



# Management of Patients with Arterial Hypertension in Italy: A Consensus Document of the Italian Society of Hypertension (SIIA) and the Italian Society for Cardiovascular Prevention (SIPREC) About the Recommended Care Pathway and Areas for Improvement

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## Abstract

Chronic diseases represent one of the most significant challenges for Public Health in Italy, involving approximately 24 million people and generating an annual cost of more than 66.7 billion euros. Among these, arterial hypertension affects 31% of the population, and it is the leading risk factor for cardiovascular diseases. However, the management of arterial hypertension presents several challenges, including inconsistencies in care pathways, poor integration between healthcare settings, and low therapeutic adherence. This document aims to share the findings of a national-level project that defined the recommended care pathway for managing hypertensive patients, identified potential areas for improvement, and proposed supporting solutions, including a list of indicators for evaluation and monitoring. The key areas for improvement, particularly the promotion of therapeutic adherence and the strengthening of communication between community-based and hospital services, serve as a foundation for optimizing the management of this condition and fostering more effective collaboration among the various stakeholders and levels of care within the healthcare system.

**Keywords** Hypertension · Blood pressure · Chronic care model · Patient journey

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## 1 Arterial Hypertension in Italy

### 1.1 Epidemiological Framework and Associated Costs

Guidelines define hypertension as a confirmed office systolic blood pressure (BP) of  $\geq 140$  mmHg or diastolic BP of  $\geq 90$  mmHg. [1].

Most patients with hypertension have essential or primary hypertension, which is the result of a complex interaction between genetic and environmental factors, with the exact cause remaining unknown. Conversely, an estimated 10% have secondary hypertension, which has an identifiable cause (often endocrine or vascular, such as atherosclerotic nephropathy, parenchymal kidney disease, or endocrine disorders) [1, 2].

Hypertension still represents a clinical challenge, as many patients do not reach the target blood pressure despite pharmacological therapy. If blood pressure remains high despite the adoption of appropriate lifestyle changes, and the

continuous use of at least three drugs, including a diuretic, at optimal doses, and after excluding “pseudo-resistant” or secondary forms, resistant hypertension is diagnosed. Resistant hypertension has been reported in 10–20% of patients with hypertension, associated with a 2–6 times greater risk of heart attack, stroke, end-stage renal failure, and mortality, compared to patients with well-controlled essential hypertension [1]. Longstanding hypertension causes structural and functional organ damage to the heart, brain, kidneys, eyes, and arterial vessels. These alterations, classified as hypertension-mediated organ damage (HMOD), can evolve into cardiovascular, cerebrovascular, and clinical nephropathies [1].

In Italy, according to the Italian National Institute of Health, hypertension affects about 31% of the population, with a further 17% in borderline condition [3]. The prevalence is higher in men and increases significantly with age, exceeding 50% in the population over 75 years of age. It is also worth noting that a significant portion of the population remains unaware that they are affected by this disease [4].

Arterial hypertension is a primary risk factor for cardiovascular diseases, which represent the leading cause of mortality in Italy. Cardiovascular disease represents 30.8% of all deaths in the country (2021), with a distribution of 28.1% among men and 33.4% among women [5]. The socio-economic impact is equally significant: in Europe, the costs associated with cardiovascular diseases correspond to 282 billion euros, equal to 636 euros per capita. In Italy, these costs amount to over 41 billion euros, equivalent to 15% of health expenditure, or 726 euros per capita, and therefore exceed the European average [6].

## 1.2 Current Management of Patients with Hypertension in Italy

To date, hypertension management in Italy continues to face several challenges. The care pathway for hypertensive patients is inconsistently implemented throughout the country, with a limited number of local or regional Diagnostic, Therapeutic, and Care Pathways (PDTAs). Consequently, healthcare and treatment models differ across regions. Additionally, the multidisciplinary approach, a key element in the management of hypertensive patients, is often poorly structured, with the roles and activities of different professionals not always being clearly defined.

In addition, there is still an insufficient level of digitalization: limited adoption of telemedicine and Electronic Health Record (EHR) restricts effective monitoring and impairs communication between different care settings, negatively impacting the integrated management of the disease [7].

Hypertensive disease management involves a network of professionals and support figures, including general

practitioners, specialists, nurses, patients, and caregivers, each with a fundamental role in ensuring effective and continuous care. Nurses play a crucial role in supporting doctors and patients, assisting with the accurate measurement of blood pressure, and participating in educational and awareness activities [8]. However, this professional figure is not always present in every care setting, and the health system is facing a severe nursing shortage, which is expected to persist in the coming years [9].

Another critical factor in the effective management of hypertensive patients is therapeutic adherence. Poor continuity of treatment can significantly compromise the effectiveness of care and increase the risk of complications. It is estimated that a third of patients stop treatment after 6 months, and about half of patients stop it after a year [10]. This data highlights the urgent need to develop strategies for evaluating adherence to therapy and increasing awareness among both patients and caregivers about the importance of continuity of care. At the same time, it is crucial to promote awareness about the correct measurement of blood pressure, an essential aspect of effective disease monitoring and treatment evaluation.

## 1.3 The Carabela Project: Focus on Management of Patients with Arterial Hypertension in Italy

Considering the current challenges in managing hypertensive patients and the structure of the healthcare system in Italy, the Carabela Project was launched to provide key recommendations for the optimal management of hypertension at the national level.

The project benefited from the participation of a Scientific Committee composed of experts in the field of hypertension, as well as the endorsement of the main Italian scientific societies involved in the clinical management of this condition: the Italian Society of Hypertension (SIHA) and the Italian Society for Cardiovascular Prevention (SIPREC).

In particular, the project focused on three key aspects:

- Analysis of the patient journey: examining the activities and professionals involved in the various stages of diagnosis, treatment, and follow-up, to define a more structured and effective management model, promoting collaboration between different care settings.
- Identification of areas for improvement: proposing targeted solutions to support the patient’s care, improve quality of life, and enhance their experience within the healthcare system.
- Definition of monitoring indicators: developing common Key Performance Indicators (KPIs) as tools for evaluating patient management and monitoring the effectiveness of interventions.

**Table 1** Assessment of patients with SBP/DBP  $\geq$  130–139/85–89 mmHg by the GP

Patient evaluation
Medical history
Physical examination
Weight, BMI, and waist circumference
Assessment of dietary habits/physical activity
BP and heart rate measurement
Risk factor assessment.
Evaluation of comorbidities
Evaluation of signs and symptoms of organ damage
Evaluation of signs and symptoms of secondary hypertension

**Table 2** List of recommended first- and second level tests

First-level tests	Second-level tests
Complete blood count (CBC)	Echocardiography
Fasting blood glucose and glycated hemoglobin (HbA1c)	Ultrasound of the supra-aortic trunks
Lipid profile	Abdominal ultrasound
Potassium and sodium	Pulse wave velocity (PWV)
	Ankle-brachial index (ABI)
Uric acid	Only in case of specific need:
Creatinine and estimated glomerular filtration rate (eGFR)	Fundus examination
Liver function tests	Assessment of intraparenchymal resistance index
Urinalysis	Cognitive function test
Urinary albumin/creatinine ratio (SPOT)	Brain imaging
Resting 12-lead electrocardiogram (ECG)	

The article presents the evidence that emerged from the project.

## 2 The Suggested Care Pathway for Hypertension Patients

The care pathway for patients with hypertension has been developed based on the main international reference guidelines for hypertension by the European Society of Hypertension (ESH) in 2023 [11] and the European Society of Cardiology (ESC) in 2024 [1] and adapted to the healthcare model of the Italian National Health Service (NHS).

In the following section, a detailed description of the patient journey, structured according to the phases of the care process (diagnosis, treatment, and follow-up), is provided. A schematic representation of each phase is provided in the Supplementary Material.

### 2.1 Diagnostic Suspicion, Risk Stratification, and Diagnosis of Hypertension

Throughout their lifetime, an individual may have their Blood Pressure (BP) measured in different situations, such as routine visits to a general practitioner (GP), emergency room visits, pharmacy check-ups, or assessments for sports or work fitness.

Suppose systolic—and/or diastolic-BP is detected at or above 130–139/85–89 mmHg (SBP/DBP  $\geq$  130–139/85–89 mmHg) on any of these occasions. In that case, the patient should be referred to a GP for further diagnostic investigation (Table 1). Conversely, for SBP/DBP values are below 130–139/85–89 mmHg, it is advisable to evaluate whether GP referral is necessary to confirm or exclude the possibility of masked hypertension or white coat hypertension. If this assessment, as well as the search for organ damage and possible secondary causes of hypertension, gives a negative result, the condition of normotension can be confirmed.

In patients with confirmed high BP, repeated home blood pressure measurements (HBPM) are recommended, and ambulatory blood pressure monitoring (ABPM) may be tested if necessary. If the values are stable above the threshold (24-hour SBP/DBP  $\geq$  130/80 mmHg for ABPM and SBP/DBP  $\geq$  135/85 mmHg for HBPM), first and second-level diagnostic investigations are recommended for the initial work-up of the patient. Among the second-level examinations, it is possible to distinguish between those that can be performed as a diagnostic routine and those that must be carried out in case of specific need for further investigation. Details of the first and second level exams are illustrated in Table 2 [1, 11].

The tests aim to assess the presence of signs of HMOD, secondary hypertension, and evaluate cardiovascular disease (CVD) risk.

At the end of the diagnostic pathway, patients are diagnosed with:

- Essential hypertension, with a specific degree of severity.
- Suspected secondary hypertension (Table 3), requiring further investigation at a specialized hypertension center [11].

### 2.2 Evaluation of a Patient with Suspected White Coat or Masked Hypertension

In patients with high BP values (SBP/DBP  $\geq$  130–139/85–89 mmHg) detected in at least one BP measurement but not subsequently confirmed in the GP setting, it is suggested to verify the presence of white coat hypertension or masked hypertension [11].

**Table 3** Signs of possible secondary hypertension**Signs of possible secondary hypertension**

Onset of grade 2 or 3 hypertension at a young age (< 40 years), sudden development of hypertension, or rapid worsening of BP in elderly patients

History of recurrent kidney or urinary tract infections

Recurrent episodes of sweating, headache, anxiety, or palpitations, which may suggest pheochromocytoma.

History of spontaneous or diuretic-induced hypokalemia, episodes of muscle weakness and tetany (hyperaldosteronism)

Symptoms associated with thyroid disease or hyperparathyroidism.

History of obstructive sleep apnea syndrome (OSAS)

Current or past pregnancy, postmenopausal status, and use of oral contraceptives or hormone replacement therapy

Additional HBPM (and, if necessary, also ABPM) monitoring, first-level diagnostic tests (Table 2), and a cardiovascular (CV) risk assessment are conducted to estimate the probability of developing hypertension over time and assess the presence of HMOD.

The experts of the Scientific Committee highlighted the following aspects as topics of attention:

- The 2023 ESH guidelines suggest considering potential treatment for patients at high and very high CV risk even without a confirmed diagnosis of arterial hypertension [11].
- The 2024 ESC guidelines introduce a new category of elevated BP (120–139/70–89 mmHg) and recommend assessing CV risk to determine when to initiate therapy, particularly if values exceed 130/80 mmHg and patient has a comorbidities such as type 2 diabetes mellitus (T2DM), chronic kidney disease (CKD), or heart failure (HF) [1].

### 2.3 Treatment

Following the diagnosis of hypertension, GPs should assess whether to initiate therapy independently or refer the patient to a specialist and/or a hypertension center. The decision depends on the type of hypertension diagnosed and the clinical characteristics of the patient:

- *Essential hypertension—Grade 1*: The GP directly manages the initiation of therapy.
- *Essential hypertension—Grade 2 or 3*: The treatment should be initiated and supervised by a specialist (cardiological/ internist clinic or hypertension specialized center). Before setting up the therapy, the patient must undergo a specialist evaluation (by an internist, cardiologist, nephrologist, or other specialist for hypertension) and, if necessary, a multidisciplinary evaluation involving other specialists.

- *Suspected secondary hypertension*: Before proceeding with the therapy setting, the patient should be referred to the hypertension specialized center for further evaluation to rule out or confirm a diagnosis of secondary hypertension. Following further evaluation, suspected secondary hypertension can be:

- Confirmed with a treatable underlying cause: The patient is referred to an alternative care pathway to address the underlying condition.
- Confirmed with a non-treatable underlying cause: Proceed with the therapy setting.
- Not confirmed: A diagnosis of essential hypertension (grade 1, 2, or 3) is established, and therapy is initiated accordingly.

The therapy approach for hypertension combines several strategies:

- Non-pharmacological treatment (lifestyle modifications, including diet, physical activity, stress reduction, etc.).
- Drug treatment
- Management of other CV risk factors and concomitant clinical conditions.

Pharmacological treatment follows a gradual approach in different steps to reach the BP target within 4–6 weeks:

1. First step (initial step):
  - Double combination therapy: Angiotensin-Converting Enzyme Inhibitor (ACEi) or Angiotensin II Receptor Blocker (ARB) + Calcium Channel Blocker (CCB) or thiazide diuretic [1, 11].
  - Initial monotherapy preferred for frail and/or elderly ( $\geq 85$  years) patients, or with low hypertension and BP < 150/95 mmHg, or high-normal BP with high CV risk [11].
2. Second step (if BP is not on target after 4–6 weeks):
  - Triple combination therapy: ACEi or ARB + CCB + thiazide diuretic [1, 11].

For all therapeutic steps, we suggest:

- Prefer Single Pill Combinations (SPCs).
- Titration until the maximum tolerated dose is reached.
- The use of  $\beta$ -blocker (BB) as monotherapy or at any step of combination therapy in concomitant clinical conditions in which indicated, both for cardiovascular disease (e.g., ischemic heart disease, tachycardia, ectopic

disease, etc.), and non-cardiovascular (e.g., hyperthyroidism, tremors, headache, etc.) [11].

If, even after 4–6 weeks from the start of the second therapeutic step, BP is still not within the recommended limits, the presence of resistant hypertension may be suspected. In this case, the patient should be referred to the specialized hypertension center for confirmation of the diagnosis of resistant hypertension.

The patient who achieves and maintains the recommended BP target for at least 3 months is subsequently referred to the follow-up phase.

Again, the scientific committee identified the following aspects as key points of interest:

- Immediate initiation of therapy is suggested for patients with grade 3 hypertension, grade 2 hypertension with high CV risk or organ damage, and hypertension associated with chronic kidney disease (CKD) or Type 2 Diabetes Mellitus (T2DM) [1].
- In the treatment of hypertension, therapeutic strategies may be adjusted based on age and the presence of comorbidities. In elderly patients (age > 80 years), therapy is recommended if systolic BP is  $\geq 160$  mmHg, provided they are in sufficiently good general health to benefit from the reduction of CV risk [1].
- For patients with comorbidities such as Heart Failure (HF), CKD, T2DM, and obesity, it is suggested to consider adding sodium-glucose cotransporter-2 inhibitors (SGLT2i)/glucagon-like-peptide-1 receptor agonist (GLP1RA) /angiotensin-receptor-neprilysin inhibitor (ARNI)/mineralocorticoid receptor antagonist (MRA) to the basic treatment, by the specific prescribing indications of each drug [1].
- The 2024 ESC guidelines recommend a target systolic BP between 120 and 129 mmHg, provided the treatment is well tolerated [1].

## 2.4 Confirmation of Diagnosis of Resistant Hypertension

Patients with suspected resistant hypertension are referred to specialized centers to rule out a form of pseudo-resistance and confirm the diagnosis of resistant hypertension.

In hypertension centers, an in-depth analysis is carried out to rule out a form of pseudo-resistance, through:

- Assessment of therapeutic adherence to rule out poor compliance with treatment;
- Search for other causes of hypertension, including those attributable to secondary forms of hypertension;
- ABPM and HBPM monitoring.

If, following the patient's evaluation, causes potentially responsible for the lack of BP control are identified, the first step is to intervene to correct them and re-evaluate the patient after 4–6 weeks. If, as a result of the suggested actions, BP returns to target values, the patient is reclassified with essential hypertension of grade 1, 2, or 3.

If, on the other hand, BP remains high and no identifiable cause for the lack of BP control is found (including a form of secondary hypertension), the diagnosis of resistant hypertension is confirmed, followed by a re-evaluation of drug treatment.

## 2.5 Treatment of Patients with Resistant Hypertension

In cases of resistant hypertension, therapy should be reviewed and managed by a specialized hypertension center.

Before proceeding with the review of the therapy in use, it is recommended to proceed with an evaluation of the eGFR:

- If eGFR < 30 ml/min/1.73m<sup>2</sup>:
  - Replace thiazide diuretics with loop diuretics.
  - Chlorthalidone (first choice) may be added or other thiazide-like diuretics,  $\beta$ -blockers,  $\alpha$ -blockers, or centrally acting agents [11].
- If eGFR  $\geq 30$  ml/min/1.73m<sup>2</sup>:
  - Spironolactone (25–50 mg), or another MRA, is added to the basic treatment (first choice) [11].

In patients receiving spironolactone, it is critical to monitor tolerance to the drug, with particular attention to the risk of hyperkalemia. If spironolactone is not well tolerated, it can be replaced with:

- $\beta$ -blockers (BB)
- $\alpha$ -blockers
- Centrally acting agents
- Renal denervation (in patients eligible for this procedure) [1, 11].

The ESH 2023 guidelines suggest, in eligible patients, to consider the addition of SGLT2i (currently indicated for the treatment of patients with HF, CKD, and T2DM), as their use may add a moderate BP-lowering effect to background antihypertensive therapy for patients with resistant hypertension [11].

Following the review of the therapy and the achievement of the BP target for at least 3 months, the patient can be referred to the follow-up phase.

## 2.6 Follow-Up

Patients with stable BP within the target for at least 3 months should be monitored periodically in the follow-up phase. The frequency of follow-up and the specialist involved are different according to the diagnosis of hypertension:

- Patients with grade 1, 2, or 3 essential hypertension and secondary hypertension are suggested to be followed by the GP, with a monitoring frequency ranging from every 3 months to once per year. Patients with resistant hypertension and those with high complexity (e.g., with high/very high CV risk or comorbidities) are suggested to be followed by the specialist or by the hypertension center, with a monitoring frequency ranging from a minimum of 3 to a maximum of 6 months.

The Scientific Committee emphasized the following aspects as focus areas:

- The management of patient follow-up, even when primarily the responsibility of the specialist/Hypertension Centre, should be supported by the GP, who often has more frequent contact with the patient.
- It is advised that the GP consult the specialist at any time during follow-up if needed, also via teleconsultation. Such consultation can be particularly useful during the therapy adjustment (e.g., in the summer season).
- Consider drafting the Individual Care Plan for complex patients with comorbidities and sharing it with the specialist/hypertension center, to coordinate the treatment plan and monitoring.
- The frequency of follow-up visits depends on the patient's health. It is important to ensure that the patient is visited at least once within the maximum identified period.

Regardless of the care setting and frequency of check-ups, periodic patient assessment in the follow-up phase includes:

- BP and heart rate measurement;
- Lifestyle analysis;
- Monitoring of possible adverse effects;
- Assessment of adherence to therapy;
- First-level work-up examination;
- Reassessment of CV risk (including assessment according to the SCORE-2 model);
- Verification of the presence of organ damage;
- Monitoring of symptoms related to any comorbidities;
- Counseling and training of the patient on lifestyles.

Monitoring of the BP target is also carried out during the follow-up phase: if the BP target is maintained, the patient is considered “controlled” and can be referred to the next periodic assessments; if the BP target is not reached, it is necessary to investigate the possible causes related and correct them.

Among the factors to be analyzed in the case of non-target BP are:

- Poor adherence to therapy;
- Side effects or intolerance to drugs;
- Use of substances that increase BP;
- Other conditions that can contribute to high BP.

After a maximum of 30 days, a new BP measurement should be performed: if the BP is within target values, the patient is considered “controlled” and can be referred to the next periodic assessments. If BP remains above the target, treatment should be re-evaluated and modified until target BP values are reached. In the case of an “uncontrolled” patient, it is suggested that the GP consult the specialist (also via teleconsultation) to discuss therapeutic strategy and the need for referral to the specialist.

## 3 Summary of the Key Role of Different Care Settings

The management of the hypertensive patient is based on a multidisciplinary approach, which involves different healthcare professionals to respond to the specific needs of the patient. A multidisciplinary approach allows for coordinated patient management, improving the appropriateness of therapeutic and diagnostic interventions.

Therefore, it is essential to identify and share the key activities and corresponding responsibilities assigned to each professional (Fig. 1).

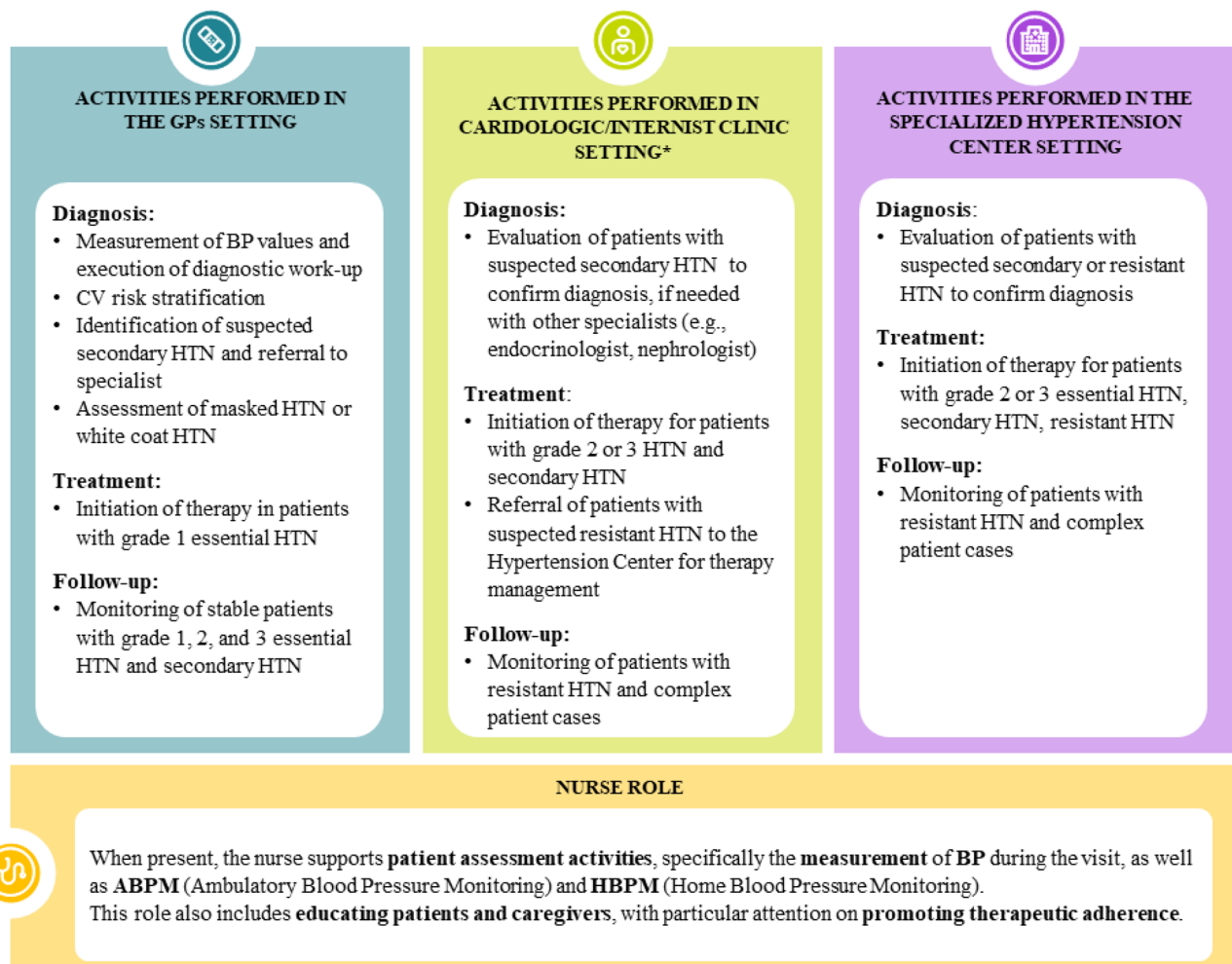
## 4 Areas of Improvement for the Management of Hypertension

### 4.1 Possible Areas for Improvement of the Patient Pathway

Based on the recommended patient pathway and considering the main critical issues in the current management of hypertension, the Experts identified eight areas of improvement (Table 4).

Focusing on these areas is expected to enhance the management of hypertension, with anticipated benefits for both patients and the healthcare system.

The experts' assessment of areas for improvement, in terms of usefulness and feasibility of implementation,



**Fig. 1** Summary of the roles of different stakeholders involved in the management of hypertension

reveals a multi-faceted picture (Fig. 2). It is interesting to note that some areas are perceived as highly strategic but at the same time less achievable in the short term. Others, although with a lower perceived value, appear more achievable in the short term.

Experts agreed on the importance of adopting a gradual implementation approach, starting with actions that are not only “useful” but also achievable in a short time. This will help to generate a tangible positive impact in a short time, creating the condition to progress towards more complex and strategic interventions. At the same time, it is equally essential to develop a plan and strategies to implement the solutions considered most relevant, but which present the most critical issues in terms of feasibility.

## 4.2 Focus on Monitoring and Promotion of Treatment Adherence

Adherence to pharmacological therapy is a critical aspect of managing hypertension. Traditional methods like manual pill counting or mechanical counters are impractical in clinical settings, and plasma drug levels measurement is not feasible for all patients. Monitoring prescription refill patterns via the EHR offers a promising alternative.

Existing platforms used by GPs could be more systematically used to track treatment adherence. Regular reassessment during follow-up visits by GPs and specialists, with specific notes in medical records, could significantly improve adherence monitoring.

Experts emphasize the importance of patient empowerment, supported through educational initiatives. Nurses and pharmacists can play a key role in the education of patients and caregivers. Additionally, encouraging patients

**Table 4** Areas for improvement and supporting solutions

Areas for improvement	Supporting solutions
#1. Definition of national guidelines for the management of patients with hypertension	Develop national-level recommendations for hypertension management, with a focus on collaboration and referral process between different levels of care (hospitals and GPs). Define key indicators to assess their adoption at the regional/local level.
#2. Adoption of shared models for the diagnosis and stratification of patients with hypertension	Formalize a list of diagnostic tests to be prescribed by GPs for patients with suspected hypertension. Define a standardized protocol for the CV risk stratification of hypertensive patients, including e.g., required clinical data and the reference stratification model (es, SCORE-2). Develop guidance to support GPs and clinicians in the identification of patients with suspected secondary hypertension or confirmed resistant hypertension (e.g., list of diagnostic tests). Enable sharing of diagnostic results between different healthcare professionals involved in patient management, e.g., via Electronic Health Record (EHR).
#3. Proactive communication and collaboration between different care settings	Formalize referral protocols for patients from primary care to specialist settings (e.g., criteria for identifying patients requiring specialist evaluation). Establish care pathways/protocols to support communication and collaboration between different stakeholders and care settings, particularly during critical patient phases (e.g., post-hospital discharge, diagnosis of secondary hypertension). Enhance digital tools to support communication (e.g., telemedicine platforms, shared electronic health records, etc.).
#4. Training of GPs/nursing settings in the management of hypertension	Develop dedicated training programs on arterial hypertension. Provide educational materials to be shared with healthcare professionals (e.g., focus on treatment protocol).
#5. Monitoring and promotion of treatment adherence	Define national protocols to assess therapeutic adherence. Strengthen the role of nurses and pharmacies in supporting the monitoring of adherence. Implement personalized strategies for managing non-adherent patients (e.g., use of SPCs). Raise awareness among patients and caregivers on the importance of treatment adherence.
#6. Definition of KPIs to monitor the quality of care and clinical outcomes	Integrate quality-of-life questionnaires for patients to be completed within the EHR. Define a list of KPIs to be monitored periodically (e.g., achievement and maintenance of BP-target through automatic analysis of patient EHR).
#7. Raising awareness among patients (and/or caregivers) of disease self-management	Provide educational materials (with particular focus on treatment adherence, BP monitoring). Organize group sessions led by nurses to promote healthy lifestyle choices and raise awareness of major cardiovascular risk factors. Design a digital tool (e.g., chatbot) to address patients' questions and concerns.
#8. Increased use of digital tools for patient management (e.g., telemedicine, EHR)	Ensure interoperability of EHR systems across care settings, integrating alerts to notify of major events (e.g., patient hospitalization, newly diagnosed comorbidities, missing drug prescription). Promote telemedicine use across care settings, with a user-friendly platform for both patients and professionals.

to maintain a diary of daily home BP measurements and therapy intake can further support adherence.

### 4.3 Focus on Proactive Communication and Collaboration Between the Community and Hospital Services

The experts agree that innovative digital tools such as teleconsultation, EHR (ideally with interoperability between different care settings) could enhance collaboration and communication across different settings. However, due to the currently inadequate IT infrastructure in most of the

Italian healthcare setting, those tools are unfeasible in the short term.

Immediate solutions proposed by the experts to reduce communication barriers include:

- Organizing joint educational sessions with specialists and GPs. This approach would facilitate the development of a professional relationship, thereby improving collaboration and mutual understanding.
- Additionally, formalized correspondence between specialists and GPs, both paper-based and digital, would help ensure shared strategies for patient treatment and

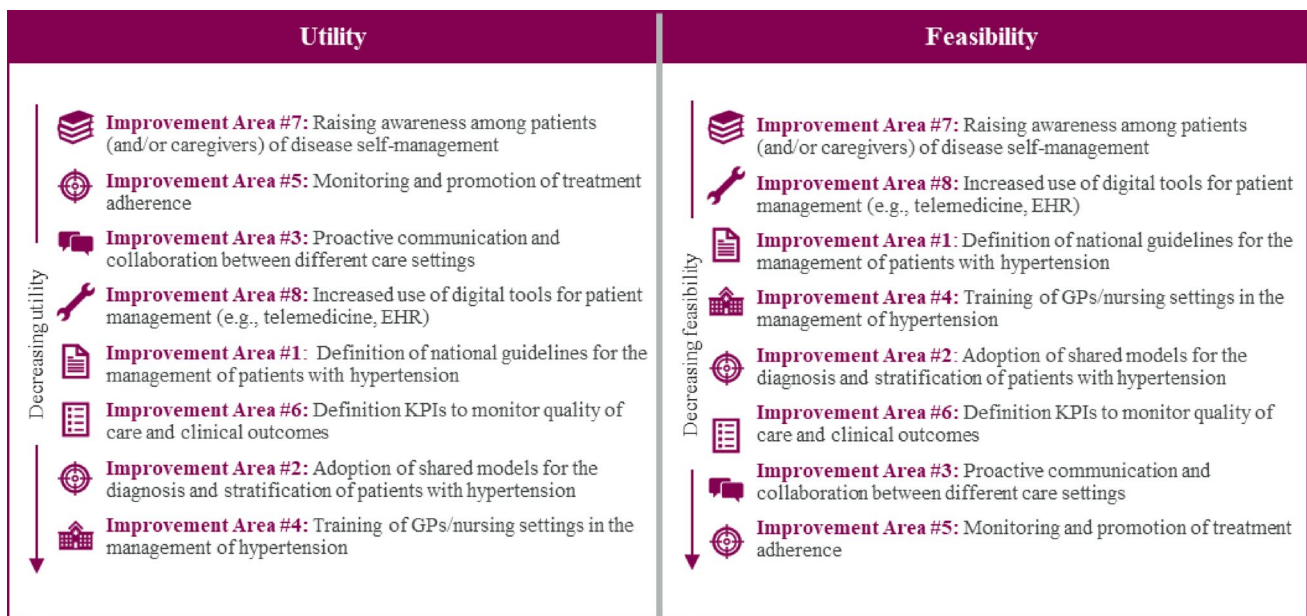


Fig. 2 Voting results on priority areas for improvement based on usefulness and feasibility

care processes based on the patient's progress and overall clinical condition, thereby enhancing long-term health management.

## 5 Key Performance Indicators (KPIs)

KPIs are useful for monitoring and evaluating the patient care pathway, as they are based on real data. To be successful, KPIs must be easy to measure and clinically interpretable, aligned with a clinical guideline.

Table 5 presents a list of KPIs related to the management of hypertension, categorized as follows: structure KPIs (resources and infrastructures available for the care of patients), process (efficiency of management pathway), and result (health outcomes and perceived quality).

## 6 Conclusions

Arterial hypertension management represents a significant challenge for the Italian NHS, requiring an integrated, multidisciplinary approach based on standardized pathways. The analysis conducted within this project has highlighted both challenges and opportunities for improvement, providing concrete recommendations for efficient patient management at the national level.

Based on the main international scientific guidelines and organizational specificities of the Italian NHS, this document proposes a recommended care model that outlines the role and activities of the different actors involved in the

diagnosis, treatment, and follow-up phases. The definition and adoption of a shared model is essential to improve the effectiveness of care, avoid duplication of activities, limit the consumption of resources, and facilitate access to the most appropriate care setting for each patient.

Collaboration and coordination are needed among the different professionals in the healthcare system—from GPs to clinicians working in local clinics or specialized hypertension centers, including nurses and pharmacies, as well as patients and their caregivers.

The analysis identified eight priority areas for improvement, with a focus on patient and caregiver education, support for therapeutic adherence, and communication and collaboration between different settings of care. The main challenge now lies in the practical implementation of the proposed actions.

A monitoring system based on KPIs can support the evaluation of the patient care pathway and guide improvement actions.

**Table 5** KPIs for monitoring and evaluating the patient care pathway**Structural KPIs**


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Existence of a PDTA with specific patient management guidelines tailored to each healthcare setting (YES/NO)
Existence of a defined access protocol for patient access to different healthcare settings (YES/NO)
Existence of a protocol with criteria for referring patients from the GP to a specialist (YES/NO)
Drafting and sharing of the patient's individualized care plan across different settings and professionals (YES/NO)
Existence of a specialized hypertension center in the local care network (YES/NO)
Number of nursing staff supporting hypertension clinics/specialized hypertension centers
Existence of a training plan for healthcare operators (clinicians, GPs, nurses) dedicated to hypertension management (YES/NO)
Existence of an interoperable EHR between GP and clinics/specialized hypertension center (YES/NO)
Existence of a standardized EHR-based analysis for drug reconciliation and evaluation of drug combinations according to treatment guideline recommendations (YES/NO)
Existence of digital tools for GPs/Clinicians and Patient communication (YES/NO)
Delivery of educational sessions for patients and caregivers delivered by the Clinic/Hypertension Centre's nursing staff (YES/NO)
Existence and distribution of educational materials for patients (YES/NO)
Delivery of questionnaires to patients to assess disease management satisfaction and quality of life (YES/NO)

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**Process KPIs**


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Percentage of patients diagnosed with arterial hypertension (out of total assisted)
Percentage of patients with suspected hypertension for whom a complete diagnostic work-up was performed (out of total patients with HTN)
Percentage of patients stratified for CV risk (out of total patients with HTN)
Percentage of patients with adequate treatment according to guidelines (out of total patients with HTN)
Percentage of patients with true resistant HTN referred to the specialized hypertension center (out of total patients with resistant HTN)
Percentage of patients with resistant hypertension excluded for pseudo-resistant HTN (out of total patients with resistant HTN)
Percentage of patients with resistant hypertension excluded for secondary hypertension (out of total patients with resistant HTN)
Percentage of patients visited according to the follow-up plan (timing of checks and monitoring tests) (out of total patients with HTN)
Percentage of patients adhering to treatment (out of total patients with HTN in treatment)
Percentage of patients receiving disease education (out of total patients with HTN)
Percentage of patients with an individualized care plan (out of total patients with HTN)

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**Outcome KPIs**


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Percentage of patients who reach the BP target established (out of total patients with HTN)
Percentage of patients who have experienced a cardiovascular event, ischemic cerebrovascular event, peripheral vascular disease, renal event, or mortality in the last year (out of total patients with HTN)
Percentage of patients hospitalized for uncontrolled HTN (failure to meet control targets) in the last year (out of total patients with HTN)
Rate of emergency room visits for causes associated with hypertension (out of total patients with HTN)
Rate of hospital admissions for causes associated with hypertension (out of total patients with HTN)
Rate of 30-day hospital readmissions for causes associated with hypertension (out of total patients with HTN)
Percentage of patients satisfied with the care received (out of total patients with HTN)

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**Declarations**

**Conflict of interest** MLM, GT, GG, FV, MP, AR, and ADG declare no financial or non-financial conflicts of interest. MV declares to be President of the Italian Society for Cardiovascular Prevention (SIPREC).

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