



# HEARTS IN THE AMERICAS

Evaluation  
framework  
for **continuous  
quality  
improvement**  
in primary care  
centers





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Washington, D.C., 2025



# **PAHO**



HEARTS in the Americas: Evaluation framework for continuous quality improvement in primary care centers

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# Abbreviations and acronyms

CVD	cardiovascular disease
HAU	higher-level administrative unit
NCD	noncommunicable disease
PAHO	Pan American Health Organization
PCC	primary care center
PHC	primary health care



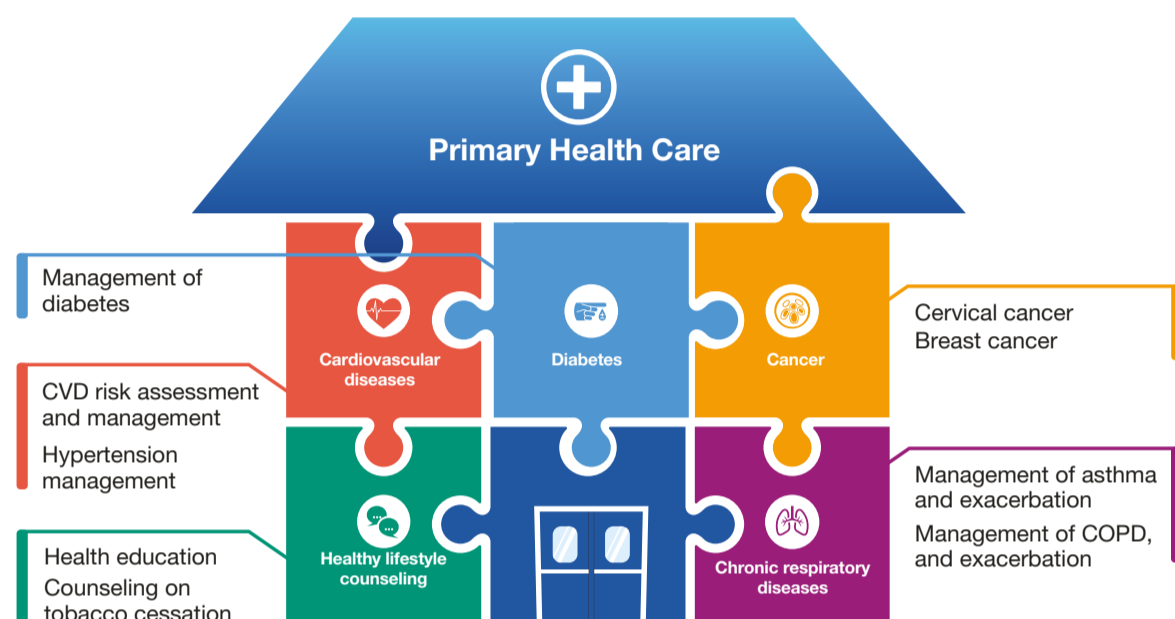
# HEARTS in the Americas for better care for noncommunicable diseases in primary care settings

HEARTS in the Americas is an operational framework that will contribute to increasing equitable access to comprehensive NCD management in primary health care (PHC) under PAHO's new initiative "Better Care for NCDs: Accelerating Actions in Primary Health Care."



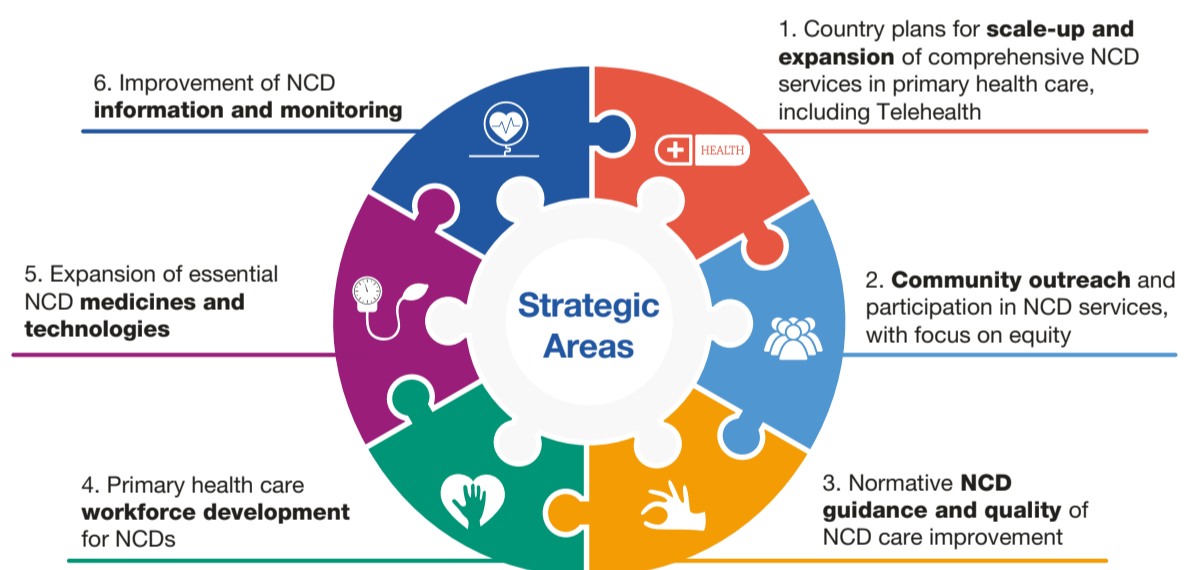
## Better Care for NCDs Accelerating Actions in Primary Health Care

Expanding equitable access to integrated and comprehensive NCD services in primary health care by:



- ✓ Strengthening the capacity of health authorities to plan and implement this approach.
- ✓ Increasing the capacity of health services to deliver comprehensive quality screening, diagnosis, treatment, and follow-up.
- ✓ Strengthening data collection and monitoring.

## Multidisciplinary approach focused on six strategic areas:



## HEARTS in the Americas A platform for expanding comprehensive NCD services

data driven implementation science governance technologies building capacity  
 access cooperation community technologies protocols  
 normative guidance protocols capacity building protocols access  
 standardization team-based care clinical pathways equity  
 governance capacity building quality medicines equity  
 protocols country ownership equity

Source: Pan American Health Organization. HEARTS in the Americas: Quality Improvement for Primary Health Care Centers. Washington, D.C.: PAHO; 2024. Available from: <https://iris.paho.org/handle/10665.2/59308>.



# Introduction

[HEARTS in the Americas](#), the regional adaptation of the World Health Organization's [Global HEARTS Initiative](#) (1), is a continuous quality improvement strategy for the clinical management of hypertension and cardiovascular risk, to be mainly implemented in primary health care (PHC) services. The HEARTS initiative is fully aligned with PAHO's *Initiative to Scale Up and Accelerate Integration of Comprehensive NCD Services in Primary Health Care 2023-2030* (2), and, in fact, is spearheading that initiative.

Management of hypertension and cardiovascular risk is a key tracer of access to care for chronic diseases in PHC and of the quality of care. The **hypertension treatment cascade** is an important concept for assessing the magnitude of the treatment gaps for this condition, the performance of the health system, and the interventions needed to improve its control in the population. For example, the prevalence of awareness of diagnosed hypertension, which is sometimes used as a proxy for program coverage, is an indicator of access to clinical preventive care. This reflects the capacity of the health system to detect and diagnose people with hypertension in a timely manner. Also, the rate of control of hypertension among those receiving treatment is an indicator of the quality of care, reflecting the system's capacity to achieve the required clinical standards.

HEARTS in the Americas is a multicomponent, evidence-based intervention that uses a clinical approach to hypertension and cardiovascular risk as a gateway to improve integrated management of cardiovascular disease (CVD) prevention and treatment in PHC services. The HEARTS approach and principles can be applied to the clinical management and the coordination of other prevalent chronic conditions, especially CVDs, including cerebrovascular, renal, and metabolic diseases, which represent the highest burdens of disease in all countries of the Region of the Americas.

The systematic implementation of the **drivers for hypertension control and cardiovascular risk management** (3), including their monitoring and evaluation, improves hypertension coverage and control indicators and is at the core of the HEARTS in the Americas quality improvement approach. It is estimated that for every 1% increase in hypertension control in the Region of the Americas, CVD mortality per 100 000 population (mainly associated with ischemic heart disease and stroke) is reduced by approximately 3% (4). If, in addition to hypertension, cardiovascular risk is addressed effectively and comprehensively, as outlined in HEARTS, a greater and more widespread impact can be achieved, with fewer complications from diabetes, chronic kidney disease, and other conditions.

## Objective of the HEARTS quality improvement evaluation in the Americas

The **HEARTS quality improvement evaluation** focuses on the systematic and standardized evaluation of the **fidelity, feasibility, acceptability, and effectiveness** of the interventions promoted by the program. HEARTS in the Americas understands quality assessment as a non-punitive process of self-evaluation, learning, and organizational commitment aimed at identifying barriers to implementation and developing innovative, effective, and sustainable local solutions to improve process quality and health outcomes.

This publication is designed to support PHC teams, particularly primary care institutions that provide care to a defined population or territory, in the context of the HEARTS in the Americas program, by facilitating understanding of the methodology and providing standardized and practical tools for its implementation.

The main users of this publication are the quality committees or quality groups of the primary care centers (PCCs) that have adopted HEARTS. However, it is also aimed at local health teams responsible for the clinical and administrative management of PCCs, which can use it to carry out a quality self-evaluation. Likewise, other national or subnational entities in each country's health system can use it for external evaluation.

Furthermore, the general principles of the **HEARTS quality improvement evaluation** can be applied in a creative and integrated way to the health care of other chronic conditions that are routinely managed in PHC services.





# **1. Programmatic framework for the HEARTS in the Americas quality improvement evaluation**

# 1.1

## HEARTS in the Americas: a new paradigm in the prevention of cardiovascular disease

The trend toward a reduction in cardiovascular mortality in the Americas has stagnated and even reversed in many countries. HEARTS in the Americas represents a paradigm shift in the comprehensive approach to cardiovascular disease (CVD) prevention, focusing on hypertension diagnosis and treatment as the main risk factor for CVD.



### THE URGENCY

In the Region of the Americas, more people die each year from cardiovascular diseases than from any other cause, and **HYPERTENSION** is the main risk factor.

### THE OPPORTUNITY



↑ 1%

**HYPERTENSION** control the population level



↓ 2.9%

**ISCHEMIC HEART DISEASE MORTALITY**



↓ 2.4%

**STROKE MORTALITY**



### THE PROBLEM

#### ACCESS and QUALITY gaps

- ✗ Inadequate diagnosis, nonstandardized, and nonvalidated blood pressure measuring devices (BPMs).
- ✗ Physician-based care with a focus on specialty care.
- ✗ Deficient and nonstandardized staff training and education.
- ✗ Discretionary treatments, highly variable, and according to physician preferences.
- ✗ Interventions based on extensive and complex clinical guidelines.
- ✗ Lack of a system for monitoring and evaluation based on quality improvement.

4 out of 10 adults have

**HYPERTENSION (BP ≥140/90)**

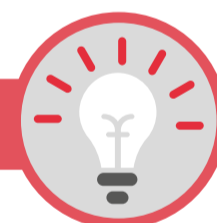


Health System

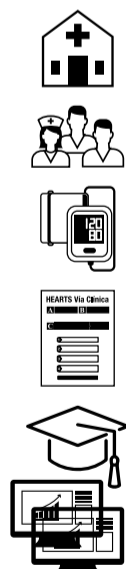
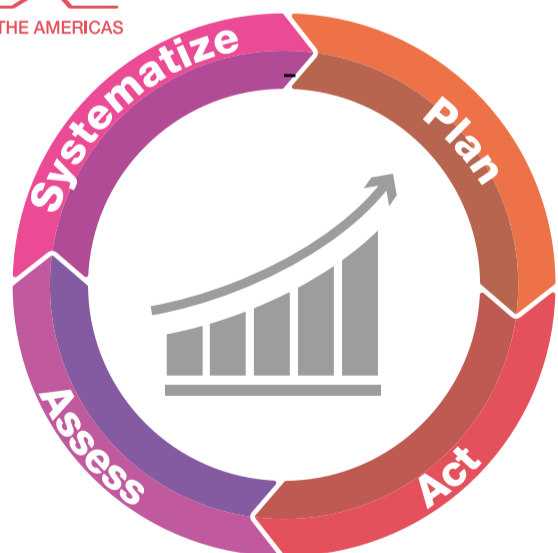


- NOT diagnosed
- Diagnosed but NOT treated
- Treated but NOT controlled
- Treated and controlled

### THE SOLUTION



**HEARTS**  
IN THE AMERICAS



- ✓ Comprehensive strategy focused on primary health care.
- ✓ Health care based on healthcare team, with nonphysician professionals playing a more prominent role.
- ✓ Standardized diagnosis using clinically validated BPMs.
- ✓ Clinical pathway containing a standardized treatment protocol with specific medications and doses.
- ✓ Standardized training and education strategy oriented to change practice.
- ✓ System for monitoring and evaluation containing structure, process, and result indicators, based on continuous quality improvement.

#### For more information:

Martinez R, Soliz P, Campbell N, Lackland DT, Whelton PK, Orduñez P. Association between population hypertension control and ischemic heart disease and stroke mortality in 36 countries of the Americas, 1990–2019: an ecological study. *Rev Panam Salud Publica*. 2022;46:e143. Available from: <https://doi.org/10.26633/RPSP2022.143>.

Orduñez P, Campbell N, Giraldo Arcila GP, Angell SY, Lombardi C, Brettler JW, et al. HEARTS in the Americas: innovations for improving hypertension and cardiovascular disease risk management in primary care. *Rev Panam Salud Publica*. 2022;46:e96. Available from: <https://doi.org/10.26633/RPSP2022.96>.

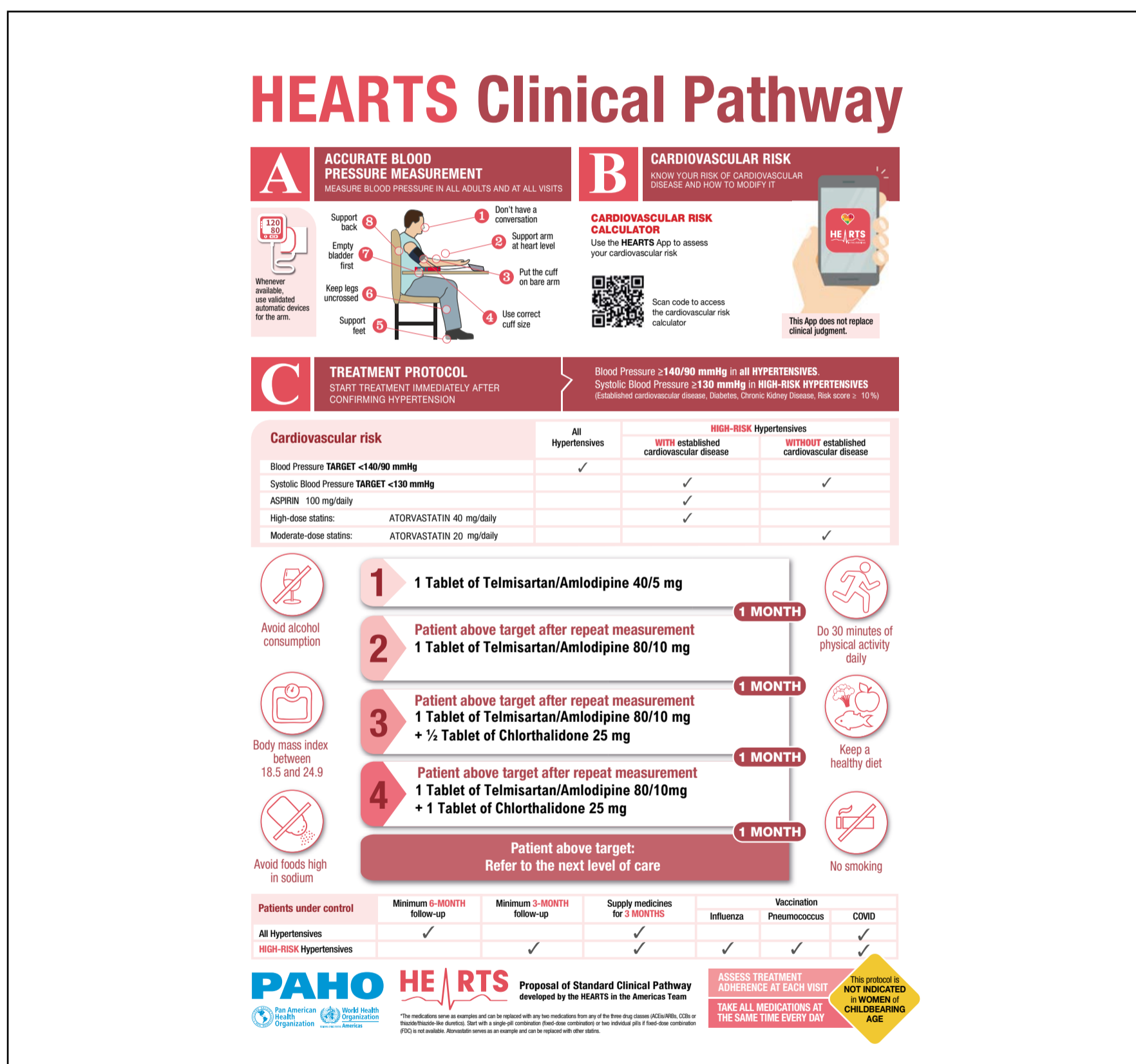
Source: Pan American Health Organization. HEARTS in the Americas: Quality Improvement for Primary Health Care Centers. Washington, D.C.: PAHO; 2024. Available from: <https://iris.paho.org/handle/10665.2/59308>.

The clinical tools that the HEARTS initiative makes available to healthcare teams can be consulted in detail in [HEARTS in the Americas. Compendium of essential clinical tools 2023](#) (3).

### 1.2.1 The HEARTS in the Americas clinical pathway

The *HEARTS clinical pathway* (Figure 1) (5) is the standardized tool that synthesizes and harmonizes the drivers for hypertension control and cardiovascular risk management (3) and the recommendations contained in the WHO Guideline for the pharmacological treatment of hypertension in adults (6). Each country must define, and then institutionalize, the clinical pathway that works best in its national context, and ensure that the necessary resources and mechanisms are in place for its systematic implementation.

Figure 1. HEARTS in the Americas hypertension clinical pathway



ARB: angiotensin receptor blocker; CCB: calcium channel blocker; ACEi: angiotensin-converting enzyme inhibitor.

#### For more information:

Rosende A, DiPette D, Brettler J, Rodríguez G, Zúñiga E, Connell K, et al. HEARTS in the Americas appraisal checklist and clinical pathway for comprehensive hypertension management in primary care. *Rev Panam Salud Publica*. 2022;46:e125. Available from: <https://iris.paho.org/handle/10665.2/56271>.

Rosende A, DiPette DJ, Martínez R, Brettler JW, Rodríguez G, Zúñiga E, et al. HEARTS in the Americas clinical pathway. Strengthening the decision support system to improve hypertension and cardiovascular disease risk management in primary care settings. *Front Cardiovasc Med*. 2023;10:1102482. Available from: <https://doi.org/10.3389/fcvm.2023.1102482>.

Source: Pan American Health Organization. HEARTS in the Americas: Hypertension clinical pathway. Washington, D.C.: PAHO; 2021. Available from: <https://www.paho.org/en/documents/clinical-pathway-standard>.

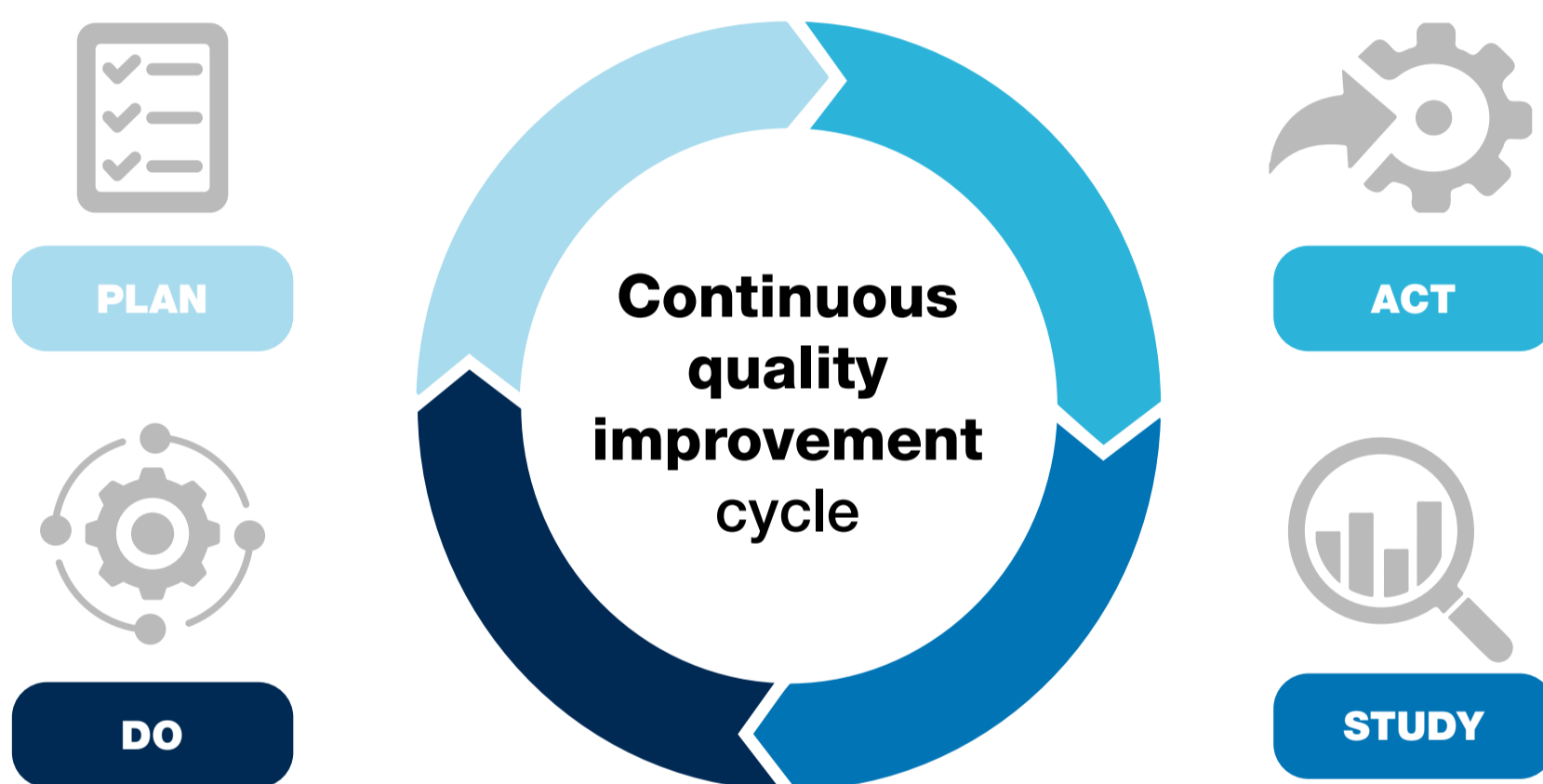
## Quality improvement methodology for primary care centers

The continuous quality improvement promoted by HEARTS in the Americas seeks to strengthen the capacity of PHC services, particularly primary care institutions, for the timely detection, adequate treatment, and effective control of hypertension and other CVD risk factors in a defined population or territory (7). For a detailed understanding of the HEARTS quality improvement approach, see the document [HEARTS IN THE AMERICAS. Quality Improvement for Primary Health Care Centers](#).

### 1.3.1 Apply the continuous quality improvement cycle

The HEARTS quality improvement methodology is operationalized through the application of the continuous quality improvement cycle, which is based on the systematic and standardized implementation of drivers to improve the control of arterial hypertension and reduce cardiovascular risk (3). The plan-do-study-act (PDSA) cycle (8) involves planning the change, implementing it, studying the results, and initiating a new work cycle based on the organizational learning acquired (Figure 2).

**Figure 2.** Continuous quality improvement



The plan-do-study-act (PDSA) cycle. Adaptation of the scientific method for action-oriented organizational learning.

Source: Associates in Process Improvement. The Model for Improvement. Available from: <https://www.ihl.org/resources/how-improve-model-improvement>.

#### 1.3.1.1 Continuous quality improvement cycles

It is recommended to implement **improvement cycles** with clear and defined goals limited to a **six-month period**, considering opportunities to make necessary adjustments and strengthen the commitment of the PHC team. An improvement cycle of more than six months makes it difficult to collect information and take timely corrective action.

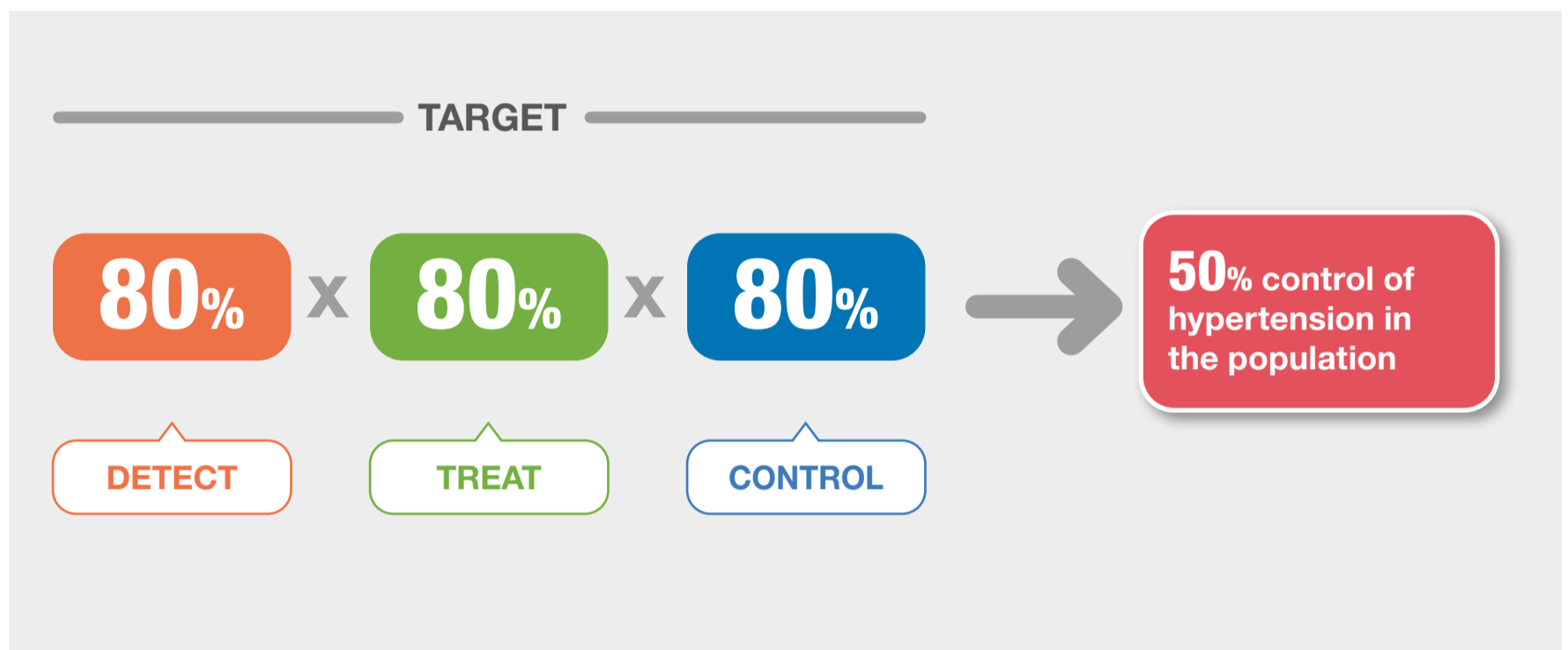


### 1.3.2 Forming the primary care center’s quality committee, defining its mission, and setting goals

A detailed description of the recommendations and steps for establishing the health center’s quality committee can be found in section 2.4 of *Quality Improvement for Primary Care Centers* (7).

The PCC’s quality committee is tasked with implementing a plan to detect at least 80% of persons with hypertension in the adult population (aged 18 years or older) under its responsibility, treat at least 80% of those diagnosed with hypertension, and effectively control at least 80% of those treated. **This “80 x 80 x 80” target** would make it possible to achieve **50% control of hypertension in the population**. Although this remains a modest performance, it is significantly better than the control rates obtained by most countries in the Region ( $\approx 35\%$ ) (4).

Increasing hypertension control in the Region from the current 35% to 50% could prevent close to half a million deaths and 3 million cardiovascular events.



### 1.3.3 Systematically implement the HEARTS in the Americas drivers

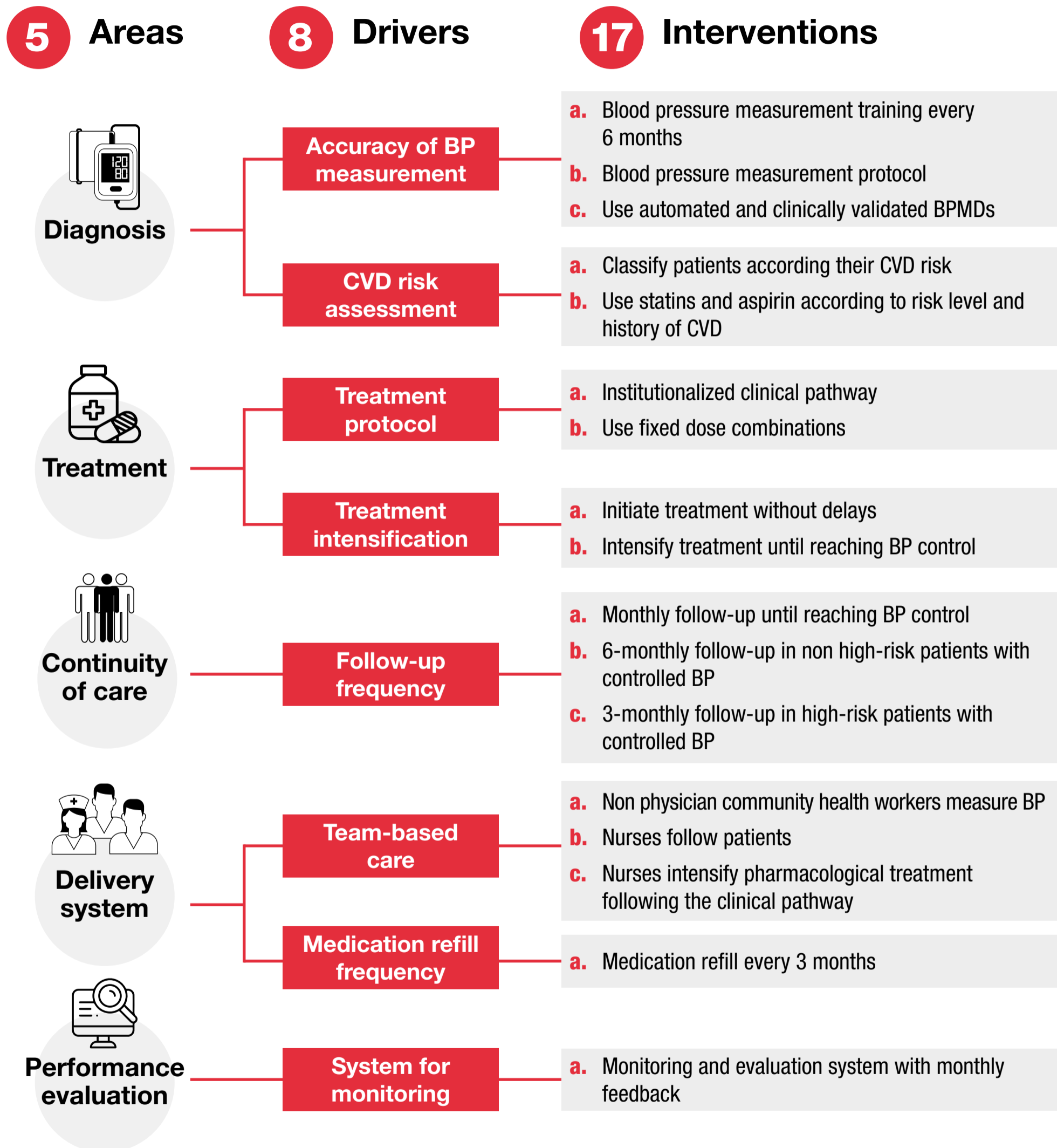
The HEARTS in the Americas quality improvement methodology focuses on the systematic and standardized implementation of eight clinical and management processes, referred to as “drivers,” aimed at reorganizing health services to improve hypertension control and reduce cardiovascular risk (3).

Section 1.4.3.1 of this publication offers a graphic presentation of the eight drivers in five areas. The eight drivers contain 17 interventions to improve health services. All of them are evidence-based and focus on optimizing the care process for people with elevated blood pressure, from detection to control and management of cardiovascular risk.

[Annex 1](#) details each driver, the proposed problem to be solved, and recommended interventions for effective implementation.

### 1.3.3.1 Key interventions for the management of cardiovascular disease risk

Improving clinical processes is a central element in closing quality gaps in the delivery of health services and positively impacting coverage and control indicators. For this reason, the HEARTS Innovation Group has defined key interventions to achieve this.



BP: blood pressure; BPMDs: blood pressure measuring devices; CVD: cardiovascular disease.

**For more information:**

Brettler JW, Giraldo Arcila GP, Aumala T, Best A, Campbell N, Cyr S, et al. Drivers and scoring methods for improving hypertension control in primary care clinical practice: recommendations from the HEARTS innovation group in the Americas. *Lancet Reg Health Am.* 2022;46:e56. Available from: <https://doi.org/10.1016/j.lana.2022.100223>.

Source: Pan American Health Organization. HEARTS in the Americas: Quality Improvement for Primary Health Care Centers. Washington, D.C.: PAHO; 2024. Available from: <https://iris.paho.org/handle/10665.2/59308>.



## **2. HEARTS in the Americas quality improvement evaluation**

## Objective

The HEARTS in the Americas quality improvement evaluation promotes the strengthening of a culture of quality among PHC personnel and institutions. Through systematic evaluation, PHC teams themselves take the lead in identifying barriers to access and quality care, in searching for effective solutions to overcome these limitations, and in monitoring and evaluating the program's implementation.

The results of the quality evaluation should be shared with the PHC team and the community they serve. It is important to consider the contributions and proposals made by the health team and the community, who should be involved in designing solutions to the identified quality gaps.

## Types of evaluation

The HEARTS quality improvement evaluation is primarily designed to be conducted by the PCCs implementing the program. When necessary, this can also be done by national or subnational entities or authorities. Accordingly, there are two types of evaluation: **quality self-evaluation and external evaluation**.

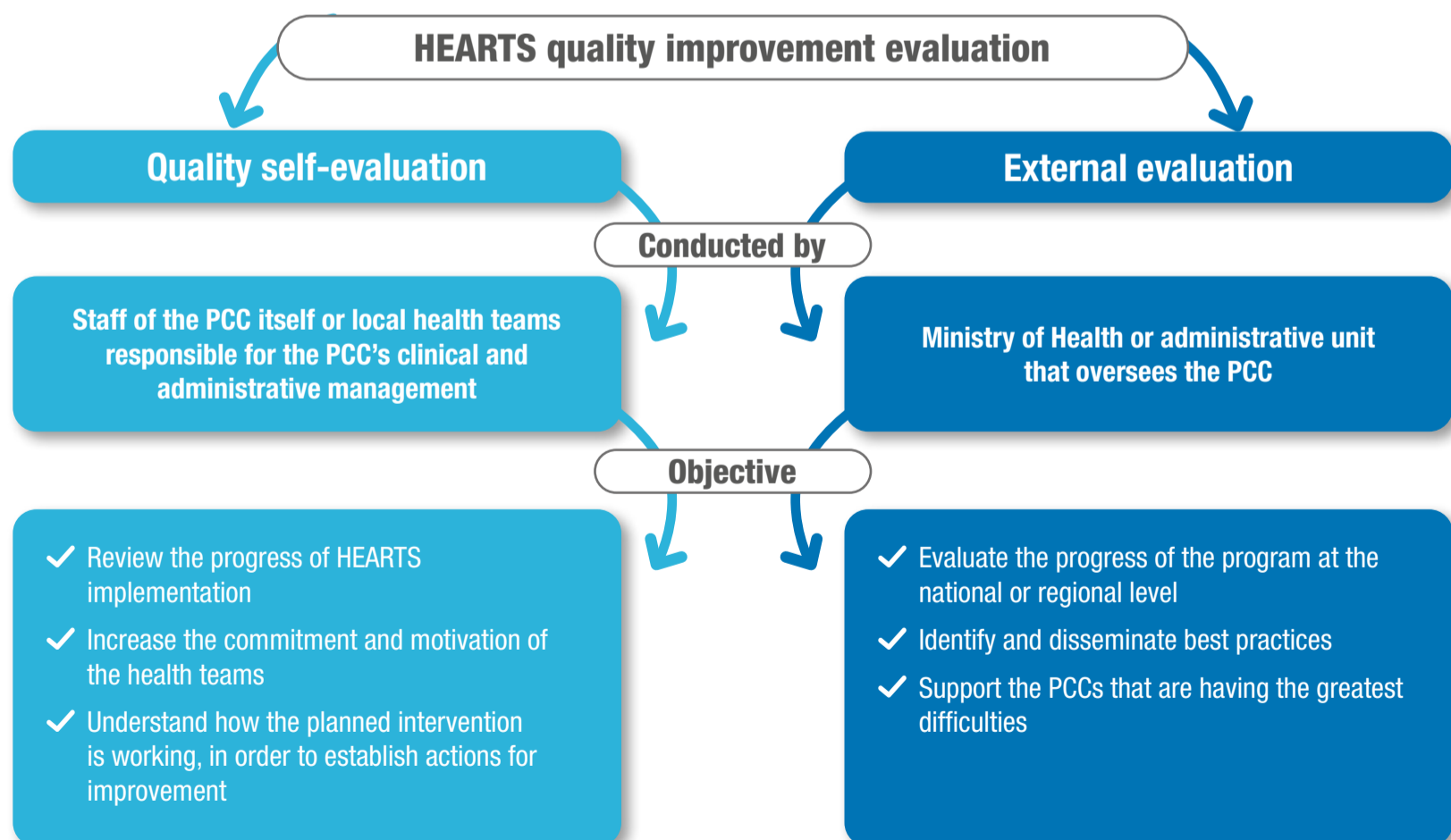
**Quality self-evaluation** is carried out by the PCC's personnel. It should be applied systematically, frequently, and in standardized manner in order to review the progress of HEARTS implementation. This tool helps maintain the initiative, increase the commitment and motivation of health teams, and show how the planned intervention is functioning, with a view to taking actions for improvement.

Depending on how the health services network is organized in each country, the quality self-evaluation can also be conducted by health teams, local management teams, or polyclinics with PCCs implementing the HEARTS program.

The **external evaluation** should be carried out by the Ministry of Health or a higher administrative unit (HAU) at the subnational level (provincial, departmental, district, municipal, etc.). It is complementary to the internal evaluation and does not replace it. Its objective is to evaluate the progress of the program at the national or regional level, identify and disseminate best practices, and support PCCs facing the greatest difficulties.

In order to avoid duplication or an overload of work, the HEARTS quality improvement evaluation (either quality self-evaluation or external evaluation) should be aligned with other existing evaluation processes or combined with them when appropriate.

**Figure 3.** Types of evaluation



PCC: primary care center.


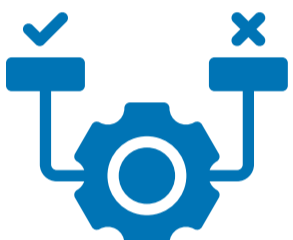


Source: PAHO.

## 2.3

# Evaluation domains and measurement instruments

The HEARTS in the Americas quality improvement evaluation covers the entire spectrum of program implementation: 1) fidelity, 2) feasibility, 3) acceptability, and 4) effectiveness.

**Table 1.** Evaluation domains for HEARTS in the Americas quality improvement

Domain	Operational definition	Information sources	Measurement instruments
 <p><b>1. Fidelity</b></p>	Degree of adherence or completeness with which the PCC has implemented recommendations on the drivers for hypertension control and cardiovascular risk management (8).	<ul style="list-style-type: none"> <li>- Observation</li> <li>- Checklists</li> <li>- Self-reporting</li> </ul>	<b>HEARTS in the Americas Maturity Index</b>
 <p><b>2. Feasibility</b></p>	Extent to which implementation of the HEARTS clinical pathway (5) is optimizing and facilitating the delivery of care by the PCC team.	<ul style="list-style-type: none"> <li>- Surveys and questionnaires</li> <li>- Administrative data</li> </ul>	<b>HEARTS in the Americas Feasibility Scale</b>
 <p><b>3. Acceptability</b></p>	Degree to which the PCC team accepts, is satisfied with, or likes the implementation of the HEARTS clinical pathway (5).	<ul style="list-style-type: none"> <li>- Surveys and questionnaires</li> <li>- Qualitative or semi-structured interviews</li> <li>- Administrative data</li> </ul>	<b>HEARTS in the Americas Acceptability Scale</b>
 <p><b>4. Effectiveness</b></p>	Degree to which HEARTS implementation has improved program coverage and hypertension control, based on evaluated results.	<ul style="list-style-type: none"> <li>- Administrative data</li> <li>- Self-reporting</li> </ul>	<b>HEARTS in the Americas Performance Index</b>

PCC: primary care center.

Source: PAHO.



### 2.3.1 Implementation fidelity

“Implementation fidelity” is the degree to which an intervention is implemented as prescribed in the original protocol (9). In the case of HEARTS, the **Maturity Index** uses a scoring method to provide a detailed assessment of the degree of adherence or completeness with which the PCC has implemented the 17 recommendations on the drivers for hypertension control and cardiovascular risk management.

The resulting score ranges from 1 to 21 points, with five levels. Level 1 reflects low maturity, while level 5 indicates high maturity (Table 2):

**Table 2.** HEARTS Maturity Index

<b>Incipient</b>				<b>Mature</b>
<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
<b>&lt;7</b>	<b>7–10</b>	<b>11–14</b>	<b>15–18</b>	<b>19–21</b>

Levels indicate implementation from the lowest level (level 1: incipient) to the highest (level 5: mature).

*Source:* Prepared by the authors, based on Pan American Health Organization. HEARTS in the Americas: Quality Improvement for Primary Health Care Centers. Washington, D.C.: PAHO; 2024. Available from: <https://iris.paho.org/handle/10665.2/59308>.

The Maturity Index is calculated by verifying the degree of compliance with the implementation of each improvement intervention in the practice of a specific PCC, comparing it to the compliance threshold defined as the quality standard for each intervention.

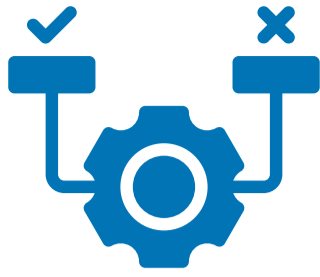
[Annex 2](#) facilitates verification of the implementation level for each of the 17 interventions recommended by the program. Systematic application of this guide will provide the scores to calculate the HEARTS Maturity Index, using the form below (Table 3).

**Table 3.** HEARTS Maturity Index calculation form

Drivers of hypertension control	Recommendations for implementation	Objectives	Score (points) Total = 21
<b>Diagnosis</b>	<b>1. Accuracy of blood pressure (BP) measurement</b>		3
	<b>1.a</b> Establish processes to train all relevant personnel in BP measurement every six months.	≥90%	1
	<b>1.b</b> Establish standardized BP measurement protocols, including patient preparation and BP re-measurement if the first reading is high.	≥90%	1
	<b>1.c</b> Implement exclusive use of automatic BPMDs validated for clinical practice.	≥90%	1
	<b>2. CVD risk assessment</b>		2
	<b>2.a</b> Assess CVD risk in all patients with hypertension to establish BP target and frequency of follow-up.	≥80%	1
	<b>2.b</b> Use a combination of BP medications, statins, and acetylsalicylic acid (as needed) in patients at high risk of CVD, including those with diabetes or chronic kidney disease.	≥80%	1
<b>Treatment</b>	<b>3. Standardized treatment protocol</b>		2
	<b>3.a</b> Use a standardized treatment protocol, with specific drugs and doses.	Implemented	1
	<b>3.b</b> Follow an established protocol with medications in fixed-dose combinations.	Implemented	1
	<b>4. Treatment intensification</b>		2
	<b>4.a</b> Initiate pharmacological treatment immediately after AHT diagnosis is confirmed.	≥70%	1
	<b>4.b</b> Medication should be added or intensified according to the standardized protocol if BP is ≥140/90 mmHg or if SBP is ≥130 mmHg in high-risk patients.	≥80%	1
<b>Continuity of care and follow-up</b>	<b>5. Continuity of care and follow-up</b>		3
	<b>5.a</b> Follow-up of elevated BP every two to four weeks if uncontrolled.	≥80%	1
	<b>5.b</b> Follow-up every six months in all patients with stable and well-controlled BP.	≥80%	1
	<b>5.c</b> Follow-up every three months in all patients with high BP and high CVD risk, including those with diabetes or chronic kidney disease.	≥80%	1
<b>Delivery system</b>	<b>6. Team-based care and task shifting</b>		3
	<b>6.a</b> BP measured by a properly trained and certified non-medical health worker.	≥90%	1
	<b>6.b</b> BP follow-up by a non-medical health worker under supervision and following a protocol.	≥70%	1
	<b>6.c</b> Individual medication titration by a non-medical health worker under supervision and following a protocol.	≥70%	1
	<b>7. Medication refill frequency</b>		3
	<b>7.a</b> Medication refill frequency is standardized for all BP medication prescriptions.	Prescription refill every three months	3 (prescription refill every 2 months = 2; prescription refill every month = 1)
<b>Performance evaluation system</b>	<b>8. Performance evaluation and feedback system</b>		3
	<b>8.a</b> Implement a performance evaluation with monthly feedback to facilitate monitoring, avoid substantial deviations, and promote timely programmatic adjustments. (Note: evaluation and feedback every two months may be acceptable for small centers; evaluation every three months is the minimum acceptable frequency).	Monthly feedback on results	3 (every two months = 2; every three months = 1)

AHT: arterial hypertension; BPMD: blood pressure measuring device; CVD: cardiovascular disease; SBP: systolic blood pressure.

Source: Brettler JW, Giraldo Arcila GP, Aumala T, Best A, Campbell NRC, Cyr S et al. Drivers and scorecards to improve hypertension control in primary care practice: Recommendations from the HEARTS in the Americas Innovation Group. Rev Panam Salud Publica. 2022;46:e56. Available from: <https://doi.org/10.26633/RPSP.2022.56>.



### 2.3.2 Feasibility

“Feasibility of implementation” is the degree to which an intervention or set of interventions can be successfully used or implemented in a given setting (9). It is recommended to apply the HEARTS Feasibility Scale (Table 4), an assessment tool adapted for HEARTS based on the “feasibility of intervention measure” (10). The HEARTS Feasibility Scale refers specifically to the degree to which implementation of the [HEARTS Clinical Pathway](#) is optimizing and facilitating the care provided by the primary care team.

**Table 4.** HEARTS Feasibility Scale

As a healthcare professional or worker in a primary care center (PCC) that is implementing the HEARTS program, please indicate your level of agreement or disagreement with the following statements:

	Completely disagree	Disagree	Agree	Completely agree
1. The HEARTS clinical pathway is a practical tool that facilitates the comprehensive management of people with hypertension and cardiovascular risk.	1	2	3	4
2. The training I have received allows me to accurately measure the blood pressure of all persons served.	1	2	3	4
3. The HEARTS clinical pathway is facilitating the use of statins and aspirin in people in need.	1	2	3	4
4. Following the HEARTS clinical pathway has made it easier for me to initiate treatment immediately in all people with hypertension.	1	2	3	4
5. For people with hypertension who are not meeting control targets, I consider it feasible to follow up within a period of no more than 4 weeks and to intensify treatment until their blood pressure is controlled.	1	2	3	4

*Note:* Weighting of the Feasibility Scale: Each of the answers is assigned a score ranging from 1 to 4. After applying the scale, the evaluation team will use [Annex 3](#) to report on: 1) the total number of health professionals or workers who completed the scale; and 2) for each question, the total number of responses in each category.

Source: PAHO.

The tool will automatically calculate the total score for each possible answer and the final result of the Feasibility Scale, expressed as a percentage.

**An overall result of  $\geq 60\%$  is considered adequate feasibility.** Lower scores require identification of barriers, analysis of causes, and formulation of proposals for improvement.





### 2.3.3 Acceptability

“Acceptability” refers to how the people involved perceive the implementation of a practice or action aimed at improvement: whether it is “agreeable, palatable, or satisfactory” (9). The following Acceptability Scale (Table 5), designed for health personnel implementing HEARTS in PCCs, was developed based on the “acceptability of intervention measure” (10). The Acceptability Scale refers specifically to the degree of acceptance of the HEARTS clinical pathway as a clinical and administrative management tool.

**Table 5.** HEARTS Acceptability Scale

As a healthcare professional or worker in a primary care center (PCC) implementing the HEARTS program, please rate your level of agreement or disagreement with the following statements:

	Completely disagree	Disagree	Agree	Completely agree
1. The HEARTS clinical pathway has positively influenced my attitude to initiating drug treatment immediately in all individuals with blood pressure >140/90 mmHg.	1	2	3	4
2. I feel more confident administering treatment to people with hypertension because the HEARTS clinical pathway defines the specific medications and doses for each step.	1	2	3	4
3. I consider it very positive that the nursing team or other trained personnel are allowed to measure blood pressure.	1	2	3	4
4. I consider it very positive that, following the HEARTS clinical pathway and under supervision, the nursing team can intensify pharmacological treatment in individuals whose blood pressure is not within the target range.	1	2	3	4
5. Initiating hypertension treatment with two drugs (in separate pills or in a single pill) results in better and faster control of people with hypertension.	1	2	3	4
6. The HEARTS clinical pathway facilitates comprehensive care for the hypertensive patient, making care more practical and the workload more manageable.	1	2	3	4

*Note:* Weighting of the Acceptability Scale: Each of the answers is assigned a score ranging from 1 to 4. After the scale has been applied, the evaluation team will use [Annex 3](#) to report: 1) the total number of health professionals or workers who completed the scale; and 2) for each question, the total number of responses in each category.

Source: PAHO.

The tool will automatically calculate the total score for each possible answer and the final result of the Acceptability Scale, expressed as a percentage.

**An overall result of ≥60% is considered adequate acceptability.** Lower scores require identification of barriers, analysis of causes, and formulation of proposals for improvement.



## 2.3.4 Effectiveness

The effectiveness of HEARTS in the Americas implementation is measured by the **HEARTS Performance Index** (Table 6), which evaluates the coverage of diagnosis and effective treatment of hypertension (<140/90 mmHg), as well as the degree of hypertension control in patients at high cardiovascular risk (systolic blood pressure <130 mmHg).

The **Performance Index** is based on the measurement of three indicators:

### A. Coverage:

*Numerator:* total number of adults (18 years of age or older) with hypertension in the records of the PCC.

*Denominator:* best estimate of the number of adults with hypertension in the PCC's coverage area (according to the best available estimate of the prevalence of hypertension in adults for that area).

### B. Control in all patients with hypertension:

*Numerator:* total number of adults (18 years of age or older) with hypertension whose blood pressure is <140/90 mmHg.


*Denominator:* total number of adults with hypertension in the records of the PCC.

### C. Control in patients with hypertension and high cardiovascular risk:

*Numerator:* total number of adults (18 years of age or older) with hypertension and high cardiovascular risk, and with systolic blood pressure <130 mmHg.

*Denominator:* total number of adults with hypertension and high cardiovascular risk in the records of the PCC.

**Table 6.** HEARTS Performance Index

Performance level, target, and score					
	<b>POOR</b> (<50%)	<b>INCIPIENT</b> (50–59%)	<b>ON TRACK</b> (≥60%)	<b>HIGH</b> (≥70%)	<b>EXCELLENT</b> (≥80%)
Coverage	0	1	2	3	4
Control (<140/90 mmHg) among all hypertensives treated	0	1	2	3	4
Control (SBP <130 mmHg) among all hypertensives at high risk for CVD	0	1	2	3	4

CVD: cardiovascular disease; SBP: systolic blood pressure.

*Note:* HEARTS Performance Index = (coverage score + control among all hypertensives treated + control of all hypertensives at high risk for CVD)/3.

Poor: below 0.8; Incipient: 0.9–1.6; On track: 1.7–2.4; High: 2.5–3.2; Excellent: 3.3–4.0.

*Source:* Prepared by the authors, based on: Pan American Health Organization. HEARTS in the Americas: Quality Improvement for Primary Health Care Centers. Washington, D.C.: PAHO; 2024. Available from: <https://iris.paho.org/handle/10665.2/59308>.

It is expected that, as the quality of care processes improves, as expressed in the Maturity Index, health outcomes (control of persons with hypertension) will also improve, as reflected in the Performance Index. The HEARTS Maturity and Performance indices, being complementary, summarize a healthcare system's degree of success or effectiveness in improving hypertension control.

## Operational recommendations for implementation of the evaluation

### 2.4.1 Frequency of evaluation

**Quality self-evaluation** should be performed at least twice a year. This frequency provides sufficient time to evaluate the four main dimensions of the planned interventions: fidelity, feasibility, acceptability, and effectiveness.

The **external evaluation**, carried out by the Ministry of Health or by a subnational or local entity other than the PCC itself, can be carried out annually, based on prioritization or on the organizational structure of the health services network in the country. It is recommended to use the sampling methodology suggested in Chapter 3 to facilitate the external evaluation process and make it more efficient.

It is advisable to start with a baseline for a situation analysis, define the quality improvement plan, design the interventions, and establish their timing. The idea is to identify bottlenecks early, seek timely solutions, and achieve the proposed targets. To ensure successful implementation of HEARTS, it is essential that the PCCs perform regular evaluations with the required quality. Quality assessment is a continuous and systematic process that should be carried out as often as necessary.

### 2.4.2 Duration of evaluation

Quality evaluation should be done quickly and efficiently, and should be completed in a single week (maximum 3–5 days). It is important to plan the implementation of the evaluation, ensuring that it is the right time, that the evaluation tools are ready, and that the team is prepared and committed to carrying out the evaluation at the required level of quality.

### 2.4.3 Composition of the evaluation team

Selection and training of the evaluation team is an essential step to ensure a rigorous evaluation and proper communication of results to PCC staff and other stakeholders, and to facilitate the search for effective solutions, and manage the implementation of recommendations resulting from the evaluation.

The evaluation team should consist of competent, trained professionals. Within the framework of the HEARTS in the Americas quality improvement training program, the evaluation team will receive training and coaching from national or subnational health authorities, with support from PAHO. In the case of the quality self-evaluation, the evaluators will be selected from among the PCC's staff. For external evaluations, the responsible administrative units will form the evaluation team, following the same principles of suitability and experience.

Depending on the size of the service, it is advisable to appoint between two and five evaluators. In addition, its composition should be appropriately balanced in terms of professional profiles, gender equity, and cultural relevance.





### 3. Sampling methodology

The sampling methodology developed by the HEARTS in the Americas regional team facilitates the implementation of the quality improvement evaluation, making it more rigorous and efficient.

The following is a step-by-step description of the actions to be carried out to select:

1. Clinical records of people with hypertension to be examined, both for a quality self-evaluation and for an external evaluation.
2. PCCs for external audit.

## Selection of clinical records

Clinical records, whether paper or electronic, are a primary source of data for quality evaluation. In order to make the selection process of clinical records efficient and rigorous, HEARTS in the Americas has designed a sampling methodology. It is only possible to select records if the PCC has a registry of people with hypertension that can be consulted.

The period to be evaluated is selected first. This selection will determine which files will be examined:

### Step 1: Select the period to be evaluated

- Define the period to be evaluated, starting from the moment the evaluation begins and looking back six months. Although it is recommended to evaluate one semester, the PCC can shorten or extend this period as needed.

### Step 2: Count the days of the selected period

- Once the period has been defined (usually six months), it is necessary to determine how many and which days will be included in the evaluation period. This number, called “D,” will be close to 180 days if the evaluation period is one semester.

### Step 3: Identify eligible days

- Exclude ineligible days, such as weekends, public holidays, and days when important community events are being held. It is recommended to cross them off in the calendar. The remaining number of days, called “N,” are the days eligible for evaluation. For example, 120 days ( $N = 120$ ) could remain after excluding 60 ineligible days.

### Step 4: Decide how many days to evaluate

- Determine how many of the eligible days (N) will be evaluated. Choose between 8 and 12 days, 12 being the ideal number. The final selection of the number of days (n) depends on the evaluation team.

### Step 5: Select days by systematic sampling

- Use a systematic phased sampling method to select the final evaluation days (n) from among the eligible days (N). It is recommended to use EPIDAT 4.0 software,<sup>1</sup> which is free and allows random and systematic selection of the required days. The specific days to be evaluated are obtained by entering the value of N, and the percentage that n represents with respect to N (for example, 12 out of 120 would be 10%).

### Step 6: Select the clinical records to be evaluated

- Once the days have been selected, a number “x” is chosen, representing between 5 and 10 clinical records. X records of adults (18 years of age or older) with hypertension who visited the center on each of those days are then selected. If the desired number of records is not obtained on a given day (i.e., if the number of people with hypertension who had a consultation is less than x), then the records of all the persons who were there on that day will be included. Thus, the final sample will contain the clinical records of between 40 patients (if 5 records are chosen for 8 days) and 120 patients (if 10 records are chosen for 12 days) over the 6 month period.

<sup>1</sup> Available (in Spanish) from: <https://www.sergas.es/Saude-publica/EPIDAT-4-2?idioma=es>.

## Selection of primary care centers for external evaluation

This section focuses mainly on the Ministry of Health, higher administrative units (HAUs), and other subnational authorities (provincial, departmental, district, municipal, etc.) that will carry out the external evaluation. This process ensures a representative selection of PCCs. The sample should be adjusted according to available resources, while maintaining operational feasibility.

A detailed explanation of the sampling methods for selecting the PCCs to be evaluated by the Ministry of Health or an HAU at the regional or local level can be found in [Annex 4](#). A summary of the sampling process is presented below:

### Step 1: Designate the responsible HAU



Establish the organizational unit that will be responsible for selecting the PCCs and conducting the external evaluations.

### Step 2: Define the sample frame



Identify eligible PCCs. Exclude those in which the evaluation is unfeasible and consider including some that are of special interest.

### Step 3: List the eligible PCCs



Create a list of PCCs that meet the established criteria.

### Step 4: Stratify the PCCs



The maximum number of possible strata is equal to  $2 \times 2 \times 2 \times 2 = 16$ . The different stratification criteria and categories are summarized in Table 7.

**Table 7.** Criteria for defining strata

Criteria	Possible conditions	
Accessibility	Urban	Rural
Socioeconomic development	High (quintile 3 or higher)	Low (quintile 1 or 2)
Maturity (according to index)	High (level 3, 4, or 5)	Low (level 1 or 2)
Performance (according to index)	Acceptable (on track, high, or excellent)	Deficient (poor or incipient)

Source: PAHO.

Based on the criteria presented in Table 7, the defined strata are shown in Table 8.

**Table 8.** Strata for the selection of primary care centers (PCCs) for external evaluation

Stratum	Accessibility	Socioeconomic development	Maturity	Performance
1	Urban	High	High	Acceptable
2	Urban	High	High	Deficient
3	Urban	High	Low	Acceptable
4	Urban	High	Low	Deficient
5	Urban	Low	High	Acceptable
6	Urban	Low	High	Deficient
7	Urban	Low	Low	Acceptable
8	Urban	Low	Low	Deficient
9	Rural	High	High	Acceptable
10	Rural	High	High	Deficient
11	Rural	High	Low	Acceptable
12	Rural	High	Low	Deficient
13	Rural	Low	High	Acceptable
14	Rural	Low	High	Deficient
15	Rural	Low	Low	Acceptable
16	Rural	Low	Low	Deficient

Source: PAHO.

### Step 5: Allocate PCCs to strata



Place each PCC in its corresponding stratum. The rules for distributing them are:

- Empty strata are discarded.
- Strata with a single PCC are combined.
- Strata with two or more PCCs are kept.

### Step 6: Reconfigure the strata



Adjust the strata to create two categories:

- **E1:** strata with two PCCs.
- **E2:** strata with three or more PCCs.
- **Result:**  $N$  (total eligible PCCs)  $\geq 2E1 + 3E2$ .



### Step 7: Initial selection of PCCs



Include both PCCs from each stratum E1 in the sample (total m).

### Step 8: Determine the sample size



- Define the total number (“x”) of PCCs to be selected. Ideally,  $x \geq 32$ . In other words, 32 is suggested as the ideal minimum number.
- The total number of selected PCCs (x) may be less than 32 in two cases:
  - In small countries or HAUs with less than 32 eligible PCCs. In this case, it is recommended to evaluate all PCCs, but the HAU will define the number of possible PCCs according to the time and resources available.
  - In medium-size or large countries where conditions limit external evaluation to a smaller number of PCCs.

### Step 9: Select PCCs for E2 strata



- If m PCCs have already been selected, additional  $x - m$  PCCs will be selected.
- Determine how many PCCs will be selected in each E2 stratum, where:

**ne** = PCCs to be selected to complete the sample.

**NE** = total number of PCCs in a given stratum.

**X** = total number of PCCs to be sampled (defined sample size).

**m** = total number of PCCs in E1 strata (strata with only two PCCs) already included in the sample.

**N** = number of eligible PCCs remaining after including in the sample the m that were in the strata containing only two PCCs. The following formula is used:

$$ne = \frac{(NE)(X-m)}{N}$$

**ne** is not an integer, so the nearest integer must be used as an approximation.

### Step 10: Make a final selection by random sampling



Select the number of PCCs that have been calculated by simple random sampling within each stratum. It is suggested to use free EPIDAT 4.0 software.<sup>2</sup>

<sup>2</sup> Available (in Spanish) from: <https://www.sergas.es/Saude-publica/EPIDAT-4-2?idioma=es>.



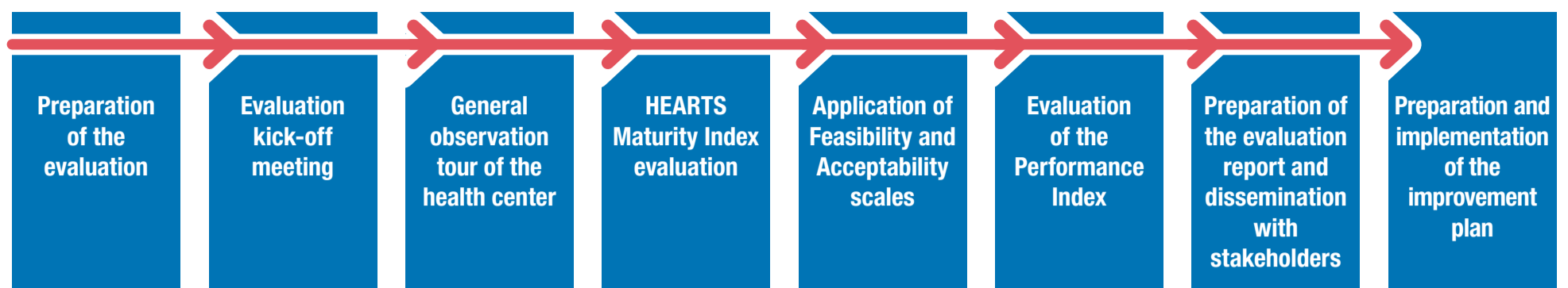


## 4. Implementation of the HEARTS quality improvement evaluation

The quality evaluation involves verifying the structural and process-related conditions required for the implementation of HEARTS at a PCC, as well as the results obtained.

The team of evaluators uses observation, interviews, and verification of various sources of information to document the four domains for evaluating implementation of HEARTS in the Americas: **fidelity**, **feasibility**, **acceptability**, and **effectiveness**. Figure 4 illustrates the recommended sequence for carrying out the activities in the quality improvement evaluation process. This process begins with preparation for the evaluation and concludes with the development and implementation of the improvement plan.

**Figure 4.** General process to be followed for the evaluation of quality improvement



Source: PAHO.

## 4.1 Preparation of the evaluation

The first step is to prepare the evaluation at least two weeks prior to its start date, covering at least the following aspects:

- ✓ Select and train the evaluation team (according to instructions in subsection 2.4.3).
- ✓ Select clinical records (following the instructions in subsection 3.1).
- ✓ Prepare the instruments for implementation and completion of the evaluation.

### 4.1.1 Request for information

The evaluation team will ask the managers of the PCC or the program implementation leaders to provide the following information on the PCC's performance (the required data correspond to the end of the immediately preceding semester):

- Total adult population (18 years of age or older) in the PCC's area of responsibility.
- Best estimate of prevalence (%) of hypertension in the adult population of the PCC's coverage area.
- Total number of adults with hypertension in the PCC's records.
- Cumulative number of people with hypertension at high cardiovascular risk.
- Total number of people with controlled hypertension (blood pressure <140/90 mm Hg).
- Number of people at high cardiovascular risk with controlled hypertension (systolic blood pressure <130 mm Hg).

Ideally, this information should be requested in advance to ensure availability and to help reduce the level of uncertainty among those being evaluated. The evaluation team will verify the consistency of this information in the PCC's information system (physical or electronic). Sources of information should be noted in the final report.

## 4.2 Evaluation kick-off meeting and distribution of the evaluation team

A meeting will be organized to formally initiate the evaluation, which will be attended by the evaluation team and the PCC's management team, including its quality committee.

One or two members of the evaluation team, together with a professional from the health center, will carry out the inspection of the PCC and conduct the interviews with staff.

The rest of the members of the evaluation team will begin the review of the clinical records. When the office inspection and interviews are completed, all team members will complete the review of the clinical records.

## 4.3

# General observation tour of the health center

The director of the health center or whoever has been delegated by the director will accompany a general tour of the facility to inspect the places detailed below.

### Blood pressure measurement areas

The evaluators will ask to see a specific area that meets the recommendations for accurate blood pressure measurement specified in the HEARTS clinical pathway. Using a checklist, the aspects of the site listed in Table 9 will be verified on-site.

**Table 9.** Checklist of conditions for blood pressure measurement areas

Condition to be verified	Satisfactory	Not satisfactory	Comments
There is a place for users to rest before their blood pressure is measured.	<input type="checkbox"/>	<input type="checkbox"/>	
A visible infographic shows the blood pressure measurement technique.	<input type="checkbox"/>	<input type="checkbox"/>	
Adequate room temperature.	<input type="checkbox"/>	<input type="checkbox"/>	
Silence in the room.	<input type="checkbox"/>	<input type="checkbox"/>	
Proper body position of users during blood pressure measurement, as described in the HEARTS clinical pathway (back against the chair, feet on the floor, arm at heart level, and legs not crossed).	<input type="checkbox"/>	<input type="checkbox"/>	
Inspection of the blood pressure measurement equipment used (validated automatic devices).	<input type="checkbox"/>	<input type="checkbox"/>	
Inspection of cuff size (various sizes available or one-size-fits-all to cover a wide range of arm diameters).	<input type="checkbox"/>	<input type="checkbox"/>	

Source: PAHO.

## Pharmacy

The PCC's pharmacy will be visited and the person in charge will be asked to verify the items from the checklist in Table 10.

**Table 10.** Checklist of pharmacy conditions

Condition to be verified	Satisfactory	Not satisfactory	Comments
Room temperature.	<input type="checkbox"/>	<input type="checkbox"/>	
Wait times for dispensed medications.	<input type="checkbox"/>	<input type="checkbox"/>	
Frequency of dispensing antihypertensive medication (preliminary data).	<input type="checkbox"/>	<input type="checkbox"/>	
Inventory of drugs included in the country's clinical pathway: consult available and missing medications.	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Antihypertensive medications dispensed</b> (preliminary data on the medications most commonly dispensed at the center).  - Ask specifically about medications that are "tracers of poor adherence to the clinical pathway": captopril, verapamil, hydralazine, nifedipine, enalapril, etc.  - Ask specifically about "monotherapy."	<input type="checkbox"/>	<input type="checkbox"/>	

Source: PAHO.

## Waiting rooms for users

Review the conditions indicated in Table 11.

**Table 11.** Checklist of waiting room conditions

Condition to be verified	Satisfactory	Not satisfactory	Comments
Separate waiting room for outpatients and patients in preventive programs.	<input type="checkbox"/>	<input type="checkbox"/>	
Seating conditions and dimensions of the waiting room.	<input type="checkbox"/>	<input type="checkbox"/>	
Condition of the restrooms provided for users.	<input type="checkbox"/>	<input type="checkbox"/>	

Source: PAHO.

## 4.4 Maturity Index evaluation

The information required to evaluate each of the 17 interventions promoted by HEARTS to improve health services (Table 12) is presented in [Annex 2](#). The verification guide for scoring the Maturity Index is applied through three activities:

1. Inspection of the healthcare consultation room.
2. Interviews with health personnel.
3. Review of clinical records.

**Table 12.** Interventions for each verification activity

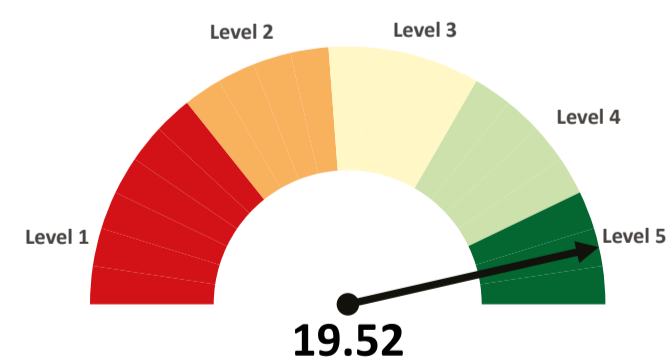
Verification activity	Intervention to be verified
<b>Inspection of the healthcare consultation rooms</b>	1.b. Blood pressure measurement protocol (requires observation of standard blood pressure measurement by health personnel).
	1.c. Use of clinically validated automatic blood pressure measuring devices.
<b>Interviews with health personnel</b>	1.a. Blood pressure measurement training every six months (requires verification of certificates of trained personnel).
	3.a. Institutionalized clinical pathway.
	3.b. Use fixed-dose combinations.
	7.a. Medication prescribed for three months.
	8.a. Monitoring system for performance evaluation and monthly feedback.
<b>Review of clinical records</b>	1.b. Blood pressure measurement protocol.
	2.a. Classify patients according to cardiovascular risk.
	2.b. Use statins and aspirin according to cardiovascular risk.
	3.a. Institutionalized clinical pathway.
	3.b. Use fixed-dose combinations.
	4.a. Initiate treatment without delay.
	4.b. Intensify treatment in patients not meeting the target.
	5.a. Follow-up after <1 month until blood pressure target is reached.
	5.b. Follow-up every six months in non-high-risk patients meeting the target.
	5.c. Follow-up every three months in high-risk patients.
	6.a. Community workers measure blood pressure.
	6.b. Nurses follow-up with patients.
	6.c. Nurses adjust treatment according to protocol.
	7.a. Medication prescribed for three months.

Source: PAHO.

After applying [Annex 2](#): in the “Maturity Index” tab of the Excel tool in [Annex 3](#), enter the result (%) obtained by the PCC in each of the 17 interventions promoted by HEARTS to improve services.

The tool will automatically calculate the Maturity Index achieved by the PCC (Figure 4), giving a score between 0 and 21 and placing the center in a performance bracket. Level 1 reflects a low Maturity Index, while level 5 indicates the highest Maturity Index.

**Figure 5.** Maturity of implementation



Source: PAHO.

## Application of the Feasibility and Acceptability Scales

The Feasibility and Acceptability Scales will be applied to the largest possible number of health professionals or workers participating in the implementation of HEARTS, ideally more than 10 people. However, in the PCCs with a very small team, it is recommended that the scale be applied to all healthcare professionals and workers involved in the care of persons with hypertension or cardiovascular risk.

The evaluation team will choose one or two days during the evaluation period and, without disrupting the facility's operations, will convene all personnel who are available and able to complete the forms for the scales.

Once the scales have been applied, the information should be consolidated and presented as follows:

### 4.5.1 Results of the Feasibility Scale

In the "Feasibility Scale" tab in [Annex 3](#), enter the following information:

- ✓ Total number of health professionals and workers who completed the Feasibility Scale.
- ✓ Report the total number of responses in each category for each of the five questions (questions 1 to 5).

It is important to keep in mind that **the result of the Feasibility Scale for the PCC is only descriptive and indicative**. If an insufficient degree of feasibility (less than 60%) is obtained for some questions, the quality committee will lead a study of the reasons for this result to identify bottlenecks and propose actions for improvement.

### 4.5.2 Results of the Acceptability Scale

In the "Acceptability Scale" tab in [Annex 3](#), enter the following information:

- ✓ Total number of health professionals and workers who completed the Acceptability Scale.
- ✓ Report the total number of responses in each category for each of the six questions (questions 1 to 6).

It is important to keep in mind that **the result of the Acceptability Scale for the PCC is only descriptive and indicative**. If an insufficient degree of acceptability (less than 60%) is obtained for some questions, the quality committee will lead a study of the reasons for this result to identify bottlenecks and propose actions for improvement.



### 4.6.1 Consolidation of information on coverage and control in the population under the responsibility of the primary care center

The evaluation team will consolidate the information reported by the PCC:

- Total adult population (18 of age or older) in the PCC's area of responsibility.
- Best estimate of prevalence (%) of hypertension in the adult population of the PCC's coverage area.
- Total number of adults with hypertension in the PCC's records.
- Cumulative number of persons with hypertension classified as high cardiovascular risk.
- Total number of people with controlled hypertension (blood pressure <140/90 mmHg).
- Number of persons at high cardiovascular risk with controlled hypertension (systolic blood pressure <130 mmHg).

### 4.6.2 Performance Index report

In the "Performance Index" tab (Table 6) of [Annex 3](#), enter the requested data (obtained in the previous step). The tool will automatically calculate the **percentages of coverage and control achieved by the PCC** and the Performance Index result. In addition, it will display a score between 0 and 4 points and place the PCC in a performance range.

The evaluation team will present the PCC staff with the results of the calculations for the three indicators that make up the Performance Index, as well as the result of the Performance Index and its practical implications.

If the performance range is poor, incipient, on track (or, even if it is high but fails to meet expectations or presents a significant discrepancy with respect to the previously evaluated dimensions of fidelity, feasibility, and acceptability), the PCC will have to conduct an analysis to identify the main bottlenecks and define and prioritize improvement actions for the next quality cycle.

### 4.6.3 Measurement and reporting of hypertension control in the sample of clinical records

When reviewing each of the audited clinical records, the evaluation team should carefully record the minimum required variables:

- Date of birth and sex.
- Cardiovascular risk classification (high risk; not high risk).
- Last recorded blood pressure figure (systolic/diastolic).
- Date of last blood pressure recording.

The above information should always be included for each file in the tab entitled "Clinical Records Control" in [Annex 3](#).

The tool will automatically calculate the percentage of hypertension control, stratified according to cardiovascular risk.

#### **4.6.4 Quality evaluation report**

The evaluation team will formally communicate the final quality evaluation report to the PCC staff. In the submitted report, the evaluation team:

- Consolidates the results obtained in the four evaluated dimensions (fidelity, feasibility, acceptability, and effectiveness);
- Summarizes the main achievements of implementation;
- Lists the main identified barriers and facilitators to implementation;
- Proposes possible solutions.

As far as possible, the PCC management team will link the results of the evaluations to incentives, primarily of an intrinsic nature (recognition, special mentions, awards, etc.). Champions of HEARTS implementation (both individuals and groups) should be recognized and encouraged to share their positive experiences.



## 5. Improvement plan

Based on the results of the quality evaluation report, particularly the implementation barriers detected in the four HEARTS implementation evaluation domains (fidelity, feasibility, acceptability, and effectiveness), the evaluation team will propose to the PCC managers and the quality committee, as appropriate, a set of possible solutions and improvement actions.

The improvement plan will address the access and quality gaps identified in the evaluation. The PCC quality committee will structure the plan as follows:

- Summary of the main identified barriers for the implementation of HEARTS in the PCC.
- List of possible solutions.
- Definition of specific quality improvement goals.
- Actions to be taken by the PCC staff in the next improvement cycle.
- Written definition of each action for improvement: tasks, responsible parties, and deadlines.
- Start date of the new quality cycle.

It is suggested to use a summary format for the improvement plan, such as the one shown in Table 13, prioritizing the five main barriers or implementation gaps and the corresponding actions for improvement:

**Table 13.** Summary form for the PCC improvement plan

Main barrier or gap identified in the HEARTS implementation evaluation	Root cause of the identified barrier or gap	Proposed action for improvement	Which of the 17 HEARTS interventions does the proposed improvement action correspond to?	Specific tasks for implementation of the action for improvement (with responsible parties and deadline)	Follow-up date to monitor achievement of the action for improvement
1.					
2.					
3.					
4.					
5.					

Source: PAHO.

## References

1. World Health Organization. Global HEARTS Initiative. Geneva: WHO; 2016. Available from: <https://www.who.int/news/item/15-09-2016-global-hearts-initiative>.
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5. Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.
6. World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. Geneva: WHO; 2022. Available from: <https://iris.who.int/handle/10665/344424>.
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## Learning resources

HEARTS in the Americas has content that can assist in the development of a practical, concrete, standardized improvement plan that is consistent with the HEARTS quality improvement methodology. The resources below are sorted by domain, driver, and intervention.

### Diagnosis: accurate blood pressure measurement

#### 1.a Establish training processes on blood pressure measurement every six months for all personnel involved.

Pan American Health Organization. Virtual course on accurate automatic blood pressure measurement (HEARTS). Washington, D.C.: PAHO; 2024. Available from: <https://campus.paho.org/en/course/Blood-Pressure-Measurement>.

#### 1.b Institute standardized blood pressure measurement protocols that include patient preparation and re-measurement of blood pressure if the first reading is high.

Pan American Health Organization. HEARTS in the Americas: Blood Pressure Measurement. Washington, D.C.: PAHO; 2024. Available from: <https://www.paho.org/en/hearts-americas/hearts-americas-blood-pressure-measurement>.

#### 1.c Adopt exclusive use of automatic blood pressure measurement devices validated for clinical practice.

STRIDE BP. [An evaluation and monitoring platform for blood pressure measurement devices]. Athens: STRIDE BP; 2024 [cited 11 October 2024]. Available from: <https://www.stridebp.org>.

Medaval. Medaval Validated Medical Device Registry. Dublin: Medaval Ltd; 2024 [cited 11 October 2024]. Available from: <https://medaval.ie/>.

Pan American Health Organization. Technical resources relevant to the accuracy of blood pressure measurement. Washington, D.C.: PAHO; 2024. Available from: <https://www.paho.org/en/documents/technical-resources-relevant-accuracy-blood-pressure-measurement>.

### Diagnosis: estimation of cardiovascular risk

#### 2.a Assess cardiovascular event risk in all patients with hypertension to guide the blood pressure target and frequency of follow-up.

Orduñez P, Tajer C, Gaziano T, Rodríguez YA, Rosende A, Jaffe MG. The HEARTS app: a clinical tool for cardiovascular risk and hypertension management in primary health care. Rev Panam Salud Publica. 2022;46:e46. Available from: <https://iris.paho.org/handle/10665.2/55853>.

Pan American Health Organization. HEARTS in the Americas: How to get an accurate blood pressure reading [cited 11 October 2024]. Available from: <https://www.paho.org/cardioapp/web/#/howtobloodpressure>.

#### 2.b Use a combination of blood pressure medications, statins, and acetylsalicylic acid (as needed) in patients at high risk of a cardiovascular event, including those with diabetes or chronic kidney disease, to reduce cardiovascular event risk.

Orduñez P, Campbell NRC, Giraldo Arcila GP, Angell SY, Lombardi C, Brettler JW, et al. HEARTS in the Americas: innovations for improving hypertension and cardiovascular disease risk management in primary care. Rev Panam Salud Publica. 2022;46:e96. Available from: <https://doi.org/10.26633/RPSP.2022.96>.

### Treatment: standardized treatment protocol

#### 3.a Follow a standardized treatment protocol, with specific medications and doses.

Pan American Health Organization. HEARTS in the Americas: Protocols and Medications. Washington, D.C.: PAHO; [date unknown] [cited 11 October 2024]. Available from: <https://www.paho.org/en/hearts-americas/hearts-americas-protocols-and-medications>.

#### 3.b Follow an established protocol with fixed-dose combination medications.

Pan American Health Organization. HEARTS in the Americas: Protocols and Medications. Washington, D.C.: PAHO; [date unknown] [cited 11 October 2024]. Available from: <https://www.paho.org/en/hearts-americas/hearts-americas-protocols-and-medications>.

## **Treatment: treatment intensification**

### **4.a Initiate drug treatment immediately after confirmed diagnosis of hypertension.**

Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

### **4.b Medication should be added or intensified according to the standardized protocol if blood pressure is $\geq 140/90$ mm Hg or if systolic blood pressure is $>130$ mm Hg in high-risk patients.**

Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

## **Continuity of care and follow-up**

### **5.a Follow-up of high blood pressure within two to four weeks if uncontrolled.**

Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

### **5.b Blood pressure follow-up within six months in all patients with stable and well-controlled hypertension.**

Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. Geneva: WHO; 2022. Available from: <https://iris.who.int/handle/10665/344424>.

### **5.c Blood pressure consultation within three months in all patients with hypertension and high risk of cardiovascular event, including those with diabetes or chronic kidney disease.**

Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

## **Delivery system: team-based care and task sharing**

### **6.a Blood pressure measurement performed by a properly trained and certified non-medical health worker.**

Pan American Health Organization. Virtual course on accurate automatic blood pressure measurement (HEARTS). Washington, D.C.: PAHO; 2024. Available from: <https://campus.paho.org/en/course/Blood-Pressure-Measurement>.

### **6.b Follow-up blood pressure consultations by a non-medical health worker under supervision and following a protocol.**

World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. Geneva: WHO; 2022. Available from: <https://iris.who.int/handle/10665/344424>.

### **6.c Individual medication titration by a non-medical health worker under supervision and following a protocol.**

World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. Geneva: WHO; 2022. Available from: <https://iris.who.int/handle/10665/344424>.







# Annexes

## Annex 1.

# Drivers for hypertension control and cardiovascular risk management

Driver	Problem	Evidence-based solutions	Interventions for improvement
<b>1. Accuracy of blood pressure measurement</b>	Blood pressure measurement is often performed inaccurately.	<p>Repeated and periodic training on blood pressure measurement helps maintain proficiency in measurement technique and has been recommended by the American Heart Association.</p> <p>Repeating blood pressure measurement when initial readings are high is a well-established quality-of-care standard.</p>	<ol style="list-style-type: none"> <li>1. Establish training processes on blood pressure measurement every six months for all personnel involved.</li> <li>2. Institute standardized blood pressure measurement protocols that include patient preparation and re-measurement of blood pressure if the first reading is high.</li> <li>3. Implement exclusive use of automatic blood pressure measurement devices validated for clinical practice.</li> </ol>
<b>2. Cardiovascular disease (CVD) risk assessment</b>	Patients with hypertension and high baseline CVD risk derive greater absolute benefit from blood pressure reduction.	Guidelines based on cardiovascular risk, which use risk scoring methods, have a more favorable cost-effectiveness ratio.	<ol style="list-style-type: none"> <li>1. Assess cardiovascular risk in all patients with hypertension to guide the blood pressure target and frequency of follow-up.</li> <li>2. Use a combination of blood pressure medications, statins, and acetylsalicylic acid (as needed) in patients at high risk for cardiovascular disease, including those with diabetes or chronic kidney disease, to reduce the risk of cardiovascular events.</li> </ol>
<b>3. Standardized treatment protocol</b>	Lack of standardized treatment protocols contributes to widening the gap between recommended use of medications and actual clinical practice.	The HEARTS in the Americas Initiative and the 2021 World Health Organization guidelines on pharmacological treatment for hypertension in adults recommend that, for initial treatment of hypertension, rapid control should be achieved with two antihypertensive drugs, preferably in a single fixed-dose combination.	<ol style="list-style-type: none"> <li>1. Follow a standardized treatment protocol, with specific medications and doses.</li> <li>2. Follow an established protocol with fixed-dose combination medications.</li> </ol>
<b>4. Treatment intensification</b>	Therapeutic inertia may be the most important obstacle to achieving blood pressure control.	<p>Team-based care, especially with the participation of pharmacists and nursing staff, enhances individualized medication titration.</p> <p>A standardized medication protocol allows for a more uniform approach to individualized medication titration, as well as facilitating titration by non-medical professionals.</p>	<ol style="list-style-type: none"> <li>1. Initiate pharmacological treatment immediately after confirmed diagnosis of arterial hypertension.</li> <li>2. Medication should be added or intensified according to the standardized protocol if blood pressure is <math>\geq 140/90</math> mmHg or if systolic blood pressure is <math>&gt;130</math> mmHg in high-risk patients.</li> </ol>

Driver	Problem	Evidence-based solutions	Interventions for improvement
<b>5. Continuity of care and follow-up</b>	Delays in follow-up care after a consultation in which elevated blood pressure was recorded can lead to an increase in adverse outcomes.	A shorter time between consultations was associated with a shorter time to achieve control, and the most significant benefit was observed with intervals of $\leq 2$ weeks. In addition, several randomized clinical trials have shown that more rapid blood pressure control improves outcomes in terms of cardiovascular events.	<ol style="list-style-type: none"> <li>1. Follow-up of high blood pressure within two to four weeks if uncontrolled.</li> <li>2. Blood pressure follow-up within six months in all patients with stable and well-controlled hypertension.</li> <li>3. Blood pressure consultation within the last three months in all patients with hypertension and high CVD risk, including those with diabetes or chronic kidney disease.</li> </ol>
<b>6. Team-based care and task shifting</b>	Due to medical staff shortages, a team-based approach is required to ensure adequate treatment and follow-up of patients with hypertension.	The HOPE 4 study showed that a care model led by non-physician health workers, involving primary care physicians and families, substantially improved hypertension control and reduced the risk of cardiovascular events compared with current, usually physician-centered strategies.	<ol style="list-style-type: none"> <li>1. Blood pressure measurement performed by a properly trained and certified non-medical health worker.</li> <li>2. Blood pressure follow-up consultations performed by a non-physician health worker under supervision and following a protocol.</li> <li>3. Individual medication titration by a non-medical health worker under supervision and following a protocol.</li> </ol>
<b>7. Medication refill frequency</b>	Various barriers limit patient access to medications.	It has been shown that 90-day prescriptions improve adherence to treatment compared to 30-day prescriptions.	1. Implement standardized three-month medication refill intervals for all prescriptions of antihypertensives.
<b>8. Performance evaluation with feedback</b>	In the Region of the Americas, data are not systematically collected and feedback is not provided on hypertension control processes and indicators.	Standardized and regular reporting of hypertension performance metrics allows healthcare leaders, managers, implementers, and care teams to understand their performance over time and address gaps.	1. Implement a monthly performance evaluation and feedback program. A lower frequency of evaluation and feedback is acceptable; the minimum acceptable frequency is every three months.

## Annex 2.

# Verification guide for the implementation of HEARTS drivers in the Americas

### Domain 1. Diagnosis of hypertension

#### Driver 1. Accuracy of blood pressure measurement

Intervention	Indicator	Achievement threshold	Verifiers	Means of verification	Comments
1.a. Establish training processes for accurate blood pressure measurement.	Number of staff trained in accurate blood pressure measurement or performing blood pressure measurement.	≥90%	Certificate of training in accurate blood pressure measurement every six months.	Interview with facility management, program manager, quality manager, or training manager.	Information may be submitted by the HEARTS program manager or someone designated by the facility's management.
1.b. Institute a standardized blood pressure measurement protocol that includes patient preparation and a second measurement if the first reading is elevated.	Number of visits where a second blood pressure measurement is recorded when the first measurement is elevated, or number of visits with an initial record of elevated blood pressure.	≥90%	Number of clinical records of persons diagnosed with hypertension where a second blood pressure measurement is recorded when the first measurement is elevated.	Review of clinical records.	This should be assessed at the final follow-up visit or blood pressure measurement.
1.c. Implement exclusive use of automatic blood pressure measurement equipment validated for clinical practice.	Number of automatic and validated blood pressure measurement devices or total number of blood pressure measurement devices in the health center.	≥90%	Automatic blood pressure equipment is validated according to national documentation or as defined by HEARTS and PAHO (section 3 of the <i>HEARTS in the Americas Compendium of Essential Clinical Tools</i> ). <sup>a</sup>	Inspection of the clinical care area: - doctors - nurses - nutritionists - rooms where blood pressure measurement is performed.	Make and model of the equipment must be noted.

Note:

<sup>a</sup> Pan American Health Organization. HEARTS in the Americas: Compendium of essential clinical tools 2023. Washington, D.C.: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/59164>.

## Driver 2. Cardiovascular disease (CVD) risk assessment

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
2.a. Assess CVD risk in all patients with hypertension to guide the blood pressure target and frequency of follow-up.	Number of users diagnosed with hypertension and with CVD risk assessment, or number of people diagnosed with hypertension during the period.	≥80%	Review of clinical records. Records of persons diagnosed with hypertension and with CVD risk assessment.	Review of clinical records.	Admission to the program must be recorded by a professional on the health team.
2.b. Use a combination of hypertension medications, statins, and acetylsalicylic acid (as needed) in people with hypertension and high cardiovascular risk (including those with diabetes or chronic kidney disease).	Number of persons with a diagnosis of hypertension and a prescription for combination therapy (two or more antihypertensive drugs), statin, and/or aspirin according to protocol; or number of persons with a hypertension diagnosis evaluated in the period.	≥80%	Review of clinical records of persons diagnosed with hypertension, with indication for combination therapy, statin, and/or aspirin, according to the protocol.	Review of clinical records.	<p><i>Combination therapy:</i> all persons with hypertension.</p> <p><i>Statins:</i> all persons at high cardiovascular risk.</p> <p><i>Acetylsalicylic acid:</i> in persons with a history of established CVD.</p> <p>All criteria must be met to assign a score.</p>

## Domain 2. Treatment of hypertension

### Driver 3. Standardized treatment protocol

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
3.a. Follow a standardized treatment protocol with specific medications and dosages.	Protocol implemented: yes/no.	Implemented	Implementation of standardized treatment protocol, available and visible in the clinical care area.	Official document in which the health center adopts the HEARTS clinical pathway: management team, program referent, or pharmaceutical chemist.	Protocols should be visible in care areas.
3.b. Follow a protocol with fixed-dose combination medication.	Use of fixed-dose combination medication: yes/no.	Implemented	Implementation of a standardized treatment protocol with fixed-dose combination medication, available and visible in the clinic.	Official document in which the health center adopts the HEARTS clinical pathway: management team, program referent, or pharmaceutical chemist.	Protocols should be visible in care areas.

#### Driver 4. Treatment intensification

Intervention	Indicator	Achievement threshold	Verifiers	Means of verification	Comments
4.a. Initiate drug treatment immediately after hypertension diagnosis is confirmed.	Number of persons who immediately initiate pharmacological treatment once the hypertension diagnosis is confirmed, or number of persons with a confirmed diagnosis of hypertension in the period.	≥70%	Clinical records of care provided to persons diagnosed with hypertension in the period evaluated (admissions).	Review of clinical records.	Applies to patients diagnosed or admitted during the period.
4.b. Add or intensify medication according to standardized protocol if blood pressure is ≥140/90 mmHg or if systolic blood pressure is ≥130 mmHg in patients at high cardiovascular risk.	Number of low- or moderate-risk persons with blood pressure ≥140/90 mmHg and high-risk patients with systolic blood pressure ≥130 mmHg whose medication was titrated according to the standardized treatment protocol, or total number of low- or moderate-risk persons with blood pressure ≥140/90 mmHg and high-risk persons with systolic blood pressure >130mmHg.	≥80%	Clinical records of care provided to users with a diagnosis of hypertension and blood pressure above the target, where medication is intensified during the consultation, according to protocol.	Review of clinical records.	This point will be assessed at the last measurement in the clinical record where blood pressure is >140/90 (or systolic blood pressure >130 mmHg in high-risk patients). Strict adherence to the HEARTS protocol is required.

## Domain 3. Continuity of care and follow-up

### Driver 5. Continuity of care and follow-up

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
5.a. Visit persons with high blood pressure for clinical follow-up within two to four weeks if blood pressure is not controlled.	Number of persons with elevated blood pressure in the period evaluated who visit the health service in the following two to four weeks, or number of persons with elevated blood pressure in the period evaluated.	≥80%	Clinical records of care provided to users diagnosed with hypertension, with follow-up after two to four weeks.	Review of clinical records.	This point will be evaluated on the basis of the last blood pressure measurement in the clinical record.  The measurement may be made by a physician or other professional.
5.b. Conduct a follow-up visit within six months in all persons with stable, well-controlled hypertension with moderate or low risk.	Number of records of persons with stable and well-controlled hypertension with moderate or low risk and with a follow-up visit every six months since blood pressure was lowered, or number of persons with stable and well-controlled hypertension with moderate or low risk evaluated in the period.	≥80%	Clinical records of care provided to persons with a diagnosis of hypertension with moderate or low cardiovascular risk evaluated during the period.	Review of clinical records.	This point will be evaluated on the basis of the last measurement in the clinical record. Consider follow-up consultations in the semester prior to the period evaluated, which may have been carried out by the physician or another professional.
5.c. Follow up within three months with all persons with hypertension and high cardiovascular risk, including those with diabetes or chronic kidney disease.	Number of persons in the records at high cardiovascular risk, with a follow-up consultation every three months after blood pressure was lowered, or number of high-risk persons evaluated in the period.	≥80%	Clinical records of care provided to persons diagnosed with hypertension at high risk of CVD.	Review of clinical records.	This point will be evaluated on the basis of the last measurement in the clinical record. Consider visits from the semester prior to the period evaluated. Follow-up consultation may be performed by the physician or other professional.

## Domain 4. Treatment delivery system

### Driver 6. Team-based care and task shifting

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
6.a. Blood pressure measurement by a properly trained and certified non-medical healthcare worker.	Number of persons diagnosed with hypertension with a blood pressure measurement by non-medical personnel, or number of persons diagnosed with hypertension with a blood pressure measurement.	≥90%	Clinical records of care provided to persons with a diagnosis of hypertension with a blood pressure measurement performed by non-medical personnel.	Review of clinical records.	Not considered if there is no record of the blood pressure value obtained.  Certification as required in 1.a.
6.b. Follow-up of persons with hypertension by a non-medical health worker under supervision and following a protocol.	Number of persons with hypertension with follow-up consultations by non-medical personnel, or number of persons with hypertension evaluated in the period.	≥70%	Clinical records of follow-up consultations by non-medical personnel.	Review of clinical records.	Not considered if there is no record of the blood pressure value obtained.
6.c. Individualized medication titration by a non-medical healthcare worker under supervision and following a protocol.	Number of persons with hypertension, evaluated in the period, whose blood pressure figures are above target and with medication titration by non-medical professional according to protocol; or persons with hypertension whose blood pressure is above target, attended by a non-medical professional.	≥70%	Clinical records of follow-up consultations by non-medical personnel.	Review of clinical records.	

### Driver 7. Medication refill frequency

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
7.a. Apply standardized three-month medication refill intervals for all prescriptions of medications for arterial hypertension.	Monthly medication refills: 1 point.  Medication refill every two months: 2 points.  Medication refill every three months: 3 points.	Prescription refill every three months.	Interview with person in charge of facility's pharmacy or medicine cabinet.  Note the name of the person interviewed and the refill intervals (monthly, every two months, or every three months).	Interview with person in charge of facility's pharmacy or medicine cabinet.	The person in charge of the pharmacy or medicine cabinet should be interviewed during the visit to the health center.



## Domain 5. Treatment delivery system

### Driver 8. Performance evaluation and feedback system

Intervention	Indicator	Objective	Verifiers	Means of verification	Comments
8.a. Implement monthly performance evaluation with feedback to facilitate monitoring, avoid substantial deviations, and promote timely program corrections (evaluation and feedback every two months is acceptable for small centers, and evaluation every three months is the minimum acceptable).	<p>Monthly meetings: 3 points.</p> <p>Bimonthly meetings: 2 points.</p> <p>Quarterly meetings: 1 point.</p> <p>Other meeting frequency: 0 points</p>	Feedback on program results.	<p>Meeting minutes.</p> <p>Presentations.</p> <p>Reports</p> <p>List of attendees at the program meeting.</p>	Interview with the establishment's management or referent.	Information may be submitted by the HEARTS program manager or someone designated by the facility's management.

## **Annex 3.**

# **HEARTS quality evaluation report**

Annex 3 is available at: [Annex 3. HEARTS quality evaluation report.](#)

## Annex 4.

### Selection of primary care centers by the administrative unit conducting the external audits

**Step 1.** Establish the organizational unit that will be responsible for completing the selection of primary care centers (PCCs) and conducting external evaluations. This will be either the Ministry of Health or the higher administrative unit (HAU) at the regional or local level.

**Step 2.** The HAU will delimit the sample frame. The sample frame will be made up of all PCCs that could be selected for the external evaluation and, therefore, could form part of the sample (eligible units). PCCs for which the audit process is considered unfeasible may be declared ineligible by the HAU. Certain PCCs can also be included if there is a rationale or special interest.

**Step 3.** Based on the above, a list will be made of properly identified PCCs to be included in the sample.

**Step 4.** Select the PCCs to be included in the sample. Four axes will be used to construct a set of strata. Two possible conditions will be considered for each stratum. The maximum number of possible strata is equal to  $2 \times 2 \times 2 \times 2 = 2^4 = 16$ . The four axes and their possible conditions are summarized in Table A4.1.

**Table A4.1.** Criteria for defining strata

Axis	Possible conditions	
1. Accessibility	Urban	Rural
2. Socioeconomic development	High (quintile 3 or higher)	Low (quintile 1 or 2)
3. Maturity (according to index)	High (levels 3, 4, or 5)	Low (level 1 or 2)
4. Performance (according to index)	Acceptable ("on track" or better)	Deficient ("poor" or "incipient")

Source: PAHO.

Next, the strata are defined, as shown in Table A4.2.

**Table A4.2.** Strata for the selection of primary care centers for external evaluation

Stratum	Accessibility	Socioeconomic development	Maturity	Performance
1	Urban	High	High	Acceptable
2	Urban	High	High	Deficient
3	Urban	High	Low	Acceptable
4	Urban	High	Low	Deficient
5	Urban	Low	High	Acceptable
6	Urban	Low	High	Deficient
7	Urban	Low	Low	Acceptable
8	Urban	Low	Low	Deficient
9	Rural	High	High	Acceptable
10	Rural	High	High	Deficient
11	Rural	High	Low	Acceptable
12	Rural	High	Low	Deficient
13	Rural	Low	High	Acceptable
14	Rural	Low	High	Deficient
15	Rural	Low	Low	Acceptable
16	Rural	Low	Low	Deficient

Source: PAHO.

**Step 5.** Place each of the eligible PCCs in the corresponding stratum. Note that in each of the possible strata, four situations can occur:

- The stratum is empty (no eligible PCC meets the conditions defining the stratum).
- The stratum contains only one PCC.
- The stratum contains two PCCs.
- The stratum has three or more PCCs.

Strata that do not contain any PCCs are discarded. Those with only one PCC are joined with a contiguous one, so that the one with only one PCC disappears. Those containing two or more PCCs are not modified.

**Step 6.** Based on the previous step, the distribution of PCCs in the remaining strata is reconfigured. It is assumed that the number of these remaining strata is **E** (a number between 1 and 16).

There are two types of strata: those containing exactly two PCCs (called **E1**) and those containing three or more PCCs (**E2**). Consequently,  $E = E1 + E2$ . The number of PCCs included in these **E strata** will be called **N**. These are the “eligible” PCCs.

**Step 7.** The two PCCs in each stratum of the first group will be included in the sample. These are **m** in total, the result of multiplying **E1** by 2. These **m** PCCs will remain in the sample.

**Step 8.** Decide on the total number of PCCs to be selected. This number will be called **x**. Ideally, **x** should be at least 32. In other words, 32 is the **suggested minimum ideal number**. If the necessary material and human resources are available, **x** can, of course, exceed this figure.

The total number of PCCs to be selected (**x**) may be less than 32 in two specific circumstances:

- a) Small countries (or HAUs) whose size requires that the total number of eligible PCCs be less than 32 (or even much less). In such cases, it would be ideal to select the total number of PCCs in the country for external evaluation. However, it is the HAU in charge of the evaluation that will determine the total number of PCCs to be evaluated, based on feasibility (mainly time and human and material resources).
- b) Countries that are not small but where due to the conditions mentioned above, external evaluation is only feasible in a smaller number of PCCs.

In general, since the sample will already contain **m PCCs**, **x - m** PCCs must be added to complete the selection process.

*Note:* If the extreme decision is made that the sample should be limited to two PCCs in each stratum, **x = m**; therefore, nothing would have to be added.

It is necessary to corroborate that the number of eligible PCCs remaining in the **E2** strata (**N**), is at least equal to **x - m**; otherwise, **x** has to be reduced. But **N** will usually be much larger than **x - m**.

Before explaining how the process continues, it is important to keep in mind that the concept of “representativeness” is largely subjective. Generally, it corresponds to common intuition, not a formal definition. Only when there is a flagrant contradiction between what intuition tells us and what has been selected should we be suspicious of the sample as a “non-representative” product. In this context, two concepts often cause confusion:

- a) When judging the usefulness, legitimacy, or even representativeness of a sample, what is most important is the number of elements in the sample, not what fraction or percentage of the population the sample size represents.
- b) In principle, in the spirit of quality assessment in the context of the HEARTS program, almost any sample size will be useful (the exception is when the feasible **x** is less than **m**, in which case the audit should not be conducted). This statement is based on two considerations: first, what is truly worthless is “studying nothing (**x = 0**)”; second, the evaluation process is gradual and continuous over time, so that while only a small number may be **evaluated now**, **a more complete evaluation may be conducted later**.

**Step 9.** Next it is necessary to decide how many PCCs will be included in each **E2 - m** stratum, and to select them.

**!** Note: Capital letters refer to the number of PCCs that exist, and lowercase letters refer to the PCCs to be selected.

We will call **NE** the number of PCCs in a given stratum. We know that the sum of the **E2** values of **NE** will be equal to **N** (note that **N** is the number of eligible PCCs remaining after the **m** that were in the strata containing only two PCCs are included in the sample). The **ne** of PCCs to be chosen is determined by the following formula:

$$ne = \frac{(NE)(X-m)}{N}$$

In reality, **ne** will not be an integer, so it must be approximated to the nearest integer.

**Step 10.** Next, the number of PCCs that have been calculated are chosen by simple random sampling within each stratum. There are numerous computer programs to do this, but it is suggested to use EPIDAT 4.0, free software (with a Spanish user interface) that contains a sub-module to select simple random samples (available for download at: <https://www.sergas.es/Saude-publica/EPIDAT-4-2?idioma=es>).

In the Region of the Americas, the slowing decline in mortality due to cardiovascular disease (CVD), coupled with suboptimal levels of hypertension control in the population, suggests that the current model of health services is exhausted and a paradigm shift is imperative. In this context, HEARTS in the Americas has emerged as the regional adaptation of the World Health Organization's Global HEARTS Initiative.

HEARTS in the Americas is a strategy of the Pan American Health Organization for continuous quality improvement. It uses a clinical approach to hypertension and cardiovascular risk as a gateway to improve integrated management of CVD prevention and treatment in primary health care services. The HEARTS approach and principles are potentially applicable to the clinical management and treatment of other chronic conditions prevalent in primary care, including cerebrovascular, kidney, and metabolic conditions, which represent the greatest burdens of disease in all countries of the Region.

The HEARTS in the Americas quality improvement evaluation focuses on systematic and standardized assessment of the fidelity, feasibility, acceptability, and effectiveness of the interventions promoted by the program, generating a culture of quality among personnel and institutions working in primary health care. Through its systematic implementation, it is possible to identify access and quality barriers, propose practical and acceptable solutions, and undertake effective and sustainable actions to improve the quality of processes and health outcomes.