

HYPERTENSION NEWS

September 2026

New hypertension guidelines for Africa

How to transform
care across
the continent

60 years of the ISH

Our Past Presidents
reflect on six decades of
advancing hypertension
research and care

IN THIS ISSUE:

- Hypertension in South Korea
- Validating blood pressure monitors in children
- Boosting adherence to blood pressure medications
- 30 years of the Anglo-Scandinavian Cardiac Outcomes Trial



**International
Society of
Hypertension**

60
YEARS
1966-2026

www.ish-world.com

IN THIS ISSUE

1 FROM THE PRESIDENT

4 THE ISH AT 60

- 4 Past Presidents of the ISH give us their reflections on what the ISH's biggest contribution has been over the last 60 years

9 REGIONAL STATEMENTS

- 9 Launching new hypertension guidelines for Africa
- 12 An Asian expert consensus on high-quality hypertension management
- 14 Why Asia-Pacific needed its own playbook for diabetes and high blood pressure

19 HYPERTENSION CONTROL PROJECTS

- 19 HEARTS 2.0: Hypertension control and integrated CKM Care in the implementation era
- 24 South Korea's success in hypertension control

28 BLOOD PRESSURE DEVICES

- 28 An urgent need for more automated blood pressure monitors validated in children
- 31 Cuffless blood pressure devices in South Korea: evidence behind the new KSH recommendation

35 RESEARCH PROJECTS

- 35 The Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT) UK 30-year anniversary 1996-2026
- 39 Biochemical urine analysis may boost adherence to treatment with blood pressure medications: the OUTREACH trial

 @ISHBP  @ISHBP  @ISHBP

 @ISHYPERTENSION  @ishbp.bsky.social



**International
Society of
Hypertension**

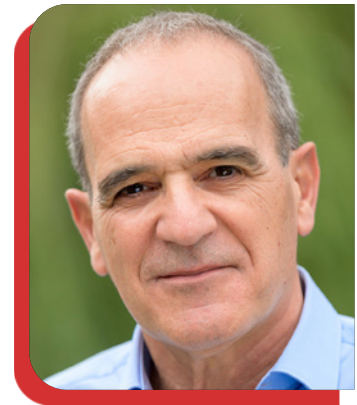
www.ish-world.com
www.ishecs26.org

INTRODUCTION FROM THE PRESIDENT

GEORGE STERGIU

President, International Society of Hypertension

Hypertension Center STRIDE-7, School of Medicine, University of Athens, Greece



Dear ISH members and friends

ISH has prepared another great edition of *Hypertension News*.

2026 represents the 60th anniversary of the ISH, founded in 1966, and we asked several past presidents of the Society to reflect on the ISH's greatest contributions over the past six decades and what should come next. It is important to reflect on the past, as ISH is growing and we aim to have an even greater impact on the global management of hypertension in the coming years.

This edition includes a summary of new ISH guidelines for hypertension in Africa, developed by our Africa Regional Advisory Group and the Pan-African Society of Cardiology. The most important aspect of these guidelines is the priority given to non-physician healthcare workers in hypertension care, a reality and necessity in most settings around the world. Another major contribution presents a statement on high-quality hypertension management in Asia, led by the incoming ISH President, Kazu Kario, and by Jiguang Wang. This is followed by a statement from our colleagues at the Asian-Pacific Society of Hypertension (APSH) and the Diabetes Asia Study Group (DASG), providing region-specific targets and therapeutic recommendations.

We have two articles that provide important lessons for scalable actions to improve hypertension control. The Pan American Health Organisation (PAHO) presents its eight-year experience implementing the WHO HEARTS 2.0 package in 30 countries across Latin America, effectively engaging 80% of primary care centres serving 70 million people. In addition, Seonghoon Choi presents Korea's success story, where national

hypertension control reached 62% in 2025, up from 5% in 1990. We also include a report from STRIDE BP (www.stridebp.org) on the limited availability of properly validated blood pressure measurement devices for children, and another article discussing a recent decision by the Korean Society of Hypertension (KSH), which for the first time recommends the use of cuffless devices for out-of-office blood pressure monitoring.

Last, we mark the 30th anniversary of the Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT) commemorated in a symposium at the Royal Society of Medicine in London, and present the key findings of the OUTREACH trial, which explores how biochemical urine analysis can improve adherence to antihypertensive medications.

This is my final introduction to *Hypertension News* as President of the ISH, as my presidential term will come to an end at our upcoming Scientific Meeting in Dubai, in October. I feel fortunate that we have enjoyed such a creative and rewarding term, working productively with an outstanding team of ISH Council members, Regional Advisory Group Chairs and Committee Chairs. Our only challenge was the increasing number of tasks, which is actually a positive sign, reflecting the rapid growth of our Society.

We made the important decision to meet our members and friends in person more frequently by holding annual Scientific Meetings. Following our meeting in Dubai next month, we are delighted to have secured the 2027 Scientific Meeting in Shanghai, in partnership with the Chinese Hypertension League. In 2028, we will hold a joint meeting with the European Society of Hypertension in Glasgow, in collaboration with the British and Irish Hypertension Society.

The scientific output of ISH has been substantial during this term. We published major position papers on paediatric and adolescent hypertension, hypertensive disorders of pregnancy, and the above-mentioned guidelines on hypertension in Africa. In October, during the ISH Meeting, we will present the 2026 ISH Global Hypertension Practice Guidelines, together with an implementation plan supported by AI technology. We hope this approach will accelerate the translation of evidence into everyday clinical practice and inspire similar initiatives by other scientific organisations.

At the end of our Dubai Meeting, I will hand over the ISH Presidency to Kazu Kario. Kazu has a great international reputation based on his scientific achievements and leadership. I know he will lead the Society with ambition, vision and commitment, and I wish him every success.

I am grateful to all those who supported ISH and me during my presidency, including members of the ISH Council, our Committees and Regional Advisory Groups, our members, partners, and the wider global hypertension community. I am also deeply grateful to the ISH staff, with whom we worked closely over the past two years. I hope that all members of the ISH family are proud of what we have achieved together during these two years, and that this has been a memorable and rewarding period for everyone involved.

Enjoy reading this edition of *Hypertension News*. I look forward to seeing many of you in Dubai next month!

George Stergiou
ISH President

George Stergiou – president@ish-world.com



Date: 28-31 October, 2027 (Thursday – Sunday)
Venue: Shanghai Zhangjiang Science Hall

**Innovations for Improving
Blood Pressure Control**

The 32nd Scientific Meeting of the International Society of Hypertension (ISH 2027)
The Chinese Hypertension Meeting 2027 (CHM 2027)
The 29th International Symposium on Hypertension and Related Diseases

In collaboration with





International
Society of
Hypertension



UNITED TO CONTROL HYPERTENSION:
SMART SOLUTIONS

31ST INTERNATIONAL SOCIETY OF HYPERTENSION
SCIENTIFIC MEETING AND 17TH EMIRATES CARDIAC
SOCIETY ANNUAL CONFERENCE 2026

ISH-ECTS 2026



REGISTER NOW

22-25 OCTOBER 2026

Intercontinental Dubai
Festival City

www.ishecs26.org

MANAGED BY

icom
GROUP
Business with Intelligence!

THE ISH AT 60



International Society of Hypertension

60
YEARS
1966-2026

Established in 1966, the ISH this year celebrates its 60th anniversary. As we reach this milestone, we asked several Past Presidents of the ISH to give us their reflections on what the ISH's biggest contribution has been over the last 60 years - and what it should focus on next.

Giuseppe Mancia

(Italy) ISH President 1988-1990



Founded in 1966 after two small preparatory meetings (Prague and Siena), the International Society of Hypertension (ISH) soon became the most prestigious scientific Society addressing the progress made by

research on pathophysiological and clinical aspects of hypertension at a worldwide level. Its prestige was due to the scientific fame of the founders (I. Page, G. Pickering, P. Milliez, F. Gross, C. Bartorelli, J. Robertson, A. Zanchetti, to mention a few) as well as to the high scientific level of its meetings which started in 1971 (Milan) and then, at biannual intervals, were held all over the world, always with a large attendance, a high scientific quality and a great interest and communication coverage from the entire medical world. This was also favoured by the fact that these were golden years for hypertension basic, epidemiological and clinical research on hypertension, including seminal trials of fundamental importance for treatment, which were often presented and discussed for the first time at the ISH meetings. For young investigators like myself, critical exposure to the best ongoing

research as well as presentation and discussion of the results of their work in a high scientific quality environment was an unforgettable experience with positive effects for future work.

A second aspect to mention is that ISH early recognized the importance of issuing hypertension guidelines beyond individual country boundaries (e.g. the US guidelines) to help correct management of hypertension worldwide. This was made possible by the close cooperation of ISH with the World Health Organization (WHO), which led to the widely popular WHO/ISH guidelines first in the eighties under the coordination of A. Zanchetti for ISH and T. Strasser for WHO, and then in the nineties and at the start of the current millennium.

Because of my European origin, allow me to mention a third important contribution, i.e. the assistance given by ISH to the foundation of the European Society of Hypertension (ESH) in 1989. ISH sponsored and helped the organization of the preliminary meetings and then inspired the structure of the new Society which was modelled after ISH, with virtually the same byelaws and goals, with the addition of one permanent ISH representative in its Scientific Council. The close relationship of ESH with ISH has since continued and reinforced by some very successful common meetings, the next one being the ISH/ESH meeting to be held in 2028 in Glasgow.



Tony Heagerty

(UK) ISH President 2008-2010



The International Society of Hypertension has a rich history of leading the drive to raising awareness and improving the management of high blood pressure globally. Its commitment to

promoting research into all aspects of the disease is unstinting and absolute. It has been led by a litany of academic hypertension physicians and I was privileged to serve as a President.

Perhaps its greatest achievement in its first 60 years was the advancement of the overwhelming case for detecting and treating high blood pressure and providing the forum for debates over which therapy to use and what constitutes good control. The Hypertension Community is a close family but argues strongly but fairly always!

Beyond these goals for me high points include assisting in the formation of National Societies of Hypertension and in particular in regions such as the Middle East where ISH was instrumental in Lebanon and Bahrain. In addition, the regular educational visits undertaken by Robert Fagard to Sub Saharan African Countries facilitated increased awareness of the epidemic of cardiovascular disease imminently threatening that region. They inspired many of the senior leaders now prominently active across the continent in hypertension management.

From a research perspective John Hall designed the ISH Fellowship Scheme which allowed young academically minded doctors from less opulent countries to visit host labs and learn new techniques to take back to establish research programmes back home. Several have become globally successful.

And unquestionably impressive has been the regular release of evidence-based hypertension guidelines which are pragmatically crafted to be applicable in low- and middle-income countries.

High blood pressure is a global problem which requires simple management – measurement and treatment. ISH has shouldered the mantle of commitment to disease prevention for 60 years.

Where should it go next?

I believe its voice should be heard on a global stage. It should be the champion of cardiovascular disease prevention. It should be the pressure on governments to understand that the cost of hypertension management is minimal compared with the savings that accrue from avoiding coronary revascularisation or treating stroke survivors lost to the workforce prematurely. There is still much to do!

Stephen Harrap

(Australia) ISH President 2010-2012



What has been ISH's greatest contribution over the past 60 years, and what should its next priority be?

The answer to these questions lies in the name ISH: "International".

The ISH provides a preeminent global stage on which countries and regions are represented and highlighted with benefits for both individuals and societies. The specific commitment of the ISH to worldwide interests has been exemplified initially through the International Forum and more recently through the Regional Advisory Groups. Within the broad constituency that comprises the ISH, the interactions and collaborations are invaluable and create a formidable network. They are fostered by the ISH to help establish careers and leadership potential of people and to strengthen and grow blood pressure professional associations around the world.

New ways in which tangible international support can be delivered should be a priority of the ISH in coming years.

Rhian Touyz

(Canada) ISH President 2014-2016



"For 60 years, the ISH has served as a global hub for hypertension, uniting clinicians, health care workers, and researchers around the world in a shared mission to reduce the burden of high blood pressure.

Looking ahead, our challenge is to translate the discoveries, guidelines, and efforts born from the ISH into real-world action – ensuring they achieve genuine, measurable impact in reducing hypertension worldwide."

Neil Poulter

(UK) ISH President 2016-2018



Over the past 60 years, I believe one of ISH's greatest contributions has been its ability to bring together the world's leading expertise in hypertension and translate that knowledge into

rigorous, evidence-based guidance that can improve clinical practice globally.

The ISH guidelines are an excellent example of this. They give healthcare professionals clear, practical guidance on how to manage hypertension once it has been identified. But, of course, that depends on people knowing they have hypertension in the first place.

That was one of the motivations behind launching May Measurement Month (MMM) during my Presidency of ISH in 2017. We knew that millions of people worldwide were living with raised blood pressure without knowing it, and that we needed to complement guidance on managing hypertension with a concerted effort to find those people. Since then, MMM has screened over 8 million adults

across more than 120 countries, and found over 2 million people with untreated or inadequately treated hypertension.

As ISH looks to its next 60 years, I believe closing that detection gap and expanding linkage to management facilities must remain a priority. We have made enormous progress in understanding how to treat hypertension, the challenge that remains is ensuring that knowledge reaches the people who need it most.

Alta Schutte

(Australia) ISH President 2018-2020



As a Past President of the International Society of Hypertension, I regard ISH's greatest contribution over the past 60 years as bringing the global hypertension community together around a shared

scientific, clinical and public-health mission. Through research, education, guidelines and advocacy, ISH has helped establish raised blood pressure as the leading preventable cause of cardiovascular disease and premature death.

Its next priority must be to achieve substantially better blood pressure control worldwide. The global burden remains immense: approximately 1.4–1.7 billion adults are living with hypertension, yet only about one in five have their blood pressure controlled. Moreover, 83% of people with uncontrolled hypertension live in low- and middle-income countries, where progress has been particularly limited. We have compelling evidence that even a 5 mmHg reduction in systolic blood pressure lowers major cardiovascular events by about 10%, consistently across different levels of cardiovascular risk. Effective, affordable and scalable strategies could therefore prevent millions of premature deaths.

The ISH should continue to provide the leadership and advocacy needed to translate evidence into implementation: strengthening prevention,

detection, treatment and long-term control, while addressing inequities in access to care. We have the knowledge and tools. Our responsibility now is to ensure they reach everyone who needs them. Improving blood pressure control must remain the central global goal of hypertension care.

Maciej Tomaszewski

(UK) ISH President 2020-2022



The International Society of Hypertension has always been a hub for excellence - celebrating the very best in hypertension research and standing as a leading voice and opinion-maker

in the field. Through its publications, impact statements, guidelines and position papers, and its partnerships with world-leading organisations, it has advanced hypertension education and fostered stronger collaboration in research and clinical care across the globe.

Above all, the Society has attracted exceptional talent and remarkable commitment to its leadership over the years. The New Investigator Committee and the New Blood campaign have been resounding successes, creating career-making opportunities for people around the world — many of whom now sit in the driving seats of hypertension research globally.

Looking ahead, the Society's priority must be to turn that reach and expertise into measurable impact: narrowing the gaps in awareness, treatment and

control that still divide world regions, and ensuring that the next generation of leaders it develops is ready and equipped to carry that work to the patients and populations who need it most.

Bryan Williams

(UK) ISH President 2022-2024



For me, the key word in the Society's title is "International" as it brings together colleagues and their different perspectives on tackling the world's most important cause of premature death.

This has been reflected

in the ISH Guidelines which have identified common aspects of best practice that should apply to all regions of the world whilst also highlighting region specific differences and challenges for implementation which is unique relative to the many other guidelines which tend to be country or region specific. This global perspective has been aided by ISH Regional Advisory Groups, the ISH congress and "Hypertension News". A key function of any organisation is to look to the future, and the ISH has been vitally important in inspiring and nurturing the next generation of global leaders in research and clinical practice in hypertension.

Looking ahead, the ISH must focus on its distinctive capabilities, continue to raise the profile of the importance of detecting and effectively treating hypertension globally, providing authoritative, rigorous and evidence-based reports and guidance on how to do this, as well as garner the support needed to inspire the next generation of leaders in hypertension.



**International
Society of
Hypertension**

60
YEARS
1966-2026



Medtronic

Symlicity™ blood pressure procedure

Hypertension care, transformed

A proven procedure for significant,
safe, and sustained blood pressure
reductions.¹⁻⁴

18.5

mmHg

reduction in office systolic
blood pressure at 3 years
on medications¹
(N = 175)

< 0.4%

major adverse events
at composite endpoint,
including no new incidence
of renal artery stenosis
(> 70%) at 6 months.⁴
(N = 253)

Learn more about the Symlicity blood pressure
procedure and view benefits/risks.

U.S. healthcare professionals

International healthcare
professionals

Side effects may include headache, back pain, and access site complications such as bruising or hematoma. In very rare cases, renal artery stenosis or arterial injury or perforation may occur. Antihypertensive medications may need to be titrated by the clinical care team over time based on patient response.

[medtronic.com](https://www.medtronic.com)

1. Kandzari DE, et al. *J Am Heart Assoc.* 2026;15:e049081.

2. Mahfoud F. Long-term outcomes in ESC guideline-recommended patients for RDN from Global SYMPPLICITY Registry DEFINE. Presented at: EuroPCR 2025; May 20-23, 2025; Paris, France.

3. Böhm M, et al. *Lancet.* 2020;395:1444-1451.

4. Kandzari DE, et al. *J Am Coll Cardiol.* 2023;82:1809-1823.

REGIONAL STATEMENTS

Launching new hypertension guidelines for Africa

ALFRED DOKU

Consultant Physician and Cardiologist, University of Ghana Medical School, Ghana. Chair, ISH Africa Regional Advisory Group (RAG)



RUAN KRUGER

North-West University in Potchefstroom, South Africa

Hypertension is one of the most pressing health challenges facing Africa, with cardiovascular disease rising by more than 50% in Africa over the past three decades. High blood pressure is a leading cause of heart failure, stroke, kidney disease and premature death, but most people in Africa with hypertension remain undiagnosed or do not have their blood pressure adequately controlled. Among adults who are diagnosed, only about 8-15% have their blood pressure under control. There is also an urgent need to address hypertension across the life-course, including among children and adolescents, among whom hypertension remains under-recognised and underdiagnosed across the continent.

Against this background, the ISH Africa Regional Advisory Group and the Pan-African Society of Cardiology (PASCAR) developed new pan-African clinical guidelines for the management of hypertension.¹

The aim was to provide practical, evidence-based recommendations that reflect how healthcare is delivered across Africa and can realistically be implemented in settings where resources, infrastructure and access to treatment may be limited.

Why Africa needed its own guidelines

Most African countries do not currently have national hypertension guidelines. International recommendations provide an evidence base, but

they are not always easily applicable to African healthcare systems.

Many existing models of hypertension management depend heavily on physicians and specialist services. In Africa, however, physicians are limited in number, and hypertension care is frequently delivered in community settings by nurses, community health workers, clinical officers, physician assistants and pharmacists. The best approach to care is therefore task sharing.

Guidelines developed for Africa had to recognise and support the essential contribution these professionals already make. They also had to take account of challenges including the affordability and availability of medicines, limited access to blood pressure measuring devices, high dietary salt consumption and cultural beliefs surrounding hypertension and its treatment.

The need for practical guidance became particularly clear through the work of the African School of Hypertension for Non-Physician Health Workers, established by the ISH Africa Regional Advisory Group.²

The School provided training for nurses, pharmacists, community health workers and other professionals on measuring blood pressure, diagnosing hypertension, initiating treatment and referring patients for specialist care when needed. This experience reinforced both the potential of non-physician healthcare workers and the importance of providing them with clear protocols and referral pathways.

A community approach

Our guidelines propose a shift towards simpler, community-based hypertension care, across the life-course.

The recommendations include simplified treatment protocols and referral pathways intended to support professionals including community health nurses, clinical nurses, and clinical officers/physician assistants working in primary care. They emphasise early detection, dietary and lifestyle changes, with pharmacological treatment when needed.

We also recommend expanding opportunistic blood pressure screening. People should be able to have their blood pressure measured in everyday locations, including schools, workplaces, markets, pharmacies and places of worship, as well as clinics.

Screening must be connected to reliable systems for confirming the diagnosis, initiating treatment and monitoring patients over the longer term. It should form part of a complete pathway of integrated chronic care rather than being undertaken as an isolated activity.

Importantly, the guidelines also address common misconceptions, including beliefs that medication can be stopped once blood pressure readings improve or that hypertension can be cured using herbal remedies or traditional healers. Healthcare professionals need to be equipped to discuss these beliefs sensitively while providing clear and accurate information.

Addressing hypertension early in life

An important feature of the guidelines is that they cover both paediatric and adult populations.

Hypertension among children and adolescents remains under-recognised and underdiagnosed in Africa. However, elevated blood pressure and cardiovascular risk can begin early in life. If prevention starts only in adulthood, important opportunities to protect long-term health may already have been missed.

The guidelines therefore recommend blood pressure screening for children aged five years and above through schools, clinics and community programmes.

By including children and adolescents, we hope to encourage governments, healthcare systems and practitioners to take a life-course approach to preventing and managing hypertension. Acting earlier offers an opportunity to reduce cardiovascular risk before irreversible damage occurs.

Towards implementation

Publication of the guidelines is an important milestone, but it is only the beginning. Their value will ultimately be determined by whether they lead to changes in healthcare delivery and better outcomes for patients.

Implementation will require governments and healthcare systems to strengthen primary care and support appropriate task-sharing. Non-physician healthcare workers will need suitable training, supervision and recognition. Reliable supplies of affordable medicines and validated blood pressure measuring devices will also be essential.

Professional societies and training organisations can help incorporate the recommendations into education and continuing professional development. Communities must also be involved in designing services that people can access and trust.

No guideline can transform hypertension care on its own. Progress will require political commitment, investment in primary healthcare, stronger community services and improved access to affordable treatment.

But we hope these recommendations provide governments, national hypertension societies, healthcare professionals and communities with a practical foundation for this work. Most importantly, we hope they help more people have their high blood pressure detected earlier, receive effective treatment and avoid preventable cardiovascular disease.

References:

1. Doku A, Kruger R, Asamoah KT, Akumiah FK, Auala T, Beheiry H, et al. 2026 ISH guidelines for the management of hypertension in Africa: the International Society of Hypertension (ISH) African Regional Advisory Group and the Pan African Society of Cardiology (PASCAR). J Hypertens. Published online 28 July 2026. doi: 10.1097/HJH.0000000000004411.

2. Isiguzo, G.C., Adejumo, O.A., Nwude, I.E., Amaechi, U.M., Ayoola, A.Y., Mamven, M.H., Mutagaywa, R.K., Oguntade, A.S., Isiguzo, K.G., Adeoye, A.M., Hind, B.M., Doku, A., Damasceno, A.A., Mbulaje, L. D, Marwa, S.C., Akinyemi Aje, Avorkliya, L., Jaiteh, L.E.S., Akumiah, F.K., Ogola, E.N., Tangeni Auala, Okereke, C.J., Onwubere, B.J., Akintunde, A.A. and Odili, A.N. (2024). Evaluating the Effectiveness of African School of Hypertension for Non-Physician Health Workers, a Qualitative Study: QuASH Hypertension Study. Global Heart, 19(1). doi:10.5334/gh.1343.

Alfred Doku – dokukavin@gmail.com

Ruan Kruger – Ruan.Kruger@nwu.ac.za

ISH around the world: join today and connect with members in over 100 countries



Not yet a member of ISH?

Explore membership options including our **FREE** Associate Member and Trainee categories.

For further information visit: www.ish-world.com/join-ish

Member

Associate Member

Trainee



REGIONAL STATEMENTS

An Asian expert consensus on high-quality hypertension management

JI-GUANG WANG

The Shanghai Institute of Hypertension, Ruijin Hospital,
Shanghai Jiao Tong University School of Medicine, Shanghai, China



KAZUOMI KARIO

Department of Cardiovascular Medicine, Jichi Medical University, Tochigi, Japan

In a recently published consensus document (Hypertens Res 2026; 49(7):2141-2155), a multi-disciplinary group of experts from Asia proposed some conceptual and practical approaches for high-quality hypertension management towards higher and better blood pressure control.

The consensus supports a multidimensional approach for the management of hypertension by grading the level of blood pressure with various innovative blood pressure measuring technologies, staging the disease severity of hypertension as no, subclinical and clinical target organ damages, and phenotyping or subtyping the diseases or other secondary causes of hypertension or the mechanisms of blood pressure dysregulation or the so-called primary hypertension (Figure).

Grading requires comprehensive blood pressure measurements for screen, diagnosis and treatment of hypertension. Everybody should measure his or her blood pressure regularly in a feasible way, in the clinic, at home, or with kiosk or wearable devices. Whenever elevated, blood pressure should be measured in a standardized manner, either with repeated standardized or automated office blood pressure measurements, or 24-h ambulator or 7-day home blood pressure monitoring. Four-limb and central blood pressure measurements may provide additional information on blood pressure and beyond. Whenever hypertension is diagnosed and treated, the best-evidenced antihypertensive drugs, often in combination, should be used for the management of hypertension, and long-term blood pressure monitoring with various

techniques should be performed for the best blood pressure control.

Staging is usually used interchangeably with grading for classifying blood pressure. However, here staging is for the classification of three stages of organ damages, that is no, subclinical structural and functional lesions, and clinical complications. Although blood pressure control is still important in those patients with clinical cardiovascular complications, either stroke, myocardial infarction, heart failure, or end-stage renal disease, the best is to prevent, retard and reverse those identified organ damages. Measurement, either with imaging or laboratory modalities, is prerequisite for “staging”. Such information should be used for the choice of compelling-indicated antihypertensive drugs, intensive blood pressure control, and other cardiovascular therapeutics such as, glucose and lipid-lowering drugs, antiplatelet therapy and anticoagulants.

Phenotyping or subtyping is for the identification of diseases in the kidneys, adrenal glands, thyroids, pituitary glands or thoracic and abdominal aorta that cause hypertension, other secondary causes of hypertension such as drugs and foods, and mechanisms of blood pressure dysregulation such as hyperinsulinemia, sympathetic overactivation and arterial stiffness. Here the treatment of hypertension is often surgical, interventional or device-based and with drugs that target the mechanisms of blood pressure dysregulation, such as glucagon-like peptide-1 (GLP)/glucose-dependent insulintropic polypeptide (GIP) receptors agonists, aldosterone synthase

REGIONAL STATEMENTS

Why Asia-Pacific needed its own playbook for diabetes and high blood pressure

A new joint consensus from the Asian-Pacific Society of Hypertension (APSH) and the Diabetes Asia Study Group (DASG) sets out region-specific targets and treatment choices for a combination that affects hundreds of millions of people across the region.



Anuj Maheshwari
Hind Institute of Medical Sciences, Lucknow, Uttar Pradesh, India



Banshi Saboo
Dia Care, Diabetes Care, and Hormone Clinic, Ahmedabad, Gujarat, India



Boon Wee Teo
Yong Loo Lin School of Medicine, National University of Singapore, Singapore



Ji-Guang Wang
Ruijin Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China



Narsingh Verma
Hind Institute of Medical Sciences, Lucknow, Uttar Pradesh, India



Amit Kumar Gupta
Center for Diabetes Care, Greater Noida, Uttar Pradesh, India.



Apichard Sukonthasarn
Chiang Mai University, and Thai Hypertension Society, Chiang Mai, Thailand



Nadima Shegem
Jordanian Society for the Care of Diabetes, Amman, Jordan



Bishwajit Bhowmik
Centre for Global Health Research (CGHR), Dhaka, Bangladesh



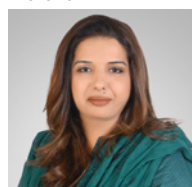
Ashraf P Valappil
Qatar Diabetes Association, Doha, Qatar



Antonia Anna Lukito
Siloam Hospital Lippo Village/ Pelita Harapan University, Banten, Indonesia



Abdul Basit
Indus Hospital & Health Network (IHHN), Karachi, Pakistan



Sumerah Jabbeem
Indus Hospital & Health Network (IHHN), Karachi, Pakistan



Hae-Young Lee
Seoul National University Hospital, National Heart and Stroke Center, Seoul, South Korea



Abdulla O. Al Hamaq
Qatar Diabetes Association, Doha, Qatar



Akira Nishiyama
Kagawa University, Kagawa, Japan



Asher Fawwad
Baqai Institute of Diabetology and Endocrinology, Baqai Medical University, Karachi, Pakistan



Tay Jam Chin
Tan Tock Seng Hospital, Novena, Singapore



Deborah Ignacia D Ona
Philippine General Hospital, University of the Philippines, Manila, Philippines



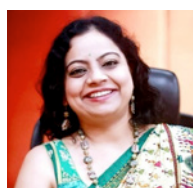
Yen-Hung Lin
National Taiwan University College of Medicine, Taipei, Taiwan



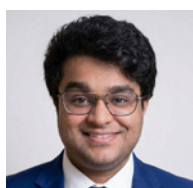
Rohana Abdul Ghani
Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia



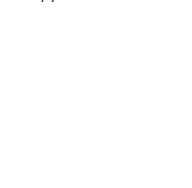
Mesbah Sayed Kamel Mohamed
IDF-MENA Chair Elect, Sohag, Egypt



Shubhashree Patil
Diabetes and Wellness Clinic, Mumbai, Maharashtra, India



Raghunath Dantu
Medeva, Hyderabad, Telangana, India



Eid Elsayed A
Delta University, Mansoura, Egypt

When we sat down as a panel of endocrinologists, cardiologists, nephrologists, internists, basic scientists and diabetologists from 15 countries across the Asia-Pacific region, one thing became clear quite quickly: the hypertension guidelines our patients were being treated according to simply weren't written with them in mind.

Most international guidelines are built on trial populations where Asian patients are a small minority. Yet look at the numbers: China, India, Pakistan, Indonesia, Bangladesh, and Japan are all among the world's top ten countries for adult diabetes cases.¹ And when diabetes and high blood pressure occur together, which happens often, since someone with diabetes is roughly twice as likely to also have hypertension, the risks to the heart, kidneys, and blood vessels compound.² A review of Southeast Asian data found hypertension affecting anywhere from 29.4% to 93.4% of people with diabetes, depending on the setting, with control rates often below 40%.³

That gap, and the absence of a regional guideline that really addressed it, is why APSH and DASG brought together this consensus. We used a modified Delphi process: multiple rounds of literature review, drafting, and voting, retaining only statements on which at least 75% of the panel agreed, and grading each recommendation based on the strength of the supporting evidence.

So, what does the consensus actually say?

First, lifestyle still comes first. A diet built around whole grains, vegetables, fruit, nuts, and low-fat dairy, with sodium kept under 1,500 mg a day (ideally closer to 1,000 mg), regular physical activity, and cutting out tobacco and alcohol, forms the foundation of care to be tried before medication, not instead of it.⁴

Second, when medication is needed, we recommend starting most patients on a combination rather than a single drug: typically an ACE inhibitor or ARB paired with a calcium channel blocker, ideally as a single-pill combination so people actually stick with treatment. If blood pressure isn't controlled, a diuretic is added as a third agent. We were deliberately cautious about older thiazide diuretics like hydrochlorothiazide, since they can nudge blood glucose and HbA1c

upward; low-dose thiazide-like agents such as chlorthalidone or indapamide are preferred instead.

Third, we're recommending tighter blood pressure targets than many clinicians have been used to. For most people with type 2 diabetes, the new target is below 130/80 mmHg.⁵ This isn't an arbitrary tightening; it's driven by three major recent trials. STEP, in older adults, found that lowering systolic blood pressure to 110-130 mmHg reduced cardiovascular events by 26% compared with a standard target of 130-150 mmHg.⁶ ESPRIT, in over 11,000 high-risk adults, including more than 4,000 with diabetes, showed a 12% reduction in major cardiovascular events when systolic pressure was brought below 120 mmHg.⁷ And BPROAD, run specifically in nearly 13,000 people with type 2 diabetes, found a 21% relative risk reduction in stroke, heart attack, heart failure, or cardiovascular death with intensive control below 120 mmHg, versus a standard target below 140 mmHg.⁸ For older or frail patients, we still allow a gentler target of up to 140/90 mmHg, because the risk of falls or kidney strain from over-treatment is real.

Fourth, we made room for the newer cardio-renal protective drugs. SGLT2 inhibitors, GLP-1 receptor agonists, mineralocorticoid receptor antagonists, and even ARNI (sacubitril-valsartan) all earned a place in the algorithm for the right patient, not to replace the core three drug classes, but to add to them when heart failure, kidney disease, or resistant hypertension is part of the picture. The treatment pathway we settled on is summarized below.

Finally, we leaned hard into home blood pressure monitoring. It reflects a patient's real-world blood pressure far better than a single clinic reading, and it's practical; measuring twice daily for at least three days gives a reliable estimate.⁹ Getting it right matters, though: posture, arm position, and avoiding caffeine, alcohol, or exercise beforehand can all change the number on the cuff. We've set out the technique below.

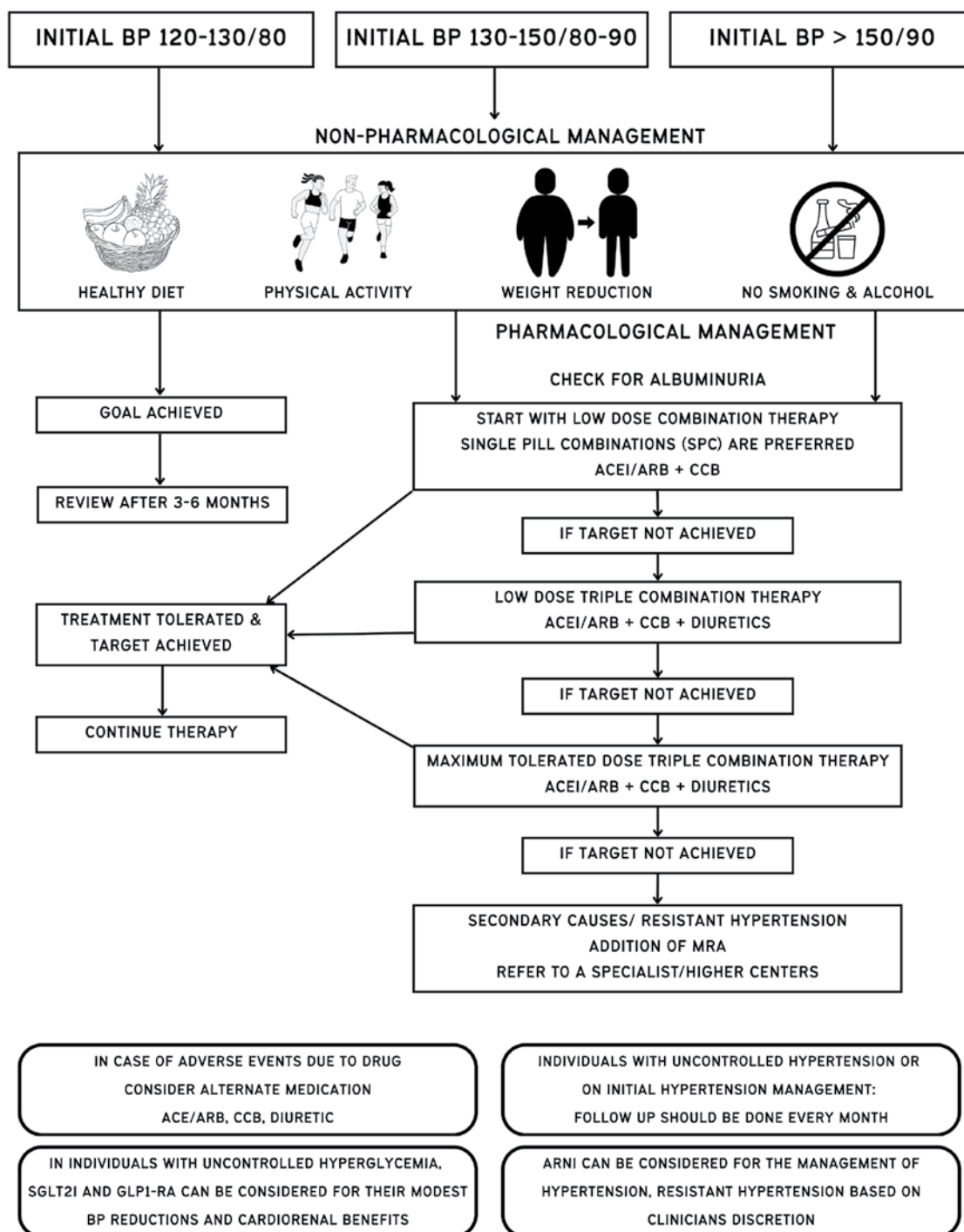
We know cost and access to validated home devices remain real barriers in parts of the region, and we've said so plainly in the consensus, calling for government programs, public-private

partnerships, or manufacturer pricing support to close that gap.

None of this is meant to replace clinical judgment; every recommendation carries a grade reflecting the strength of the underlying evidence, and

treatment must always be individualized to the patient in front of you. But we hope this consensus gives clinicians across the Asia-Pacific something that's been missing until now: guidance that actually reflects the patients walking into their clinics.

Simplified treatment pathway for hypertension in people with diabetes, adapted from the consensus.



Getting an accurate reading: technique for office, home, and ambulatory blood pressure measurement, adapted from the consensus.



SIT COMFORTABLY WITH BACK SUPPORT, FEET ON THE GROUND FOR 5 MINUTES IN A QUIET ROOM



ARMS ON THE TABLE, CUFF AT THE HEART LEVEL



NO SMOKING, ALCOHOL, CAFFEINE & EXERCISE 30 MINUTES BEFORE



USE VALIDATED DEVICE WITH APPROPRIATE CUFF SIZE & CALIBRATE IT PERIODICALLY

OFFICE BLOOD PRESSURE MEASUREMENT (OBPM)



- RECORD BP IN BOTH THE ARMS & CONSIDER ONE WITH HIGHER READING
- MEASURE BP 3 TIMES (1-2 MINUTES APART) AND AVERAGE THE LAST 2 READING.
- MINIMUM OF 2-3 VISITS AT 1-4 WEEKS INTERVALS TO CONFIRM THE DIAGNOSIS.
- DOCUMENT THE READINGS

HOME-BASED BLOOD PRESSURE MEASUREMENT (HBPM)



BEFORE VISITING THE HEALTHCARE PROFESSIONAL:

- 2 READING 1 MINUTE APART IN THE MORNING BEFORE TAKING MEDICATION, & IN THE EVENING FOR AT LEAST 3 & IDEALLY 7 DAYS.
- DOCUMENT THE READING & AVERAGE THE READING EXCLUDING FIRST DAY.

AMBULATORY BLOOD PRESSURE MEASUREMENT (ABPM)



- READINGS ARE OBTAINED AT 15-30 MINUTES INTERVALS DURING THE DAY & 30-60 MIN INTERVALS AT NIGHT.
- TO IDENTIFY MASKED AND WHITE COAT HYPERTENSION

References:

1. IDF Diabetes Atlas, 11th Edition [Internet]. International Diabetes Federation; 2025. Available from: <https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/>
2. Wang Z, Yang T, Fu H. Prevalence of diabetes and hypertension and their interaction effects on cardio-cerebrovascular diseases: a cross-sectional study. BMC Public Health. 2021 Jun 25;21(1):1224.
3. Wong WJ, Nguyen TV, Ahmad F, Vu HTT, Koh AS, Tan KM, et al. Hypertension in Adults With Diabetes in Southeast Asia: A Systematic Review. J Clin Hypertens (Greenwich). 2025 Jan;27(1):e14936.
4. Timsina YP, Pandey P, Mondal IH, Dar AH. Non-pharmacological management of hypertension: A systematic review. Food Chemistry Advances. 2023 Dec 1;3:100406.

5. Kumar V, Agarwal S, Saboo B, Makkar B. RSSDI Guidelines for the management of hypertension in patients with diabetes mellitus. Int J Diabetes Dev Ctries. 2022 Oct;42(4):576-605.
6. Zhang W, Zhang S, Deng Y, Wu S, Ren J, Sun G, et al. Trial of Intensive Blood-Pressure Control in Older Patients with Hypertension. N Engl J Med. 2021 Sep 30;385(14):1268-79.
7. Liu J, Li Y, Ge J, Yan X, Zhang H, Zheng X, et al. Lowering systolic blood pressure to less than 120 mm Hg versus less than 140 mm Hg in patients with high cardiovascular risk with and without diabetes or previous stroke: an open-label, blinded-outcome, randomised trial. Lancet. 2024 Jul 20;404(10449):245-55.
8. Bi Y, Li M, Liu Y, Li T, Lu J, Duan P, et al. Intensive Blood-Pressure Control in Patients with Type 2 Diabetes. N Engl J Med. 2025 Mar 27;392(12):1155-67.
9. Groenland EH, Bots ML, Visseren FLJ, McManus RJ, Spiering W. Number of measurement days needed for obtaining a reliable estimate of home blood pressure and hypertension status. Blood Press. 2022 Dec;31(1):100-8.

Anuj Maheshwari – dranujm@gmail.com



CPD-accredited course

Menopause, Blood Pressure and Cardio- vascular Disease

Free course – start now
and earn CPD points

academy.omron-healthcare.com

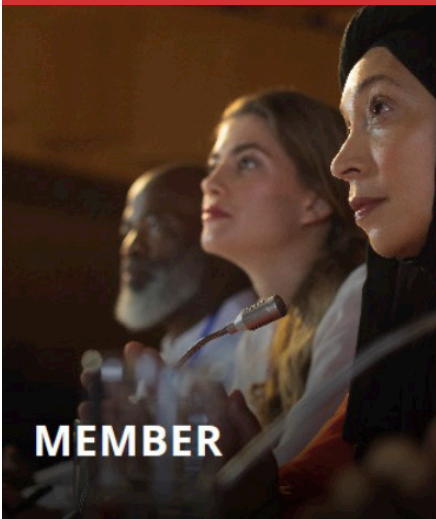


THE CPD STANDARDS OFFICE
CPD PROVIDER: 50682
2025-2027
www.cpdstandards.com

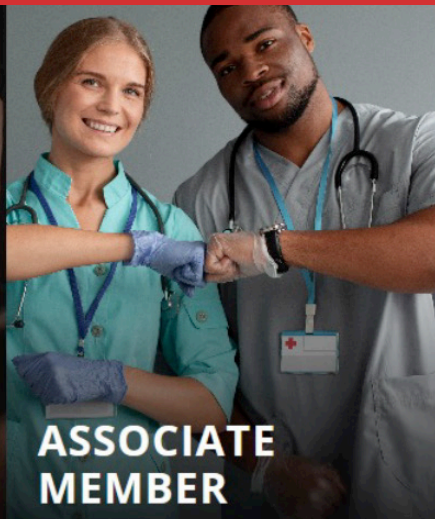


OHEAPP-1148

Not yet a member of the ISH?



MEMBER



**ASSOCIATE
MEMBER**



TRAINEE

Explore membership options including our
FREE Associate Membership category.

<https://ish-world.com/join-ish/>



**International
Society of
Hypertension**

HYPERTENSION CONTROL PROJECTS

HEARTS 2.0: Hypertension control and integrated CKM Care in the implementation era

PEDRO ORDUNEZ & ANDRES ROSENDE

Department of Noncommunicable Diseases and Mental Health
Pan American Health Organization/World Health Organization, Washington, DC, USA



Eight years that changed the conversation

Hypertension is one of the best-understood but least well-controlled major risk factors for cardiovascular disease. Effective medicines have been available for decades; the benefits of blood pressure reduction are beyond dispute, and few areas of medicine have generated such extensive clinical evidence and so many clinical practice guidelines. Yet hypertension control remains low worldwide, even in most high-income countries, highlighting the persistent gap between knowledge and implementation.¹

Launched in the Americas in 2018, as an adaptation of the WHO Global HEARTS Initiative, HEARTS shifted the focus from producing more recommendations to strengthening health-system capacity to deliver existing evidence through primary health care.² It has since been adopted by 34 countries and territories across the Region, reaching nearly 15,000 primary health care facilities serving a catchment population of approximately 68 million adults. Thirty-one countries have developed standardized clinical pathways, and 15 have expanded implementation across more than 80% of their primary care centers. HEARTS has thus become the largest regional implementation initiative for hypertension control.³

HEARTS' greatest contribution has been to reframe hypertension control as a health-system challenge. In practice, this has meant shifting from conventional manual blood pressure

measurement to clinically validated automated devices; from discretionary prescribing to standardized treatment protocols specifying medicines, doses, and titration schedules; from stepwise monotherapy to early combination treatment, preferably as a single-pill; from a physician-centred approach to team-based care; and from administrative reporting to routine performance monitoring for continuous quality improvement.⁴

Progress, however, has been uneven. Some countries have used HEARTS to strengthen primary health care and advance broader chronic disease management, whereas others remain at earlier stages, reflecting differences in political commitment, institutional leadership, and investment.

As HEARTS matured, cardiovascular prevention was also evolving. The growing recognition that hypertension, cardiovascular disease, chronic kidney disease, diabetes, obesity, and related metabolic disorders should be managed more cohesively, together with major therapeutic advances, challenged traditional disease-specific models of care.⁵ The question was no longer whether HEARTS remained relevant—it clearly did—but whether it could evolve without losing the simplicity and practicality that had made large-scale implementation possible. HEARTS 2.0 was our answer.



HEARTS 2.0: The Evolution of HEARTS

As HEARTS gained regional momentum and became a priority for PAHO and many Ministries of Health, countries increasingly adopted its policy frameworks, operational tools, training resources, and implementation experience to strengthen primary health care. HEARTS had evolved from a technical program into a regional implementation platform, creating the conditions for its next evolution.

Recently published in *The Lancet Primary Health Care*, the HEARTS 2.0 Clinical Pathway broadens the original model to more effectively address cardiovascular-kidney-metabolic conditions. Rather than becoming another clinical practice guideline, it integrates the strongest recommendations already available into a single framework for primary care.⁶

Clinical practice guidelines define standards of care. Standardized treatment protocols translate clinical recommendations into structured therapeutic and follow-up actions by specifying medicines, doses, titration schedules, and criteria for treatment intensification. Clinical pathways organize how that care is delivered. HEARTS 2.0 translates contemporary recommendations into a standardized clinical pathway that can be implemented consistently in primary health care.⁷

HEARTS 2.0 was developed in three phases. An international multidisciplinary group identified candidate interventions from contemporary evidence. Countries implementing HEARTS in the Americas assessed their feasibility in routine primary care. Finally, an international expert panel prioritized the interventions most appropriate for standardized implementation across diverse health systems.⁸ The result was the HEARTS 2.0 Clinical Pathway (**Figure 1**).

The Clinical Pathway is the operational core of HEARTS 2.0. Hypertension remains its clinical backbone and entry point, while contemporary evidence is organized into four connected components covering diagnosis, risk assessment, treatment, and follow-up. Rather than creating parallel disease pathways, it integrates cardiovascular, kidney, and metabolic care into a single sequence of clinical decisions that can be

delivered, measured, and continuously improved through primary health care.⁶

This evolution also introduces new implementation dilemmas⁶—not shortcomings of the Clinical Pathway, but inevitable trade-offs when higher clinical standards are translated into routine practice.

The first dilemma is how to balance integration with feasibility. People with hypertension often have CKM conditions that must be managed together, yet broader pathways are more difficult to implement. The challenge is to harmonize recommendations, prioritize interventions with the greatest clinical value, and preserve practicality without omitting essential care.

The second dilemma is how to balance standardization with clinical individualization. Evidence now strongly supports standardized treatment protocols over discretionary prescribing. Clinical judgement should guide justified exceptions, not replace standardized care.

The third dilemma is how to reconcile higher clinical standards with scalability and equity. Better care often requires more resources, but the response cannot be to accept lower standards for vulnerable populations. Nor should feasibility be used to exclude interventions supported by robust evidence. The challenge is to advance coverage and quality together—and equitably—through careful prioritization, phased implementation, adequate financing, and stronger health systems.

The fourth dilemma is how to strengthen primary health care while preserving the essential role of specialists. Strengthening primary health care does not diminish specialized care; it allows specialists to focus on patients whose diagnosis or management requires expertise or resources beyond standardized primary care pathways.

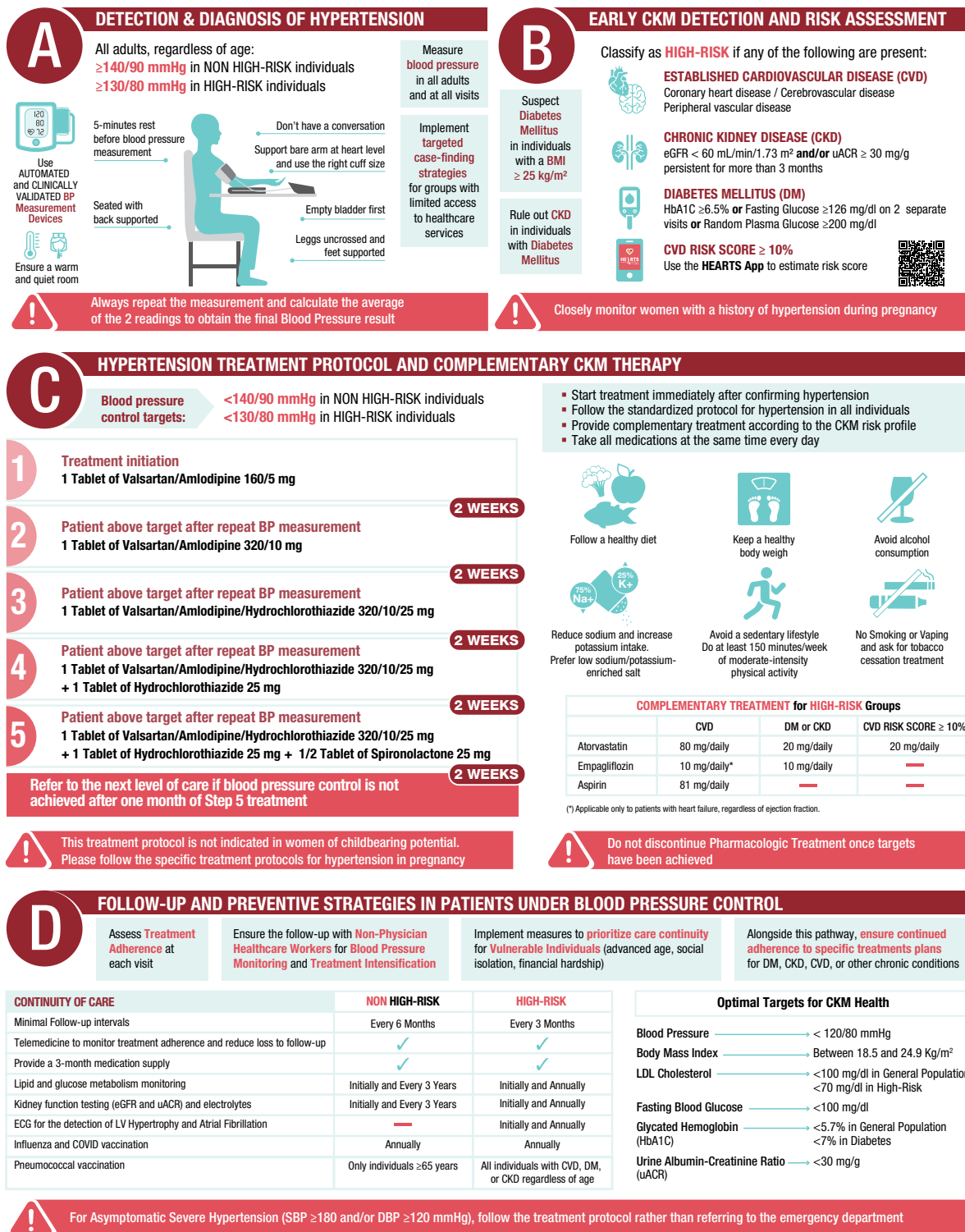
Taken together, these dilemmas reinforce an important conclusion: HEARTS 2.0 should not be viewed as a stand-alone solution. Even a well-designed clinical pathway cannot by itself overcome the organizational, educational, regulatory, and financial barriers that continue to limit hypertension control. Addressing these barriers defines the next frontier in the era of implementation.



Figure 1. HEARTS 2.0 Standard Clinical Pathway designed by the authors.

HEARTS 2.0 Standard Clinical Pathway

Integrated Cardiovascular-Kidney-Metabolic (CKM) Management for Primary Care



Beyond HEARTS 2.0: From Clinical Pathway to Institutionalized Practice

The publication of the HEARTS 2.0 Clinical Pathway is only the beginning. Its long-term value will depend less on endorsement than on institutionalization. To improve hypertension control at scale, HEARTS 2.0 must become part of routine health care. That is the defining challenge of the implementation era.⁴

Institutionalization means embedding agreed standards of care into the policies, financing, procurement systems, workforce organization, information systems, quality assurance processes, and accountability mechanisms that shape everyday practice. It transforms recommended care into consistently delivered care.

HEARTS 2.0 also reflects a broader shift in hypertension care. Contemporary guidelines still differ in important respects, but they increasingly converge around a core set of evidence-based practices: accurate blood pressure measurement with clinically validated devices; integrated cardiovascular risk assessment; simple, standardized treatment protocols with early combination therapy; timely treatment intensification; team-based care; and routine performance monitoring.

Bringing these elements together in a single clinical pathway may promote greater harmonization across guidelines for hypertension, diabetes, chronic kidney disease, lipid management, and cardiovascular prevention. Patients experience one clinical journey; our recommendations should reflect that reality. In the future, clinical practice guidelines may be judged not only by the quality of their recommendations, but also by their feasibility, their capacity to reduce fragmentation, and their potential for sustainable implementation.

This new era also expands the scientific agenda.⁹ Clinical research will continue to refine pharmacological treatment, risk prediction, and individualized care. Equally important, however, is understanding how proven interventions can be delivered consistently, equitably, and at scale.

Some of the most important advances in hypertension over the next decade may come not from another head-to-head trial or another debate over treatment thresholds, but from learning how to translate existing evidence into better population outcomes. The next frontier extends beyond efficacy to effectiveness and implementation. The ultimate purpose of clinical research is not simply to determine what works, but to ensure that it benefits everyone who needs it.¹⁰

Hypertension is already one of the best-understood conditions in medicine. The next challenge is to make it one of the best implemented.

References:

1. O'Connell SS, Whelton PK, Li F, Allouch F, Shapiro L, Vandenburg M, et al. Global Hypertension 2000 to 2020: Trends, Disparities, and Progress in Awareness, Treatment, and Control. *J Am Coll Cardiol*. 2026 May 12;87(18):2338-2351. doi: 10.1016/j.jacc.2025.12.091.
2. Ordunez 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 Jul 16;46:e96. doi: 10.26633/RPSP.2022.96.
3. Londoño E, Gupta R, Stuyft PV, Heine M, Giraldo G, Ku GM, et al. HEARTS quality: a policy framework to strengthen hypertension and cardiovascular risk management in primary healthcare-insights from HEARTS in the Americas. *Lancet Reg Health Am*. 2025 Dec 1;53:101311. doi: 10.1016/j.lana.2025.101311.
4. Ordunez P, Campbell NRC, DiPette DJ, Jaffe MG, Rosende A, Martinez R, et al. HEARTS in the Americas: Targeting Health System Change to Improve Population Hypertension Control. *Curr Hypertens Rep*. 2024 Apr;26(4):141-156. doi: 10.1007/s11906-023-01286-w.
5. Ndumele CE, Neeland IJ, Tuttle KR, Chow SL, Mathew RO, Khan SS, et al. A Synopsis of the Evidence for the Science and Clinical Management of Cardiovascular-Kidney-Metabolic (CKM) Syndrome: A Scientific Statement From the American Heart Association. *Circulation*. 2023 Nov 14;148(20):1636-1664. doi: 10.1161/CIR.0000000000001186.
6. Ordunez P, Rosende A, Angell SY, Londoño E, Whelton PK, et al. HEARTS 2.0: an implementation-oriented clinical pathway for integrated care of hypertension and cardiovascular-kidney-metabolic conditions in primary health care in the Americas. *Lancet Prim Care* 2026; 2: 100161. Published Online May 9, 2026 <https://doi.org/10.1016/j.lanprc.2026.100161>

7. Ordunez P, Angell SY, DiPette DJ, Brettler J, Campbell NRC, Jaffe MG, et al. Translating Guidelines, Protocols, and Care Pathways for Hypertension Into Effective Program Implementation. *Am J Hypertens*. 2026 Jan 1;39(1):23-27. doi: 10.1093/ajh/hpaf103.

8. Ordunez P, Rosende A, Ratti MFG, DiPette DJ, Torres AM, Londoño E, et al. Evidence-informed prioritization of interventions for integrating hypertension management into cardiovascular-kidney-metabolic care in primary health care: HEARTS 2.0 Phase 3. *Am J Hypertens*. 2026 Aug 1;39(8):956-965. doi: 10.1093/ajh/hpag033.

9. Kario, K. Implementation hypertension: a new paradigm for global hypertension control in the JSH 2025, WHO 2025, and AHA/ACC 2025 guideline era. *Hypertens Res* 49, 1–6 (2026). <https://doi.org/10.1038/s41440-025-02497-1>

10. Matsushita K, Angell SY, Appel LJ, Bygrave H, Cohn J, Kalyesubula R, et al. Priorities for Research on Hypertension Care Delivery: A WHO Report Executive Summary. *Hypertension*. 2025 Jun;82(6):971-976. doi: 10.1161/HYPERTENSIONAHA.125.24702.



Adopted from Ref. 6 of this manuscript. *Lancet Prim Care* 2026; 2: 100161 Published Online May 9, 2026 <https://doi.org/10.1016/j.lanprc.2026.100161>.

Copyright © 2026 Pan American Health Organization.

Published by Elsevier Ltd. This is an open-access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Disclaimer: PO and AR are, respectively, a staff member and a consultant of the Pan American Health Organization. The authors alone are responsible for the views expressed in this publication, which do not necessarily represent the decisions or policies of the Pan American Health Organization.

Pedro Ordunez – ordunezp@paho.org

Advert from an ISH Corporate member

汉王大健康
Hanvon Healthcare

Hanvon Korotkoff Sound Blood Pressure Monitor

The New Generation Blood Pressure Monitor
As **Accurate** as a Mercury Sphygmomanometer

AI-Powered Digitization of the Korotkoff Method
One-Button Accurate Measurement
Enhancing Medical Efficiency for
Healthcare Professionals



Tel: +86 400-810-8816 Fax / Website: <https://www.hwbpm.com> E-mail: hwbh@hanwang.com.cn

HYPERTENSION CONTROL PROJECTS

South Korea's success in hypertension control

SEONGHOON CHOI

Department of Cardiology, Hallym University Kangnam Sacred Heart Hospital, South Korea
Public Relations Director, Korean Society of Hypertension



1. Achievements and Key Drivers of Success

According to the "WHO Global Report on Hypertension 2025,"¹ the Republic of Korea (Korea) has emerged as an exemplary global benchmark for national-level success in hypertension management. As a prevalent chronic condition, hypertension substantially elevates the risk of critical comorbidities, including cardiovascular diseases (CVD), cerebrovascular accidents (CVA), chronic kidney disease, and dementia. Over the past three decades, Korea has achieved substantial improvements in public health indicators. Most notably, the national hypertension control rate expanded from a mere 5% in 1990 to 62% in 2025,² representing an unprecedented public health milestone achieved within a relatively brief timeframe.

Prior to 2005, public awareness regarding the systemic dangers of elevated blood pressure was deficient. Diagnostic and therapeutic services across primary healthcare facilities lacked structural integration, leaving patients vulnerable within the gaps between diagnosis, active treatment, and follow-up monitoring. Furthermore, the absence of standardized clinical practice protocols, coupled with the prohibitive cost of antihypertensive medications, severely undermined patient medication adherence.

To systematically address these structural barriers, a well-coordinated, multisectoral coalition was formed. This initiative integrated the efforts of the Ministry of Health and Welfare, the Korea Disease Control and Prevention Agency, the National

Health Insurance Service (NHIS), local public health centers, and academic bodies such as the Korean Society of Hypertension (KSH). Together, they deployed a comprehensive, team-based strategy incorporating the following core interventions:

Strengthened Policy Governance: The government launched the National Sodium Reduction Program in 2012,³ integrated routine blood pressure screening into national health examinations, and implemented protocol-driven care through standardized national clinical guidelines.

Sustainable Cost Management: By regulating and subsidizing medication costs, financial barriers to long-term antihypertensive therapy were minimized, facilitating therapeutic persistence.

Multisectoral Actions: Broad-scale public awareness initiatives, workplace-based screenings, and targeted national dietary interventions were executed. Consequently, by 2023, the mean national sodium intake decreased by 34.5% compared to 2012 baselines.

Optimization of Pharmacotherapy: Access was expanded for Angiotensin Receptor Blockers (ARBs) and Calcium Channel Blockers (CCBs), recognized for optimal blood pressure reduction and target-organ protection with minimal adverse events. Currently, the utilization rate of combination therapy exceeds 60%,⁴ with over half prescribed as Single-Pill Combinations (SPCs), vastly enhancing clinical efficacy and patient persistence.

Figure 1. Changes in Korean hypertension control rate.

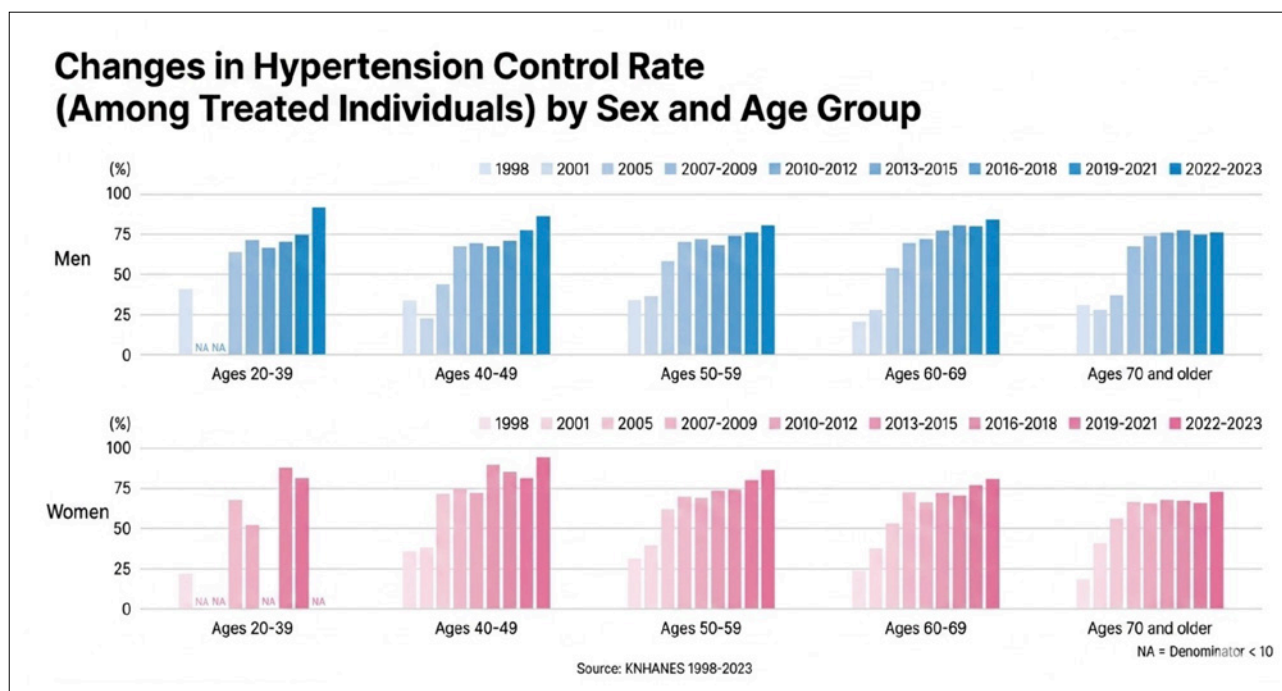
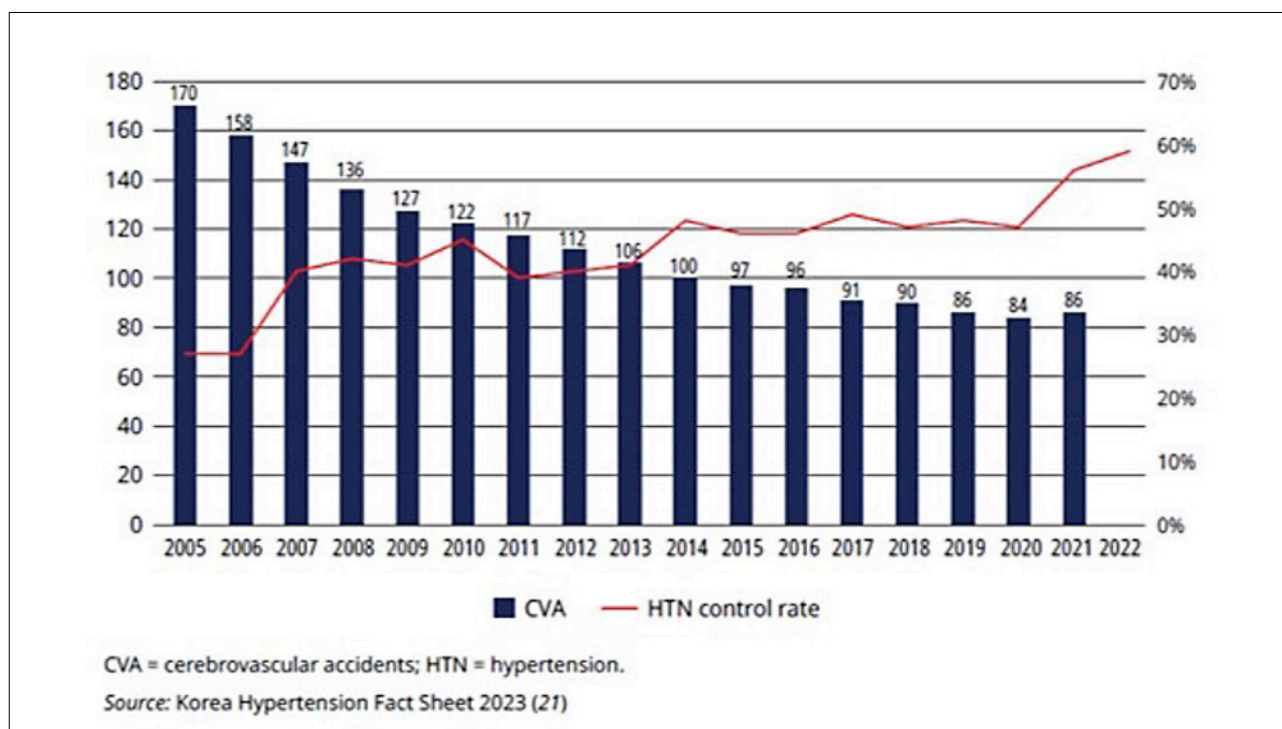


Figure 2. Trends of hypertension control and rates of cardiovascular disease deaths in the Republic of Korea.



Data-Driven Accountability: The establishment of a comprehensive national healthcare database enabled the KSH to publish annual "Hypertension Fact Sheets" and 2026 KSH Hypertension Clinical guideline.⁵ These publications function as an objective public report card, enforcing strict accountability among policymakers and healthcare providers. In tandem, nationwide clinical tours and

symposia hosted by the KSH delivered evidence-based clinical guidance directly to primary care physicians, fostering more aggressive therapeutic interventions.

As a direct result of these efforts, Korea documented a 4.6-fold increase in hypertension treatment rates (16% in 1990 to 74% in 2022), an

11.2-fold increase in blood pressure control rates (5% in 1990 to 56% in 2022), a 44% net reduction in sodium consumption (2005–2022), and a 74% decline in age-adjusted cardiovascular mortality.

2. Remaining Challenges and Future Directions

To further optimize hypertension control, the Korean government lowered the eligibility threshold for national health screenings down to 20 years of age. This policy modification was informed by empirical data revealing that hypertension detection and treatment rates among young adults were critically lower than those observed in the elderly population. This intervention underscores that robust data monitoring is a prerequisite for identifying systemic vulnerabilities within a healthcare infrastructure. Furthermore, maintaining open access to population-level medical data remains vital for analyzing epidemiological trends and formulating advanced public health strategies.

Despite these landmark achievements, significant clinical and epidemiological challenges persist:

Persistent Excess Sodium Consumption: Although national sodium intake has successfully declined, the average individual consumption still remains double the maximum amount recommended by international health bodies.

Epidemiological Stagnation: The crude prevalence of hypertension is failing to decline substantially due to rapid population aging, the westernization of dietary habits, and a post-COVID-19 surge in youth obesity rates. Consequently, the strategic focus must shift toward enhancing awareness and blood pressure control among younger demographics through targeted lifestyle modifications and nutritional interventions.

Escalating Gestational Hypertension: Mirroring the national decline in birth rates, the rising average age of pregnancy among Korean women has led to an increased incidence of gestational hypertension, which poses severe, long-term

cardiovascular risks. Crucially, the formulary of available obstetric antihypertensive medications has become restricted; essential agents such as methyldopa and hydralazine are no longer manufactured domestically, and labetalol faces severe supply constraints. Resolving this pharmaceutical supply chain instability is an urgent priority.

Suboptimal Control Rates in High-Risk Cohorts: While the overall treatment rate is high, the strict blood pressure control rate among patients at high risk for cardiovascular and cerebrovascular complications remains low at 28.6% (according to the 2023 Fact Sheet, applying the stringent target of <130/80 mmHg). Elevating the qualitative management of these high-risk cohorts represents the next critical frontier in long-term chronic disease control.

Ultimately, addressing these emerging public health bottlenecks requires the consolidation of robust, collaborative partnerships. For international healthcare systems seeking to replicate Korea's epidemiological success, it is imperative that government bodies, academic medical societies, and primary care clinicians actively construct a unified governance model to co-establish, evaluate, and evolve adaptive chronic disease management strategies.

References:

1. WHO Global report on hypertension. <https://www.who.int/teams/noncommunicable-diseases/hypertension-report>.
2. Kim HC, et al. Korea Hypertension Fact Sheet 2025: national trends in hypertension with a special analysis of hypertensive disorders of pregnancy. Clin Hypertens. 2026;32(1):e13.
3. HY Park et al. Progress on sodium reduction in South Korea. BMJ Glob Health. 2020 May 12;5(5):e002028
4. HC Kim. Korea Hypertension Fact Sheet 2024: nationwide population-based analysis with a focus on young adults. Clin Hypertens. 2025;31(1):e11.
5. EM Lee et al. Highlights of the 2026 Korean Society of Hypertension guidelines for the management of hypertension: what's new and what has changed. Clin Hypertens. 2026 May 22;32:e31

Seonghoon Choi – heartcsh@gmail.com

ISH 2027

Shanghai Oct 28-31



International
Society of
Hypertension



Chinese
Hypertension
League

SAVE THE DATE

Date: 28-31 October, 2027 (Thursday - Sunday)

Venue: Shanghai Zhangjiang Science Hall

Innovations for Improving Blood Pressure Control

The 32nd Scientific Meeting of the International Society of Hypertension (ISH 2027)

The Chinese Hypertension Meeting 2027 (CHM 2027)

The 29th International Symposium on Hypertension and Related Diseases



In collaboration with



Shanghai
Institute of
Hypertension



Chronic Disease
Institute for Green
Health in Hainan



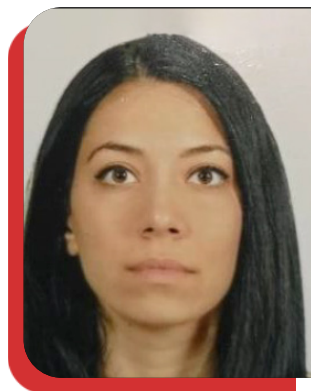
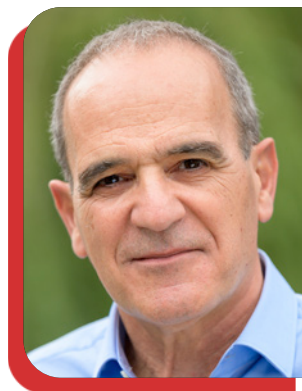
Beijing
Hypertension
Association

BLOOD PRESSURE DEVICES

An urgent need for more automated blood pressure monitors validated in children

GEORGE STERGIOU, ARIADNI MENTI & ANASTASIOS KOLLIAS

Hypertension Center STRIDE-7, National and Kapodistrian University of Athens, School of Medicine, Third Department of Medicine, Sotiria Hospital, Athens, Greece



Blood pressure measurement in children

In the last issue of the International Society of Hypertension (ISH) Hypertension News (May 2026), we included an important article on pediatric hypertension prepared by Joseph Flynn and Ruan Kruger. This aimed to inform ISH members and friends about an ISH Position Paper published in the Journal of Hypertension in April entitled “Practical approach to evaluate and manage hypertension in youth”.¹ We highlighted this major ISH publication on the cover page of the Hypertension News with a nice photo of a child whose blood pressure (BP) was taken using an automated device (**Figure 1**). And we added a strong statement: “Paediatric hypertension: why it can no longer be ignored”.

The reason for writing this article is shown in Figure 1 and is about using automated cuff BP monitors in children. Children are regarded a special population for validating the accuracy of automated cuff BP monitors.^{2,3} This means that an automated BP monitor which is accurate in adults, may not be accurate in children and separate validation in this population is required.^{2,3}

As in adults, in children white-coat and masked hypertension are common, and out-of-office BP monitoring (ambulatory or home) is necessary for all diagnostic and treatment decisions.^{4,5} However,

both methods are applied using automated BP monitors, which must be properly validated specifically in children. Moreover, the photo in **Figure 1** rightly shows the BP taken by a healthcare professional using an automated device, because these devices are primarily used today in many clinics around the world. So, the question is, how many automated cuff BP monitors for office, home, and ambulatory use have been successfully validated in children? More importantly, how many of them are currently available on the market?

Figure 1.
ISH Hypertension
News cover page,
May 2026.



Validated blood pressure monitors in children

STRIDE BP (www.stridebp.org) is a global non-profit organisation providing guidance on BP measurement methodology and technology. It operates in collaboration with the ISH, European Society of Hypertension, World Hypertension League, Chinese Hypertension League, and French Society of Hypertension. The World Health Organization recommends STRIDE BP,^{6,7} as the only scientific organisation which is global (not regional) presenting information in English, Chinese, French, and Spanish.

STRIDE BP performs periodic systematic PubMed searches for validation studies of automated BP devices and provides regularly updated lists of recommended devices for office, home, and ambulatory use in adults, children, and pregnant women (**Figure 2**). To date, the website of STRIDE BP has reached >1,100,000 views from 220 countries.

Figure 2. STRIDE BP updated lists of validated cuff BP monitors for office, home, and ambulatory use in adults, children, and pregnant women. (<https://www.stridebp.org/bp-monitors>)



Figure 3. Validated blood pressure devices in children and availability on the market.

In July, STRIDE BP published in Hypertension [8] a systematic review of validation studies of automated cuff BP monitors in children (all the PubMed published studies). Of 628 studies in the STRIDE BP platform, 51 included children. Overall, only 25 BP devices have been successfully validated in children (including office, ambulatory, and home monitors), and only 18 are currently available on the market (**Figure 3**).

This paper also presented a meta-analysis of 20 successful validation studies in children (N=1,476) and showed that those which are properly validated are as accurate as in adults, with pooled systolic BP difference versus reference auscultatory BP at 0.6 mmHg (95% CI -0.2, 1.4) and diastolic -0.3 (-1.2, 0.6)].⁸ Thus, high BP in children detected by a properly validated automated device does not require confirmation with manual auscultatory measurement, as pediatric guidelines suggest.^{4,5} After all, the confirmation of the diagnosis needs out-of-office BP monitoring (ambulatory or home) which requires the use of automated devices.

Conclusions

- In children, only upper-arm cuff BP devices that have been properly validated in this population should be used for the diagnosis and management of hypertension. The use of non-validated devices or inappropriate cuff sizes can lead to inaccurate BP measurements, misdiagnosis, and inappropriate treatment.
- There is a severe shortage of properly validated automated devices for office, ambulatory, and home BP measurement in children, and even fewer devices are commercially available. Manufacturers and investigators should invest time and resources in validating more automated BP devices in children, thereby improving the diagnosis and management of hypertension in this special population.

References:

- 1 Flynn JT, Kruger R, Brady TM, Chanchlani R, Dionne J, et al. Practical approach to evaluate and manage hypertension in youth: an International Society of Hypertension position paper. *J Hypertens*. 2026; 44:553-571.
- 2 Stergiou GS, Alpert B, Mieke S, Asmar R, Atkins N, et al. A Universal Standard for the validation of blood pressure measuring devices: Association for the Advancement of Medical Instrumentation/European Society of Hypertension/International Organization for Standardization (AAMI/ESH/ISO) Collaboration Statement. *J Hypertens* 2018; 36:472-478.
- 3 International Organization for Standardization. ISO 81060-2:2018. Noninvasive sphygmomanometers: part 2: clinical investigation of intermittent automated measurement type. <https://www.iso.org/standard/73339.html>. Accessed 4 Aug. 2026.
- 4 Lurbe E, Agabiti-Rosei E, Cruickshank JK, Dominiczak A, Erdine S, et al. 2016 European Society of Hypertension guidelines for the management of high blood pressure in children and adolescents. *J Hypertens* 2016; 34:1887-920.
- 5 Flynn JT, Kaelber DC, Baker-Smith CM, Blowey D, Carroll AE, et al. Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents. *Pediatrics* 2017; 140.
- 6 WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff. WHO medical devices technical series 2020. www.who.int/publications/i/item/9789240002654. Accessed 4 Aug. 2026.
- 7 HEARTS in the Americas regulatory pathway to the exclusive use of validated blood pressure measuring devices. Pan American Health Organization & World Health Organization 2021. DOI <https://doi.org/10.37774/9789275124864>. Accessed 4 Aug. 2026.
- 8 Stergiou GS, Menti A, Palatini P, Parati G, Wang JG, et al. Validated automated cuff blood pressure devices for children: STRIDE BP report and call to action. *Hypertension*. 2026 Jul 15 Online ahead of print.

George Stergiou – president@ish-world.com

BLOOD PRESSURE DEVICES

Cuffless blood pressure devices in South Korea: evidence behind the new KSH recommendation



HAE-YOUNG LEE

Division of Cardiology, Department of Internal Medicine, Seoul National University Hospital, Seoul, Republic of Korea
Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea

For decades, every major hypertension society has told clinicians the same thing about cuffless blood pressure devices: not yet. So when the 2026 Korean Society of Hypertension (KSH) guidelines,¹ which I had the privilege of helping to develop, assigned a Class IIb, Level of Evidence B recommendation stating that validated cuffless devices "can be considered for out-of-office blood pressure monitoring," I understood it would draw attention — and scrutiny. Here I want to walk through the evidence that led us there, and what I think it means for practice.

Why the rest of the world says "not yet"

The case against cuffless devices is not speculative. Independent validation studies have repeatedly shown that commercially available wearables fail to track real blood pressure change: wrist-worn optical devices have failed to detect nocturnal dipping or treatment-induced reductions, and consumer smartwatches have been shown to largely mirror the cuff value used to calibrate them rather than measure blood pressure independently. In their 2025 review, Mukkamala and colleagues concluded that there is no compelling evidence that pulse-wave or pulse-arrival-time analysis adds meaningful accuracy over the calibrating cuff reading itself.² Against that backdrop, the 2025 AHA/ACC guideline, the accompanying 2026 AHA scientific statement, the 2024 ESC guideline, and the 2026 ESC scientific statement all converge on a Class III

position: cuffless devices should not be used for hypertension diagnosis or management until they demonstrate far greater precision.

What is different in Korea

Our Class IIb recommendation is not a lower evidentiary bar dressed up as innovation — it rests on a specific, reproducible body of Korean validation data for one device, CART BP, a ring-type cuffless monitor. In first-in-human testing, CART BP met ISO 81060-2 static-accuracy criteria against auscultatory reference measurement.³ In a subsequent study, it demonstrated 24-hour ambulatory performance, including the primary awake/asleep comparison, that was concordant with conventional ABPM.⁴ Those two completed protocols — static accuracy and the awake/asleep test — place CART BP further along the ESH's five-step validation pathway than any cuffless device evaluated internationally, though treatment-response and recalibration-stability testing remain outstanding (**Table 1**).⁵

Three additional, distinctly Korean factors shaped our decision. CART BP has cleared the Ministry of Food and Drug Safety and is now reimbursed under the National Health Insurance system for 24-hour monitoring — to my knowledge the first national insurance coverage of its kind anywhere. Korean academic centers have run ESH-aligned validation programs at a scale not matched elsewhere. And the KSH has a track record of

Table 1. Rationale underlying the international Class III position versus the 2026 KSH Class IIb, LOE B recommendation for cuffless blood pressure devices.

Domain	AHA/ACC · ESC · ESH (Class III)	2026 KSH Guidelines (Class IIb, LOE B)
Validation completed	No device has completed the full ESH six-test protocol	CART BP has completed 2 of 5 ESH tests (static, awake/asleep)
BP tracking accuracy	Devices often reflect calibration baseline; failed to track nighttime dip in independent studies	Met ISO 81060-2 static-accuracy limits; passed the ESH awake/asleep test
Treatment response	No commercial device has detected treatment-induced BP reduction	Acknowledged evidence gap; highest-priority pending validation step
Regulatory / insurance	Clearances often rely on substantial equivalence, without full ESH compliance	MFDS-cleared; first device with national health-insurance reimbursement
Outcome / thresholds	No RCT outcome data or cuffless-specific normative thresholds exist	Acknowledged limitation; Class IIb applies to monitoring only, not diagnosis

issuing early, evidence-informed positions on emerging BP technologies, having published the world's first position paper on smartphone- and smartwatch-based cuffless measurement in 2021.⁶

What Class IIb actually means — and does not mean

I want to be explicit about this, because I think the designation is easy to over-read in either direction. Class IIb, LOE B signals that usefulness is "less well established by evidence or opinion," supported by a limited number of studies rather than adequately powered outcome trials. It authorizes conditional, context-specific use; it does not certify that cuffless monitoring performs equivalently to cuff-based methods, and it applies to monitoring, not diagnosis — a cuff-based reference is still required to establish a diagnosis of hypertension.

Despite encouraging milestones, we must balance optimism with unresolved limitations. Calibration dependency remains a central methodological hurdle; apparent accuracy is inseparable from the calibrating cuff reading itself. Furthermore, long-term measurement drift remains inadequately characterized, and current validation cohorts have largely excluded critical populations such as patients with atrial fibrillation, advanced chronic kidney disease, severe obesity, or pregnancy.

Most fundamentally, no cuffless device has yet been evaluated in a trial linking device-guided management to hard cardiovascular outcomes.

Implications for practice

For clinicians in Korea, the practical takeaway is narrow rather than sweeping: a validated, reimbursed device may now reasonably supplement out-of-office monitoring — particularly where repeated, comfortable, near-continuous assessment adds value, such as characterizing nocturnal dipping or blood pressure variability — but it should not replace ABPM or home BP monitoring as the diagnostic reference, and results still warrant clinical judgement. For colleagues elsewhere, I would frame the KSH position less as a recommendation to adopt and more as a signal of what a genuinely validated cuffless device, embedded in the right regulatory and reimbursement infrastructure, can look like. Whether other guideline bodies follow will depend on whether treatment-response validation, recalibration data, and outcome evidence accumulate in the way we hope they will.

Our answer, for now, is a conditional "yes, with caveats." Whether that becomes the international answer will be written in the data still to come.

References:

1. Lee EM, Cho IJ, Kang HT, Kim KI, Kim DH, Kim JH, et al. Highlights of the 2026 Korean Society of Hypertension guidelines for the management of hypertension: what's new and what has changed. Clin Hypertens. 2026;32:e31.
2. Mukkamala R, Shroff SG, Kyriakoulis KG, Avolio AP, Stergiou GS. Cuffless Blood Pressure Measurement: Where Do We Actually Stand? Hypertension. 2025;82(6):957–70.
3. Kim J, Chang SA, Park SW. First-in-Human Study for Evaluating the Accuracy of Smart Ring Based Cuffless Blood Pressure Measurement. J Korean Med Sci. 2024;39(2):e18.
4. Lee H, Park S, Kwon H, Cho B, Park JH, Lee HY. Feasibility and Effectiveness of a Ring-Type Blood Pressure Measurement Device Compared With 24-Hour Ambulatory Blood Pressure Monitoring Device. Korean circulation journal. 2024;54(2):93–104.
5. Lee SM, Kwon H, Cho B, Park JH, Na SH, Lee SP, et al. Validation of ring-type cuffless blood pressure (BP) monitoring device for detecting awake-asleep BP variations compared to ambulatory BP monitoring device. Hypertens Res. 2026.
6. Lee HY, Lee DJ, Seo J, Ihm SH, Kim KI, Cho EJ, et al. Smartphone / smartwatch-based cuffless blood pressure measurement : a position paper from the Korean Society of Hypertension. Clin Hypertens. 2021;27(1):4.

Hae-Young Lee – hylee612@snu.ac.kr

Advert from an ISH Corporate Member

Abbott

**HALF OF PATIENTS
DON'T TAKE
THEIR MEDICINES
AS PRESCRIBED.¹**

LET'S CHANGE THAT.

a:care
**Cracking the
code of
medication
non-adherence**
and shifting paradigm from 'treating diseases'
to 'treating patients'
Olivier Gryson, Oana Butu
Abbott

Source: ¹Khan R, Socha-Dietrich K. Investing in medication adherence improves health outcomes and health system efficiency. OECD Health Working Paper No. 105. 2018

GLO-26-00100



Date: 28-31 October, 2027 (Thursday – Sunday)
Venue: Shanghai Zhangjiang Science Hall

**Innovations for Improving
Blood Pressure Control**

The 32nd Scientific Meeting of the International Society of Hypertension (ISH 2027)
The Chinese Hypertension Meeting 2027 (CHM 2027)
The 29th International Symposium on Hypertension and Related Diseases

In collaboration with



为人类健康提供 卓越的医药产品

Salubris focuses on
improving people's lives with
exceptional medicines.



www.salubris.com

注：画面由AI生成
Note: The image is generated by AI.

ISH Regional Advisory Groups (RAGs)



Our six ISH Regional Advisory Groups (RAGs) provide a platform for members to connect and collaborate in their region and for ISH to pick up messages and send messages to the world. The ISH RAGs lead initiatives which serve the specific needs of their regions.

Find out more about your RAG: <https://ish-world.com/rags>

RESEARCH PROJECTS

The Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT) UK 30-year anniversary 1996-2026

PETER SEVER

National Heart and Lung Institute, Imperial College London, UK

NEIL POULTER

School of Public Health, Imperial College London, UK



At the Royal Society of Medicine (London) on May 26th 2026, we held a symposium to commemorate the 30-year anniversary of ASCOT. Unfortunately, limited resources resulted in attendees being restricted to the UK/Ireland “half” of ASCOT. However, present and former colleagues who had participated in the original trial and its long-term follow-up in the UK and Ireland, together with a number of other guests, attended a meeting at which the history of the trial, the main results and the outcome of many sub-studies were presented. We were honoured to have the Presidents of the British and Irish Hypertension Society (Ian Wilkinson) and the International Society of Hypertension (George Stergiou) as co-chairmen of the meeting.

Peter Sever began the meeting with an account of the 10-year period preceding the trial from initial discussions at meetings of the European Blood Pressure Group in 1988 and 1989, to an agreement with Pfizer-NY in 1996, to support a trial based on a collaboration between UK investigators and the Gothenburg Trial Center led by Björn Dahlöf.

Neil Poulter presented the original factorial trial design which involved randomisation of almost 20,000 participants with hypertension and three associated cardiovascular risk factors into treatment with either amlodipine to which perindopril was added as necessary or atenolol to which a thiazide was added as necessary- the blood pressure-lowering arm (BPLA). In addition, those participants with a total cholesterol less than 6.5 mmol/L were randomised to atorvastatin or placebo- the lipid-lowering arm (LLA).

Both arms of the trial were terminated early- the LLA after 3.3 years due to highly significant benefits of the statin on myocardial infarction and other cardiovascular endpoints, and the BPLA after 5.5 years owing to the highly significant benefits of the amlodipine-based regimen compared with the atenolol-based regimen on stroke, and all-cause mortality.

In the UK, following closure of the trial, participants who were alive were tagged by NHS England and Public Health Scotland, which allowed electronic data on subsequent hospital admissions and mortality to be recorded- the ASCOT Legacy Programme, which eventually reported over 3,000 cardiovascular outcomes.

Over the ensuing 25 years ASCOT generated over 150 publications based on sub-studies and sub-analyses.

Alun Hughes and Jamil Mayet highlighted the results of several studies focussing on a more detailed phenotypic characterisation of a sub-study population of over 1,000 participants, including the application of pulse wave tissue doppler imaging of the heart as a powerful predictor of subsequent cardiovascular mortality and vascular studies providing further insight into the differential effects of the two antihypertensive treatment regimens on cardiovascular structure and function and their relation to disease outcomes.

Patsy Munroe and Helen Warren summarised the extensive utilisation of the ASCOT DNA resource to study genetic determinants of baseline phenotypic markers, determinants of blood pressure and lipid responses to treatment and determinants of cardiovascular endpoints. This genetic database has also contributed to wider international databases, which have provided unique information on blood pressure loci, new gene discoveries and gene variants associated with interindividual variation in treatment response.

Ajay Gupta presented the study on adverse effects of statins emphasising that during the blinded LLA of the trial there was no difference in reports of muscle related symptoms (and other side effects) between those assigned atorvastatin or placebo, but after the trial when all participants were offered statins and were aware of their statin treatment, there was a highly significant increase in muscle related adverse reactions in those taking atorvastatin compared with those who were not taking the drug. This important example of the nocebo response was probably exacerbated by widespread media reports of the harmful effects of statins, which many subsequent reviews have demonstrated have no scientific basis.

Ramzi Khamis reviewed the ASCOT biomarker programme involving studies with a wide range of biomarkers including the demonstration of the ongoing importance of inflammatory biomarkers such as CRP associated with cardiovascular outcomes.

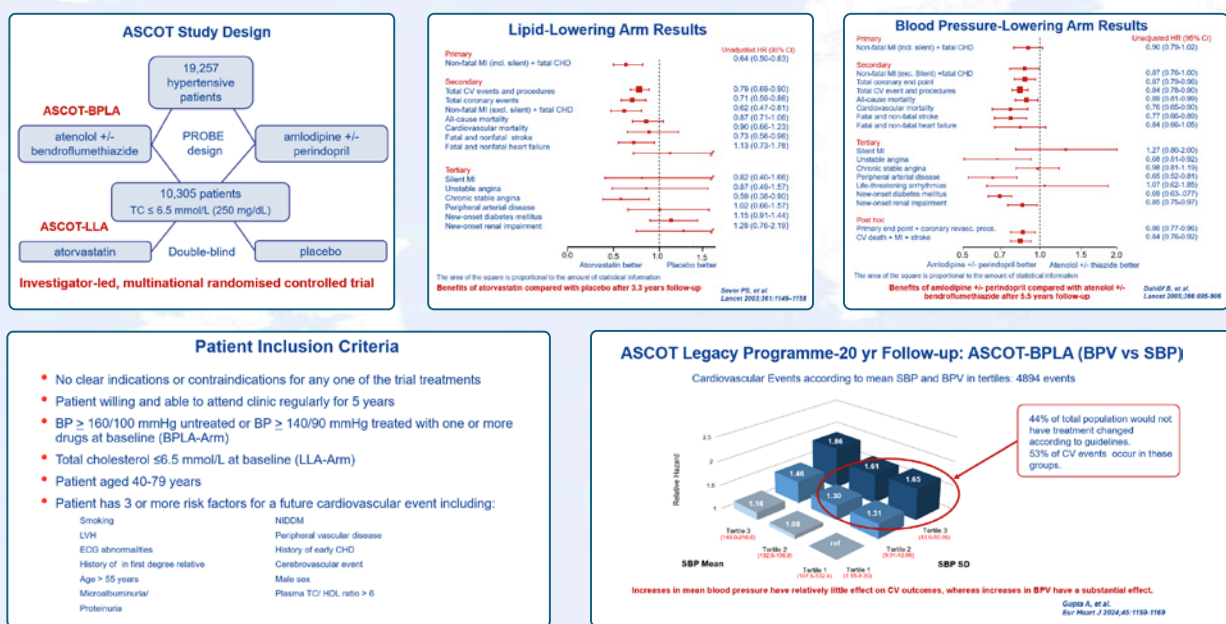
The ASCOT Legacy Programme produced a number of clinically important outcomes. Over the 20-year follow-up, those previously assigned the amlodipine-based regimen had significantly reduced strokes and cardiovascular events compared with the atenolol-based regimen, and those formerly assigned statins had significantly lower coronary events compared with placebo.

These findings, particularly for statins, have important implications for long-term management of lipid-lowering therapy to prevent cardiovascular disease.

One of the key findings in the main trial was that visit-to-visit (long-term) systolic blood pressure variability whilst on treatment was a far better predictor of cardiovascular outcomes than average blood pressures. Moreover, those assigned the amlodipine-based regimen had a greater reduction in long-term blood pressure variability than those assigned atenolol and this effect of amlodipine

ASCOT Trial Overview

A landmark cardiovascular outcomes trial that has transformed the prevention and management of cardiovascular disease through more than three decades of clinical research.



was shown to be the strongest explanator of the overall benefits of this regimen on cardiovascular outcomes. In the Legacy Study these effects of long-term systolic blood pressure variability were confirmed and critically it was demonstrated that even in those subjects with well controlled blood pressure, those with high blood pressure variability remained at high cardiovascular risk and accounted for approximately 50% of all cardiovascular events occurring during prolonged follow-up.

Neil Poulter summarised the key outcomes from ASCOT and their implications:

This was one of the first studies to show, in primary prevention, that statins conferred substantial protection against cardiovascular events and all-cause mortality. This protection conferred benefit over the ensuing 20 years - the legacy effect - and the routine use of statins is now recommended for most patients with hypertension largely on the basis of the ASCOT trial.

Amlodipine and perindopril were shown to be associated with highly significant benefits on cardiovascular outcomes compared with the traditional regimen of beta blocker and diuretic and has influenced the best combination of drugs recommended in guidelines since then.

Looking to the future, Amit Kaura presented some preliminary data and a fascinating insight into the potential for AI to explore the multiple ASCOT databases to provide new information on the phenotypic characterisation of individuals at high risk of developing cardiovascular events.

In summary, the chairmen Ian Wilkinson and George Stergiou emphasised the importance of ASCOT in the generation of national and international guidelines on hypertension and cardiovascular disease prevention.

The anniversary event concluded with drinks and a celebratory dinner.

The **ASCOT website** provides further details on sub-studies and publications.

Peter Sever – p.sever@imperial.ac.uk

Neil Poulter – n.poulter@imperial.ac.uk

References:

1. Sever PS, Dahlöf B, Poulter NR, Wedel H, Beevers G, Caulfield M, Collins R, Kjeldsen SE, McInnes GT, Mehlsen J, Nieminen M, O'Brien E, Ostergren J. Rationale, design, methods and baseline demography of participants of the Anglo-Scandinavian Cardiac Outcomes Trial. ASCOT investigators. *J Hypertens*. 2001;6:1139-47.
2. Sever PS, Dahlöf B, Poulter NR, Wedel H, Beevers G, Caulfield M, Collins R, Kjeldsen SE, Kristinsson A, McInnes GT, Mehlsen J, Nieminen M, O'Brien E, Ostergren J; ASCOT investigators. Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-than-average cholesterol concentrations, in the Anglo-Scandinavian Cardiac Outcomes Trial--Lipid Lowering Arm (ASCOT-LLA): a multicentre randomised controlled trial. *Lancet*. 2003;361:1149-58.
3. Dahlöf B, Sever PS, Poulter NR, Wedel H, Beevers DG, Caulfield M, Collins R, Kjeldsen SE, Kristinsson A, McInnes GT, Mehlsen J, Nieminen M, O'Brien E, Ostergren J; for the ASCOT Investigators. Prevention of cardiovascular events with an antihypertensive regimen of amlodipine adding perindopril as required versus atenolol adding bendroflumethiazide as required, in the Anglo-Scandinavian Cardiac Outcomes Trial-Blood Pressure Lowering Arm (ASCOT-BPLA): a multicentre randomised controlled trial. *Lancet*. 2005; 366: 895-906.
4. Sever P, Dahlöf B, Poulter N, Wedel H, Beevers G, Caulfield M, Collins R, Kjeldsen S, Kristinsson A, Mehlsen J, Nieminen M, O'Brien E, Ostergren, ASCOT Steering Committee Members. Potential synergy between lipid-lowering and blood-pressure-lowering in the Anglo-Scandinavian Cardiac Outcomes Trial. *Eur Heart J*. 2006 (24):2982-8.
5. Rothwell PM, Howard SC, Dolan E, O'Brien E, Dobson JE, Poulter NR, Sever PS on behalf of the ASCOT-BPLA and MRC Trial Investigators. Effects of β -blockers and calcium-channel blockers on within-individual variability in blood pressure and risk of stroke. *Lancet Neurol*. 2010;9:469-480.
6. Rothwell PM, Howard SC, Dolan E, O'Brien E, Dobson JE, Dahlöf B, Sever PS, Poulter NR. Prognostic significance of visit-to-visit variability, maximum systolic blood pressure, and episodic hypertension. *Lancet*. 2010;375:895-905.
7. Sever PS, Poulter NR, Chang CL, Hingorani A, Thom SA, Hughes AD, Welsh P, Sattar N; on behalf of the ASCOT Investigators. Evaluation of C-reactive protein prior to and on-treatment as a predictor of benefit from atorvastatin: observations from the Anglo-Scandinavian Cardiac Outcomes Trial. *Eur Heart J*. 2011 Jul 28. [Epub ahead of print]
8. Sever PS. The Anglo-Scandinavian Cardiac Outcomes Trial: Implications and Further Outcomes. *Hypertension*. 2012;60:248-259
9. Gupta AJ, Whitely W, Godec T, Rostamian S, Mackay J, Whitehouse A, Janani L, Poulter N, Ariti C, Sever PS. Legacy benefits of blood pressure treatment on cardiovascular events are primarily mediated by improved blood pressure variability: the ASCOT trial. *Eur Heart J*. 2024;45:1159-1169.
10. Sever PS, Rostamian S, Whitely W, Ariti C, Godec T, Gupta A, Mackay J, Whitehouse A, Poulter N. The long-term benefits of atorvastatin on the incidence of cardiovascular events: The ASCOT-Legacy 20 -year follow-up. *Heart*. 2025;11:769-775

microlife®

WatchBP

OFFICE 2G

Advanced Office AOBPM with
Automated Atrial Fibrillation
Detection and Central BP
Options



Scan the QR code
to learn more



Flexible, Unattended
Automated Office BP

Configurable measurement
settings for every clinical protocol

Interested in writing for
Hypertension News?



We are particularly interested in proposals about recent studies in hypertension, or perspectives on current issues in hypertension.

Contact us with your proposal: comms@ish-world.com



RESEARCH PROJECTS

Biochemical urine analysis may boost adherence to treatment with blood pressure medications: the OUTREACH trial

MACIEJ TOMASZEWSKI

The University of Manchester, Manchester, UK

SHADI HAMES-FATHI

The University of Manchester, Manchester, UK

PETER LACY

University College London, London, UK

BRYAN WILLIAMS

University College London, London, UK



Adherence is defined by the World Health Organization as “the extent to which a person’s behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider”.¹ Suboptimal adherence to prescribed blood pressure (BP) lowering medications hinders the treatment of hypertension and remains a major obstacle to effective BP control. This translates into increased cardiovascular risk, excessive healthcare costs, and unnecessary treatment escalations. It is a problem affecting up to one in three to four people with treated hypertension²⁻⁶ and limits the effectiveness of guideline-based treatment.

Detecting non-adherence to medication

Using an objective method of detecting non-adherence to medications has been identified as potentially useful as both a diagnostic test and a powerful therapeutic intervention when combined with a structured discussion targeting the key drivers on non-adherence.⁴

Chemical adherence testing (CAT), based on biochemical analysis of urine or blood samples for metabolites of BP-lowering medications may

be a practical component of this therapeutic intervention, and has already been recognised by international guidelines as an objective method for diagnosing non-adherence to therapy.⁷ CAT uses high-performance liquid chromatography-mass spectrometry (HPLC/MS) to detect the presence of antihypertensive drugs or their metabolites in biological samples.

Observational studies have demonstrated a relationship between biochemical non-adherence and elevated BP, with increasing degrees of non-adherence associated with progressively poorer BP control.² Until recently, the clinical utility and cost-effectiveness of a CAT-guided intervention had not been evaluated in a prospective randomised controlled trial (RCT).



Investigating the efficacy of urine CAT for non-adherence to BP-lowering medication

The OUTREACH study (BiOmArkers in Urine, anTiHyperTensive trEAtment and blood pressure Control in Hypertensive patients)⁸ was designed to address some of the existing gaps in knowledge in management of non-adherence to antihypertensive treatment. The study examined whether providing non-adherent hypertensive patients with information about their urine CAT test results, combined with a tailored discussion focussing on the main reasons driving their non-adherence (urine CAT-guided intervention), could lead to improved adherence and BP control compared with standard care (Figure 1).

Funded by British Heart Foundation, NIHR Manchester Biomedical Research Centre, Manchester Academic Health Science Centre, and Omron, OUTREACH was a multicentre RCT conducted across 12 NHS sites in England and Scotland. We recruited adults with hypertension who had been prescribed at least two antihypertensive medications. At screening, patients found to be non-adherent to one or more prescribed medications were eligible for enrolment.

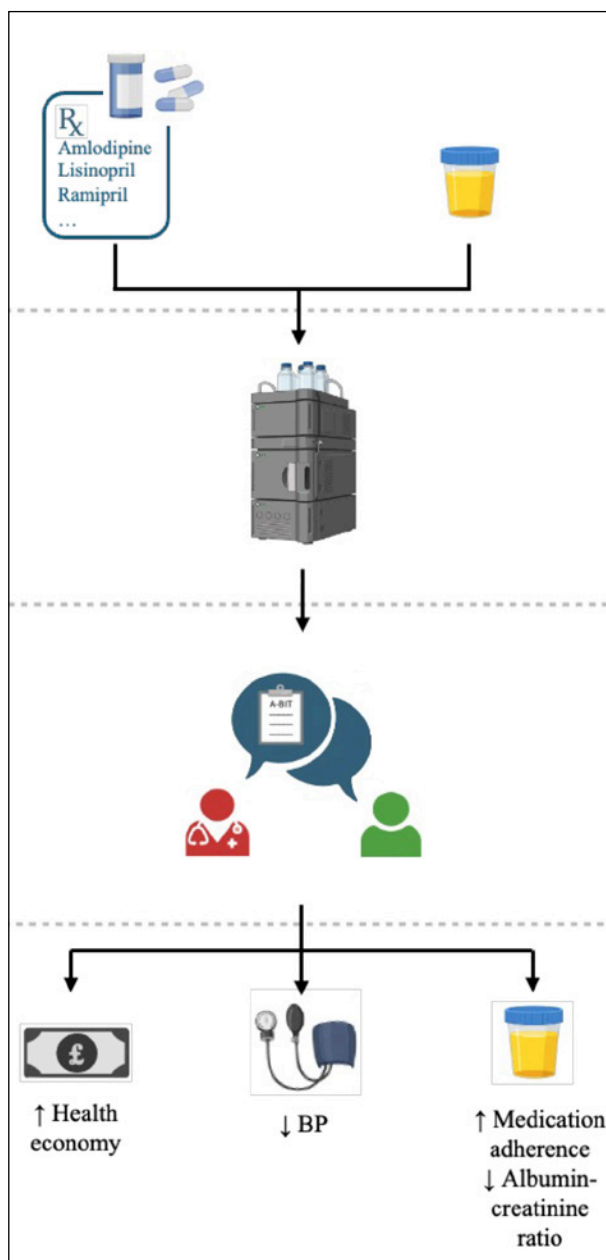
OUTREACH randomised a total of 130 participants to receive either CAT-guided intervention, consisting of disclosure of adherence-testing results alongside a structured discussion exploring reasons for non-adherence (group A), or to continue treatment according to standard clinical care (group B).

The intervention (delivered by trained physicians) aimed to identify and address individual barriers to treatment adherence, including concerns regarding adverse effects, treatment burden, medication beliefs, or practical difficulties with taking prescribed therapy.

Promising improvement in medication adherence

Participants were followed up for a median of 2.8 months to assessment of the primary endpoint, and 4.7 months for longer-term secondary outcome evaluation. The primary endpoint was change in clinic systolic blood pressure (SBP) from baseline.

Figure 1. Study concept. The depiction of the study's overarching hypothesis; BP-blood pressure. Created with BioRender.com.



Secondary endpoints included biochemical adherence status, clinic diastolic BP, home BP measurements, urinary albumin:creatinine ratio (ACR), and health economic outcomes.

Whilst OUTREACH did not demonstrate a statistically significant difference in average SBP between the two groups at the primary endpoint, the adjusted SBP in those who received the CAT intervention was approximately 5 mmHg lower than in the standard of care group ($p=0.19$). Other BP measures, including DBP and home

BP measurements were numerically consistent but did not reach the threshold of statistical significance.

We did, however, find a modest improvement in biochemical adherence to antihypertensive treatment at visit 4 (adjusted mean difference 12.7% [95% CI 0.9 to 24.4]; $p=0.035$). This is consistent with other studies which showed that CAT coupled with a structured intervention has potential to impact adherence.^{4, 9-11}

Limitations

OUTREACH was a very difficult trial to conduct. Recruitment reached only 80% of the planned target sample size. As with many clinical studies conducted during the early 2020s, the COVID-19 pandemic significantly affected recruitment, finances, staffing, participant follow-up, and study delivery. Protocol adaptations were necessary to facilitate safe participant attendance, and the study had to be paused and reactivated several times. Furthermore, recruitment and retention of patients with documented medication non-adherence presents well-recognised challenges for clinical trials and may have contributed to the lower-than-anticipated completion rates.

Lessons from the trial

The OUTREACH study shows how to address common sources of bias when running RCTs on adherence to treatment. This includes the importance of mitigating against Hawthorne effect (an awareness of being monitored). We made sure to account for this effect by not giving participants advance warning of trial participation and including a second additional phenotyping visit to quantify how information about the trial may change adherence.

We also emphasise the importance of creating a strategy to ensure that over-delivery of the intervention is not inadvertently administered. Given the nature of the trial, we had anticipated that clinicians may go beyond their normal actions in particular in the standard of care arm. Therefore, we included a population of adherent participants (group C) in order to mask clinicians to the adherence status of participants allocated to this arm of the study.

Furthermore, we also identified a gap regarding a lack of guidelines for clinicians delivering results from a urine CAT. We developed our A-BIT tool to provide a structured conversation guide for clinicians to support the delivery of intervention. Our A-BIT tool was informed by the principles of NICE guidelines and was developed in collaboration with hypertension specialists, health psychologists, and patients with hypertension – it provides a guide on how to combine the results of urine CAT with a discussion tailored to patient needs. This ensured reproducibility in the care provided and is shared as a resource in our publication.

Finally, as part of the visits, OUTREACH participants completed deep psychological phenotyping. This information will be used in secondary analyses dedicated to understanding the psychological aspects of adherence.

Conclusion

OUTREACH demonstrates that larger-scale trials are now required to fully understand whether CAT-based improvements in adherence can be translated into sustained BP reductions, improved cardiovascular outcomes, and long-term cost-effectiveness for people with hypertension. We would recommend that future RCTs should focus on recruiting participants from even larger number of centres run by teams experienced in dealing with non-adherent participants in order to effectively evaluate the full potential conferred by CAT-based intervention. A high degree of flexibility is required, and a longer duration should also be a priority. We deliver further practical insights for other investigators in our Lancet Primary Care paper.⁸

*The main results of this study have been published here: Tomaszewski M, Gupta P, Chowienczyk P, et al. Chemical adherence testing-guided intervention versus standard of care in patients with hypertension who are non-adherent to antihypertensive treatment in the UK (OUTREACH): a multicentre, randomised controlled trial. *The Lancet Primary Care*. 2026;2(5):100154. doi:10.1016/j.lanprc.2026.100154

References:

1. World Health Organization (2003). Adherence to long-term therapies: evidence for action. World Health Organization. <https://iris.who.int/handle/10665/42682>
2. Tomaszewski, M . White, C . Patel, P . et al. High rates of non-adherence to antihypertensive treatment revealed by high-performance liquid chromatography-tandem mass spectrometry (HP LC-MS/MS) urine analysis. *Heart*. 2014; 100:855-861
3. Gupta, P . Patel, P . Štrauch, B . et al. Risk factors for nonadherence to antihypertensive treatment. *Hypertension*. 2017; 69:1113-1120
4. Gupta, P . Patel, P . Štrauch, B . et al. Biochemical screening for nonadherence is associated with blood pressure reduction and improvement in adherence. *Hypertension*. 2017; 70:1042-1048
5. Patel, P . Gupta, PK . White, CM . et al. Screening for non-adherence to antihypertensive treatment as a part of the diagnostic pathway to renal denervation. *J Hum Hypertens*. 2016; 30:368-373
6. Mancia, G . Kreutz, R . Brunström, M . et al. 2023 ESH Guidelines for the management of arterial hypertension.

The Task Force for the management of arterial hypertension of the European Society of Hypertension: endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *J Hypertens*. 2023; 41:1874-2071

7. Gupta, P . Patel, P . Horne, R . et al. How to screen for non-adherence to antihypertensive therapy. *Curr Hypertens Rep*. 2016; 18:89

8. Tomaszewski M, Gupta P, Chowienzyk P, et al. Chemical adherence testing-guided intervention versus standard of care in patients with hypertension who are non-adherent to antihypertensive treatment in the UK (OUTREACH): a multicentre, randomised controlled trial. *The Lancet Primary Care*. 2026;2(5):100154. doi:10.1016/j.lanprc.2026.100154

9. Brinker, S . Pandey, A . Ayers, C . et al. Therapeutic drug monitoring facilitates blood pressure control in resistant hypertension. *J Am Coll Cardiol*. 2014; 63:834-835

10. Oliveras, A . Vázquez, S . Vega, MV . et al. Improvement of non-adherence and reduction of BP values in patients with difficult-to-treat hypertension: the ATHAN clinical trial. *Hypertens Res*. 2024; 47:2864-2873

11. Peeters, LEJ . Kappers, MHW . Hesselink, DA . et al. Antihypertensive drug concentration measurement combined with personalized feedback in resistant hypertension: a randomized controlled trial. *J Hypertens*. 2024; 42:169-178

Maciej Tomaszewski – maciej.tomaszewski@manchester.ac.uk

Bryan Williams – bryan.williams@ucl.ac.uk

Advert from an ISH Corporate Member



HUAWEI WATCH D3

Caring Always

Ambulatory Blood Pressure Monitoring¹
All-Round Health Management² | Slim Fit and Comfortable Wear

1. Medical grade ambulatory blood pressure monitoring (ABPM) is available on the Huawei Watch D3. The device is not intended for use as a medical device. 2. This feature is not intended for medical use. Results are for reference only, and should not be used as a basis for medical diagnosis, or treatment.



Office



A&D
A&D Medical

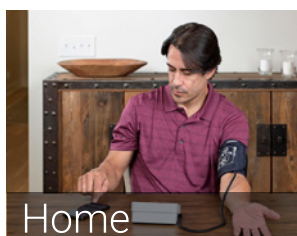


Ambulatory



Japanese precision covers versatile situations

A&D Medical is the only global company that manufactures and sells the most advanced BPM devices for blood pressure monitoring in the office (OBPM), ambulatory (ABPM) and home (HBPM) environments.



Home



Check out the previous editions of HYPERTENSION NEWS



Visit: <https://ish-world.com/ish-hypertension-news/>



**International
Society of
Hypertension**

ISH COUNCIL MEMBERS



George Stergiou (Greece)
ISH President



Hiroshi Itoh (Japan)
ISH Vice President



Kazuomi Kario (Japan)
ISH Secretary



Cesar Romero (USA)
ISH Treasurer



Erika Jones (South Africa)
ISH Officer-at-Large



Bryan Williams (UK)
ISH Immediate Past President



Dagnovar Aristizabal
(Colombia)



Hind Beheiry
(Sudan)



Myeong-Chan Cho
(South Korea)



Débora Colombari
(Brazil)



Yan Li
(China)



Tazeen Jafar
(Singapore)



**Ulrike (Muscha)
Steckelings**
(Denmark/Germany)

Corporate
Members



A partner for people. For life.



The opinions expressed by contributors in this issue of Hypertension News do not necessarily reflect or represent the opinions or policy positions of ISH or its Council of Trustees. ISH is a registered charitable incorporated organisation in England and Wales (no. 1204969).

www.ish-world.com

Email: secretariat@ish-world.com