroke care via certification programs based on their infrastructure and resource capacities.

Best Practice in Action
Name: Roane Medical Center
Location: Harriman, Tennessee

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

The use of SCC is found to be effective. There are studies with a true experimental design indicating the effectiveness of the strategy to reduce stroke-related complications, increase time to acute treatment, and reduce the likelihood of disability and death.[1,3,4] There are systematic reviews indicating the effectiveness, cost-effectiveness, and cost-efficiencies of the strategy.[2,5–7] Because acute stroke care services are implemented in specific clinical settings (emergency department or in-patient health care facilities), replication across other health care settings (e.g., clinics, pharmacies, or community paramedicine programs) is not plausible. This strategy has been replicated in similar settings and among similar patient populations. Comprehensive implementation guidance at the national, regional, and local levels are available to implement this strategy with fidelity.[8–13] Additionally, this strategy has high external and ecological validity, as is it has been implemented in two or more applied, "real-world" settings that are similar to each other.

Evidence of Impact

Health Impact

A review of current literature found that PSCs certified by nationally recognized accrediting bodies were linked to improved neurological outcomes, reduced morbidity, increased access to appropriate stroke treatment, and improved mortality rates.[1] A recent analysis assessing the impact of SCC on thrombolysis time metrics found that, compared with non-PSCs, PSCs had significantly higher odds of achieving door-to-needle times of no more than 45 min (odds ratio [OR]: 2.8, 95% confidence interval [CI]: 1.8–4.4, $p < 0.001$) and no more than 60 min (OR: 3, 95% CI: 2.1–4.3, $p < 0.001$).[4] Overall, PSCs and CSCs achieve similar quality of care and health outcomes.[3]

► *Emergency medical services (EMS) systems refers to the coordinated delivery systems for emergency medical care for stroke treatment that may be organized on a local, regional, statewide, or nationwide basis using public or private resources.*

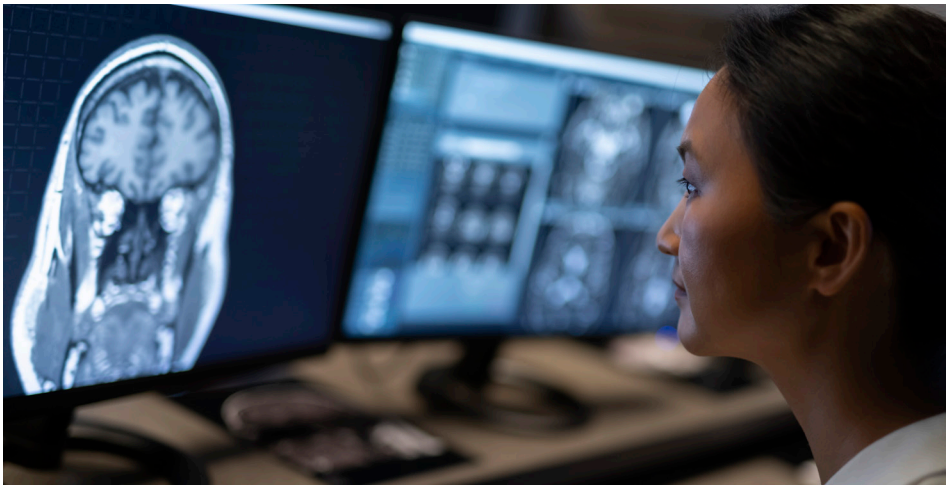
Health Equity Impact

Adoption of SCCs is associated with patients' access to lifesaving stroke treatment.[14] Hospital- and system-level characteristics of stroke care across states and regions vary and affect disparities in access to timely stroke care.[15] Identifying these variations in characteristics may help clinicians and decision makers understand and address specific gaps in care. Gaps in quality of stroke care between metropolitan and nonmetropolitan areas could be partially addressed through the procedural efforts of SCC, such as training and hiring of new neurologists, thereby increasing the availability of critical neurological services.[16]

Economic Impact

Costs for implementing SCC involve additional staffing, data entry, and reporting requirements. Considering this, the short-term costs of implementation are high; however, the long-term cost-effectiveness of increasing efficiencies in care and reducing health care service utilization outweigh these initial costs.

A 2019 evaluation of the Paul Coverdell National Acute Stroke Program (PCNASP), which supports hospital adoption of SCC practices, revealed that PCNASP-funded expenditures ranged from $790,123 to $1,298,160 across the six health departments for the 3-year funding period, the primary expenditure being labor/staffing.[17]



Best Practice in Action Story

Roane Medical Center is a medical facility located in Harriman, Tennessee, that was founded in 2013 and primarily works with communities with financial challenges and older adults. The center decided to pursue primary stroke center certification from The Joint Commission, which involves community education on identifying early signs of stroke. Self-assessment to help get people into the emergency department (ED) for treatment is critical to successful stroke treatment. Before becoming a certified stroke center, Roane administered approximately six tissue plasminogen activator (tPA) treatments per year; now they treat three to four patients per month. By putting a systemwide emphasis on putting patients first, Roane negotiated better reimbursement costs with the drug manufacturer to help those in their community with limited insurance cover these tPA treatments.

For more information

Website: https://www.roanemedical.com/

Four Considerations for Implementation

1 Settings

Hospitals are the only health care institutions eligible to pursue primary or comprehensive SCC. Types of hospitals that implement SCC include hospitals of varying capacity, including community hospitals and academic hospitals. Within a hospital, stroke care services are typically implemented in the inpatient and ED wards.

2 Policy- and Law-Related Considerations

To improve stroke systems of care, some states have adopted their own certification process based on AHA certification elements and criteria.[18] Decision makers are encouraged to work with representatives from hospitals, EMS, and stroke coalitions to assess their specific certification needs across states and regions.

3 Implementation Guidance

The Joint Commission

- Standardized Performance Measures for Comprehensive Stroke Centers [PDF – 73.2K].[8]
- Standardized Performance Measures for Primary Stroke Centers [PDF – 87.2K].[9]
- Standardized Performance Measures for Acute Stroke Ready Hospitals [PDF – 66.4K].[10]
- Standardized Measures for Thrombectomy Capable Stroke Centers [PDF – 87.1K].[11]

American Heart Association

- Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update.[12]
- Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities from the Prehospital Stroke System of Care Consensus Conference [PDF – 1.34M].[13]

4 Additional Resources

Brain Attack Coalition

- Recommendations for the Establishment of Primary Stroke Centers.[19]

The Joint Commission

- Quick Guide: Comprehensive Stroke Center (CSC) Certification [PDF – 1.50M].[20]
- Disease-Specific Care Certification Review Process Guide [PDF – 1.75M].[21]
- Stroke Certification Programs – Program Concept Comparison [PDF – 88.8K].[22]

CDC/PCNASP

- Public Health Data Modernization [PDF – 666K].[23]
- Evaluation Results Brief: CDC Coverdell Program Progress from 2015–2020 [PDF – 322K].[24]

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Engaging Organizations to Promote Cardiovascular Health

These strategies explore activities and approaches for promoting cardiovascular and cerebrovascular health, such as such as policies and programs carried out in organizational settings and various food environments including community institutions.

- **Reducing Sodium to Prevent and Manage Hypertension**
- **Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke**

Reducing Sodium to Prevent and Manage Hypertension

Best Strategy

Reducing sodium to prevent and manage hypertension involves a decrease in sodium intake through lifestyle modifications and through changes at the environmental, industry and policy levels. U.S. adults' average sodium intake is greater than 3,400 milligrams per day, which exceeds national recommended limits of 2,300 milligrams per day.[1] Most sodium in the diet comes from packaged and processed foods and foods prepared outside the home. The *Dietary Guidelines for Americans* recommends that sodium intake be limited as part of a healthy dietary pattern that provides a variety of nutrient-dense foods and beverages.[2]

Sodium reduction strategies include: adoption of nutrition standards by meal providers and in workplaces to limit sodium in food procurement, prepared foods, packaged snacks, and vending machines foods and beverages; restaurants providing menu item nutrition labeling, including sodium content; food manufacturers providing nutrition content, including sodium on the front of the package label; state/local governments incentivizing or requiring stores to set sodium limits on prepared foods and packaged snacks; manufacturers reformulating processed and packaged foods to reduce sodium content; and consumer/patient education related to reducing sodium intake and purchasing lower sodium foods.[3]

Sodium reduction leads to a positive effect on blood pressure and cardiovascular disease in adults with hypertension and prehypertension.

Summary

Reducing sodium to prevent and manage hypertension is a cost-effective strategy for lowering blood pressure and is associated with reduced cardiovascular disease rates.

Best Practice in Action
Name: Sodium Reduction in Philadelphia Correctional Facilities
Location: Philadelphia, Pennsylvania

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported; Promising/Emerging; Unsupported; Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported; Moderate; Insufficient; No Evidence

Evidence of Effectiveness

The evidence base supporting sodium reduction is strong. Studies demonstrate internal and external validity. Sodium reduction strategies have been independently replicated, indicating reliability of impact. Studies show that sodium reduction is a cost-effective strategy that reduces blood pressure and is associated with reduced CVD.[4–7] Comprehensive implementation guidance exists to carry out this strategy in food service organizations, such as hospitals, workplaces, universities, and food banks, and as part of consumer and patient education interventions.

Evidence of Impact

Health Impact

Sodium reduction leads to a positive effect on blood pressure and CVD in adults with hypertension and prehypertension.[4–6] Modeling study data has estimated that a 10-year, graduated reduction in sodium consumption to 2,300 milligrams per day may[7]:

- Reduce the number of adults with systolic blood pressure (SBP) of at least 140 mmHg by 6.9 million (22%) and reduce the number of adults with SBP of 120–139 mmHg by 8.1 million (13%).
- Prevent approximately 895,200 CVD events and 252,500 CVD-related deaths.

Evidence shows that sodium reduction policy interventions, including compliance with nutrition standards by daily meal providers and in workplaces, are associated with increased availability of reduced sodium foods and reduced sodium intake.[3] Sodium reduction policy interventions that include front-of-package and menu item labeling are associated with reduced sodium intake, reduced risk for cardiometabolic syndrome, and improved consumer knowledge.[3] Group patient education for hypertension control involving curriculum on sodium reduction, including cooking techniques and healthy snack selection, resulted in improvements in blood pressure, knowledge, and achievement of healthy eating behavior change goals.[8]

Health Equity Impact

The health impact of population-wide sodium reduction could benefit those disproportionately affected by the burden of hypertension and CVD, including those with diabetes or chronic kidney disease and people from racial and ethnic minority groups, such as Black and Asian persons.[4] Evidence shows that interventions that incentivize or require food retailers to limit sodium in foods are associated with increased availability of reduced sodium items and reduced sodium intake among people with lower incomes and people from racial and ethnic minority groups.[3] Evidence also showed that sodium reduction policy interventions involving daily meal providers are associated with increased availability of reduced sodium foods and reduced sodium intake among incarcerated populations and people with mental illness.[3]

Economic Impact

It is estimated that a reduction in salt intake of 3 grams per day would save 194,000 to 392,000 QALYs and $10 billion to $24 billion in health care costs annually.[9] Implementation of 10-year graduated U.S. sodium reduction targets to 2,300 milligrams per day can save $37 billion due to avoided disease-related health care costs.[7] Studies have shown that population-wide salt reduction is very cost-effective and cost-saving in reducing CVD and early deaths in low-, middle-, and high-income countries.[4]

A CDC study on the Sodium Reduction in Communities Program (SRCP) found SRCP sodium reduction strategies to be cost-effective. Strategies include implementing nutrition standards, changing procurement practices, modifying menu items, and applying behavioral-economic approaches such as product placement, signage, and pricing. Cost-effectiveness modeling showed that if sustained, reduction in medical costs would be greater than implementation costs in the intended population (net $1.82 per capita through 2025 and $2.09 per capita through 2040).[10]

► *Reducing sodium to prevent and manage hypertension is a cost-effective strategy for lowering blood pressure and is associated with reduced cardiovascular disease (CVD) rates.*

Best Practice in Action Story

People who are incarcerated may lack access to healthy foods, as options in correctional facilities may be heavily processed and high in sodium, unhealthy fats and added sugars.[11] A lack of healthy food options can contribute to hypertension and cardiovascular disease. To provide healthier meals, the Philadelphia Department of Prisons (PDP) partnered with the Philadelphia Department of Public Health to implement nutrition standards for food served and sold in PDP facilities.[12] PDP incorporated the city's nutrition standards into a food service request for proposals. Public health staff worked with the food service provider to review menus for compliance and facilitate implementation of the nutrition standards through food service staff. In addition, incarcerated people were surveyed on their food preferences and nutritional needs, to inform the addition of healthier foods for purchase. Though some lower sodium product substitutions cost more, the food service provider made adjustments to prevent overall cost increases. Due to these efforts, 18 of the 28 highest sodium food products on the regular menu for incarcerated people were replaced with lower sodium alternatives. The amount of sodium in the 4-week cycle menu decreased by 31%, to an average daily sodium intake of 2,280 milligrams, which is lower than the *Dietary Guidelines for Americans'* recommended sodium limit.

For more information

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Four Considerations for Implementation

1 Settings

Sodium reduction strategies have been successfully implemented in a variety of settings including congregate meal sites, universities, hospitals, food banks, supermarkets, small food retailers, correctional facilities, restaurants, community health centers, Federally Qualified Health Centers (FQHCs), and primary care clinics. Collaborative national salt reduction initiatives have been coordinated between local, state, and national health organizations and major food companies.[13]

2 Policy- and Law-Related Considerations

More than 70% of the sodium consumed in the United States comes from salt added during commercial food processing and preparation. A comprehensive public health approach to reducing sodium in the U.S. food supply and reducing overall sodium consumption will require a continued collaborative approach between the food industry and federal, state, and local governments. In 2021, the U.S. Food and Drug Administration (FDA) finalized its voluntary sodium reduction targets, which provide guidance to set sodium reduction goals for food manufactures, restaurants, and food service establishments.

3 Implementation Guidance

Implementation guidance for sodium reduction strategies is available for a variety of settings. See the links below for more information on implementation:

- Sodium Reduction in Communities Program (SRCP) Implementation Guide.[14]
- Partnering with Food Service to Reduce Sodium: A Toolkit for Public Health Practitioners [PDF – 7.76M].[15]
- The SHAKE Technical Package for Salt Reduction.[16]
- Smart Food Choices: How to Implement Food Service Guidelines in Public Facilities [PDF – 3.47M].[17]
- Food Service Guidelines for Federal Facilities: A Model for Your State or Community.[18]
- Food Service Guidelines Implementation Toolkit.[19]
- The Health Educator's Nutrition Toolkit: Setting the Table for Healthy Eating.[20]

4 Additional Resources

Several federal and national organizations have developed resources to support Sodium Reduction Strategies:

- Sodium Reduction: Policy Evidence Assessment Report.[3]
- Sodium Reduction Initiatives.[21]
- Salt Reduction Resources.[22]
- Global Sodium Reduction Strategies Online Course.[23]
- Sodium Reduction Resources for Everyone.[24]
- Laws and Policies That Support the Reduction of Sodium in the Food Supply.[25]
- The 2020–2025 *Dietary Guidelines for Americans*.[2]
- DASH Eating Plan.[26]
- Life's Essential 8™.[27]

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Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke

Best Strategy

Workplace health Promotion (WHP) is a coordinated and comprehensive set of activities and strategies for promoting and protecting health at the workplace. These can include programs, policies, benefits, environmental supports, and links to the surrounding community. A coordinated and systematic approach to workplace health includes assessment, program planning and management, implementation, and evaluation. A comprehensive WHP program addresses multiple risk factors and health conditions simultaneously. Key to WHP programs is a culture of health that permeates all aspects of an organization and approaches employee health in a holistic matter, rather than in a siloed, one-size-fits-all approach. Examples include health screening and risk assessment programs, providing health education programs, and integrating WHP programs into an organization's structure through health benefits plans, incentives to participate in programs, and well-designed communication of services and programs. WHP programs can positively impact employee health and morale, improve organization productivity and culture, and prevent disease and sustain health amongst employers, workers, their families, and their communities.[1–3]

A WHP program can contain a number of other strategies highlighted in this Best Practices Guide, including lifestyle modification programs to control hypertension, sodium reduction, self-monitoring of blood pressure, self-management programs, public access defibrillation, and reducing out-of-pocket costs.

Summary

WHP is a coordinated and comprehensive set of activities and strategies for promoting and protecting health in the workplace.

Best Practice in Action
Name: Nabholz Wellness Program
Location: Arkansas, Kansas, Mississippi, Missouri, and Oklahoma

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence base for implementing WHP programs is very strong. Literature shows WHP programs to be effective, demonstrating internal and external validity. Based on strong evidence for effectiveness, health risk assessments with feedback when combined with health education programs is recommended by the Community Preventive Services Task Force (CPSTF).[3] This strategy has been partially replicated in real-world settings but not evaluated, which shows limited reliability of impact. Several randomized controlled trials have been conducted and show positive results from implementing WHP programs to reduce heart disease and stroke morbidity and mortality. Several organizations, such as the National Alliance of Healthcare Purchaser Coalitions, the AHA, and CDC, have developed resources for planning, implementing, and evaluating WHP programs.

Evidence of Impact

Health Impact

A systematic review by the CPSTF found that health risk assessment screening programs with feedback improve high blood pressure and total cholesterol control (median decrease of 1.8/2.6 mm Hg and 4.8 mg/dL, respectively).[3] In addition, programs with multiple components, policies, and environmental supports can lead to lower prevalence for high blood pressure and high cholesterol.[4]

WHP programs have also been found to reduce employee weight, increase physical activity, and improve nutrition—all conditions associated with heart disease and stroke.[5]

Health Equity Impact

Strong evidence supports the effectiveness of WHP programs targeting smoking cessation, healthy nutrition, physical activity, and weight loss among minority-owned businesses.[6] Research has also shown a positive impact on systolic and diastolic blood pressure levels among African Americans.[7]

Employees with lower education levels may benefit from WHP programs, but more issues related to access may affect adoption, health care usage, and effectiveness.[8]

Additional research is needed to examine the adoption and engagement among ethnically diverse women in low socioeconomic positions.[9,10]

Economic Impact

WHP programs have been shown to lower health and productivity-related costs. Employers could yield a $3–$15 return on investment (ROI) for each dollar invested.[11,12] A meta-analysis estimates a $3.27 decrease in medical costs for every dollar spent.[12] In addition to the economic benefits, the value on investment is also an important outcome for WHP programs.[13] Evidence demonstrates WHP programs reduce absenteeism and increase productivity.[12] The strongest economic data exist for addressing hypertension and high cholesterol. However, data for related lifestyle risks, such as healthy weight and diet, are weaker.

► *WHP programs can positively impact employee health and morale, improve organization productivity and culture, and prevent disease and sustain health amongst employers, workers, their families, and their communities.*

Best Practice in Action Story

The Nabholz Wellness Program is a benefits program designed to promote employee health. Serving several locations across the Central and Eastern United States, the program employs a trained wellness team including a physician, personal trainer, medical assistant, and registered dietitian. The comprehensive program offers health screenings, provides education, integrates workplace health promotion into its structure, uses a holistic approach to health, and continuously evaluates its efforts. Nabholz, through its self-funded insurance, covers 100% of the health insurance premium for employees who complete annual health screenings and provides incentives to those who meet blood pressure, cholesterol, blood glucose, weight, and tobacco use goals. The wellness team also travels to the company's sites to provide tailored education and specific steps to improve health to employees and their family members. In addition, Nabholz leaders have committed financial and personnel resources to maintaining the program and creating a supportive environment though regular communication and program participation. The wellness team uses employee feedback to shape the program and tailor it to employee needs. Ninety-nine percent of employees completed screenings each year between 2010 and 2017. Between 2011 and 2017, the program saw an increase from 34% to 82% of employees meeting at least four biometric targets.

For more information

Website: https://nabholz.com/careers/benefits/
Phone: 877-622-4659

Four Considerations for Implementation

1 Settings

WHP programs targeting CVD have been successfully implemented in small, medium, large businesses across multiple industries, including health care and social assistance; local, state, and federal public administration; agriculture; and education services throughout the United States.

2 Policy- and Law-Related Considerations

Many strategies in WHP programs that involve policy are unique to the organizational level (i.e., the workplace). In addition, federal policies promote and govern WHP programs and improve health at the population level.[14,15] Examples include:

- The Employee Retirement Income Security Act of 1974, which sets minimum standards for most voluntarily established retirement and health plans in private industry to provide protection for individuals in these plans.[16]
- The Genetic Information Nondiscrimination Act of 2008.[17]

State policies also exist to support WHP programs. In 2017, CDC's Division for Heart Disease and Stroke Prevention conducted a study to understand these state laws. The study found that the laws had several common components that can support program implementation and positively support employee health[18]:

- Incentives for employees who participate in or meet goals associated with WHP program activities.
- Environmental supports, such as AEDs at worksites.
- Grants and tax incentives to businesses that develop or maintain WHP programs.
- Guidance on how to implement a WHP program.
- Health promotion activities that target specific health conditions, like high blood pressure and high cholesterol.

3 Implementation Guidance

Resources for planning and implementing WHP programs include:

- Cardiovascular Health: Action Steps for Employers [PDF – 204K].[19]
- CDC's Million Hearts® Action Guide: Medication Adherence: Action Steps for Health Benefit Managers [PDF – 173K].[20]
- CDC's Workplace Health Model.[21]
- Employee Engagement in Health & Well-Being: Influencers, Outcomes, and Practice Considerations [PDF – 89.7K].[22]
- Reform in Action: Six Resources for Employers About Improving Health and Health Care for Employees.[23]
- How to Promote Heart Disease and Stroke Prevention in the Workplace.[24]

4 Additional Resources

Several federal and national organizations have developed resources to support WHP programs:

- A Purchaser's Guide to Clinical Preventive Services: Moving Science Into Coverage.[25]
- Workplace Health Promotion.[26]
- Compendium on the U.S. Surgeon General's Call-to-Action to Control Hypertension.[27]
- Workplace Health.[28]
- Life's Essential 8™.[29]

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Implementing Technology-Based Strategies to Optimize Cardiovascular Care

These strategies utilize technology to inform clinical decision making to support patients in maintaining their cardiovascular and cerebrovascular health, such as providing prompts to care teams to initiate care and bringing the gap in patients' access to care.

- **Clinical Decision Support Systems**
- **Telehealth**

Clinical Decision Support Systems

Best Strategy

Clinical decision support systems (CDSS) are computer-based programs that assist clinicians by analyzing data within electronic health records (EHRs) against domain knowledge and/or evidence-based guidelines to provide prompts and reminders at the point of care. CDSS is utilized to improve efficiency, reduce errors and adverse events, and enhance the overall quality and availability of effective care. For example, CDSS can be used to facilitate clinical decision making in CVD prevention by reminding clinicians to screen for CVD risk factors, flagging cases of hypertension or hyperlipidemia, providing information on treatment protocols, prompting questions on medication adherence, and providing tailored recommendations for health behavior changes.[1]

Based on sufficient evidence of effectiveness, this strategy is recommended by the CPSTF.

Summary

CDSS involves the use of computer-generated prompts and reminders to help clinicians make decisions that may improve the quality of care (e.g., initiating screening, testing, treatment).

Best Practice in Action
Name: A CDSS Intervention in New York City
Location: New York, New York

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence base demonstrating the effectiveness of CDSS is very strong. Based on sufficient evidence of effectiveness, this strategy is recommended by the CPSTF.[2] Research studies that examined CDSS had strong internal and external validity and CDSS trials have been replicated with positive results. However, there is evidence that the external and ecological validity may be harmful. Studies indicate that in some circumstances, CDSS may cause "alert fatigue" among providers, where they begin to disregard alerts due to their frequency or repeated false alarms.[3] The National Academy of Medicine's, *Optimizing Strategies for Clinical Decision Support*, which is in the resource section of this guide, provides recommendations on how to reduce alert fatigue while designing and using CDSS.[3] Other implementation guidance on CDSS is also available from several sources.

Evidence of Impact

Health Impact

A CPSTF review found that CDSS leads to significant improvements in the three quality of care practices for CVD prevention: recommendations for screening (e.g., blood pressure, cholesterol) and other preventive care (e.g., supporting smoking cessation), evidence-based clinical tests related to CVD, and prescribed CVD-related treatments.[2] Some evidence suggests that CDSS can be tied to lower blood pressure and cholesterol levels, though evidence for this association is inconsistent.[4–6] Nonetheless, CDSS demonstrates promise that health outcomes can improve following the use of CDSS in cardiovascular and stroke prevention. An example of this is leveraging EHRs to identify stroke patients to minimize manual abstraction of data for stroke performance measures.[7] A study compared outcomes 12 months before the implementation of a coronary artery disease reporting system and after. The system had an 84% utilization rate and led to a higher cholesterol improvement than the cohort that did not use the system (58% versus 49%).[8] Finally, a randomized control trial found that patients using mobile health technology managing atrial fibrillation improved patient knowledge, drug adherence, and quality of life since their enrollment.[9]

Health Equity Impact

The ability of CDSS to reduce health disparities is understudied, and several researchers have suggested that further work is needed to directly examine this issue. Some have noted that providers working with communities that are medically underserved, such as in rural areas or populations with low-income, typically have less uptake of EHRs and CDSS. It has been noted that some of these populations are more likely to have inconsistent broadband Internet access, which could be a factor that affects CDSS utilization. However, there is evidence that CDSS leads to successful health outcomes when used in these communities.[10,11]

Economic Impact

Economic factors related to the implementation and maintenance of CDSS have not been well documented. The CPSTF found that current studies are extremely heterogeneous in the range of CDSS functions and CVD risk factors studied and in the inclusion of major cost factors.[12] Thus, the ability to determine an overall estimate of the cost or economic benefit of CDSS is limited. Of the studies available, health care costs appear to be more likely to decrease than to increase after CDSS implementation, but the usefulness of this evidence is limited by incomplete and inconsistent data.[12] More studies on the complete costs of developing, implementing, and operating CDSS systems are needed to fully assess its cost-effectiveness or ROI.

► *CDSS involves the use of computer-generated prompts and reminders to help clinicians make decisions that may improve the quality of care (e.g., initiating screening, testing, treatment).*

Best Practice in Action Story

There is a disproportionate prevalence of hypertension among South Asian adult persons (43%) compared to non-Hispanic White persons (28%) in the United States.[13] In 2016, several New York City–based partners collaborated to implement Project IMPACT (Implementing Million Hearts for Provider and Community Transformation), an intervention providing EHR training and technical support to improve blood pressure control in predominantly South Asian immigrant neighborhoods. Partners included the New York University–City University of New York Prevention Research Center, Healthfirst, and Island Peer Review Organization. Staff within 14 clinics that treat an average of 178 patients/wk were trained in (1) generating patient registry reports to identify and prioritize follow-up for patients and (2) developing and implementing medical alerts and order sets. Medical alerts notified clinicians to create follow-up appointments, enter blood pressure measurements, and repeat blood pressure measurements if needed. Order sets included lab tests, prescriptions, and counseling orders "pre-set" for those with hypertension. Counseling orders contained culturally tailored educational materials in several South Asian languages. After 1 year, there was a significant reduction in average systolic and diastolic blood pressure—1.71 and 1.13 mmHg, respectively—among the subset of Medicaid patients. Also, following the intervention, all the practices felt prepared to use point-of-care alerts and most felt prepared to use order sets to improve hypertension management.[14]

For more information

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Four Considerations for Implementation

1 Settings

Although CDSS has been implemented in a wide variety of health care settings, most published research has been within the context of primary outpatient care.

2 Policy- and Law-Related Considerations

Legal considerations for CDSS begin with the vendors who interpret and translate guidelines into algorithms used by these systems. Vendors may fully disclose the sources used to build the knowledge base and any limitations or weaknesses of the software. The vendor may also disclose which users have access and who will have the authority to accept, deny, or respond within the CDSS system during patient care. The Department of Health and Human Services and the Office of the National Coordinator for Health Information Technology are addressing standards for data elements (e.g., lab results, medications, patient demographics) via the United States Core Data for Interoperability.[1]

Public health and federal health agencies involvement in the creation and maintenance of domain knowledge bases from evidence-based guidelines can serve as an available reference when algorithms for CDSS are developed.

Providers may ensure that CDSS programming is updated regularly to account for changes in evidence and guidelines and that EHRs associated with CDSS include complete and up-to-date information about patients' medical histories and allergies.[2,14,15]

3 Implementation Guidance

Implementation guidance for CDSS is available from various sources. Since provider fatigue or avoidance of CDSS guidance has been raised as a barrier to successful outcomes, there have been suggestions that initial and repeat trainings become mandatory in CDSS implementation.[16]

The following resources may be useful:

- Measure Up Pressure Down: Provider Toolkit to Improve Hypertension Control [PDF – 10.5M].[16]
- Optimizing Strategies for Clinical Decision Support.[17]
- Considerations for a Successful Clinical Support System.[15]

4 Additional Resources

CDSS is supported and promoted by many federal initiatives and agencies, including:

- Hypertension Control Change Package, Second Edition.[18]
- Clinical Decision Support.[1]
- The Merit-Based Incentive Payment System: Advancing Care Information and Improvement Activities Performance Categories [PDF – 1.94M].[19]
- Topic: Clinical Decision Support (CDS).[20]
- A Mid-South Chronic Disease Registry and Practice-Based Research Network to Address Disparities [PDF – 2.80M].[21]

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Telehealth

Leading Strategy

Telehealth is the delivery of health care services to patients through technology, such as mobile phones or computers. Telehealth aims to bridge gaps in patients' access to care by allowing them to meet virtually with their providers in cases where they are unable to meet in person.[1] Patients can connect with their providers through telehealth in various ways, including live (synchronous) and store-and-forward (asynchronous) videoconferencing, remote patient monitoring, mobile applications, or audio alone.[1] Some telehealth systems, such as telestroke systems, enable communication between providers to expedite access to acute stroke care services. The goal of telehealth is not to replace in-person care but rather to provide an additional avenue for care delivery when patients face barriers to accessing care.

Based on sufficient evidence of effectiveness, mobile health, interactive digital, and text messaging interventions are recommended by CPSTF.

Summary

Telehealth involves the delivery of health care through technology, such as mobile devices or computers to enhance care and management of chronic conditions, such as hypertension.

Best Practice in Action

Name: Northwest Regional Virtual Integrated Multisite Patient Aligned Care Team Hub

Location: Northwest (Alaska, Washington, Oregon, Idaho, and western Montana)

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence base for the telehealth strategy is strong. Based on sufficient evidence of effectiveness, mobile health, interactive digital, and text messaging interventions are recommended by CPSTF.[2–4] Based on strong evidence, telehealth interventions to improve diet among patients with chronic disease is recommended by the CPSTF.[5] There is some evidence that this strategy achieves desired outcomes, with studies being applied among diverse populations and in different contexts. Due to variability in the breadth of implementation and telehealth technologies, exact replication can be challenging.[6] More evidence that supports these interventions on a larger scale using RCTs is needed, as meta-analyses and systematic reviews do not always capture condition variability in patient populations.[7,8]

Evidence of Impact

Health Impact

The literature suggests that telehealth is associated with patient adherence to medication,[2] adherence to diet,[3] and self-management goals.[2–4] Dietary-focused telehealth interventions have also been associated with decreases in risk factors for cardiovascular disease, such as total cholesterol and hypertension.[5]

There is evidence for the use of home or remote telemonitoring for management for conditions such as heart failure, associated with reduced morbidity, hospitalizations and readmissions, and mortality rates.[9]

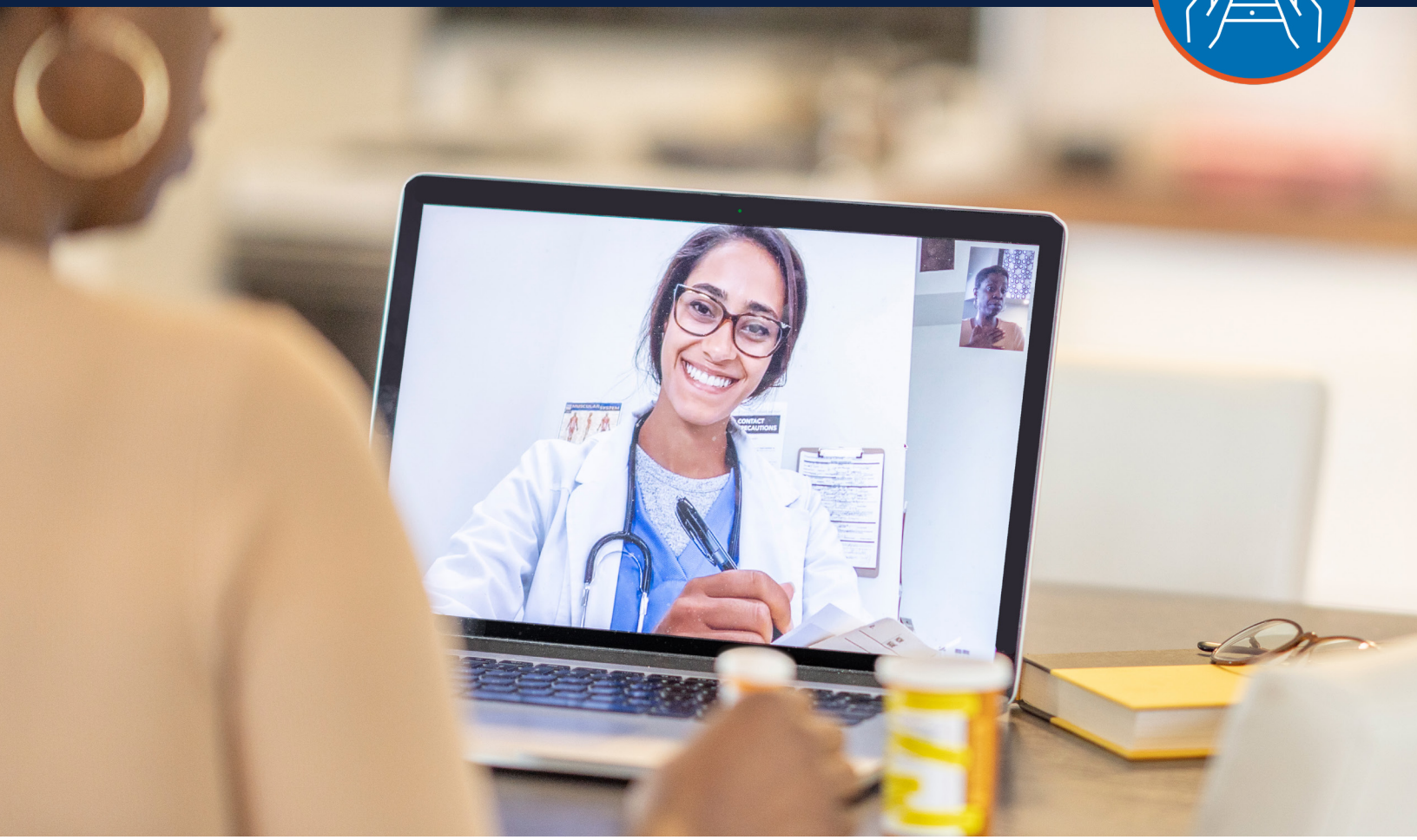
Economic Impact

Programs that implement telehealth can be cost-effective, through cost savings for patients as well as through reduced health care utilization.[10,11] Removing barriers to care will likely lead to increased use of telehealth interventions and programs, which may be cost-effective but still result in higher short-term costs. Additional and rigorous economic studies assessing the long-term cost savings and effectiveness are needed to support economic impact of telehealth.

Health Equity Impact

Priority populations with higher incidences of chronic and communicable diseases lack access to cardiovascular care. For example, they may not have access to reliable transportation, lack physical mobility, or live too far away from specialists.[1] From its beginning, telehealth interventions aimed to increase access to care.[1,12,13] Application in American Indian and Alaska Native populations, among older adults, and in rural regions has been explored, but not comprehensively.[11,14] While the expansion of health information technologies and the utility of telehealth interventions has been recognized in chronic care settings, the full impact of telehealth interventions for cardiovascular care across various populations has not been examined as closely for health outcomes. Further examination of such interventions across a range of populations and settings could support implementation of telehealth more broadly.

► *Telehealth involves the delivery of health care through technology, such as mobile devices or computers to enhance care and management of chronic conditions, such as hypertension.*



Best Practice in Action Story

Funded through the U.S. Department of Veterans Affairs' Office of Rural Health, the Northwest Regional Virtual Integrated Multisite Patient Aligned Care Team (V-IMPACT) Hub is a telehealth-based chronic disease management program based in Boise, Idaho. The program uses clinical video telehealth (CVT) and phone calls to deliver primary care to rural veterans in Alaska, Washington, Oregon, Idaho, and western Montana. The intervention is delivered by a Patient Aligned Care Team (PACT), consisting of primary care providers, including clinical pharmacy specialists (CPSs). Six full-time CPSs delivered medication management services and discharged 554 patients between October 2014 to March 2017.[15] Of those patients, 122 were categorized into a hypertension group, 94 in hyperlipidemia group, and 140 in a tobacco cessation group.

At discharge, 103 patients (84.0%) within the hypertension group met their blood pressure goal, with a mean blood pressure decrease of 26.00 mmHg over 11.00 mmHg. Additionally, 93% of patients were discharged on a lipid-lowering medication. For the hyperlipidemia group, 77 patients (82.0%) were taking the goal-indicated statin dose at time of discharge. For the tobacco cessation group, 59 patients (42.0%) achieved tobacco cessation. The V-IMPACT Hub successfully used the PACT CPS model to increase access to health care for veterans in rural areas and demonstrated improved cardiovascular outcomes in patients with high blood pressure, with high cholesterol, and who consume tobacco products.

For more information

Website: https://www.patientcare.va.gov/primarycare/PACT.asp

Four Considerations for Implementation

1 Settings

Telehealth can be used in cardiac rehabilitation clinics, emergency departments, and ambulatory care settings. By definition, telehealth interventions can connect patients with their providers from a distance in various ways, by synchronously (same time, different location) or asynchronously (different time, different location) using information and communication technologies to exchange health information.[16] The COVID-19 pandemic has led to an increased use in these telehealth services.[17]

2 Policy- and Law-Related Considerations

Legal, financial reimbursement, and logistical barriers exist in the implementation of telehealth strategies. A resource that serves as an implementation guide for telehealth implementation from a policy lens is *Recommendations for the Implementation of Telehealth in Cardiovascular and Stroke Care: A Policy Statement From the American Heart Association*, which provides an overview of the scientific evidence evaluating the use of telemedicine in cardiovascular and stroke care and proposes steps to overcome the barriers of telehealth adoption or delivery.[18] Implementers of telehealth programs are encouraged to understand state policies regarding application of the Health Insurance Portability and Accountability Act of 1996 to electronic communications with patients.[19] Lastly, there is potential for national legislation to address barriers for telemedicine capacity building, reimbursement policy, and secure data sharing policies.

3 Implementation Guidance

Resources for planning and implementing telehealth programs include:

- Telemedicine Implementation Guide [PDF – 2.20M].[20]
- Telehealth Implementation Playbook [PDF – 9.53M].[21]
- Telehealth Interventions to Improve Chronic Disease.[22]
- National Consortium of Telehealth Resource Centers.[23]
- American Telemedicine Association.[24]
- Telehealth Benefits and Barriers.[25]
- Recommendations for the Implementation of Telehealth in Cardiovascular and Stroke Care: A Policy Statement From the American Heart Association.[18]
- State Medicaid and CHIP Telehealth Toolkit [PDF – 901K].[26]

4 Additional Resources

- Telehealth News.[27]
- HealthIT.gov.[28]
- Telehealth Resources for Patients and Providers.[29]
- Indian Health Service Telehealth Resources.[30]
- Telehealth Toolkit [PDF – 488K].[31]
- Telehealth Factsheets.[32]
- Telehealth in Rural America Policy Paper [PDF – 175K].[33]

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Leveraging Community and Clinical Public Health Workforces

These strategies leverage and combine different sectors of the health workforce to provide high-quality care to prevent and/or manage complications from heart disease and stroke and improve outcomes.

- **Community Health Workers**
- **Community Paramedicine**
- **Collaborative Practice Agreements to Enable Drug Therapy Management**
- **Community Pharmacists and Medication Therapy Management**
- **Tailored Pharmacy-Based Interventions to Improve Medication Adherence**
- **Team-Based Care to Improve High Blood Pressure Control**

Community Health Workers

Best Strategy

Community health worker (CHW) is an umbrella term that has several other job titles, including *promotores* and community health representative.[1] CHWs are frontline public health professionals who come from, are trusted members of, and have a close understanding of the community served.[2] Fundamentally, CHWs promote health equity and social justice within the communities they serve.[1] They leverage their trusting relationships to act as liaisons between health and social services and the community, facilitate access to services, improve the quality and cultural competence of service delivery, and build individual and community capacity to improve health outcomes.[2] CHWs take on a wide range of roles in the community and clinical sectors, including cultural mediation, care coordination, social support, advocacy, research, and evaluation.[3]

The CPSTF found that engaging CHWs in team-based care had strong evidence of effectiveness.

Summary

CHWs are frontline public health professionals who come from, are trusted members of, and have a close understanding of the community served. Fundamental to what they do, CHWs promote health equity and social justice within the communities they serve.

Best Practice in Action

Name: Mi Corazón, Mi Comunidad (My Heart, My Community) Program
Location: El Paso, Texas

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence demonstrating the effectiveness of interventions that engage CHWs in clinical and community care teams to prevent CVD is very strong. Based on strong evidence of effectiveness, engaging CHWs in a team-based care model is recommended by the CPSTF.[4] Based on sufficient evidence, engaging CHWs for health education, outreach, enrollment, and information sharing is recommended by the CPSTF.[4] It is also a cost-effective strategy.[5] Research studies examining the effectiveness of this strategy have had strong internal and external validity; systematic reviews and studies with strong research designs have concluded that this strategy is effective, and this strategy has been replicated with positive results. In the last two decades, there has been substantial interest in CHWs, reflected by implementation guidance in numerous documents, including peer-reviewed journal articles and gray literature such as briefs, guides, toolkits, and websites.[6,7]

Evidence of Impact

Health Impact

The CPSTF found that engaging CHWs in team-based care had strong evidence of effectiveness. Integrating CHWs on clinical care teams or in the community as part of CVD prevention programs can help program participants lower their blood pressure, cholesterol, and CVD risk factors (e.g., diabetes).[4,8–10] It can also increase physical activity, healthy eating, smoking cessation, and patient knowledge and adherence to medication regimens.[4,10,11]

Health Equity Impact

Because of CHWs' connection, credibility, and commitment to the communities they serve, they are uniquely positioned to address health and social conditions experienced by communities most affected by health disparities and inequities.[1–3,12] Notably, most studies that engaged CHWs focused on people who live or work in settings that put them at increased risk of developing or worsening CVD and having to contend with adverse social determinants of health (SDOH).[4,5,13–18]

► *CHWs are frontline public health professionals who come from, are trusted members of, and have a close understanding of the community served.*

Economic Impact

A review by the CPSTF concluded that interventions that integrate CHWs on clinical care teams to prevent CVD are cost-effective.[4,5] The median cost of intervention was $329 (range: $98 to $422) per person per year, with the main cost drivers being CHW time, costs for training and supervision of CHWs, and cost for any additional interventions or staff.[5] The median change in health care costs after a CHW intervention was a reduction of $82 (range: -$415 to $14) per person per year.[5] One well-designed study found an ROI of 1.8 to 1 for a large health plan that served an underserved urban population.[5] Overall evidence for an estimated net benefit indicated that health care cost savings did not exceed the cost of intervention (median net benefit: -$311 from seven studies).[5] The median cost per QALY saved was $17,670 (range: $8,233 to $24,149), and all estimates were well below the commonly used and conservative threshold of $50,000 per QALY.[5] The review also noted incomplete reporting or inclusion of major cost drivers in some studies.[5] Future studies are needed to understand the cost of CHW services and time, whether those services are voluntary (unpaid) or otherwise.

Best Practice in Action Story

The Mi Corazón, Mi Comunidad (MiCMiC [My Heart, My Community]) program was implemented by the University of Texas at El Paso and the University of Texas Health Science Center with the YWCA, the El Paso Department of Parks and Recreation, a grocery store chain, and a community health clinic called Centro San Vicente.[19–21] MiCMiC focused on Hispanic persons at higher risk for CVD and lived in two Texas communities along the U.S.–Mexico border that have lower incomes, education, and acculturation. MiCMiC promoted the use of existing community nutrition and physical activity resources. Program activities were related to heart healthy behaviors, blood pressure, and diabetes. *Promotores*—bilingual, Spanish-speaking CHWs—hired by the YWCA were integral to MiCMiC's implementation. After receiving training, the *promotores* took on various roles, such as conducting outreach, using a culturally appropriate health education curriculum (Salud Para Su Corazón [Health for Your Heart]), providing coaching and social support, and championing community-level improvements. Over 4 months, among participants, greater utilization of community nutrition and physical activity resources led to greater changes in behavioral and clinical outcomes. Overall, there were statistically significant average increases in physical activity (from 2.5 to 5 hours per week) and eating at least five daily servings of fruits and vegetables (from 33% to 67%). Statistically significant average decreases occurred in CVD risk sum score (from 5.6 to 3.7), weight (2 lbs), and waist (1") and hip (0.75") circumferences. CHWs and allies also worked together in a CHW workforce coalition over the 8 years of this National Institutes of Health–funded project.

For more information

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Four Considerations for Implementation

1 Settings

CHWs have effectively worked in and/or partnered with a wide variety of health care and community-based organizations to address the prevention or management of CVD. Examples of health care organizations include FQHCs, managed care health systems, patient-centered medical homes (PCMHs), and EDs.[10–12,15,22–27] Community-based organizations include community pharmacies, community recreational facilities, prisons and jails, and social services.[10,11,14–17,19–23]

2 Policy- and Law-Related Considerations

There are a variety of state-level policies and laws that have been implemented to effectively engage and support CHWs. Examples include formalizing a statewide CHW definition, integrating CHWs in multidisciplinary health care teams, authorizing CHWs to provide services (e.g., blood pressure screening and education) to help prevent or manage chronic diseases (e.g., hypertension, diabetes), defining and clarifying the CHW scope of practice by delineating boundaries that distinguish CHWs from other health professions, authorizing payment for health insurer coverage of CHW services, and offering CHW certification or formal CHW trainings.[24,25]

Notably, there are important policy considerations and divergent opinions on the benefits, drawbacks, and impact of state-level CHW certification and/or required formal trainings.[26,27] Those who support them suggest potential benefits such as ensuring consistent, reliable qualifications among CHWs; conferring opportunities for career advancement and employment stability; and facilitating reimbursement of CHW services from health insurance payers such as Medicaid.[27] Those who are against them raise concerns about potential barriers for many CHWs related to affordability, accessibility, and eligibility criteria (e.g., cost, location, criminal history record); potential to undermine the grassroots orientation of the CHW workforce; and the creation of hierarchies or tiers among CHWs who are certified and/or formally trained versus those who are not.[27] Lastly, regarding impact, there is no empirical evidence showing that CHWs with certification perform their job better or achieve better health outcomes than CHWs without certification.[26,27]

3 Implementation Guidance

- Background on Statewide Community Health Worker (CHW) Certification.[26]
- *Best Practice Guidelines for Implementing and Evaluating Community Health Worker Programs in Health Care Settings*.[7]
- Community Health Worker Forum: Summary Report [PDF – 922K].[28]
- Field Notes: Clinical Community Health Worker Initiative [PDF – 246K].[29]
- Field Notes: Community Heart Health Actions for Latinos at Risk (CHARLAR) Program [PDF – 284K].[30]
- Field Notes: Vida Sana Program [PDF – 281K].[31]
- Impact of Community Health Worker Certification on Workforce and Service Delivery for Asthma and Other Selected Chronic Diseases. AHRQ technical brief, no. 34.[27]
- Including Community Health Workers (CHWs) in Health Care Settings: A Checklist for Public Health Practitioners [PDF – 226K].[32]
- States Implementing Community Health Worker Strategies for the Centers for Disease Control and Prevention's "State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health" Program [PDF – 515K].[33]
- Successes and Lessons Learned From Implementing Community Health Worker Programs in Community-Based and Clinical Settings: Insights From the Gulf Coast.[34]
- Transitions Clinic Network: Challenges and Lessons in Primary Care for People Released From Prison.[18]

4 Additional Resources

- C3 Project's Findings: Roles & Competencies.[3]
- CHW Document Resource Center.[35]
- The Community Health Worker (CHW) Common Indicators Project: Engaging CHWs in Measurement to Sustain the Profession.[36]
- Community Health Worker (CHW) Toolkit.[37]
- Community Health Workers [APHA].[2]
- Community Health Workers [ASTHO].[38]
- Community Health Workers (CHWs): Policy Resources.[39]
- Community Health Workers Toolkit.[40]
- State Community Health Worker Models.[41]

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Community Paramedicine

Best Strategy

Community paramedicine is an emerging field in health care where EMS providers, including emergency medical technicians (EMTs) and paramedics, operate in expanded roles to increase access to primary care and facilitate appropriate use of emergency care resources. Community paramedicine has its origins in providing services to people with multiple chronic conditions who face several challenging social determinants of health such as living in rural areas or having trouble getting to a provider's office.[1,2] These services are designed to fill gaps in primary care delivery, including post-hospital discharge; provide nonurgent home visits to assist patients with chronic disease management; and conduct general risk assessment.[2–10] To maximize these services, community paramedicine programs are, ideally, integrated within the health care system and collaborate with organizations or practitioners who facilitate community–clinical linkages, and who have a shared commitment to enhance access to health care, reduce health disparities, improve health outcomes, and reduce health care costs. Examples include EMS agencies, health care systems, payers, CHWs, social workers, and advocates for people who are medically underserved (e.g., rural dwellers, elderly adults, people who are homebound).

Community paramedicine programs typically focus on people who are medically underserved, such as those who live in rural areas, are homebound with multiple chronic conditions, are elderly, or repeatedly access medical emergency services.

Summary

Community paramedicine is an emerging field in health care where EMS providers, including EMTs and paramedics, operate in expanded roles to increase access to primary care and facilitate appropriate use of emergency care resources.

Best Practice in Action
Name: Community Paramedicine Applied in a Rural Community
Location: Abbeville County, South Carolina

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

The evidence demonstrating the effectiveness of community paramedicine programs is strong. Most studies have used a quasi-experimental design and demonstrated strong internal validity. This strategy has been implemented in several different settings and thus has strong external validity. Nonetheless, robust evaluation studies are still needed. Comprehensive implementation guidance from several sources is available to facilitate the adoption of this strategy by emergency medical service agencies, hospitals, and health care systems.

Evidence of Impact

Health Impact

There is a modest but growing evidence-base demonstrating the impacts of community paramedicine programs on CVD and related risk factors, including reduced blood pressure in patients with hypertension and increased glucose control in patients with diabetes.[11–22]

Health Equity Impact

Community paramedicine programs typically focus on people who are medically underserved, such as those who live in rural areas, are homebound with multiple chronic conditions, are elderly, or repeatedly access medical emergency services. These programs fill critical gaps in access to medical care and establish linkages between people who are medically underserved and social and health care providers.[1–10]

► *Community paramedicine is an emerging field in health care where EMS providers, including EMTs and paramedics, operate in expanded roles to increase access to primary care and facilitate appropriate use of emergency care resources.*

Economic Impact

Avoidable inpatient hospital admissions and frequent ED visits are key drivers of costs in the health care system.[7,23] For example, it is estimated that about 40% of ED visits could be effectively treated in nonurgent settings.[23] Frequent inpatient hospital admissions and ED visits often serve as indicators that individuals lack adequate access to social or health care services to effectively manage their health conditions. Though limited, research suggests that community paramedic programs can be cost-saving to the health care system, primarily through fewer 911 calls and ED visits, reduced acute care utilization, reductions in hospitalizations and hospital readmissions, and reduced health care costs associated with medically unnecessary ambulance transports, ED visits, and hospitalizations.[6,8,16,18–20,24–26]

Best Practice in Action Story

Abbeville County Emergency Management Services, located in a rural community in South Carolina, implemented the Abbeville Community Paramedicine (CP) Program with diverse partners in health care, rural health, public health, and social services organizations.[22,27] The program focused on patients who frequently used 911 or the ED and had at least one chronic disease, including hypertension and chronic heart failure. By training and utilizing community paramedics in expanded roles that fell within their scope of practice, the CP program provided home- or community-based non-emergency care to Abbeville County residents. Community paramedics received 300 hours of didactic and clinical training. With a physician's order and patients' consent, community paramedics expanded their roles with patients by, for example, assessing home safety and health literacy, monitoring blood pressure and medication adherence, clarifying discharge instructions, and connecting patients to appropriate health care providers, social services, and community resources. Over 1.5 years, findings showed statistically significant reductions in inpatient hospital stays, 30-day readmissions, and unnecessary or avoidable ED use, cumulatively resulting in a 20% ROI to the local health care system. Seventy-three percent of patients with hypertension had a statistically significant reduction in systolic and diastolic blood pressure by 7.2 mmHg and 4.0 mmHg, respectively. Also, 100% of patients were highly satisfied with the CP program.

For more information

Website: https://www.ruralhealthinfo.org/project-examples/866

Four Considerations for Implementation

1 Settings

Although community paramedics' services are provided for people in their own homes and community settings, community paramedicine programs are initiated by a wide array of organizations in the clinical sector, such as EDs, managed care health systems, and PCMHs.

2 Policy- and Law-Related Considerations

Despite advancements in the field, reimbursement and reliance on discretionary funding are regarded as major policy-related challenges.[28–30] Other policy challenges are related to legal restrictions on definitions and standards (i.e., inconsistency in definition of community paramedicine programs, training requirements, licensing/certification, and evolving performance standards), scope of practice (i.e., state laws and regulations permit EMS practitioners to provide non-emergency and/or preventive care in home settings), and infrastructure (i.e., need for statewide infrastructure to clarify regulatory and jurisdictional boundaries when acting outside of emergency care roles).[7,21,28,31–40]

3 Implementation Guidance

- Beyond 911: State and Community Strategies for Expanding the Primary Care Role of First Responders.[7]
- Blueprint for Community Paramedicine Programs Especially for EMS Agencies: Specific to South Carolina. Version 1: The Abbeville Experience [PDF – 4.67M].[41]
- The Business Case for Community Paramedicine: Lessons from Commonwealth Care Alliance's Pilot Program [PDF – 763K].[42]
- Community Paramedic Program Handbook.[43]
- Community Paramedic Toolkit [Idaho Department of Health].[44]
- Community Paramedic Toolkit [PDF – 915K].[45]
- Community Paramedicine.[9]
- Community Paramedicine Business Case Assessment Tool.[46]
- Community Paramedicine: Evaluation Tool [PDF – 352K].[47]
- Development and implementation of a community paramedicine program in rural United States.[48]
- Development of sustainable community paramedicine programmes: a case study in Pennsylvania.[49]
- Fire-based EMS community health care guide: NFPA guide to offer roadmap to implementing a community paramedicine program.[50]
- Implementing and Sustaining Rural Community Paramedicine [PDF – 375K].[51]
- Mobile Integrated Healthcare and Community Paramedicine (MIH-CP) 2nd National Survey [PDF – 4.67M].[52]

4 Additional Resources

- Community Health Needs Assessments: Resources for Community Paramedicine & Mobile Integrated Healthcare [PDF – 294K].[53]
- Mobile Integrated Healthcare–Community Paramedicine.[54]
- Paramedic Innovation.[55]

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Collaborative Drug Therapy Management

Best Strategy

Collaborative drug therapy management (CDTM) is the partnership between qualified pharmacists and prescribing clinicians to manage a patient's drug therapy, as defined within the context of a collaborative practice agreement (CPA).[1] This approach allows pharmacists to deliver services such as selecting, initiating, adjusting, and monitoring medications; ordering and interpreting laboratory tests; and administering drugs.[2] To support heart disease and stroke prevention and control, CDTM can include pharmacists engaging directly with patients in their own care and adjusting patients' medications for hypertension, cholesterol, and other chronic conditions.

CDTM has been found to be cost-effective, reduce payer costs (and increase ROI), and increase cost-avoidance for payers and patients.

Summary

CDTM is the collaboration between pharmacists and clinicians that gives pharmacists the authority to manage patient drug therapy. This partnership and delivery of services is in accordance with protocols defined in collaborative practice agreements.

Best Practice in Action
Name: Cluster-Randomized Trial of Blood-Pressure Reduction in Black Barbershops
Location: Los Angeles, California

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

Very strong evidence exists showing that CDTM, enabled by a CPA, is effective in improving blood pressure control, improved rates of cholesterol levels at goal, and increased anticoagulation quality.[3,4] Evidence supporting this strategy has been independently replicated and evaluated, demonstrates strong internal and external validity. In addition, systematic reviews assessing the use of CDTM have confirmed reliability of impact. Several organizations, including CDC and the American Pharmacists Association, have developed implementation resources and published peer-reviewed studies on CDTM.

Evidence of Impact

Health Impact

CDTM was found to be effective in improving clinical and behavioral health indicators, including improved blood pressure control; improved rates of cholesterol at goal; increased anticoagulation quality as measured by time in therapeutic range; improvements in patient knowledge, attitudes, and behavior; increased treatment adherence; and increased effectiveness of TBC interventions.[3,4] CDTM may be more effective among pharmacists who have board certifications, broader scopes of work, clinicians who championed models involving pharmacists, or embedded other pharmacists in onsite clinical settings.[5]

Health Equity Impact

When developing CPAs, reaching populations at disproportionate risk for high blood pressure and high cholesterol and reducing health disparities is an important goal for pharmacy organizations (e.g., the American Pharmacists Association), state medical and pharmacy boards, and state pharmacy organizations.[4] CDTM has led to improvements in patient knowledge, attitudes, behavior, and medication adherence. Pharmacists' work in community settings makes them accessible to patient populations and CPAs authorize their ability to manage medications, which, in turn, expands access to care, reduces hospital visits and readmission, increases disease state control, and improves adherence to medications. Future research directly examining the impact of CPAs and CDTM on populations at disproportionate risk for heart disease is needed.

Economic Impact

CDTM has been found to be cost-effective, reduce payer costs (and increase ROI), and increase cost-avoidance for payers and patients.[3] One 2006 study found that a CDTM program resulted in a 12% decrease in hospitalizations, a 25% reduction in ER visits, and a decrease in drug-related problems among beneficiaries after 1 year.[6] The same study also resulted in a 2.5-to-1 ROI to the state, with an estimated savings of $518.10 per patient per month.[6] Future research examining the economic implications of CDTM with regards to availability for reimbursement and insured status of patients to inform expanded implementation and sustainability is needed.

► *CDTM is the collaboration between pharmacists and clinicians that gives pharmacists the authority to manage patient drug therapy. This partnership and delivery of services is in accordance with protocols defined in collaborative practice agreements.*

Best Practice in Action Story

In Los Angeles County, pharmacists who prescribed hypertension drug therapy under a CPA engaged 132 Black, non-Hispanic male patrons at 28 barbershops from February 2015 to July 2017.[7] The engagement was led by researchers and health professionals from the Smidt Heart Institute at Cedars-Sinai Medical Center, the Department of Biomathematics at UCLA's School of Medicine, and Kaiser Permanente. As part of the engagement, participants received free haircuts, $25 per pharmacist visit to offset the cost of transportation and generic medication, pharmacist interviews and peer experience stories, hypertension screenings, health sessions, and follow-up recommendations. The pharmacist-led intervention resulted in 64% of participants achieving blood pressure below 130/80 mmHg and a 27 mmHg mean reduction of systolic blood pressure (from 152.8 mmHg to 125.8 mmHg). Antihypertensive medication adherence increased 45% after 6 months (from 55% at baseline to 100%).[7] Peer support may have facilitated health promotion, which in turn improved the results.

For more information

Website: https://www.cedars-sinai.org/programs/heart.html
Phone: 1-800-233-2771

Four Considerations for Implementation

1 Settings

Enabling CDTM through CPAs has been found to be effective in several clinical and community settings, including FQHCs, PCMHs, managed care health systems, community pharmacies, hospital pharmacies, primary care clinics, community organizations (e.g., Y's, barbershops/hair salons, faith-based organizations), penal systems (e.g., prisons), and housing centers. This strategy is more effective when part of TBC and/or embedded managed care and when prescribing clinicians and pharmacists are in the same location, regularly collaborate, share EHR access, and are based in community settings.[3,4,8,9]

2 Policy- and Law-Related Considerations

CDTM requires CPAs to be implemented. CPAs enable CDTM by expanding the professional requirements for pharmacists to manage a patient's drug therapy in accordance to defined protocols and guidelines approved/authorized by a prescribing clinician.[2,10] Under this legal authority, prescribing clinicians can delegate certain professional responsibilities to collaborating pharmacists. Although CPAs are not required for pharmacists to perform many care functions or services, pharmacists engaging in CDTM through CPAs may also initiate or modify medication therapy.[10,11]

Although CDTM is an evidence-based strategy to improve health outcomes, the implementation and effectiveness can vary depending on the legal landscape, community needs, and/or prescribers supporting the legal authority and pharmacist involvement. CPAs are subject to the legal and administrative requirements of each state, including the number and types of practitioners that can participate in CPAs and the time that they remain valid. Considerations to pursuing a CPA and CDTM include variations in prescriptive authority based on state scope of practice and CPA laws, the role of reimbursement in expanded implementation and sustainability, and that certification/training and recognition maximize pharmacists' skills and the effectiveness of CDTM.[2,7]

The Pharmacy and Medically Underserved Areas Enhancement Act (HR 2759), originally introduced to the 114th Congress in January 2015, was reintroduced to the 117th Congress in April 2021 to authorize Medicare coverage and payment for certain pharmacist services that (1) are provided in a health-professional shortage area and (2) would otherwise be covered under Medicare if provided by a physician.[12] This bill could address issues related to limited reimbursement based on state scope of practice laws and, in turn, expand patient access to care by recognizing pharmacists as health care providers.

3 Implementation Guidance

The following guides can support the implementation of CDTM. This guidance should be received with the knowledge that pharmacists' scope of practice and reimbursement laws vary state-by-state. In addition, implementation has been found to be more effective when pharmacists are part of the embedded staff within a health system and physicians act as champions for pharmacist involvement.

- The Pharmacists' Patient Care Process Approach: An Implementation Guide for Public Health Practitioners Based on the Michigan Medicine Hypertension Pharmacists' Program [PDF – 2.78M].[13]
- Advancing Team-Based Care Through Collaborative Practice Agreements [PDF – 3.73M].[14]
- Collaborative Practice Agreements and Pharmacists' Patient Care Services: A Resource for Pharmacists [PDF – 316K].[15]
- Collaborative Practice Agreements and Pharmacists' Patient Care Services: A Resource for Government & Private Payers [PDF – 308K].[16]

4 Additional Resources

Several guides and examples are available to educate and guide health care providers, decision makers, insurers, and pharmacists about how pharmacists and other health care providers can better serve patients through CDTM. Examples include the following:

- Pharmacist Billing/Coding Quick Reference Sheet for Services Provided in Physician-Based Clinics [PDF – 229K].[17]
- The Ultimate Guide to Collaborative Practice Agreements for Independent Pharmacies.[18]
- Agency for Healthcare Research and Quality.[19]
- Surgeon General's Call to Action to Control Hypertension.[20]

Federal agencies, including the Bureau of Prisons, the Department of Veterans Affairs, and the Indian Health Service, commonly leverage the expertise of their pharmacists as advanced practice providers with prescriptive authority.

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Community Pharmacists and Medication Therapy Management

Best Strategy

Medication therapy management (MTM) is a distinct service or group of services that optimizes therapeutic outcomes for patients.[1] It is a patient-centered, comprehensive approach in which community pharmacists use interventions that engage the patient and prescriber on a frequent and consistent basis. MTM includes five core elements: medication therapy review, a personal medication record, a medication-related action plan, intervention and/or referral to a physician or other health care professional, and documentation and follow-up.[2] Within the context of CVD prevention, MTM can include a broad range of services, often centering on three areas: identifying uncontrolled hypertension, educating patients on CVD and medication therapies, and advising patients on health behaviors and lifestyle modifications for better health outcomes. MTM is especially effective for patients with multiple chronic conditions, complex medication therapies, high prescription costs, and multiple prescribers. MTM can be performed by pharmacists with or without a CPA.

Expanding the pharmacist's role through MTM is likely to increase access to care for people who are underserved and those facing barriers to accessing primary care (including those in rural settings, populations that are low income, and those without access to transportation).

Summary

MTM is a patient-centered, comprehensive approach to care in which pharmacists engage patients and prescribers to improve medication use, medication adherence, and reduce risk of adverse events.

Best Practice in Action

Name: Improving Chronic Disease Outcomes Through Medication Therapy Management in Federally Qualified Health Centers
Location: Ohio

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

Strong evidence exists that community pharmacist provided MTM is effective. Studies examining MTM had strong internal and external validity; had been partially replicated in various settings, such as chain and independent pharmacies; and included evaluation components.[3–5] These implementations had positive results but were not evaluated in similar manners. MTM has considerable implementation guidance from the American Pharmacists Association, CDC, the Centers for Medicaid & Medicare Services (CMS), and peer-reviewed studies from the field.

Evidence of Impact

Health Impact

MTM was correlated with improvements on cardiovascular-related health outcomes, though the strength of the evidence was mixed. MTM can improve clinical outcomes, including reduced blood pressure, blood cholesterol, and hemoglobin A1c; improve blood pressure control; improve patient behavioral outcomes, including patient knowledge and patient satisfaction; improve medication adherence; reduce adverse reactions to medication; and improve quality of care and quality of life indicators among patients and providers.[3–12] The findings stated that the intervention had been shown to improve patient adherence, contribute to blood pressure control, and improve cholesterol management. Additional studies reported that MTM led to improvements in self-reported use of self-management tools, reduction of barriers to medication adherence, and high satisfaction with pharmacist care.[10,11]

Health Equity Impact

Expanding the pharmacist's role through MTM is likely to increase access to care for people who are underserved and those facing barriers to accessing primary care (including those in rural settings, populations that are low income, and those without access to transportation).[4–7,9,10] Yet there is limited evidence on the specific population health outcomes for community pharmacist–provided MTM. Few studies have examined the ability of MTM to reduce health disparities in CVD outcomes. Although there is some evidence that MTM can achieve positive outcomes among households with lower income and among persons from certain racial and ethnic groups, the extent of this evidence is limited and inconsistent. Some studies have reported improved diabetes and cardiovascular-related health outcomes among those that are medically underserved in FQHCs when pharmacist-provided MTM was the intervention.[4,5]

Economic Impact

MTM has been found to be cost-effective and to result in improved ROI.[9,13–15] One study involving a health plan in Minnesota found that total health expenditures per person were reduced from nearly $12,000 per person to slightly more than $8,000 per person for the year before compared to the year after enrollment in MTM services.[12] Another study estimated ROI of $1.29 per $1.00 in MTM administrative costs based on pharmacist-estimated cost-savings to a specific health system.[13] It also reported a cost of $67 per encounter for MTM services and $86 in savings per encounter over a 10-year period. A 2013 study reported that all-cause medical and total expenditures were reduced among beneficiaries who received MTM compared with those who did not and that MTM had positive ROI for a self-insured employer.[14] Finally, the Pennsylvania Project, whose community pharmacists-based intervention included components of MTM, reported that its screening and brief intervention approach resulted in reduced health care spending per patient for a year (ranging from $241 for statins to $341 for oral diabetes medications annually).[16]

► *MTM is a patient-centered, comprehensive approach to care in which pharmacists engage patients and prescribers to improve medication use, medication adherence, and reduce risk of adverse events.*

Best Practice in Action Story

In 2014, three Federally Qualified Health Centers (FQHCs) in Ohio assessed pharmacists-provided medication therapy management (MTM) for more than 700 patients with a history of hypertension and/or diabetes.[4] The MTM consortium, consisting of representatives from the FQHCs, Ohio's Department of Health, nonprofits, and pharmacy colleges, provided oversight and guidance. Pharmacists providing MTM collaborated with the patient and the prescribing provider to identify medication changes, educate the patient, and set goals related to the patient's chronic disease. Each site had site-specific protocols and workflows. From March 2014 to December 2015, the percent of patients who achieved their goal A1c levels increased from 0% to 52.84%, and the percent of patients reporting hypertension control increased from 0% to 65.21%.[4] Pharmacists identified and resolved more than 1,400 medication-related problems and addressed multiple adverse drug event issues. This project cited partnerships between the FQHCs, health department, and nonprofits and as a key component to enhancing MTM and improving population health among medically underserved patients.

For more information

Website: https://www.ohiochc.org/page/MTM

Four Considerations for Implementation

1 Settings

MTM has been implemented in several settings, including FQHCs, PCMHs, managed care health systems, community pharmacies, hospital pharmacies, and primary care clinics.

2 Policy- and Law-Related Considerations

CMS annually reviews MTM programs to ensure they are meeting eligibility and enrollment criteria. As of 2019, all state programs that were required to have MTM programs had implemented the program.[4] MTM program eligibility includes Part D enrollees who have multiple chronic conditions, are taking multiple Part D drugs, and incur annual costs for covered Part D drugs that exceed a certain level. This program's sponsors offer the following MTM services to all eligible beneficiaries: interventions for beneficiaries and prescribers, annual comprehensive medication reviews, and quarterly targeted medication reviews with follow-ups when necessary.

As of 2014, 34 states have recognized pharmacists as health care providers in state statutes, though formal mechanisms for direct reimbursement are limited.[17] As of 2021, 43 states have introduced provider status-related bills. Federally, pharmacists are not recognized as health care providers, and Medicare does not include a mechanism for direct fee-for-service reimbursement.[18] A 2017 HHS report to the White House recommends that federal and state governments enact legislative and administrative proposals to expand direct reimbursement for providers, so long as the provider can provide care safely and effectively.[3]

The Pharmacy and Medically Underserved Areas Enhancement Act (HR 2759), originally introduced to the 114th Congress in January 2015, was reintroduced to the 117th Congress in April 2021 to authorize Medicare coverage and payment for certain pharmacist services that (1) are provided in a health-professional shortage area and (2) would otherwise be covered under Medicare if provided by a physician.[19] Notably, this bill would include pharmacists on the Social Security Act's list of recognized health care providers.

3 Implementation Guidance

Implementation guidance for MTM and evidence to support implementation are widespread.

- CMS oversees the requirements for Part D sponsors and eligibility and enrollment guidelines for beneficiaries involved with MTM programs.[4]
- Federal law requires Medicare Part D plans to cover and reimburse health care providers for MTM services provided to eligible beneficiaries. Sponsors are required to offer each beneficiary enrolled in the MTM program the same minimum level of MTM.[4]

4 Additional Resources

MTM has overlap with many community pharmacy–based interventions and is a large part of the tasks that community-based pharmacists undertake. Resources to better understand MTM and how it is implemented include:

- The Medication Therapy Management Pharmacist Reference Book.[20]
- Community Pharmacists' Contributions to Disease Management During the COVID-19 Pandemic.[21]
- Medication Therapy Management.[18]
- Hypertension-Focused Medication Therapy Management: A Collaborative Pilot Program Uniting Pharmacists, Public Health, and Health Insurers in Wisconsin.[3]
- Improving Chronic Disease Outcomes Through Medication Therapy Management in Federally Qualified Health Centers [PDF – 240K].[4]

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Tailored Pharmacy-Based Interventions to Improve Medication Adherence

Best Strategy

Tailored pharmacy-based interventions to improve medication adherence refer to a two-step approach used in community and health system pharmacies to help patients take their medications as prescribed. First, medication adherence barriers are identified through patient interviews or assessments tools. Pharmacists then use the findings to provide tailored guidance (e.g., motivational interviewing sessions) and tailored services (e.g., medication refill synchronization) to remove or reduce identified barriers. Tailored pharmacy-based interventions may be used alone or as part of a broader intervention to reduce patients' CVD risk and can include additional components, such as communication between the pharmacist and the patient's primary care provider (PCP).[1,2]

The CPSTF found tailored pharmacy-based interventions to be cost-effective in preventing CVD among patients with CVD risk factors.

Summary

Tailored pharmacy-based interventions to improve medication adherence is a strategy that aims to help patients take their medications as prescribed. These interventions are comprised of two steps: identifying medication adherence barriers and then removing or reducing the identified barriers through tailored guidance and tailored services.

Best Practice in Action
Name: Hypertension-Focused Medication Therapy Management Program
Location: Madison, Wisconsin

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence demonstrating the effectiveness of tailored pharmacy-based interventions to improve medication adherence is very strong. Based on strong evidence of effectiveness, this strategy is recommended by the CPSTF; it is also cost-effective.[2,3] Research studies examining this intervention have had strong internal and external validity, and evaluation results have shown that this strategy can be replicated in community and health system pharmacies with positive results.

Evidence of Impact

Health Impact

The CPSTF found that tailored interventions delivered by pharmacists increase the number of patients who report taking medications for CVD prevention as prescribed.[2] Studies have shown that patients who are adherent to their antihypertensive medications are 30% to 45% more likely to achieve blood pressure control, while patients who do not take their medications as prescribed experience higher mortality.[1,2] Patients with high cholesterol who are less adherent to their medications have a 26% greater likelihood of a cardiovascular-related hospitalization compared to patients who adhere to their prescriptions.[2] Nonadherence to medications to prevent CVD has been associated with a significant increase in the risk of premature death from any cause, CVD death, hospitalization for heart attack or heart failure, and coronary revascularization procedures.[1]

Health Equity Impact

There is a growing awareness for pharmacy-based interventions to advance health equity by addressing barriers to medication adherence and healthy lifestyle that appear at multiple levels.[4–6] Examples of equity-related barriers include structural determinants of health such as pharmacy deserts, which are communities that have limited or no access and availability of medication and/or pharmacies; costs of medications; and pharmacy hours of operation.[7–14]

There is evidence of positive results among a few studies that have addressed and examined the impact of tailored pharmacy-based interventions on health equity. Activities implemented at the community level (e.g., deploying mobile pharmacies to address pharmacy accessibility) have shown significant increases in medication adherence of statins and flu vaccinations.[15] Significant decreases in high blood pressure have been achieved when pharmacists help patients at the individual level by addressing SDOH through community–clinical linkages with other health care and community-based organizations and frontline public health professionals such as CHWs.[16–21]

Economic Impact

Despite the challenge of heterogeneity of tailored pharmacy-based interventions, the CPSTF found tailored pharmacy-based interventions to be cost-effective in preventing CVD among patients with CVD risk factors.[3] There were no studies reporting cost-effectiveness outcomes among patients with existing CVD; however, the CPSTF found evidence that the cost savings from averted health care—measured by reductions in cost of outpatient primary care and specialist visits, hospitalizations, and ED use—exceeded the costs of implementation.[3]

When implementing tailored pharmacy-based interventions, costs and cost savings may be distributed across patients and key partners involved in the delivery, payment, and receipt of these interventions due to variability of payment or reimbursement mechanisms and health insurance structures that may separate pharmacy and medical benefits. Notably, these positive economic findings are from a societal perspective. Tailored pharmacy-based interventions to improve medication adherence among patients with CVD risk factors help address growing health care costs in the United States, which are high and place significant financial strains on the health care system as a whole. Medication nonadherence is associated with worse health outcomes and higher health care costs among people with CVD or CVD risk factors. In one study, higher adherence to prescribed medications for congestive heart failure, high blood pressure, and elevated low-density lipoprotein, or LDL, cholesterol levels reduced annual health care spending per person by an estimated $7,800, $3,900, and $1,250, respectively, compared with patients with poorer adherence.[22]

Best Practice in Action Story

The Pharmacy Society of Wisconsin, the Wisconsin Division of Public Health, and NeuGen, a nonprofit health insurer, piloted a pharmacist-led program in partnership with eight community pharmacies.[22] Patients were adult members of NeuGen with hypertension who filled an antihypertensive medication prescription at a participating pharmacy 12 months preceding the pilot. Pharmacists conducted two in-person visits, with 4 to 6 weeks between participant visits. At the beginning of each visit, pharmacists administered a participant survey that documented self-reported barriers to antihypertensive medication adherence and use of blood pressure self-measurement/monitoring tools. After the survey, a comprehensive medication review was conducted, during which pharmacists used tailored guidance focused on medication counseling and motivational interviewing techniques. Pharmacists addressed five areas (system, understanding, motivation, recall, and financial) to generate adherence solutions. They also provided patients with tools, including action plans, self-measurement of blood pressure education forms, and logs for recording home blood pressure readings. When needed, pharmacists communicated with participants' primary care providers to optimize medication therapy following both visits. Findings indicated reductions in self-reported barriers to adherence to antihypertensive medication therapy and increased use of self-management tools. Moreover, participants reported high satisfaction with their pharmacist's care overall.[23]

For more information

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Four Considerations for Implementation

1 Settings

Tailored pharmacy-based interventions have been found to be effective in several pharmacy settings, including FQHCs, community pharmacies, primary care clinics, patient-centered medical homes, managed care organizations, health system pharmacies, and workplace settings.

2 Policy- and Law-Related Considerations

Tailored pharmacy-based interventions are generally activities that are within the pharmacist's regular scope of practice. Pharmacists' scope of practice laws and regulations vary by state; in some states, pharmacists may be able to offer supplementary services, including certain medical or lab tests.[24] Policy mechanisms such as collaborative practice agreements further define the services and circumstances under which pharmacists can practice.

Challenges exist with billing and reimbursement for pharmacist's time and services. For example, under two major payers—Medicare and Medicaid—pharmacists have limited ability to bill for their patient care services beyond dispensing of drugs. Specifically, Medicare does not recognize pharmacists as eligible providers and pharmacists' Medicaid eligibility for the types of services that can be reimbursed varies among states.

3 Implementation Guidance

- Tailored Pharmacy-Based Interventions to Improve Medication Adherence.[1]
- Pharmacy-Based Interventions to Improve Medication Adherence for Cardiovascular Disease Prevention.[2]
- The Pharmacists' Patient Care Process (PPCP) [PDF – 9.40M].[25]
- Hypertension-focused medication therapy management: a collaborative pilot program uniting pharmacists, public health, and health insurers in Wisconsin.[23]

4 Additional Resources

- The Surgeon General's 2020 Call to Action to Control Hypertension [PDF – 1.91M].[26]

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Team-Based Care to Improve Blood Pressure Control

Best Strategy

Team-based care (TBC) is a strategy implemented at the health system level. It aims to enhance patient care by having health professionals from different disciplines work collaboratively with the patient and the patient's primary care provider (such as physicians, physician assistants, and nurse practitioners).[1,2] The team includes the patient and the patient's PCP, as well as other clinical health professionals. Team members, who may include nurses, pharmacists, CHWs, social workers, and other health professionals, use their unique training and skills to implement TBC.

Based on strong evidence for effectiveness, this strategy is recommended by the CPSTF; it is also cost-effective.

Summary

TBC enhances patient care by engaging a variety of health professionals from different disciplines (e.g., physicians, pharmacists, nurses, and/or CHWs).

Best Practice in Action

Name: BuchananCares Program: A Team-based Care Pilot led by a Rural Community Hospital and Local Pharmacist
Location: Buchanan County, Virginia

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported | Promising/Emerging | Unsupported | Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported | Moderate | Insufficient | No Evidence

Evidence of Effectiveness

The evidence for implementing TBC in health care systems and practices is very strong. Evidence shows that this strategy achieves desired outcomes, with studies demonstrating internal and external validity.[1–8] This strategy has also been independently replicated, which shows reliability of impact. Several randomized controlled trials have been conducted and show favorable results from using multidisciplinary teams to improve hypertension control.[1–8] Based on strong evidence for effectiveness, this strategy is recommended by the CPSTF; it is also cost-effective.[1–9] Additional implementation resources are available from CDC, Healthy People 2030, AHRQ, the Primary Care Collaborative, and the National Academy of Medicine, among others.[3–6]

Evidence of Impact

Health Impact

The Surgeon General's Call to Action to Control Hypertension promotes TBC as a part of a comprehensive treatment protocol for hypertension management.[2] TBC can reduce systolic and diastolic blood pressure and increase blood pressure control based on a systematic review of 54 studies.[1] Further improvements have been shown when both nurses and pharmacists are working in collaboration with PCPs, patients, and other professionals. TBC has been found to improve patient knowledge, attitudes, medication adherence, and behaviors; improve rates of hyperlipidemia, hyperglycemia, diabetes, and myocardial infarction control; reduce stroke, heart attack, heart disease, heart failure, and coronary artery disease rates; and reduce morbidity and mortality.[1]

Health Equity Impact

TBC has been found to be effective at improving blood pressure control for Black, African American, Hispanic, and Latino populations.[1] When implemented by health care professionals who serve patients from racial and ethnic minority groups, the intervention is likely to improve health equity and reduce health disparities.[7] However, evidence for health equity is limited. More research is needed to examine the impact TBC has on other populations of low socioeconomic status with a focus on the intersections between race, ethnicity, income, and education.

Economic Impact

TBC to improve blood pressure control is cost-effective based on a median cost per QALY gained of $24,472, which is below a conservative threshold of $50,000.[1] The median intervention cost per patient per year was $311.[9]

Modelling the health and economic impact of nationwide adoption of TBC for hypertension over the course of 10 years generated an estimated net cost savings to Medicare of $5.8 billion (2012 U.S. dollars) and national savings of $25.3 billion in averted disease costs (which offsets an estimated $22.9 billion cost of intervention).[8] The same study found that the intervention could prevent up to 36.8 million person-years of uncontrolled blood pressure, up to 230,900 heart attacks and strokes over the course of 5 years, and cost savings for Medicare populations. Cost savings for private insurers can be achieved with a $180 intervention cost per patient per year. TBC may generate costs for the payers using a fee-for-service model but may be cost-saving for accountable care organizations as patient costs are reduced.

► *TBC enhances patient care by engaging a variety of health professionals from different disciplines (e.g., physicians, pharmacists, nurses, and/or CHWs).*

Best Practice in Action Story

A health care provider team consisting of a community pharmacist, student pharmacists, and providers from Buchanan General Hospital in Buchanan County, Virginia, developed a program to reduce patient readmissions and improve health outcomes called BuchananCares.[10] The program involved the student and community pharmacists working with the attending physician to answer medication-related questions, engage the patient in their own care, complete a medication review, and provide patient education while the patient is hospitalized. After discharge, the student and community pharmacist follow up with the patient for 30 days to review medications, monitor health conditions, evaluate patient satisfaction, discuss medication-related problems with the patient's primary care provider, and monitor readmission. The BuchananCares program reported overall satisfaction from the patient and health care team during the period of transition from an inpatient to a home setting. None of the patients that completed the full program were readmitted, indicating that the program was successful at preventing 30-day readmission.

For more information

Website: https://www.acp.edu/
Phone: 276-498-5260

Four Considerations for Implementation

1 Settings

TBC has been applied in a range of U.S. settings and population groups.[1] Successful implementation of the strategy involves assessment of the community's unique needs and health systems–level organizational changes. TBC has successfully been applied in primary health clinics, managed care health systems, PCMHs, pharmacies (community and hospital based), FQHCs and other clinic- and community-based settings, hospitals, and various other settings.[7]

2 Policy- and Law-Related Considerations

Policies related to scope of work, CPAs, and standardized protocols for members part of TBC teams—especially pharmacists, nurses, and CHWs—need to be considered.[1,2,7] These policies will determine how team members will be able to engage with the patient and their treatment. CPAs and standardized protocols will also shape the links within the team, with the patient at the center.[11]

3 Implementation Guidance

DHDSP's TBC implementation webpage, which provides complementary information related to CPSTF findings, provides an overview of TBC and guidelines on implementation.[7] Implementation of TBC is facilitated by communication and coordination between team members, using evidence-based guidelines, establishing regular and structured follow-up mechanisms with the patient, and involving the patient in their own care. Tools involved in implementation include patient follow-up, medication management, medication adherence support, self-management support, and SMBP.[11–15] Health departments can effectively implement TBC by sharing information and resources with community and clinical partners and supporting implementation; supporting information sharing, education initiatives, and expansion of effective models; and supporting evaluation activities where TBC has been implemented.

Additional implementation guidance is listed below:

- Creating Patient-Centered Team-Based Primary Care [PDF – 972K].[16]
- Hypertension Control Change Package, Second Edition.[3]
- STEPS Forward®: Team-Based Care and Workflow.[17]
- Hypertension Management Program Toolkit.[18]

4 Additional Resources

TBC involves a multidisciplinary and health system–wide approach to implementation. Resources to aid this implementation are listed below:

- Collaborative Practice Agreements [PDF – 3.73M].[19]
- Pharmacists' Patient Care Process Approach Guide [PDF – 2.78M].[12]
- Surgeon General's Call to Action.[2]
- CHW Toolkit.[20]
- Policy Resources.[11]

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Supporting Patients in Cardiovascular Disease Self-Management

These strategies enable patients to better manage their conditions by expanding access to medical care and through support, counseling, tools, and education provided by clinicians and public health professionals.

- **Lifestyle Modification Programs**
- **Reducing Out-of-Pocket Costs**
- **Self-Management Support and Education**
- **Self-Measured Blood Pressure Monitoring With Clinical Support**

Lifestyle Modification Programs to Control Hypertension

Leading Strategy

Lifestyle modification programs focus on modifying risk factors associated with a particular disease and can play an important role in cardiovascular disease (CVD) prevention. Lifestyle modification programs to control hypertension often focus on multiple lifestyle behaviors and typically include an emphasis on a healthy diet, including limiting sodium intake, as well as regular physical activity. Additional focus areas may include maintaining a healthy weight, smoking cessation, and stress management. Lifestyle programs may employ more than one behavior change approach such as education and motivational interviewing. In addition, program components can vary and may include self-measured blood pressure monitoring (SMBP), cooking demonstrations and/or group physical activity.

Lifestyle modification programs focused on multiple lifestyle behaviors, implemented in clinical and community settings, have been shown to reduce blood pressure.

Summary

Lifestyle modification programs simultaneously address multiple CVD risk factors and show some evidence of effectiveness to lower blood pressure, although behavior change approaches and program components vary.

Best Practice in Action
Name: Eskenazi Health Hypertension Group Education Program
Location: Indianapolis, Indiana

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported · Promising/Emerging · Unsupported · Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported · Moderate · Insufficient · No Evidence

Evidence of Effectiveness

The evidence base for implementing lifestyle modification programs in community and clinical settings is strong. Studies demonstrate evidence of effectiveness with internal and external validity. This strategy has been partially replicated in real-world settings, with no evaluation of the replications, which shows limited reliability of impact. Several studies demonstrate effectiveness in lowering blood pressure.[1–3] Practice guidelines on lifestyle management to reduce cardiovascular risk and control hypertension are available. However, comprehensive implementation guidance is limited.

Evidence of Impact

Health Impact

Lifestyle modification programs focused on multiple lifestyle behaviors, implemented in clinical and community settings, have been shown to reduce blood pressure. Intervention strategies include education on lifestyle changes and blood pressure management and behavioral strategies such as motivational interviewing; in-person, telephonic, and electronic counseling; and coaching.

Evidence demonstrates that lifestyle modification programs that simultaneously address multiple CVD risk factors such as dietary patterns, sodium consumption, physical activity, and smoking are effective at reducing systolic and diastolic blood pressure. Such programs are associated with increased physical activity and improved diet quality.[1–6] Interventions are also associated with an increase in hypertension related knowledge and self-efficacy to control blood pressure.[1–3]

► *Lifestyle modification programs simultaneously address multiple CVD risk factors and show some evidence of effectiveness to lower blood pressure, although behavior change approaches and program components vary.*

Health Equity Impact

Lifestyle modification programs have been implemented, with positive results, in people from diverse racial and ethnic minority groups, urban and rural communities and people with lower health literacy. However, there is limited evidence of a direct impact on health equity.[1–3,6] Programs have also been shown to effectively reduce blood pressure in populations disproportionately impacted by CVD, including people with lower incomes and people who are medically underserved.[1,6–8] Lifestyle program components may be tailored to meet the needs of the population of interest—for example, low sodium cooking classes that use culturally relevant healthy foods that are accessible to participants, or curricula that reflect the health literacy level of participants.[8,9]

Economic Impact

There is limited evidence on the economic impact of lifestyle modification programs. One community-based lifestyle program, designed to reduce modifiable CVD risk factors and led by community health workers (CHWs), was shown to be cost-effective.[10] A base case scenario evaluation for a hypothetical 52-year-old male participant revealed incremental cost savings of $3,576 and a gain of 0.16 quality-adjusted life years (QALYs) as per model simulation analysis.[10] A base case scenario evaluation for a hypothetical 52-year-old female participant revealed incremental cost savings of $1,889 and a gain of 0.08 QALYs as per model simulation analysis. While further research in this area is needed, there is potential for cost-effectiveness.

Best Practice in Action Story

Eskenazi Health Hypertension Group Education Program (EHHGEP) is a lifestyle program run by the Indianapolis-based Eskenazi Health System. The program is conducted in five of the health system's Federally Qualified Health Centers (FHQCs) and has served 297 participants between 2017 and 2019.[11] EHHGEP uses a multidisciplinary team, including a registered dietitian (RD), a registered nurse (RN), a pharmacist, and lifestyle coaches, to lead three weekly group education sessions. The 2-hour sessions focus on hypertension management and include topics on sodium reduction, medication management, tailored physical activity, and understanding hypertension. The group education sessions are also interactive and include healthy cooking demonstrations, goal setting, and a personalized follow-up visit with the RD and pharmacist. DHDSP completed an evaluation of the EHHGEP in 2019.[11] As a result of the EHHGEP, participants' blood pressure control increased from 28% at baseline to 61% at program end and increased further to 74.5% at 12-month chart review. In addition to achieving sustained hypertension control, participants lowered their body mass index (BMI) by the end of the program, with sustained improvements at 12-month chart review. In addition, 95% of participants met their healthy eating goal and 86.5% met their physical activity goal at program end; participants also increased their health knowledge and confidence significantly. The program continues to evolve to meet the changing needs of its participants.

For more information

Website: https://www.eskenazihealth.edu/programs/nutrition-education
Phone: 317-541-3431

Four Considerations for Implementation

1 Settings

Lifestyle modification programs to control hypertension have been implemented in clinical and community settings, including Federally Qualified Health Centers (FQHCs), primary care clinics, community centers and local Y's.

2 Policy- and Law-Related Considerations

There is a lack of standardization around intervention approaches and lifestyle program components, which lends to insufficient guidance around insurance coverage for comprehensive lifestyle modification programs to control hypertension.

3 Implementation Guidance

Currently, there is a lack of comprehensive implementation guidance for lifestyle modification programs. The National Diabetes Prevention Program (National DPP) can serve as a model for preventive lifestyle program standardization. The National DPP provides a standardized framework for public- and private-sector partners to implement a research-based lifestyle change program to reduce the risk for type 2 diabetes and improve overall health. The following are practice guidelines that broadly outline recommendations for individual lifestyle behaviors.

The American College of Cardiology and the American Heart Association have developed guidelines on lifestyle management to reduce cardiovascular risk and for the management of hypertension:

- 2013 American College of Cardiology/American Heart Association Guideline on Lifestyle Management to Reduce Cardiovascular Risk.[12]
- 2017 American College of Cardiology/American Heart Association Clinical Practice Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults.[13]

These global hypertension practice guidelines, from the International Society of Hypertension, are tailored standards of care that are applicable to low and high resource settings and useful for clinicians, nurses, and community health workers:

- 2020 International Society of Hypertension Global Hypertension Practice Guidelines.[14]

4 Additional Resources

Several federal and national organizations have developed resources to support Lifestyle Modification Program Strategies:

- Life's Essential 8™.[15]
- DASH Eating Plan.[16]
- The 2020–2025 *Dietary Guidelines for Americans*.[17]
- Findings for Physical Activity.[18]
- 2018 Physical Activity Guidelines Advisory Committee Scientific Report.[19]
- Physical Activity Guidelines for Americans, 2nd edition [PDF – 14.5M].[20]
- Tobacco Cessation Change Package.[21]
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Reducing Out-of-Pocket Costs for Medications

Best Strategy

Reducing out-of-pocket costs (ROPC) for medications for patients with hypertension and/or hyperlipidemia involves program and policy changes that make CVD medications more affordable. Costs for medications can be reduced by providing new or expanded coverage and lowering or eliminating out-of-pocket payments by patients (e.g., copayments, coinsurances, deductibles).[1]

The CPSTF's review found that ROPC could reduce health care costs.

Summary

Reducing medication costs for medications for patients is an effective strategy for increasing medication adherence and lowering blood pressure and cholesterol levels among diverse populations in various settings.

Best Practice in Action
Name: Grady Heart Failure Program
Location: Atlanta, Georgia

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported; Promising/Emerging; Unsupported; Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported; Moderate; Insufficient; No Evidence

Evidence of Effectiveness

The evidence base supporting the implementation of ROPC for medications to increase medication adherence is very strong. Studies examining ROPC for medications have demonstrated strong internal and external validity. Based on strong evidence of effectiveness, this strategy is recommended by the CPSTF.[2,3] Evaluations of ROPC strategies have been replicated with positive results, including increased medication adherence and health outcomes. Unfortunately, no comprehensive guidance for implementing ROPC strategies is available, however commentaries have been published.[4–6]

Evidence of Impact

Health Impact

Evidence demonstrates that ROPC for medications for patients with hypertension and hyperlipidemia is effective in improving medication adherence, which results in lower blood pressure and cholesterol levels.[1–3] For instance, the CPSTF found that ROPC for patients taking blood pressure and cholesterol medications increased medication adherence by 3% and increased the proportion of patients achieving 80% adherence by 5.1%, leading to significantly improved health outcomes.[2,3]

A CDC study also measured adherence and found that those within employer-sponsored health insurance programs who are paying high out-of-pocket costs have an increased likelihood for hypertension medication nonadherence.[7]

Other researchers found that free distribution of medication to patients with cost-related nonadherence increased adherence (38.7%) compared to a usual medication access group (28.6%).[8]

► *Reducing medication costs for medications for patients is an effective strategy for increasing medication adherence and lowering blood pressure and cholesterol levels among diverse populations in various settings.*

Health Equity Impact

Evidence shows that ROPC for medications is an effective strategy for men and women and for patients from diverse racial and ethnic minority groups.[3] ROPC is especially beneficial for patients with lower incomes who face the greatest financial barriers to taking medications as prescribed.[3] For example, a nationally representative dataset found that risk factors such as low annual household income, unemployment, having at least one comorbidity, younger age, female gender, and living in a state without Medicaid expansion increased cost-related medication nonadherence from 10% to up to 29%.[9]

It has also been found that rural areas and the United States South were more likely to experience high out-of-pocket costs than urban or suburban areas and other United States Census regions.[9,10]

Economic Impact

There is a need to increase the evidence base assessing the overall economic impact of ROPC for medications, as findings are limited and inconsistent.[2] The CPSTF found that the median intervention cost for ROPC for medications was $174 per person per year.[3] The CPSTF's review found that ROPC could reduce health care costs, with a median change of -$128 per person per year. Health care savings could potentially offset intervention costs, but evidence on net benefits was limited and mixed.[3]

In terms of costs specific to the patient, a CDC study observed that patients tended to pay lower out-of-pocket costs in public insurance markets like Medicaid, while patients paid higher copayments and out-of-pocket costs on commercial plans.[11]

Studies have also highlighted an increasing burden for out-of-pocket costs for direct oral anticoagulant medications for Medicare Part D and Medicaid recipients.[12]

Best Practice in Action Story

The Grady Heart Failure Program (GHFP) was launched in 2011 to improve the quality of care and reduce hospital visits among patients diagnosed with heart failure who have lower incomes. GHFP serves mostly African American patients and is based in the Grady Health System (GHS), a public safety net hospital serving more than 600,000 patients annually in Atlanta, Georgia. In addition to various core elements that address barriers to care such as assisting with transportation and connecting patients to public programs, GHFP provides patients with an initial 30-day supply of prescribed medications. The medication is ordered through the hospital pharmacy and sent to the patient's room before discharge for free or at a discounted rate. The 30-day supply is financed by the program to ensure that each patient can adhere to their medication at the beginning of their regimen and provides them with additional time to find continued medication access. Since GHFP began, the program's 30-day readmission rate has decreased by 31%, and ED visits have fallen by 37%. Although the success of this program could not be attributed to any one strategy alone, reducing out-of-pocket costs for medications likely played an important role.[13]

For more information

Website: https://www.gradyhealth.org/care-treatment/heart-vascular-center/heart-failure-care/

Four Considerations for Implementation

1 Settings

Strategies to ROPC for medications can be implemented by health care providers and plans, government agencies, and employers who offer insurance plans to their employees.[1]

2 Policy- and Law-Related Considerations

Policies or programs to reduce or eliminate out-of-pocket costs for medications can be coordinated and implemented through health care systems, partnerships, and health care providers or insurance plans. One ROPC policy approach is to reduce or eliminate copayments for generic medications. Providers may need to discuss appropriate generic medications with their patients. Many states have statutory or regulatory requirements that require Medicaid providers to use generics first and require or authorize pharmacists to switch Medicaid patients to an equivalent generic drug if a brand-name drug is prescribed.[14]

In 2022, there were some modifications to Medicare Part D and Medicare Advantage to reduce drug prices and out-of-pocket costs.[15] These new rules have been intended to improve price transparency and market competition. Some guidance on coverage for fixed-does combination antihypertensive medications is available.[16]

3 Implementation Guidance

Direct implementation guidance for ROPC was not readily available at the time of this publication. Collaboration between public insurance plans, such as Medicare and Medicaid, and private insurance plans can be considered to promote use of these strategies. However, reports that provide some summaries and perspectives exist:

- Comments of the Pharmaceutical Research and Manufacturers of America [PDF – 1.64M].[4]
- PAN Challenge and Cost-Sharing Roundtable.[5]
- Strategies for Reducing Out-of-Pocket Payments in the Health System: A Scoping Review.[6]

4 Additional Resources

ROPC for medications is a strategy that is supported by the following initiatives:

- Control High Blood Pressure.[17]
- Medication Adherence.[18]

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Self-Management Support and Education

Best Strategy

Self-management support and education is defined as assistance provided by clinicians and public health practitioners to enhance an individual's self-efficacy in managing one or more chronic conditions. The term self-management is often associated with self-care and includes an array of activities needed to effectively manage one or more chronic conditions.[1] With the assistance from health care professionals, individuals participate in activities such as patient education, support for lifestyle modifications, and support to help develop the skills needed for effective chronic disease management.[1,2]

This strategy has been replicated and evaluated in multiple chronic disease contexts, including diseases of the cardiovascular system, diabetes, asthma, and arthritis.

Summary

Self-management support and education involves support provided by clinicians and public health practitioners to enhance an individual's self-efficacy in managing chronic conditions, such as hypertension.

Best Practice in Action
Name: The Hypertension Health Equity Project
Location: Idaho, Alaska, Washington, Oregon, and Montana

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported; Promising/Emerging; Unsupported; Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported; Moderate; Insufficient; No Evidence

Evidence of Effectiveness

The evidence base for the self-management and education strategy is very strong. Evidence demonstrates that this strategy achieves desired outcomes, with studies demonstrating internal and external validity. This strategy has been replicated and evaluated in multiple chronic disease contexts, including diseases of the cardiovascular system, diabetes, asthma, and arthritis.[3–6] Randomized controlled trials have been conducted and show positive results from implementing self-management and education strategy interventions.[3,5–7] However, additional evidence of randomized control trials examining impacts among specific populations, such as African American people or women, would be beneficial. Multiple systematic reviews and meta-analyses describe strategy intervention effects on patient outcomes such as reduced blood pressure and increased rates of blood pressure control.[8,9] The U.S. Preventive Services Task Force recommends offering or referring adults with CVD risk factors to behavioral counseling interventions to promote a healthy diet and physical activity.[10] Additionally, CDC has developed resources for planning, implementing, and evaluating self-management and education programs.[11–13]

Evidence of Impact

Health Impact

The evidence provides insight into the impact of self-management support and education on positive cardiovascular outcomes, including lowered blood pressure, increased hypertension-related knowledge, increased medication adherence, and enhanced competence in hypertension self-management behaviors.[4,14] Evidence supports reduced morbidity and increased reported quality of life for individuals who engage in self-management strategies. Research has also shown that self-management support and education can improve self-efficacy self-rated health cognitive symptom management frequency of aerobic exercise and depression.

Health Equity Impact

There is evidence for improved quantitative and qualitative indicators that can be used among groups at higher risk for CVD, such as Patient Activation Measures and various adaptations of self-efficacy scales.[15,16] Additionally, quantitative metrics such as the Behavioral Change and Counseling Index were utilized in an observational study to assess advanced nurse practitioners' skills in conducting motivational interviewing among their cardiovascular patients.[17]

Men are less likely than women to participate in self-management programs for middle-aged and older adults.[18] Retaining such populations in programs and strategies for increasing reach, such as different locations, activities, or modalities (e.g., online), are worth exploration.

Certain components of self-management support and education may be more important in rural and low-income settings, where health care resources may be limited, but this issue has not been looked at in depth and deserves further exploration.[19] Literature that addresses Hispanic and/or African American persons and those with disabilities appears to be sparse.

Economic Impact

The costs of chronic disease self-management programs vary depending on the strategy and program components used. Hypertension self-management education programs that use strategies beyond SMBP can be cost-effective.[20] Similarly, a recent meta-analysis found that, even across several health conditions, self-management interventions improved quality of life and reduced health care utilization.[5] Another meta-analysis compared usual care with self-management interventions and found a marginally significant decrease in all-cause hospitalization therefore reducing health care utilization costs. A study estimated a health system's cost savings of about $394 per participant per year when enrolled in a self-management education program, and it is estimated that health systems could save $3.9 billion nationally if 5% of adults with one or more chronic conditions were reached.[20,21] Additionally, reducing expenditures on provider visits and adverse events saved money overall as reported in a study that modeled incremental cost-effectiveness ratios (ICERs) over a 10-year horizon. Another study that studied ICERs and quality-adjusted life years for the Chronic Disease Self-Management Program (CDSMP) used health-related quality-of-life measures to assess participant cost-effectiveness. They found positive trends but cited a limitation: The CDSMP data collection was not based in cost-effectiveness, and costs of program implementation were only estimations.

Best Practice in Action Story

The Hypertension Health Equity Project began in 2015 as a quality improvement and equity initiative of the San Francisco Health Network's Primary Care group, a branch of the San Francisco Department of Public Health.[22] The goals of the project were to advance health equity, provide high-quality care, and improve blood pressure control for African American patients with high blood pressure in 14 locations within the San Francisco Health Network. The project included the development of tailored health education materials, a home blood pressure monitoring tool kit, and a medication algorithm to identify effective treatments for African American patients with high blood pressure. The project also included and piloted patient identification and outreach activities, chronic care visits with registered nurses, and a clinic-based food pharmacy. As of 2017, two clinics met the goal of 20% relative to baseline improvement in blood pressure control for African American patients. Additionally, 75% of patients who participated in the food pharmacy pilot test said it gave them more access to healthy food, and 50% said they were now eating healthier foods.

For more information

Website: https://sfhealthnetwork.org/about-sfhn/

Four Considerations for Implementation

1 Settings

Self-management support and education has been implemented in several community organizations and clinical settings, including Y's, FQHCs, ED, and managed care health systems. Increasingly, interventions for self-management and education are being explored in telehealth settings.

2 Policy- and Law-Related Considerations

The Bundled Payments for Care Improvement Advanced (BPCI Advanced) Model[23] is a new iteration of CMS and the Center for Medicare and Medicaid Innovation (Innovation Center) continuing efforts in implementing voluntary episode payment models. The model aims to support health care providers who invest in practice innovation and care redesign to better coordinate care and reduce expenditures while improving the quality of care for Medicare beneficiaries. BPCI Advanced qualifies as an Advanced Alternative Payment Model under the Quality Payment Program.

Efforts in legislation to expand payment options and access to cardiac rehabilitation programs are underway. The Increasing Access to Quality Cardiac Rehabilitation Care Act (HR 3911) bill, originally introduced to the 116th Congress in July 2019, was reintroduced to 117th Congress in June 2021 to authorize physician assistance, nurse practitioners, and clinical nurse specialists to supervise cardiac, intensive cardiac, and pulmonary rehabilitation programs under Medicare.[24]

3 Implementation Guidance

Resources for planning and implementing self-management and education programs include:

- Component 7: Hypertension Management Visits.[25]
- Self-Management Education Workshops.[26]
- Tomando Control de su Salud (Take Control of Your Health).[27]
- Women Take PRIDE.[28]
- Hypertension Control Exemplars 2021.[29]
- WISEWOMAN Success Stories.[30]
- Managing Heart Disease.[31]
- TAKEheart.[32]
- Heart-Check Certification Program.[33]

4 Additional Resources

- Million Hearts® Initiative.[34]
- Self-Management Education: Learn More. Feel Better.[35]
- Self-management education: History, definition, outcomes, and mechanisms.[36]

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Self-Measured Blood Pressure Monitoring With Clinical Support

Best Strategy

Self-measured blood pressure monitoring (SMBP) involves the regular measurement of blood pressure by the patient, outside of a clinical setting using a personal blood pressure measurement device.[1] SMBP may be paired with clinical support including patient training on how to use a blood pressure measuring device, one-on-one counseling, electronic or web-based tools, and/or educational sessions.[2] Telehealth and telemedicine may be used in conjunction with home blood pressure telemonitoring, for patients with office visit barriers, including virtual assessments, virtual patient trainings on SMBP device use and virtual follow-up visits.[3] When combined with clinical support, SMBP can improve blood pressure control and enhance accessibility to care and quality of care for people with hypertension.[4]

SMBP with clinical support can contain elements from a number of other strategies highlighted in this Best Practices Guide, including telehealth, lifestyle modification programs to control hypertension, self-management support and education, and team-based care to improve blood pressure control.

Economic evidence from the CPSTF indicates that SMBP strategies are cost-effective when combined with additional clinical support or within a team-based care model.

Summary

SMBP with clinical support is a cost-effective strategy for lowering blood pressure and increasing medication adherence among patients with high blood pressure.

Best Practice in Action
Name: Hunterdon Cardiovascular Associates
Location: Flemington, New Jersey

Evidence of Effectiveness

Effect	Implementation Guidance	Research Design
Internal Validity	Independent Replication	External & Ecological Validity

Legend: Well supported/Supported; Promising/Emerging; Unsupported; Harmful

Evidence of Impact

Health Impact	Health Equity Impact	Economic Impact

Legend: Supported; Moderate; Insufficient; No Evidence

Evidence of Effectiveness

The evidence base for implementing SMBP in health care systems and practices is very strong. Studies demonstrate internal and external validity, and there has been independent replication with positive results. Based on strong evidence for effectiveness, this strategy is recommended by the CPSTF; it is also cost-effective.[2,5,6] Comprehensive implementation guidance is available to facilitate the adoption of this strategy by health care systems and practices.

Evidence of Impact

Health Impact

SMBP has been demonstrated to reduce the risk of death associated with high blood pressure.[4] The literature has shown that when combined with additional clinical support, SMBP is effective in reducing high blood pressure, improving patient knowledge, and enhancing medication adherence.[7–9] SMBP is useful for monitoring the effectiveness of antihypertensive medication, the diagnosis of resistant hypertension, masked hypertension, white coat hypertension, and the detection of morning hypertension.[10] SMBP has also been associated with patient empowerment, autonomy, self-efficacy, and lifestyle modification.[7]

Health Equity Impact

Further research is needed to assess SMBP's effect on health disparities, particularly in people from racial and ethnic minority groups.[11] Some evidence exists that clinical–community care models involving health departments, community organizations, and clinical providers can increase access to SMBP and related support for people from rural and urban communities.[12] These collaborative models include partners implementing SMBP Supporter Tasks, such as providing SMBP devices, training on SMBP device use, and patient outreach and support.[2,3]

National cross-sectional survey data found SMBP use greater in people who had health insurance, a higher number of visits to a health care professional, and a higher income-to-poverty ratio.[9] For people with health insurance, inadequate coverage for automatic blood pressure measurement devices and out-of-pocket costs for securing a device can be barriers to SMBP use.[13]

Economic Impact

Economic evidence from the CPSTF indicates that SMBP strategies are cost-effective when combined with additional clinical support or within a team-based care model.[5] For insurers, coverage of SMBP devices produced positive ROIs in the short run and at the lifetime horizon when used to collectively diagnose hypertension, manage medications, and monitor treatment, as per simulation models.[14] When scaled to the U.S. population, SMBP implementation would prevent close to 16.5 million false positive hypertension diagnoses, resulting in improved quality of care and insurance plan savings of $254 per member.[14]

► *SMBP with clinical support is a cost-effective strategy for lowering blood pressure and increasing medication adherence among patients with high blood pressure.*

Best Practice in Action Story

Hunterdon Cardiovascular Associates' (HCA's) 13 cardiologists and 10 advanced primary providers use a collaborative approach to cardiology care in Flemington, New Jersey.[15] The practice supports their patient's blood pressure control efforts through a combination of team-based care and at-home blood pressure monitoring. HCA encourages patients to use a home blood pressure monitor and to keep a log of their blood pressure readings. The practice's team of cardiologists, nurses, and medical assistants support patients' at-home blood pressure monitoring through discussing at-home readings, reinforcing correct measurement techniques, and regularly validating patient monitors with the practice's monitors.[15] HCA serves more than 12,000 patients—most are covered by Medicare, and roughly half have been diagnosed with hypertension.[15] HCA's implementation of at-home blood pressure monitoring, in combination with the strategies mentioned, contributed to a hypertension control rate of greater than 80% among its patients in 2019.[15] HCA has been recognized by the Million Hearts® initiative as a Hypertension Control Champion.

For more information

Website: https://hunterdoncardiovascular.com/

Four Considerations for Implementation

1 Settings

SMBP has been implemented in many clinical and community settings, including FQHCs, primary care clinics, cardiac rehabilitation programs, pharmacies, local Y's, and U.S. Department of Veterans Affairs medical centers.

2 Policy- and Law-Related Considerations

Health insurance coverage for SMBP devices and services varies across payers and states. Payers are encouraged to cover automatic upper-arm devices and cuffs that have been clinically validated and appropriately sized.[13] Experts have also recommended that payers reimburse clinical care teams for the time spent training patients in SMBP techniques, validating patients' measurement techniques, interpreting SMBP measurements, and communicating treatment changes based on SMBP readings.[1] Two Current Procedural Terminology (CPT©) codes for SMBP services (99473 and 99474) were introduced in 2020 to reimburse clinical care teams for the provision of these clinical support services.[16] According to a recent 50-state analysis, 13 state Medicaid programs cover/reimburse for both automatic upper arm devices and SMBP clinical services, though level of coverage varies and may not always be sufficient.[13] Medicare Fee-for-Service Part B covers SMBP services but limits coverage for SMBP devices to beneficiaries with end-stage renal disease.[13] Coverage across commercial payers varies. When not covered by insurance, health care flexible spending accounts may be used to cover the costs of home blood pressure devices. More information on SMBP coverage can be found online and through Million Hearts® resources.

3 Implementation Guidance

Implementation guidance for SMBP strategies is available for public health practitioners and clinicians. See the links below for more information on implementation:

- Hypertension Control Change Package, Second Edition.[17]
- The 7-Step Self-Measured Blood Pressure (SMBP) Quick Guide.[18]
- Implement SMBP.[19]
- Self-Measured Blood Pressure (SMBP) Implementation Toolkit [PDF – 555K].[20]
- Self-Measured Blood Pressure Monitoring Implementation Guide for Health Care Delivery Organizations [PDF – 6.62M].[21]
- Self-Measured Blood Pressure Monitoring: Action Steps for Clinicians [PDF – 947K].[22]
- Self-Measured Blood Pressure Monitoring: Action Steps for Public Health Practitioners [PDF – 1.00M].[1]

4 Additional Resources

Several federal and national organizations have developed resources to support SMBP monitoring with clinical support:

- Self-Measured Blood Pressure (SMBP) Monitoring.[23]
- Choosing a Home Blood Pressure Monitor for Your Practice: At-a-Glance Comparison [PDF – 119K].[24]
- SMBP Coverage Insights: Medicaid [PDF – 232K].[25]
- Self-Measured Blood Pressure Monitoring: Key Findings From a National Health Information Technology Landscape Analysis [PDF – 1.29M].[26]
- SMBP Patient Virtual Training Checklist [PDF – 130K].[27]
- Life's Essential 8™.[28]

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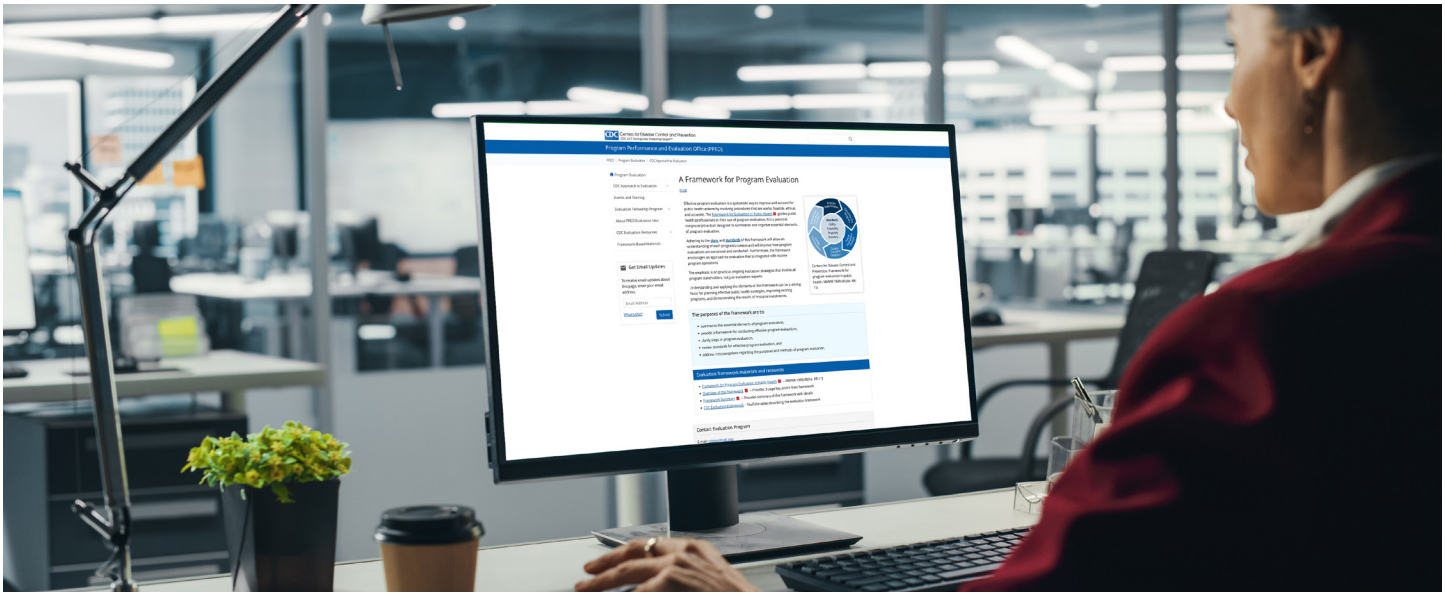
Evaluation

Introduction



Evaluation is a systematic process of collecting information to understand what a program does, what it achieves, and then using that information to improve program quality and determine the program's effectiveness and efficiency.[1,2] When public health program evaluation is designed with a health equity lens, it can help the audience understand what works, for whom, and under what conditions; it reveals whether health inequities decreased, increased, or remained the same; and it provides actionable information that can be used to attain higher levels of health potential.[3] Additionally, evaluating public health programs creates practice-based evidence, engages program collaborators and participants, and demonstrates accountability for funding.[2]

This summary is intended as a starting point for program evaluators to prepare themselves to execute evaluation practice for one or more of the evidence-based best practices outlined in the Best Practices Guide. It lists evaluation resources that can be referred to throughout different stages of the evaluation process and provides specific examples on how evaluations of these evidence-based best practices were implemented and adapted.

The six steps of the CDC Framework for Evaluation in Public Health (CDC's Framework for Program Evaluation) are interwoven throughout this summary.[1,4] Understanding and applying the steps of this framework can be helpful for planning effective public health strategies, improving programs, and identifying the results of resource investments.[4]

What is an equity-focused evaluation?
Designed to understand what works, for whom, and under what conditions, it reveals whether health inequities have decreased, increased, or remained the same.[3]

Why is an equity-focused evaluation important?
It ensures that underrepresented populations, especially people with disabilities and those who are culturally and/or linguistically different, are fairly represented and included in the evaluation process.

What are the implications for public health practice?
Equity-focused evaluations provide for more inclusivity and lead to improved decisions for all.

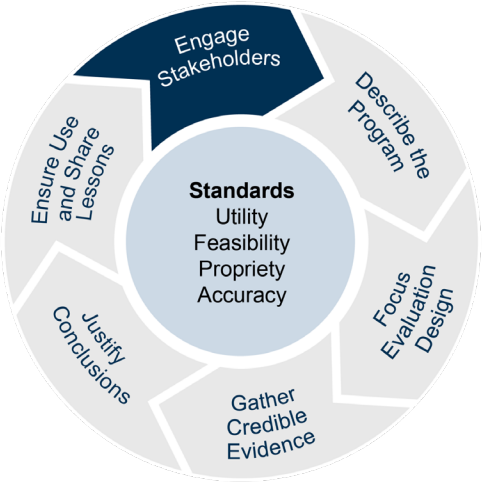
Evaluation at DHDSP

DHDSP identifies and encourages uptake of best practices for heart disease and stroke prevention programs. As best practices are adopted over time in various settings, evaluation work becomes crucial to identifying progress and areas for improvement. DHDSP evaluates heart disease and stroke programs, policies, and interventions to ensure they are being implemented as intended and to identify the outcomes that they produce. Several evaluation resources are available to build professional knowledge and capacity for evaluation, including evaluation summaries and implementation guides.[5]

CDC Framework for Evaluation, Steps 1–6

1 Engage Stakeholders

Engage partners, including those involved in program operations, those served or affected by the program, and primary users of the evaluation. When developing an evaluation approach, it is important to involve those who have an interest in the evaluation (e.g., program implementers and participants, care providers, data analysts, evaluators). Including those who offer differing perspectives on what progress looks like initiates conversation on clarifying values and sets program priorities. Representation and power sharing can be critical to ensuring credibility and uptake of the findings and recommendations for improvement.[4]



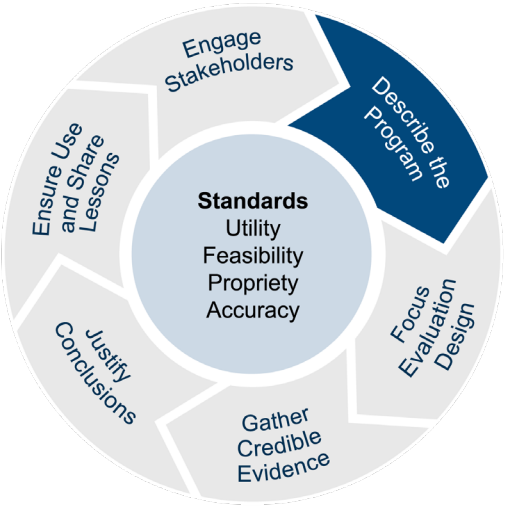
Incorporating Health Equity

In addition to representing those who have an interest in the evaluation, actively seeking and taking action based on the voices of the people or communities that are affected by the issue or strategy intervention is equally important. Tips on how to foster meaningful engagement through culture competence from CDC's Practical Strategies for a Culturally Competent Evaluation guide are listed in the callout box below.[6]

Culture Competence Strategies

- Assess cultural self-awareness.
- Engage partners who reflect the diversity of the community.
- Lay clear ground rules for participation to establish equality.
- Teach basic evaluation skills along the way.
- Create a diverse advisory team to help with planning, implementing, and interpreting findings from the evaluation.
- Build trust by talking openly with the community about the evaluation.

2 Describe the Program



Describe the program, including the need, expected effects, activities, resources, stage, context, and logic model. It is important to describe the features of the program being evaluated, including its purpose and place in a larger public health context.[4] This step typically involves the development of conceptual tools, such as logic models or theories of change. Incorporating one or more conceptual tools in executing evaluation practice for evidence-based best practices outlined in the Best Practices Guide is encouraged.

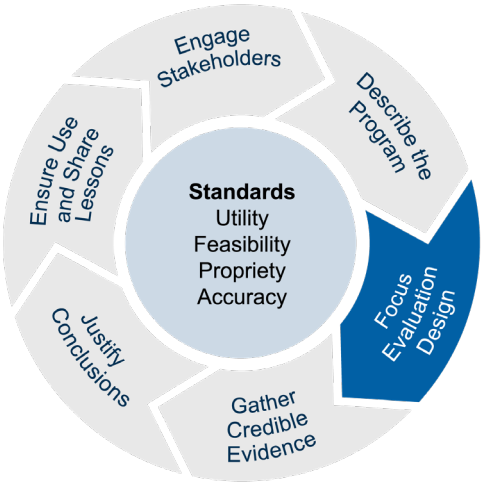
Incorporating Health Equity

Consider the historical, societal, and political context along with the power dynamics of a community, institution, and/or health system when developing conceptual tools to inform program planning and implementation. Logic models ensure a mutual understanding of program activities, including those geared toward health equity and intended outcomes; help determine the primary purpose of the evaluation; and aid in evaluating adaptations or implementation of programs. Logic models can also help narrow down the various possibilities of evaluation questions and can help prioritize which outcomes are most important. Logic models increase the likelihood that program efforts will be successful, because they help identify potential obstacles to program operation so that staff can address them early on.[7] Compared with logic models, a theory of change provides a less linear approach and explains how and why program activities are expected to lead to outcomes.[7] An example that uses change concepts to foster productive interactions between informed patients and health systems is the Chronic Care Model.[8]

Example of an Equity-Focused Evaluation

Two examples of DHDSP logic models include the Sodium Reduction in Communities Program (SRCP) and the Grady Heart Failure Program (GHFP). In particular, the GHFP logic model provides an overview of program inputs, activities, and expected outcomes designed to advance health equity and reduce socioeconomic barriers to promote adherence to an outpatient medical plan and achieve improved quality of care and patient health outcomes. Likewise, a logic model was developed for the SRCP national evaluation and was built to clearly describe the steps required to reach the ultimate programmatic goal of reducing sodium intake and the overall health impact, which, in this case, was to improve prevention and control of hypertension. Users of the Best Practices Guide can reference the information and specific components addressing health disparities provided in these logic models to inform their own equity-focused evaluation. For more information, check out Appendix B in the Sodium Reduction in Communities Program: Outcome Evaluation Toolkit [PDF – 1.15M] and the Grady Heart Failure Program Implementation Guide.[9,10]

3 Focus Evaluation Design



Focus the evaluation design to assess the issues of greatest concern to partners while using time and resources as efficiently as possible. Consider the purpose, users, uses, questions, methods, and agreements. Part of determining the evaluation purpose involves evaluators and partners working together to develop evaluation questions with methods that are useful, feasible, ethical, and accurate.[4]

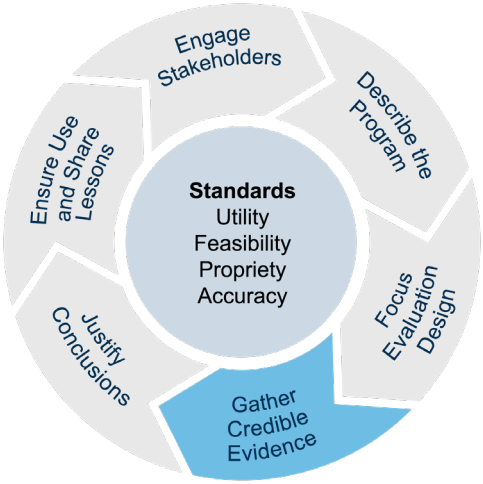
Incorporating Health Equity

When developing evaluation questions, consider writing ones that answer how the program or intervention has affected health equity outcomes. Once priority questions and methods are identified, programs may determine the evaluation design that best suits the goals and resources available for the evaluation.

Consider when formulating evaluation questions for your program or intervention:

- How is the program/intervention addressing [specific social determinant of health] that causes disparities in [specific population] in [specific outcome]?
- Was [specific activity] implemented as planned?
- Did [specific outcomes] occur and at an acceptable level?
- Were the changes in [specific outcomes] due to activities as opposed to something else?
- What factors prevented the activities in the focus from being implemented as planned? Were [specific inputs and moderating factors] responsible?
- What factors prevented (more) progress on the outcomes in the focus? Were [specific moderating factors] responsible?

4 Gather Credible Evidence



Gather credible evidence to develop evaluation findings and recommendations. Such evidence can be experimental, observational, qualitative, quantitative, or derived from a mixture of methods.

Evaluation indicators are measures that will be used to judge the program's progress and success and serve as a valid method to ensure that the information gathered can help answer evaluation questions.[4] Tying indicators to evaluation questions can be helpful to monitor changes in community or social conditions that influence heart disease and stroke outcomes. Evaluators may consider identifying sources of data for the evaluation that are best suited for the program and assess the feasibility of accessing each data source. A key factor to consider is whether the evaluation will rely on existing data sources or whether additional primary data will be collected.

The Surveillance and Evaluation Data Resource Guide for Heart Disease and Stroke Prevention Programs serves as an at-a-glance compilation of data sources, tools, and indicators useful for heart disease and stroke prevention programs. Additionally, the Data Set Directory of Social Determinants of Health at the Local Level is a data resource guide that contains an extensive list of existing data sets with information on the local level (e.g., metropolitan statistical area, county, ZIP code, census tract) that can be used to address social health determinants.[11] Furthermore, the CDC PLACES Local Data for Better Health website provides small area estimates (community, census tract, and ZIP Code Tabulation Area) for chronic disease risk factors and health status that can be used to better understand the geographic burden of health outcomes and to assist in planning public health interventions.[12]

Step 4 continued

Incorporating Health Equity

Through the systematic collection of data, evaluation can also measure progress to reduce disparities and advance health equity. This should be a consideration early in the evaluation process to ensure sufficient data can be gathered, tracked, and analyzed. It is important to consider tracking potential areas of inequities (e.g., income, race, gender, geography) by selecting relevant indicators. Health equity indicators, defined as measures of inequalities in health access and outcomes, are useful to inform and address disparities, such as in heart disease and stroke prevention and management.[13,14] Types of health equity indicators include racism, genderism and sexism, sexual orientation and gender identity, disability status, neighborhood characteristics, socioeconomic factors, health care access, organizational or institutional factors, and policy.

Example of an Equity-Focused Evaluation

A tool, such as an evaluation matrix, is a systematic way of organizing and presenting evaluation methods.[15] It can be created to serve as a guide for the program evaluation as it specifies the details of how the program will be evaluated. Additionally, the evaluation matrix is used to ensure evaluation questions are addressed and it should contain all the variables that will be collected by the program. An excerpt of the GHFP evaluation matrix is below.

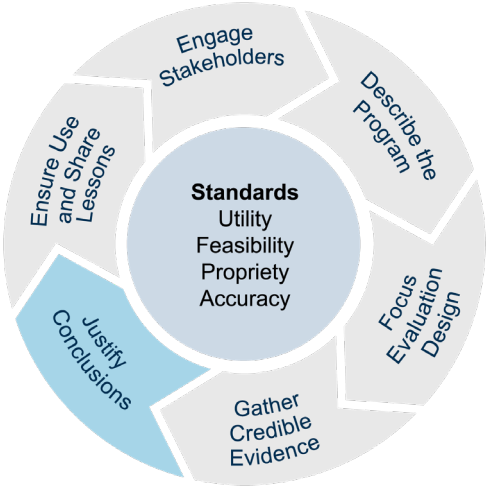
Excerpt of the GHFP Evaluation Matrix[16]

Evaluation Question	Data Source	Methods	Indicators	Analyses
To what extent do barriers to health equity influence short-term outcomes for patients?	Healthy Planet EMR data	Data summary from Healthy Planet	• 30-day readmissions • Length of stay • Transportation barriers • Financial stress	• Descriptive statistics • Inferential statistics

Once data collection and analysis are complete, interpretation of the evaluation data and dissemination of findings are recommended.

5 Justify Conclusions

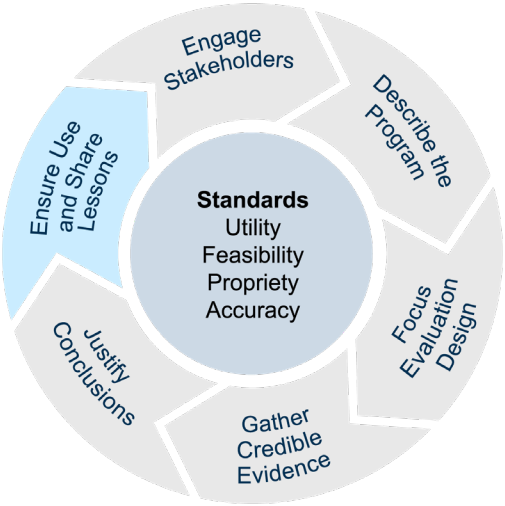
Justify conclusions by linking them to the evidence gathered and judging them against agreed-upon values or standards set by partners. Justify conclusions on the basis of evidence using these five elements: standards, analysis/synthesis, interpretation, judgment, and recommendations.



Incorporating Health Equity

Understanding cultural context is necessary for accurate interpretation. During this process, consider engaging community partners who represent the views of the population of focus when interpreting data to ensure best use of equity data. When interpreting health disparities, interpretation of the data in the societal and environmental contexts in which they occur is recommended. This may help avoid placing blame on the person, community, or population for the increased risk of heart disease and stroke outcomes.[17]

6 Ensure Use and Share Lessons



Ensure use and share lessons learned with these steps: design, preparation, feedback, follow-up, and dissemination.

Incorporating Health Equity

Ensure that the findings will be used appropriately by reflecting the evaluation's intended population of focus and sharing lessons learned with relevant audiences. When applying a health equity lens to disseminate information, using inclusive language can eliminate stereotypes and maintain respect when referring to people who are disproportionately affected by heart disease and stroke health outcomes. Consider using non-stigmatizing and bias free language[18] when communicating your findings about disparities and disseminating evaluation results. The CDC's Health Equity Guiding Principles for Inclusive Communication provides guiding principles for framing information about health disparities and general public health implications. Additionally, consider including community members and partners as co-authors in publications and co-presenters in presentations and/or invite community members to review prior to sharing findings. These considerations may help better engage them in dissemination efforts. Disseminating the results and lessons learned of equity-focused evaluations builds capacity, increases awareness among community members and partners, and empowers them to act upon that knowledge. Sharing findings and providing the data may also contribute to practice-based evidence, policy changes, system and environmental changes, and program improvement.

When reporting findings, consider multiple communication products and diversity in the types of collaborators. Examples of dissemination products include journal publications, newsletters, fact sheets, evaluation reports, infographics, webpages, and presentations. In addition, to reach a larger demographic, findings may be disseminated through community- and faith-based centers, state and local public awareness campaigns, and social media channels. Other examples of dissemination products include DHDSP's Recipes for Public Health, which highlights program partnership strategies and toolkits, such as the Hypertension Management Program toolkit.[19,20] DHDSP also provides strategy implementation resources, such as pharmacy-based interventions, use of telehealth, and team-based care, that provide information on how to implement interventions that are designed to prevent and control heart disease and stroke.[21-24]

Examples of dissemination efforts from DHDSP's Evaluation of GHFP are below.

Implementation Guide	Field Notes [PDF – 428K]
This guide provides health care professionals (e.g. cardiologists, nursing staff, cardiac care clinics) and public health practitioners a detailed description of an effective intervention to address health disparities among heart failure patients. The Guide provides considerations for replication of the GHFP approach and considerations for evaluating the program. This format benefits health care professionals and public health practitioners because it outlines the facilitators, challenges, and needs of patient populations, as well as the unique characteristics of the GHFP's core elements.	This field note highlights the program's approach to use TBC to reduce high rates of hospital readmissions for heart failure patients through education and services that improve access to care. State, tribal, and local health departments and other public health entities concerned with continuity of care and addressing health disparities among heart failure patients may find the GHFP field note useful. The GHFP field note was designed to spotlight the program components, progress toward implementation, and reach and impact. For this particular field note, a section was added on how the program is addressing health disparities and advancing health equity in its population of focus.

Additional Dissemination Examples from DHDSP

Guides and Toolkits | Webinars | Publications | Tip Sheets

Additional Evaluation Resources

- Practical Strategies for Culturally Competent Evaluation [PDF – 706K].[25]
- Developing an Effective Evaluation Plan [PDF – 2.47MB].[26]
- Evaluation Spotlights & Strategies.[27]
- Evaluation Guides & Toolkits.[28]
- Evaluation Reporting: A Guide to Help Ensure Use of Evaluation Findings [PDF – 550K].[29]
- Program Performance and Evaluation Office (PPEO).[30]
- Health Equity Research Guide.[31]
- Evaluation Checklists.[32]
- CDC Coffee Break presentations:
  - Evaluating Health Equity [PDF – 1.95M].[33]
  - Beyond Behavior: Measuring Health Equity in Cardiovascular Disease Prevention Programs [PDF – 2.19M].[34]
  - Arriving at Actionable Evaluation Findings [PDF – 1.67M].[35]
  - Making the Most of Your Program Logic Model [PDF – 1.56M].[36]

Strategy Specific Resources

Resource	Related Strategies
Hypertension Management Program (HMP) Toolkit[37]	• Self-Management Support and Education • Self-Measured Blood Pressure with Clinical Support
Pharmacists' Patient Care Process Approach Guide[38]	• Self-Management Support and Education • Team-Based Care to Improve Blood Pressure Control
Community Health Worker (CHW) Toolkit[39]	• Community Health Workers
Telehealth Interventions to Improve Chronic Disease[40]	• Telehealth
How to Promote Disease and Stroke Prevention in the Workplace[41]	• Workplace Health Promotion

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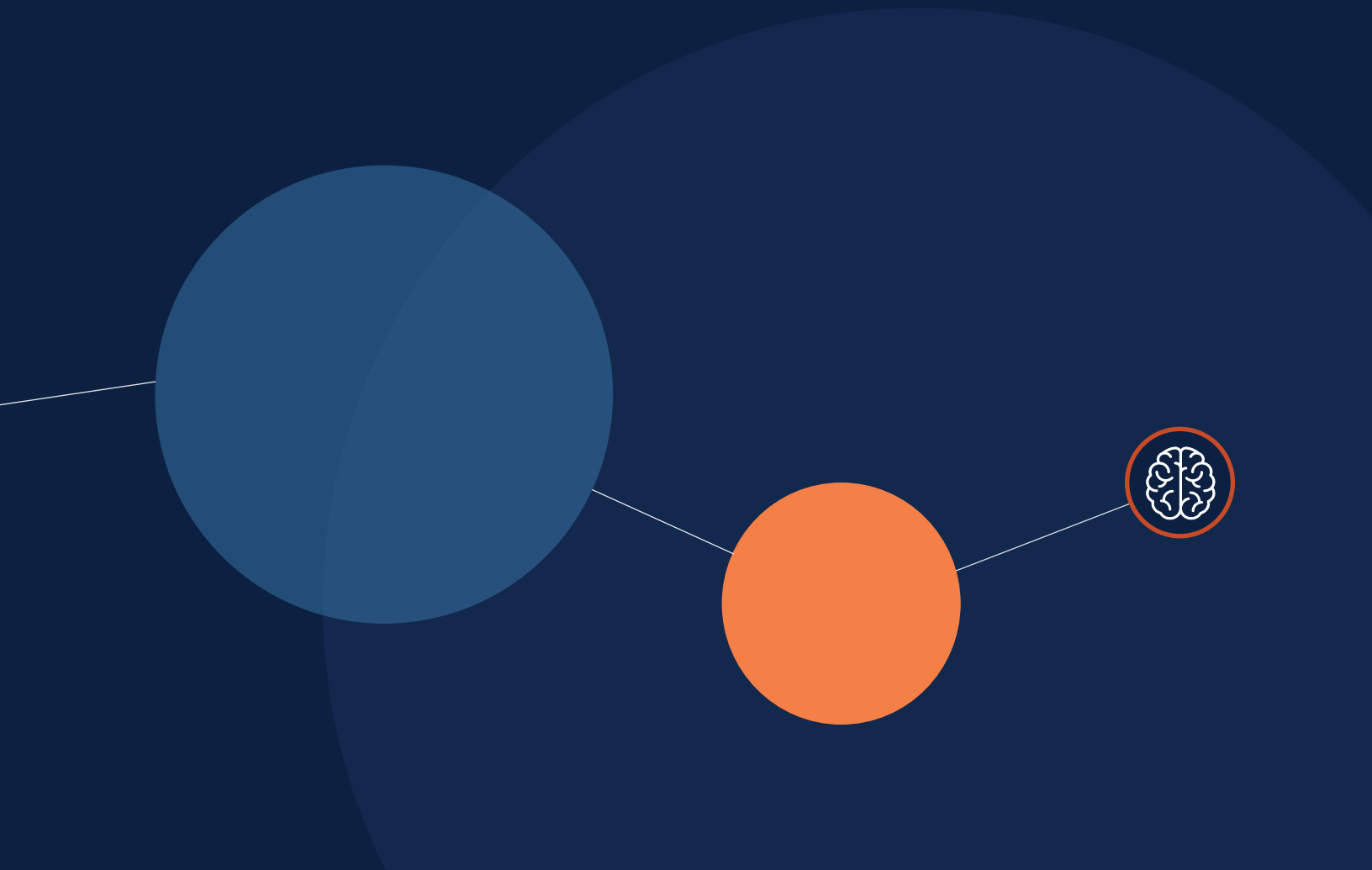
Appendices



Appendix A. Summary of Effective Strategies to Address Heart Disease and Stroke

	Evidence of Effectiveness Dimensions						Evidence of Impact		
Strategy	Effect	Internal Validity	Research Design	Independent Replication	Implementation Guidance	External and Ecological Validity	Health Impact	Health Equity Impact	Economic Impact
Coordinating Services for Cardiovascular Events									
Cardiac Rehabilitation to Support Recovery from Cardiac Events[a]	Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Emergency Medical Service Systems for Stroke Treatments[b]	Well supported/Supported	Well supported/Supported	Harmful	Harmful	Well supported/Supported	Well supported/Supported	Supported	Harmful	Harmful
Public Access Defibrillation[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Stroke Center Certification[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Engaging Organizations to Promote Cardiovascular Health									
Reducing Sodium to Prevent and Manage Hypertension[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Workplace Health Promotion to Prevent and Manage Heart Disease and Stroke[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Harmful	Supported
Implementing Technology-based Strategies to Optimize Cardiovascular Care									
Clinical Decision Support Systems[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Harmful	Supported	Supported	Harmful
Telehealth[b]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Leveraging Community and Clinical Public Health Workforces									
Community Health Workers[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Community Paramedicine[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported

Legend: Well supported/Supported; Supported; Promising/Emerging; Moderate; Unsupported; Insufficient; Harmful; No Evidence

Summary of Effective Strategies to Address Heart Disease and Stroke *continued*

	Evidence of Effectiveness						Evidence of Impact		
Strategy	Effect	Internal Validity	Research Design	Independent Replication	Implementation Guidance	External and Ecological Validity	Health Impact	Health Disparity Impact	Economic Impact
Leveraging Community and Clinical Public Health Workforces *continued*									
Collaborative Practice Agreements to Enable Collaborative Drug Therapy Management[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Community Pharmacists and Medication Therapy Management[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Promising/Emerging	Well supported/Supported	Well supported/Supported	Supported	Promising/Emerging	Supported
Tailored Pharmacy-based Interventions to Improve Medication Adherence[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Team-based Care to Improve High Blood Pressure[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Supporting Patients in Cardiovascular Disease Self-Management									
Lifestyle Modification Programs to Control Hypertension[b]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Promising/Emerging	Promising/Emerging
Reducing Out-of-Pocket Costs[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Promising/Emerging
Self-Management Support and Education[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported
Self-Measured Blood Pressure Monitoring With Clinical Support[a]	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Well supported/Supported	Supported	Supported	Supported

[a]Best strategies in addressing heart disease and stroke; [b]Leading strategies in addressing heart disease and stroke

Legend: Well supported/Supported; Supported; Promising/Emerging; Moderate; Unsupported; Insufficient; Harmful; No Evidence

Appendix B. Rapid Synthesis and Translation Process (RSTP)

As part of the process of developing the *Best Practices Guide for Heart Disease and Stroke*, the RSTP was adapted to provide a structure for engaging both subject matter experts (SMEs) and health care practice partners. This conceptual process, developed within CDC's Division of Violence Prevention in the National Center for Injury Prevention and Control, consists of six fundamental steps (Figure 2), which do not necessarily occur in chronological order.

The following steps and related definitions are applied in our adaptation of the RSTP framework:

Step 1: Solicit Topics From End Users. For the *Best Practices Guide for Heart Disease and Stroke*, "end users" were grantees (health care practitioners), evaluators (internal), content SMEs (internal and external), and program specialists (internal).

Step 2: Scan Findings. The *Best Practices Guide for Heart Disease and Stroke* development team in CDC's Division for Heart Disease and Stroke Prevention reviewed the research literature to identify evidence-based strategies for preventing cardiovascular disease. The strategies determined to be potential best practices were moved to Step 3.

Step 3: Sort for Relevance. Criteria for including strategies in the *Best Practices Guide for Heart Disease and Stroke* were determined according to an internal vetting process that included Division and Branch leadership, internal SMEs, and external SMEs. A group of grantees was also asked to identify practice-based relevance for each strategy.

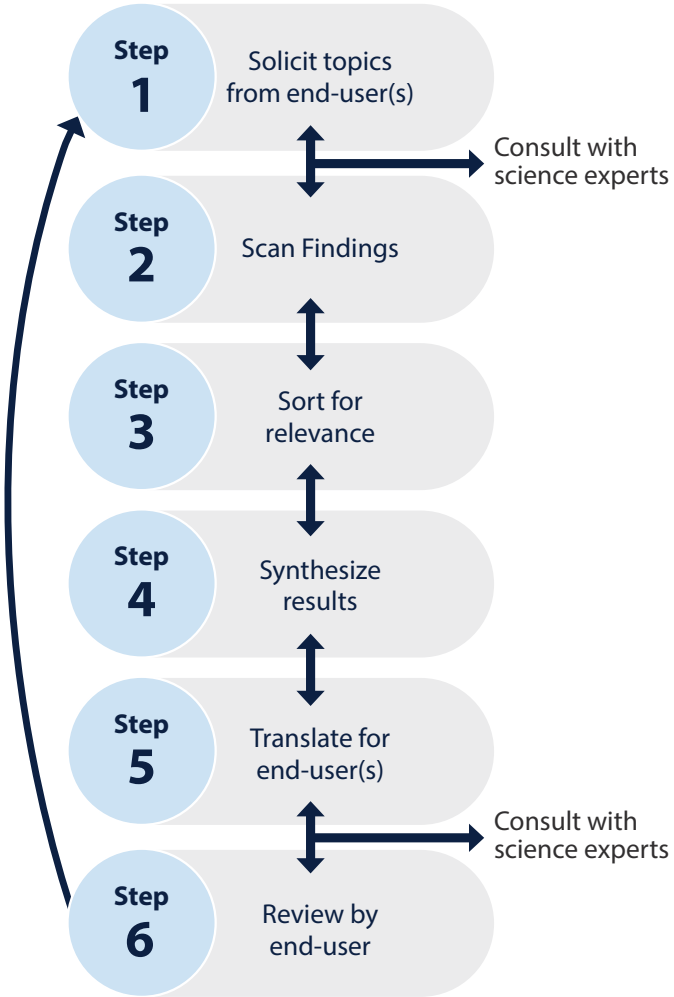
Step 4: Synthesize Results. Internal SMEs used the Continuum of Evidence of Effectiveness to assess the evidence behind the identified strategies. This interactive, online tool uses a series of questions about each strategy to place it on a continuum of six dimensions of evidence (see Appendix C for more information). Once this baseline assessment of the evidence was done, only strategies with results and methodology in the highest category (i.e., supported or well-supported) were considered further. The availability of implementation guidance was not a requirement for inclusion. Selected strategies were then reviewed for fit with the Best Practices Framework to assess their potential to improve cardiovascular health, improve health equity, and demonstrate economic sustainability.

Step 5: Translate Results for End Users. The *Best Practices Guide for Heart Disease and Stroke* development team used the data collected from the SME assessments, the Best Practices Framework review, and additional input from internal program and evaluation experts to draft the Best Practices Guide for Heart Disease and Stroke.

Step 6: Solicit Reviews by End Users. Standard processes for clearance by CDC and the U.S. Department of Health and Human Services were initiated after an additional review by a panel of funded recipients, SMEs, and other potential end users. In addition, the *Best Practices Guide for Heart Disease and Stroke* underwent an Influential Scientific Information review (see the CDC Agency for Toxic Substances and Disease Registry's Office of Management and Budget Peer Review Agenda for more information).

For more information on the Best Practices Framework, see: Spencer LM, Schooley MW, Anderson LA, Kochtitzky CS, DeGroff AS, Devlin HM, Mercer SL. Seeking best practices: a conceptual framework for planning and improving evidence-based practices. *Prev Chronic Dis*. 2013;10:130186. doi:10.5888/pcd10.130186.

Figure 2. Rapid Synthesis and Translation Process (RSTP)



Adapted figure from: Thigpen S, Puddy RW, Singer HH, Hall DM. Moving knowledge into action: developing the Rapid Synthesis and Translation Process within the Interactive Systems Framework. *Am J Community Psychol*. 2012;50(3–4):285–94. doi:10.1007/s10464-012-9537-3. Reproduced with permission of John Wiley & Sons Books.

Appendix C. Understanding the Continuum of Evidence of Effectiveness Tool

The Continuum of Evidence of Effectiveness tool (hereafter called the Continuum) clarifies and defines standards for assessing research evidence. Because of its ability to determine the strength of evidence on the basis of a clear and universal set of standards, the Continuum was chosen as the mechanism to rate the evidence behind the strategies included in the *Best Practices Guide for Heart Disease and Stroke*. This interactive, online tool was developed in 2007 by CDC's Division of Violence Prevention in the National Center for Injury Prevention and Control. The Division needed a way to provide coherent and consistent language around the word *evidence* in programmatic activities. Division staff synthesized information about program effectiveness from the research literature, subject matter experts, and practitioners with experience implementing strategies in the field. This information guided the development of the Continuum, which assesses various components to determine the strength of the best available research evidence on a program, practice, or policy. The Continuum also illuminates the strengths and weaknesses of the research evidence and offers guidance on next steps for consideration.

Although this tool was developed to be applied specifically to the field of violence prevention, it can be used to guide evidence-based decision making in a wide range of health-related areas. In developing the *Best Practices Guide for Heart Disease and Stroke*, two knowledgeable reviewers used this tool to rate the evidence for each strategy considered for inclusion in this publication. Any discrepancies between the reviewers' results were resolved through discussion.

The structure and range of possible results from the Continuum are shown in Figure 3. The Continuum has six evidence dimensions, which are listed down the left side of the figure. It has three overarching categories of evidence strength, which are listed across the top of the figure. The Continuum uses the reviewer's input for a specific program or strategy to determine the strength of evidence for each dimension and assign a corresponding strength category for each dimension. The full range of responses for each dimension is shown in Figure 3. Definitions and possible results for the six dimensions are provided in a table after the figure.

For more information about the Continuum of Evidence of Effectiveness, see CDC's 2011 publication, *Understanding Evidence Part 1: Best Available Research Evidence. A Guide to the Continuum of Evidence of Effectiveness*.

Figure 3. Continuum of Evidence of Effectiveness

	Well Supported | Supported		Promising Direction | Emerging | Undetermined			Unsupported | Harmful	
Effect	Found to be effective		Some evidence of effectiveness	Expected preventive effect	Effect is undetermined	Ineffective	Practice constitutes risk of harm
Internal validity	True experimental design	Quasi-experimental design	Non-experimental design	Sound theory only	No research No sound theory	True or quasi-experimental design	Any design with results indicating negative effect
Type of evidence/ research design	Randomized control trials and meta-analysis/ systematic review	Quasi-experimental design	Single group design	Exploratory study	Anecdotal/Needs assessment	Randomized control trials or quasi-experimental design	Any design with results indicating negative effect
Independent replication	Program replication with evaluation replication		Program replication without evaluation replication	Partial program replication without evaluation replication		Program replication with evaluation replication	Possible program replication with/ without evaluation replication
Implementation guidance	Comprehensive		Partial	None		Comprehensive	Comprehensive/ partial
External and ecological validity	Applied studies—different settings (2+)	Applied studies—similar settings (2+)	Real-world informed	Somewhat real-world informed	Non–real-world informed	Applied studies—same/different settings	Possible applied studies—similar/ different settings

Adapted figure from: Puddy, R.W. & Wilkins, N. (2011). *Understanding Evidence Part 1: Best Available Research Evidence. A Guide to the Continuum of Evidence of Effectiveness*. Atlanta, A: Centers for Disease Control and Prevention.

Table1. Possible Results and Definitions of the Six Dimensions of the Continuum of Evidence Effectiveness Tool

Dimensions and Possible Results	Definitions
Effect: The strategy's ability to reduce cardiovascular disease (CVD) or related risk factors or outcomes.	
Found to be effective	Prevention strategies that are found to be effective are those that are based on sound theory, have been evaluated in at least two well-conducted studies, and have demonstrated significant short-term or long-term preventive effects, depending on intent and design.
Some evidence of effectiveness	Some programs may not have two or more rigorous evaluations to demonstrate short-term or long-term preventive effects, but they are based on sound theory and have been rigorously evaluated, and the results indicate that they may produce preventive outcomes.
Expected preventive effect	Some programs may be grounded in theory and have been evaluated with a less rigorous design, or they may have been evaluated for short- or long-term preventive effects that are different from the outcomes of interest.
Effect is undetermined	Prevention programs that have not been evaluated or that have been evaluated poorly (with neither a true design nor a quasi-experimental design), whether or not they are based on sound theory, are considered to have undetermined effectiveness. It is not known whether these programs produce short- or long-term preventive effects.
Ineffective	Ineffective strategies are those that have been evaluated in at least two well-conducted studies and have demonstrated no significant short- or long-term outcomes in these evaluation studies.
Practice constitutes risk of harm*	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term, long-term, and unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.
Internal Validity: The extent to which the short-term and long-term outcomes of a strategy can truly be attributed to the strategy itself.	
True experimental design	True experiments are considered highest in internal validity, because participants are randomly assigned to the treatment and control conditions. This helps assess whether the program, practice, or policy is likely responsible for changes in outcomes or whether something else could be causing them. The strongest experimental designs also have multiple measurement points. These experiments are able to measure not only differences in outcomes between treatment and control groups but also changes in outcomes over time. This helps to assess whether the demonstrated effects are sustained over time.
Quasi-experimental design	Quasi-experiments are also considered to have high internal validity, although less so than true experiments. Quasi-experiments are based on sound theory and typically have comparison groups (but no random assignment of participants to condition) and/or multiple measurement points. Some quasi-experimental designs are used to evaluate policy changes or naturally occurring experiments. These evaluations may not have a comparison group but include multiple waves of observation both before and after the introduction of a treatment.

Dimensions and Possible Results	Definitions
Internal Validity: The extent to which the short-term and long-term outcomes of a strategy can truly be attributed to the strategy itself. *(continued)*	
Nonexperimental design	Relative to experimental and quasi-experimental designs, nonexperimental studies are weaker in terms of internal validity. Even though these designs are not as rigorous as true and quasi-experiments, they may still be based on sound theory and include some empirical aspects geared toward internal validity. Nonexperimental studies do not have a control or comparison group or multiple measurement points, making it difficult to attribute observed changes to the program.
Sound theory only	Prevention programs based on sound theory only are unable to establish or attribute observed changes to the program, much like those based on experimental or quasi-experimental studies. These programs are often exploratory in nature and are rooted in well-established research and subject matter expert opinion, suggesting that the program and/or its components may modify known risk or protective factors and produce preventive outcomes.
No research, no sound theory	Programs not based on research or sound theory are considered weakest of all in terms of establishing an empirical link to a preventive outcome. In the absence of research or sound theory, there is no evidence to suggest that they are likely to modify known risk/protective factors or produce preventive outcomes. Some, however, may have face validity. This type of validity is concerned with how a measure or procedure appears and whether it seems reasonably well designed and reliable. Unlike other forms of validity, face validity does not depend on established theories for support.
Any design with results indicating negative effect*	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term, long-term, and unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.
Research Design: The soundness of individual research method components.	
Randomized control trial and meta-analysis or systematic review	Randomized control trials are true experiments and considered a highly rigorous research design. They are the strongest research design for establishing a cause-and-effect relationship. Randomized control trials have a control group and randomly assign participants to the control or treatment condition. Systematic reviews collect information from a number of scientific studies on a specific topic for the purpose of summarizing, analyzing, and interpreting the overall scientific findings on that topic. A meta-analysis is a type of systematic review that uses statistical analyses to combine and analyze the data from single scientific studies on a specific topic and uses these combined findings to generate a single estimate or effect size to make more conclusive statements about the topic. The strongest reviews are conducted independently, consist of studies that were conducted independent from one another, consist of studies that are comparable, and include some form of empirical analysis to draw broader, general conclusions about the effectiveness of a strategy.

Dimensions and Possible Results	Definitions
Research Design: The soundness of individual research method components. *(continued)*	
Quasi-experimental design	If a design uses multiple groups without random assignment or includes multiple measurement points, it is considered quasi-experimental. Quasi-experimental designs are considered rigorous designs, although not as rigorous as randomized control trials because participants are not randomly assigned to treatment and control conditions and may not be equivalent from the start. In this respect, they are weaker in controlling threats to internal validity than randomized control trials.
Single-group design	The single-group design is not considered as rigorous as the randomized control trial or quasi-experimental designs because it does not include a control or comparison group. Single-group designs may also have just one post-measure or they may include pre- and post-measures.
Exploratory studies	Exploratory studies are focused on learning about a program and the phenomena it addresses. Exploratory studies are based on sound theory derived from prior research and/or knowledge from subject matter experts. The information gleaned from an exploratory study may point to risk and protective factors that are potentially important to consider in developing or refining a prevention strategy or its components. Some descriptive and observational studies may also be considered exploratory studies.
Anecdotal or needs assessment	Studies not based on empirical research or sound theory are the weakest with respect to research design. Studies that are based on anecdotal information, needs assessments, or windshield surveys are examples of this kind of research.
Any design with results indicating negative effect*	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term, long-term, and unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.
Independent Replication: Implementation and evaluation of a program by researchers or practitioners who were unaffiliated with the original program and who do not have any known conflicts of interest.	
Program replication with evaluation of replication	Programs that demonstrate the most reliability (ability to repeatedly produce the preventive effects) are those that have been replicated at least once by independent researchers or practitioners, in a similar setting to the original program, using a rigorous research design, and with high fidelity to the original program.
Program replication without evaluation of replication	Programs that demonstrate some reliability are those implemented with high fidelity to the original program and in settings that are similar to the setting of the original program. These replications may or may not be conducted by independent researchers/practitioners. Finally, these replications have not been evaluated in the same way as the original evaluation of the program.
Partial program replication without evaluation of replication	Programs that demonstrate weak reliability are those that are partially replicated and have not been evaluated. These replications may or may not be conducted by independent researchers/practitioners. Programs that are the weakest in reliability are those that are not replicated at all since there is no way to measure their reliability.

Dimensions and Possible Results	Definitions
Independent Replication: Implementation and evaluation of a program by researchers or practitioners who were unaffiliated with the original program and who do not have any known conflicts of interest. *(continued)*	
Possible program replication with or without evaluation of replication	If a program demonstrates harmful effects, it should not be replicated. In some cases, harmful effects may not have occurred during the original implementation of a prevention strategy but may occur in its replication. Evaluations may or may not have been conducted of this replication since a formal evaluation is not needed to prove harm. Once harmful effects have been associated with a program, either in the original or during a replication, no subsequent replications should be conducted.
Comprehensive or partial replication and possible evaluation with results indicating negative effect*	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term, long-term, and unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.
Implementation Guidance: The availability of any and all services or materials that could help in the implementation of a strategy in different settings.	
Comprehensive	Comprehensive guidance is the most effective way of ensuring that a program is carried out with fidelity in a different setting. This entails availability and accessibility of any products, services, or activities that facilitate proper implementation in a new setting. These products and services include training, coaching, technical assistance, support materials, organizational/systems change consultation, and manuals/guides, and may be offered by the program's developers or some other entity.
Partial indicating promising direction	For some programs, there may be some products, services, or activities to help researchers/practitioners implement them in different settings, but they may be limited in their availability and accessibility. It is important to note that since implementation support and guidance are limited for these programs, there is a chance that implementation issues may be influencing outcomes.
Partial indicating emerging direction	For some programs, there may be few resources to help researchers/practitioners implement them, but they are very be limited in their availability and accessibility. It is important to note that since implementation support and guidance are limited for these programs, there is a chance that implementation issues are influencing outcomes.
None	Programs that do not have any products, services, or activities available to help researchers/practitioners implement them in a different setting run a high risk of experiencing implementation issues. This also means there is a significant chance that implementation issues may be influencing outcomes.
Comprehensive – ineffective	Comprehensive guidance exists indicating that this strategy is ineffective in multiple settings and for different populations.
Comprehensive/Partial – harmful*	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term, long-term, and unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.

Dimensions and Possible Results	Definitions
External and Ecological Validity: Whether a program has been evaluated among diverse populations and in different contexts.	
Two or more applied studies in different settings	Programs that demonstrate the highest external and ecological validity are those that have been implemented in two or more applied ("real-world") settings that are distinct from both the original setting and each other in terms of their populations and physical/geographical locations.
Two or more applied studies in same settings	Some programs have been implemented in two or more applied ("real-world") settings that are similar to one another with similar populations. These prevention strategies demonstrate moderate external and ecological validity although not as much as those implemented in two or more settings that are different and that have different populations.
Real-world–informed	Programs that have not been implemented in applied settings may still demonstrate some external and ecological validity if they are made up of components that are consistent with an applied setting. Likewise, programs may demonstrate external and ecological validity if they are implemented in ways that mirror conditions of the "real-world."
Somewhat real-world–informed	Some programs have not been implemented in applied settings and are not structured and implemented in ways that are completely consistent with an applied setting. These prevention strategies demonstrate some external and ecological validity if some of their components and implementation approximate conditions in the "real world."
Not real-world–informed	The programs that demonstrate the least amount of external and ecological validity are those whose basic components are not consistent with an applied setting and are not implemented in ways that mirror conditions of the "real world." Although it is not known whether these programs will be effective in applied settings, there is no way to measure which aspects work well across different settings and populations or which aspects are setting-specific.
Two or more applied studies in different settings – ineffective	Programs that have been implemented in two or more applied ("real-world") settings that are distinct from both the original setting and each other in terms of their populations and physical/geographical locations, but have proven to be ineffective.
Possible applied studies in similar or different settings – harmful*	Programs that demonstrate harm in any kind of a setting, applied or otherwise, are considered harmful. In other words, the program is considered harmful regardless of whether it has been conducted in an applied setting.

*No strategies included in the *Best Practices Guide for Heart Disease and Stroke* received this rating.

Appendix D. Glossary

Best practice: A practice supported by a rigorous process of peer-review and evaluation, indicating effectiveness in improving health, reach feasibility, sustainability, and transferability, generally demonstrated through systematic reviews.

Best practices framework: A conceptual framework that includes important aspects of impact and quality to provide a common lexicon and criteria for assessing and strengthening public health practice.

Cardiac rehabilitation: A supervised program that includes physical activity, health education, and counseling to help anyone recovering from a heart attack, a heart failure, or another cardiac event that required surgery or medical care.

Clinical decision support system (CDSS): A computer-based program that assists clinicians by analyzing data within electronic health records against domain knowledge and/or evidence-based guidelines to provide prompts and reminders at the point of care.

Collaborative drug therapy management (CDTM): The partnership between qualified pharmacists and prescribing clinicians to manage a patient's drug therapy, as defined within the context of a collaborative practice agreement.

Collaborative practice agreements (CPAs): A strategy to expand the pharmacist's role in team-based care with other providers and improving health outcomes. The range of services authorized under each state's practice act varies.

Community health worker (CHW): The American Public Health Association defines a CHW as a "frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community being served. This trusting relationship enables the CHW to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery. In addition, a CHW builds individual and community capacity to improve health outcomes by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, the provision of social support and advocacy."

Community paramedicine: An emerging field in health care where emergency medical service providers, including emergency medical technicians and paramedics, operate in expanded roles to increase access to primary care and facilitate appropriate use of emergency care resources.

Community Preventive Services Task Force (Task Force): An independent, nonfederal, unpaid panel of public health and prevention experts that provides evidence-based findings and recommendations about community preventive services, programs, and policies to improve health. Findings are summarized within the Guide to Community Preventive Services. The Task Force issues findings based on systematic reviews of effectiveness and economic evidence that are conducted with a methodology developed by the Community Guide Branch, which is based at CDC.

Continuum of Evidence of Effectiveness: A tool to describe and assess various components in determining the strength of the best available research evidence on a program, practice, or policy's effectiveness. It illuminates the strengths and weaknesses of the research evidence and offers guidance on next steps for consideration. It consists of six dimensions, each of which addresses a specific aspect of the best available research evidence (e.g., effect, internal validity, research design, independent replication, implementation guidance, external and ecological validity).

Effect: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. Effectiveness is important because it tells us whether a prevention strategy is having an impact on the outcomes of interest. The most effective strategies produce preventive effects in the short term, the long term, or both. The effectiveness of a strategy is based on its intent and design.

Emergency medical services (EMS): A system that provides emergency medical care. Once it is activated by an incident that causes serious illness or injury, the focus of EMS is emergency medical care of the patient.

External ecological validity: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. External validity refers to whether a program, practice, or policy can demonstrate preventive effects among a wide range of populations and contexts. Ecological validity refers to whether the program components and procedures approximate the "real-life" conditions specific to a specific setting.

Health care system interventions: Effective delivery and use of quality care and preventive services in clinical settings.

Health disparity: A type of health difference that is linked with social, economic, and/or environmental disadvantage and other characteristics that are linked to discrimination or exclusion.

Health equity: An ethical, human rights, and social justice principle that calls for ensuring that all people can attain their highest level of health, regardless of age, race, ethnicity, or geography.

Health inequity: A health difference or disparity that is unfair, unjust, and avoidable.

Implementation guidance: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This includes any and all services and/or materials that aid in the implementation of a prevention strategy in a different setting, including but not limited to "training, coaching, technical assistance, support materials, organizational/systems change consultation, and manuals/guides."

Independent replication: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This helps determine whether a prevention program can be replicated and implemented with other participants and produce the same effects. Independent replications are not used to determine whether a program can be successfully generalized to a broad variety of settings or populations.

Internal validity: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This refers to the extent to which the short- and/or long-term outcomes of a program, practice, or policy can truly be attributed to it or whether these outcomes could have been caused by something else.

Lifestyle intervention: A program that targets the modifiable risk factors associated with a particular disease.

Leading practice: A practice supported by peer-review, indicating effectiveness and some combination of evidence of reach, feasibility, sustainability, and transferability, generally demonstrated through non-systematic reviews of published literature.

Medication therapy management (MTM): A patient-centered, comprehensive approach in which community pharmacists use interventions that engage the patient and prescriber on a frequent and consistent basis. MTM includes five core elements: medication therapy review, a personal medication record, a medication-related action plan, intervention and/or referral to a physician or other health care professional, and documentation and follow-up.

Out-of-pocket cost: The direct payment from the patient for health services that are not reimbursed by insurance. This may include deductibles, coinsurance, or copayments for care that may be partly covered or not covered at all by insurance.

Public access defibrillation: The support and use of available and accessible automated external defibrillators outside of a hospital setting by knowledgeable bystanders in the event of cardiac arrests.

Rapid Synthesis and Translation Process (RSTP) Framework: A six-step process developed by and for CDC's Division of Violence Prevention in collaboration with partners in order to expedite the transfer of research knowledge to practitioners, specifically to prevent violence. The six steps include (1) soliciting topics from end users, (2) scanning findings, (3) sorting for relevance, (4) synthesizing results, (5) translating for end users, and (6) soliciting end user expert reviews.

Self-measured blood pressure monitoring (SMBP): The regular measurement of blood pressure by the patient outside the clinical setting, either at home or elsewhere. It is sometimes known as "home blood pressure monitoring."

Sodium reduction: A decrease in sodium intake through individual lifestyle modifications and through changes at the environmental, industry, and policy levels.

Stroke center certification: A recognition of a health care facility's ability to meet certain standards to support better outcomes for stroke care, which is attained through The Joint Commission or a nationally certifying organization. Three levels of stroke certification include primary stroke center certification, comprehensive stroke center certification, and acute stroke-ready hospitals certification.

Tailored pharmacy-based interventions to improve medication adherence: A two-step approach used in community and health system pharmacies to help patients take their medications as prescribed. First, medication adherence barriers are identified through patient interviews or assessments tools. Pharmacists then use the findings to provide tailored guidance and tailored services to remove or reduce identified barriers.

Team-based care: The provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively with patients and their caregivers—to the extent preferred by each patient—to accomplish shared goals within and across settings to achieve coordinated, high-quality care.

Telehealth: The delivery of health care services to patients through technology, such as mobile phones or computers.

Type of evidence or research design: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. The nature of the design of the research study determines whether and how to answer the research questions related to effectiveness. The more rigorous the research design, the higher its internal validity and the more likely outcomes can be attributed to the program, practice, or policy.

Workplace health promotion: A coordinated and comprehensive set of activities and strategies for promoting and protecting health at the workplace. These can include programs, policies, benefits, environmental supports, and links to the surrounding community.

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