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Research Article

The Asian Mosaic: Integrating Cardiometabolic Control and Adherence as One Narrative of Well-being

Jose Donato Magno[1], Reinhold Kreutz[2], Aslam Amod[3], Atul Pathak[4], Chan Siew Pheng[5], Om Lakhani[6], Jeyakantha Ratnasingam[7], Arindam Pande[8], Effarezan Abdul Rahman[9], Zaw Lynn Aung[10], Peter Ting[11], Fatima Jehangir[12], Habibie Arifianto[13], Nhat Giang M[14], Kang-Un Choi[15], Sirinart Sirinvaravong[16], Md. Farid Uddin[17], Thu Thi Hoai Nguyen[18], Nure Alam[19] , Azani Mohamed Daud[20]

Affiliation(s):

1. *Clinical Associate Professor, University of the Philippines College of Medicine; Division of Cardiovascular Medicine, Department of Medicine, Philippine General Hospital; Executive Director, Cardiovascular Institute, Angeles University Foundation Medical Center.* ***Corresponding Author: donny.magno@gmail.com***
2. *Charité – Universitätsmedizin Berlin, Institute of Clinical Pharmacology and Toxicology. reinhold.kreutz@charite.de*
3. *Life Chatsmed Garden Hospital & Nelson R Mandela School of Medicine, South Africa. amod.aslam1@gmail.com*
4. *Institut national de cardiologie, de chirurgie cardiaque et de cardiologie interventionnelle (INCCI), National Institute of Cardiology, Cardiac Surgery and Interventional Cardiology, 2A rue Nicolas Ernest Barblé, L-1210 Luxembourg. profapathak@gmail.com*
5. *Emeritus Professor of Endocrine Medicine, Consultant Endocrinologist, University of Malaya. spchan88@hotmail.com*
6. *Department of Endocrinology, Zydus Hospital, Ahmedabad. dromlakhani@gmail.com*
7. *Endocrine Unit, Department of Medicine, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia. jeyakantha_r@hotmail.com*
8. *Senior Consultant, Department of Cardiology, Manipal EM Bypass Hospital, Kolkata, India. drapande@gmail.com*
9. *National Heart Association Malaysia, Kuala Lumpur, Malaysia. effarezan@yahoo.com*
10. *Emeritus Patron (Medical Education), Clinical Director (Internal Medicine), Punhlaing International and Private Hospital; Senior Consultant Physician, Bahosi Private Hospital, Yangon, Myanmar. zawlynna@gmail.com*
11. *Senior Consultant Cardiologist, Harley Street Heart and Vascular Centre, Gleneagles Hospital, Singapore. peter.ting@harleystreet.sg*
12. *Ziauddin University Hospital, Pakistan. fatima.jehangir@zu.edu.pk*
13. *Department of Cardiology and Vascular Medicine, Universitas Sebelas Maret Hospital, Universitas Sebelas Maret Surakarta, Indonesia. habibie.arifianto@staff.uns.ac.id*
14. *Senior Cardiologist, MD, PhD, FACC; Deputy Dean, Cardiovascular Intensive Care and Cardiovascular Imaging Dept., Nhan Dan Gia Dinh Hospital, Ho Chi Minh City, Vietnam. minhnhat210189@gmail.com*
15. *Division of Cardiology, Department of Cardiology, Yeungnam University Medical Center, Daegu, Republic of Korea. tipcode@gmail.com*
16. *Division of Endocrinology and Metabolism, Department of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University.sirinart.oh@gmail.com*
17. *Department of Endocrinology, Bangabandhu Sheikh Mujib Medical University, Bangladesh.dr.md.fariduddin@gmail.com*
18. *Hanoi Medical University; National Geriatric Hospital, Hanoi, Vietnam.nththu.bvlk2@gmail.com*
19. *Mymmensingh Medical College, Mymensingh, Bangladesh. drnurealam36@gmail.com*
20. *Consultant Cardiologist, Gleneagles Hospital, Kuala Lumpur, Malaysia. heartcentre@gmail.com*

Abstract

Cardiometabolic diseases continue to escalate in frequency and complexity across the Asia-Pacific region, with multimorbid patterns involving hypertension, diabetes mellitus, dyslipidemia, and atherosclerotic cardiovascular diseases posing clear challenges in adherence and pharmacotherapy. The Cardiometabolic Asia Summit 2025 brought together 188 clinicians and 22 expert faculty with diverse specialties and practice backgrounds from 13 countries to examine these regional realities through interactive case discussions, live polling, and multidisciplinary discourse. Insights from transdisciplinary dialogues revealed that multimorbidity affects more than half of patients in real-world practice

and has become the clinical norm rather than the exception, with the diabetes-dyslipidemia-hypertension triad as the dominant pattern. The summit identified two interdependent pillars essential to addressing this complexity: achieving disease control through evidence-based interventions and sustaining adherence through physician-patient partnership. Discussions emphasized practical frameworks including structured hypertension management approaches using the ESH MASTER plan, organ-protective strategies in diabetes extending beyond glycemic targets, and goal-oriented lipid therapy. Emerging consensus hinged on randomized trials and real-world evidence highlighted that artificial intelligence integration, enhanced therapeutic strategies, and multidisciplinary management models represent critical enablers of sustainable, patient-centered cardiometabolic care across diverse Asian populations.

Keywords: Cardiometabolic Diseases; Multimorbidity; Asia-Pacific Region; Medication Adherence; Hypertension; Diabetes Mellitus; Dyslipidemias; Multidisciplinary Health Care

1. Introduction

Global Burden of Disease estimates quantify cardiovascular disease (CVD) as a substantial epidemiological burden, contributing 437 million disability-adjusted life years (DALYs) globally in 2023 [1]. Lancet-published forecasting models project a dramatic 109% escalation in CVD prevalence across Asia over 2025-2050, culminating in approximately 730 million affected individuals by 2050, accompanied by a projected 91.2% increase in cardiovascular mortality across the region during this timeframe [2].

This substantial cardiovascular disease burden has been closely associated with suboptimal adherence to pharmacological therapy, representing a persistent implementation challenge across the Asia Pacific region. A singular of seven guideline-directed adherence-promoting interventions demonstrated systematic deployment in clinical practice, showing the evidence-to-practice translation deficit. Contemporary adherence strategies predominantly emphasize clinician-centered educational approaches and therapeutic regimen optimization, whereas patient-centered behavioral interventions and organizationally mediated adherence mechanisms remain significantly underutilized [3].

To systematically address this escalating disease burden, 188 clinicians and 22 expert faculty representing 13 Asian nations (cardiology, endocrinology, nephrology, and internal medicine disciplines) convened for The Cardiometabolic Asia Summit in July 2025 in Kuala Lumpur, Malaysia. The conference encompassed plenary lectures, case-based workshops, and panel discussions specifically designed to delineate regional implementation gaps, synthesize evidence-based management approaches, and establish practical consensus regarding optimized cardiometabolic disease management and therapeutic adherence. Real-time audience engagement via the Menti platform was employed to systematically capture clinical perspectives. Anonymized responses from a mean of 100 participants per question yielded representative empirical insights across key areas of multimorbidity, medication adherence, clinical follow-up, digital health technologies, and health policy implementation. These quantitative and qualitative data, triangulated with expert deliberations and literature synthesis, established the foundation for analysis in this manuscript.

2. Current Challenges and Unmet Needs in the Management of CVD

The Cardiometabolic Summit discussed multiple obstacles in CVD management across the region. Key gaps encompass prevalence, multimorbidity, disease control, patient health-related behaviors, and routine clinical practice patterns.

Multimorbidity is increasingly common in Asian region, with nearly half of clinicians at the summit reporting that over 50% of their patients live with two or more chronic conditions, and 62% observed the triad of Diabetes (DM), Hypertension (HTN), and dyslipidemia commonly occurring together, highlighting the complexity of patient management in real-world practice. According to Asian data, up to 25.4% of individuals with hypertension were found to have at least one additional cardiometabolic comorbidity [4]. Prevalent young-age HTN in this region might also complicate management. The highest prevalence of Young HTN was found in Malaysia at 24.5% [4]. In the Asia-Pacific region, which accounts for 60% of the global population, two out of five adults are living with overweight or obesity. Obesity alone contributes to an estimated annual economic burden of USD 166 billion [5]. When present alongside albuminuria, it also signals underlying chronic kidney disease, further amplifying overall cardiovascular risk. Despite these rising trends, suboptimal control remains a big challenge. In India, only 8.5% of adults diagnosed with hypertension attained guideline-defined blood pressure control [6]. Across Indonesia, Malaysia, the Philippines, Thailand, Vietnam, and Australia, elevated total cholesterol was

documented in 30–47.7% of the adult population [7].

Experts also speculated patient-related unmet needs. They hypothesized limited awareness among patients and within communities regarding the importance of symptom control, long-term disease management, and the prevention of complications. Lifestyle interventions, such as dietary modifications, regular physical activity, and smoking cessation, may not always be recommended or adhered to. Factors like cost constraints and a high pill burden may contribute to suboptimal adherence following diagnosis.

In discussions, experts noted that in real-world practice, clinicians could face substantial challenges when attempting to balance multiple therapeutic targets glycemic, blood pressure, and lipid control; without slipping into excessive polypharmacy. Given routine outpatient visit constraints, there may be insufficient time to comprehensively manage all risk factors. For elderly or multimorbid patients, tailoring therapy to respect physiological fragility or comorbid organ impairment might be particularly difficult. Side effects like hypoglycemia, hypotension, or statin intolerance could force dose reductions or discontinuation. In highly heterogeneous patient profiles (e.g. with obesity, CKD, fatty liver, renal/hepatic impairment), individualizing therapeutic goals and safely adjusting regimens may be especially challenging. Experts also raised that lack of strong multidisciplinary teams (MDT) and poor coordination across specialists (diabetologists, cardiologists, general physicians) could lead to fragmented care and suboptimal optimization of combined cardiometabolic risk management.

Adherence also remained a critical gap. In the onsite poll, 67% of physicians report discussing adherence only once every three months, and 49% spend merely 5–10 minutes per visit on that discussion (Figure 1).

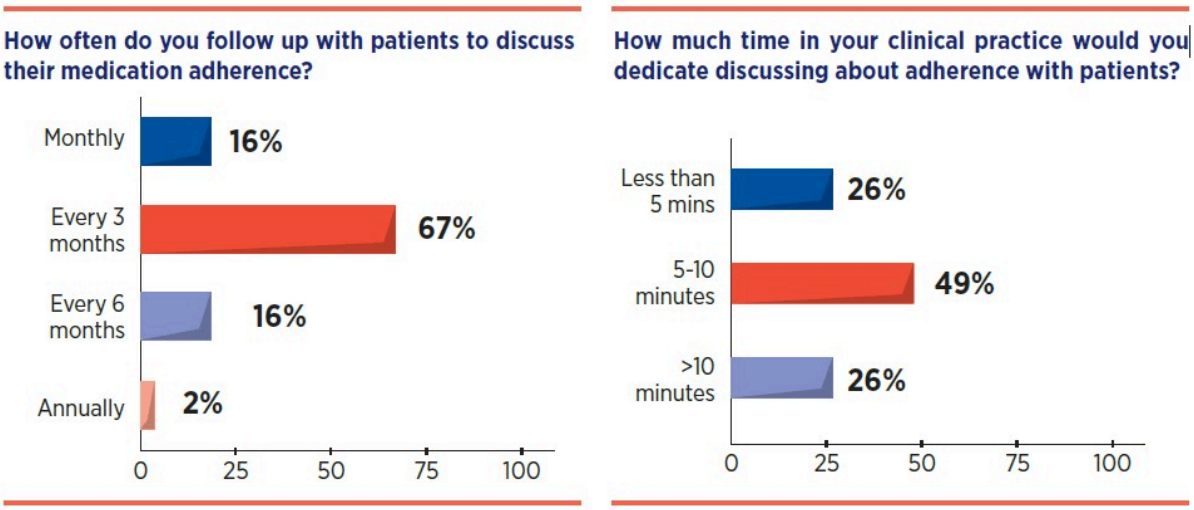

Figure 1: Polling insights on Adherence

Suboptimal physician-patient communication demonstrates a quantitative association with medication non-adherence. A meta-analysis revealed that patients experiencing deficient physician communication exhibit approximately 19% elevated nonadherence risk compared to counterparts with effective physician communication [8].

Against this backdrop, the summit's objectives were to identify regional gaps in cardiometabolic management, assess the impact of disease control and adherence on outcomes, explore the role of digital technologies and multidisciplinary models, and develop actionable, region-specific strategies to improve long-term outcomes across Asia.

3. Pillars of Management- Control and Adherence

Recognizing the above challenges, summit experts identified two central pillars of cardiometabolic management: disease control and adherence. These pillars are supported by robust evidence, multidisciplinary care models, and emerging technologies such as artificial intelligence (AI), which were noted for their potential to support diagnostic processes, facilitate treatment personalization, and enable real-time monitoring of adherence. Collectively, these elements outline a structured approach to patient-centered,

scalable, and regionally relevant management strategies for cardiometabolic multimorbidity, with the aim of improving clinical outcomes.

3.1 Control in Cardiometabolic Care

Effective cardiometabolic disease management requires timely identification, implementation of evidence-based therapeutic interventions, and continuous monitoring to achieve and sustain target levels of key risk factors, including blood pressure, glycemic control, and lipid parameters. This approach forms the foundation for complication prevention and is closely linked to treatment adherence, as the effectiveness of well-established therapies is reliant upon consistent and sustained disease control.

3.1.1 Hypertension- Early initiation and intervention

Experts emphasized that early identification and management of hypertension is crucial to prevent long-term cardiovascular complications. Thus, the practical implementation of the European Society of Hypertension (ESH) 2024 "MASTER" plan - Measure BP, Assess patient, Select Therapy, Evaluate Response; was highlighted as a structured framework for hypertension care, with treatment aimed at achieving a target blood pressure of <130/80 mm Hg [9] (Figure 2).

Key recommendations included using validated upper-arm devices, confirming diagnosis with home blood pressure monitoring (HBPM) or ambulatory blood pressure monitoring (ABPM), whenever deemed necessary and feasible, basic and extended assessing of patients including cardiovascular risk, comorbidities, frailty, and patient functionality, particularly in older patients, selection of both lifestyle interventions and pharmacotherapy and finally the evaluation of responses during follow up [9].

With respect to selection of therapy, case discussions reinforced the value of early initiation of combination therapy, particularly single pill combinations (SPCs) to achieve faster and more consistent blood pressure control. Sequential treatment adjustments with dual SPCs enabled optimal BP control while reducing therapeutic inertia and supporting adherence. Early intervention in pre-hypertensive or pre-diabetic patients was emphasized to delay disease progression and prevent target organ damage as also captured in literature [10]. These strategies, when applied systematically, allow personalized, patient-centric care, prevent long-term complications, and can facilitate sustained blood pressure control in real-world clinical practice.

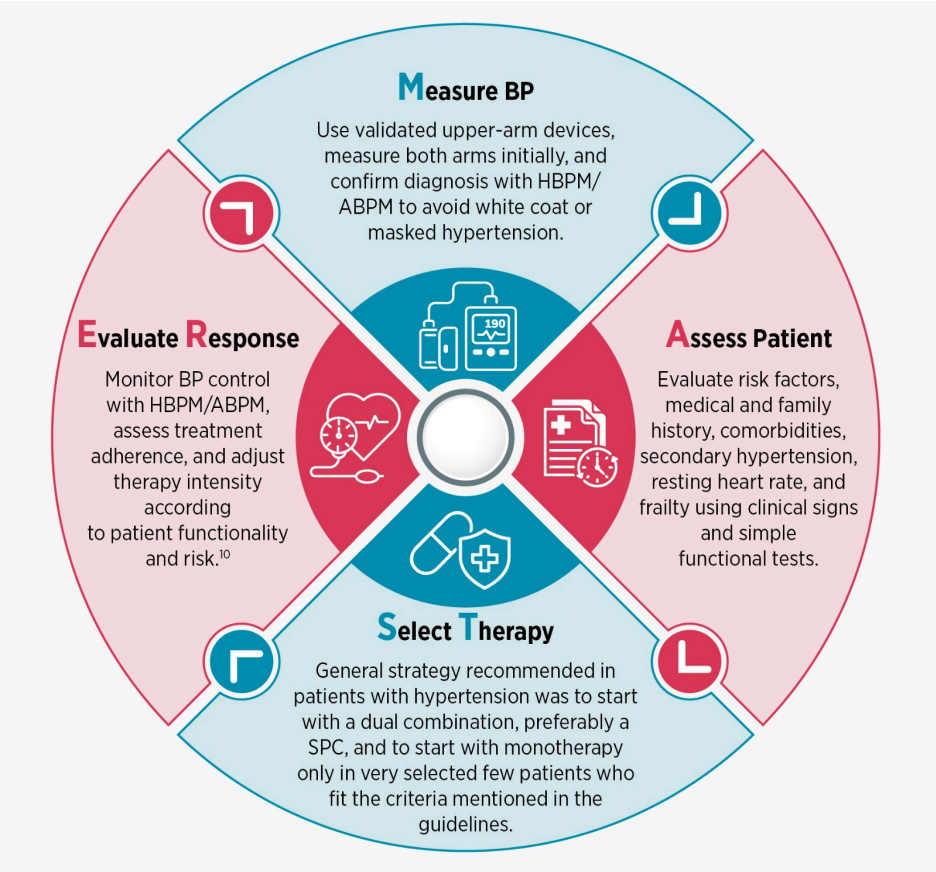

Figure 2: MASTER plan adapted from the ESH 2024 guidelines and the summit discussion[9]

3.1.2 Diabetes – Integrated Approach to Cardiometabolic and Glycemic Control

During the summit, multiple experts underscored that glycemic management in type 2 diabetes requires integration within a comprehensive organ-protective therapeutic framework rather than isolated application. In particular, they highlighted the existing role of Sulphonylureas (SU) and evolving role of SGLT2 inhibitors (SGLT2i) as more than glucose-lowering drugs, but as agents that confer cardiovascular and renal benefit.

In consonance with the 2025 ADA Standards of Care and by virtue of their proven CV benefits, selected therapies such as SGLT2i or receptor agonist (GLP-1RA) are recommended in adults with T2D and CKD (eGFR 20-60 mL/min/1.73 m^2 and/or albuminuria) to optimize glycemic management (irrespective of HbA1c), retard CKD progression, and reduce cardiovascular events. This best practice is sustained despite the diminished glycemic efficacy of SGLT2i at lower levels of renal function (eGFR < 45 mL/min/1.73 m^2) [11]. In an obesity case examined by experts, therapeutic intensification utilizing sulfonylurea, metformin, and SGLT2i emerged as a clinically justified strategy; adjunctive GLP-1 RA therapy (where accessible) was advocated for enhanced weight loss and cardiovascular/renal risk reduction, while reinforcing that early intensive glycemic control, even with conventional agents such as metformin and sulfonylureas, remains effective in preventing complications and improving survival [12]. Discussion around glucose control in fasting individuals was based around the DIA-Ramadan real-world analysis in which a gliclazide MR (Modified Release) + SGLT2i combination was found to be well tolerated in patients fasting, and the proportion of patients reporting ⩾1 symptomatic HE during Ramadan was low (2.2%) with no reported severe HEs. Significant reduction was also found in HbA_{1c} (-0.3%), FPG (-9.7 mg/dL), body weight (-0.5 kg) and body mass index (-0.2 kg/m^2) [13].

Use of gliclazide modified release was further grounded in evidence from the ADVANCE trial. In that trial (n = 11,140), intensive glycemic control employing gliclazide MR (plus other agents as needed) to achieve HbA1c ⩽ 6.5 % resulted in a relative 10 % reduction in the combined incidence of major macrovascular and microvascular events (HR 0.90, 95 % CI 0.82-0.98), and a 21 % reduction in new or worsening nephropathy (HR 0.79, 95 % CI 0.66-0.93) [14].

Keeping all the evidence in picture, the importance of early control and holistic approach to glycemic control was highlighted at the summit.

3.1.3 Control in Chronic Coronary Syndrome (CCS)

In CCS, both symptomatic management, such as relief of angina, and long-term disease modification through control of heart rate, lipid burden, and atherosclerotic progression, are required to be addressed by therapeutic strategies. Expert panel discussions emphasized that disease control should be individualized, optimized, and aligned with adherence-enhancing strategies to maximize clinical benefit. Case-based experiences from routine clinical practice, together with emerging clinical evidence, highlighted the potential advantages of early initiation of combination therapy with trimetazidine and a hemodynamic antianginal agent, such as a β-blocker. This combined metabolic-hemodynamic approach has been associated with improvements in myocardial energy utilization and reductions in myocardial oxygen demand, resulting in reduced angina frequency, improved exercise tolerance, and enhanced health-related quality of life. Early adoption of such combination strategies may support improved symptom control and functional outcomes in patients with newly diagnosed stable angina.

For patients requiring additional heart rate reduction, ivabradine was discussed as an option when β-blocker therapy alone is insufficient to achieve target heart rates or is contraindicated. It was noted that ivabradine may be considered in patients fulfilling criteria similar to those evaluated in the SHIFT trial, including reduced left ventricular ejection fraction, elevated resting heart rate in sinus rhythm, and a prior hospitalization for heart failure. Ivabradine continues to be positioned as a Class IIa recommendation in contemporary ESC and ACC guidelines, in combination with β-blockers and renin-angiotensin-aldosterone system inhibitors, across appropriate stages of the heart failure continuum [15,16]. Its pharmacological profile, characterized by selective I(F) current inhibition within the sinoatrial node, heart rate lowering devoid of negative inotropic effects, and negligible influence on systemic blood pressure, positions it as a safe therapeutic option for hypotensive or multimorbid HFrEF patients [17].

Expert discussions further noted that heart rate reduction with ivabradine, when combined with metabolic modulation and guideline-directed medical therapy, was associated with improvements in angina symptoms and exercise tolerance.

Another key discussion point zeroed in on the incremental benefit of non-statin therapies such as ezetimibe to

provide greater cardio protection on top of high- or maximally tolerated statins for high- and very-high-risk individuals who fail to achieve LDL-C targets with statin monotherapy, echoing the recent ESC/EAS 2025 guidelines. This combination provides incremental LDL-C reduction (-15-20%) and improves goal attainment while reducing the risk of adverse effects compared with escalating statin doses alone. Evidence from clinical trials indicates that early combination therapy enhances both efficacy and adherence, ultimately translating into improved cardiovascular outcomes. Statin + ezetimibe therapy thus represents a guideline-supported, practical, and evidence-based strategy for optimizing lipid management [18].

4. Importance of Adherence in Management of Cardiometabolic Diseases

Patient symposia at the summit provided clinicians with a valuable lens into the lived experiences of individuals managing diabetes, hypertension, and dyslipidemia & direct insights into real-world challenges in managing diabetes, hypertension, and dyslipidemia, including medication nonadherence, dietary constraints, and variability in clinical readings. The onsite poll conducted indicated that the quality of the physician-patient relationship was the most significant determinant of adherence (43%), followed by patient education (22%). These findings emphasize that therapeutic adherence is strongly influenced by relational and educational factors in addition to pharmacologic regimens (Figure 3).

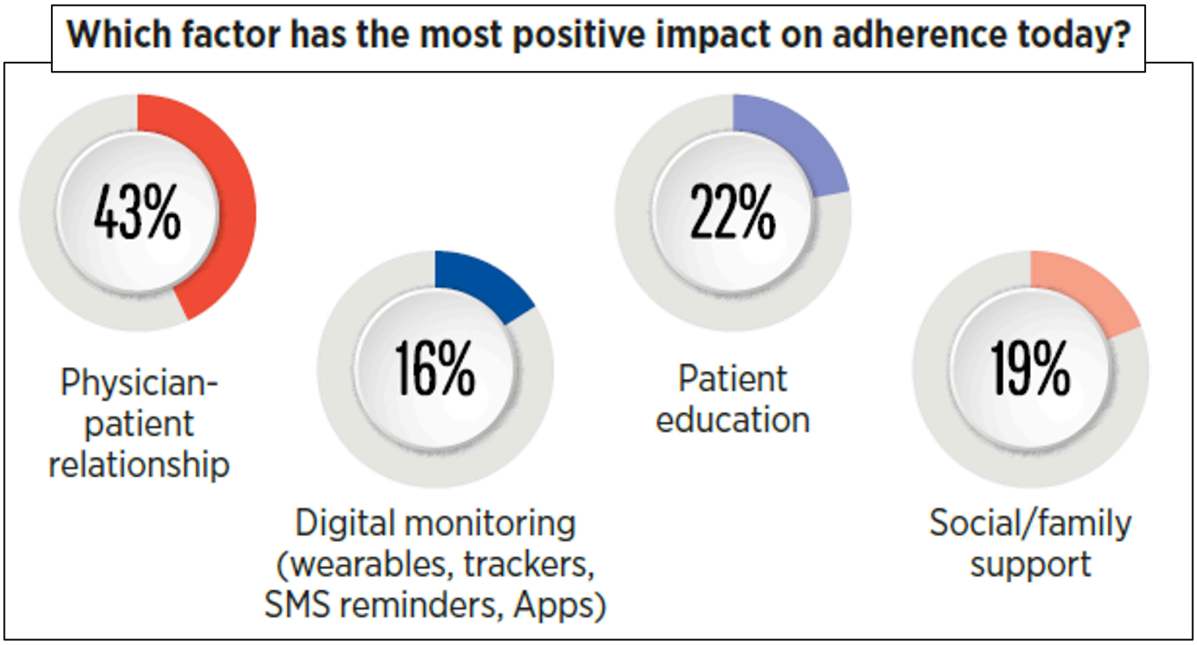

Figure 3: Real time polling insights on adherence

Implementation of evidence-based strategies, such as regimen simplification, structured patient education, digital monitoring tools, and coordinated counseling, may enhance adherence and optimize patient-centered clinical outcomes. To tackle the issue of adherence, various tools were discussed as CVD adherence toolkit captured in Figure 4.

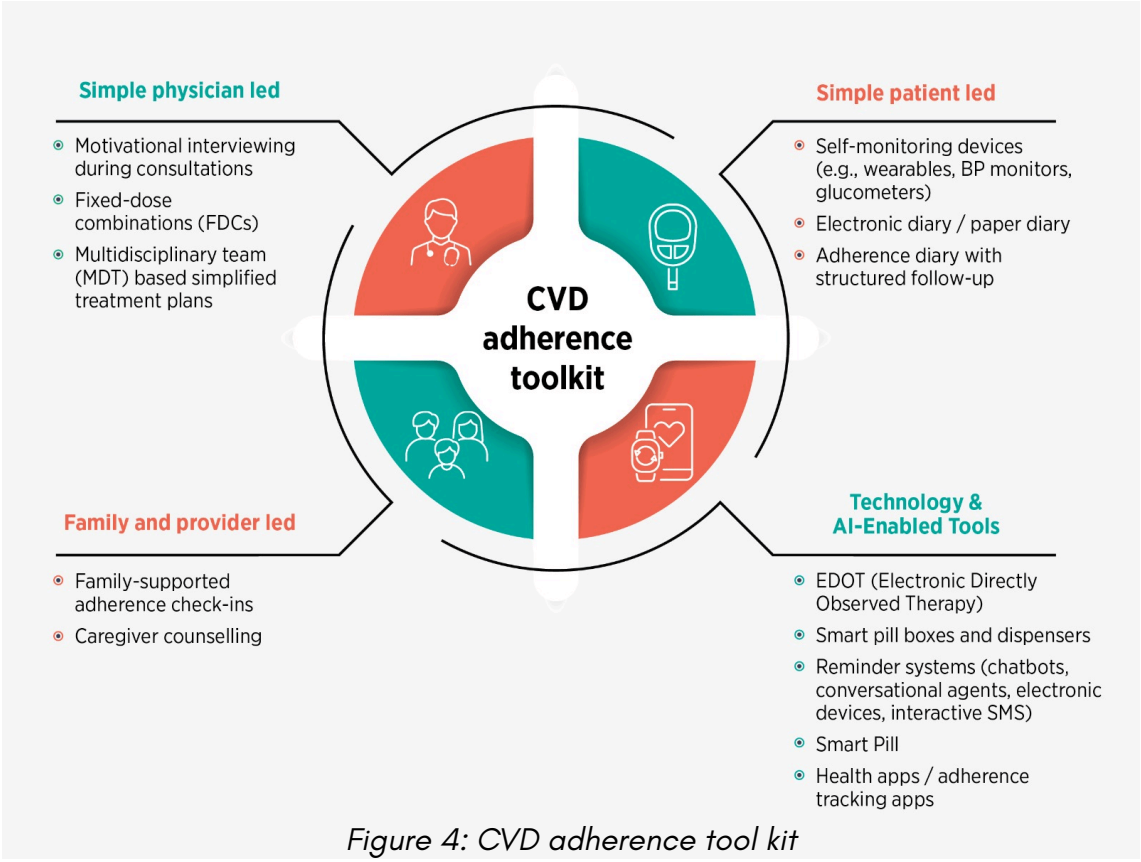

Figure 4: CVD adherence tool kit

A cross-sectional study of 501 adults in India, found that empathetic and competent communication by physicians was directly associated with higher patient satisfaction and willingness to recommend their provider, with consultation length acting as a mediator [19]. Training physicians in communication skills results in substantial and significant improvements in patient adherence such that with physician communication training, the odds of patient adherence are 1.62 times higher than when a physician receives no training [20]. These findings emphasize that both the quality and duration of physician–patient communication are pivotal in supporting adherence to prescribed therapies (Figure 5).

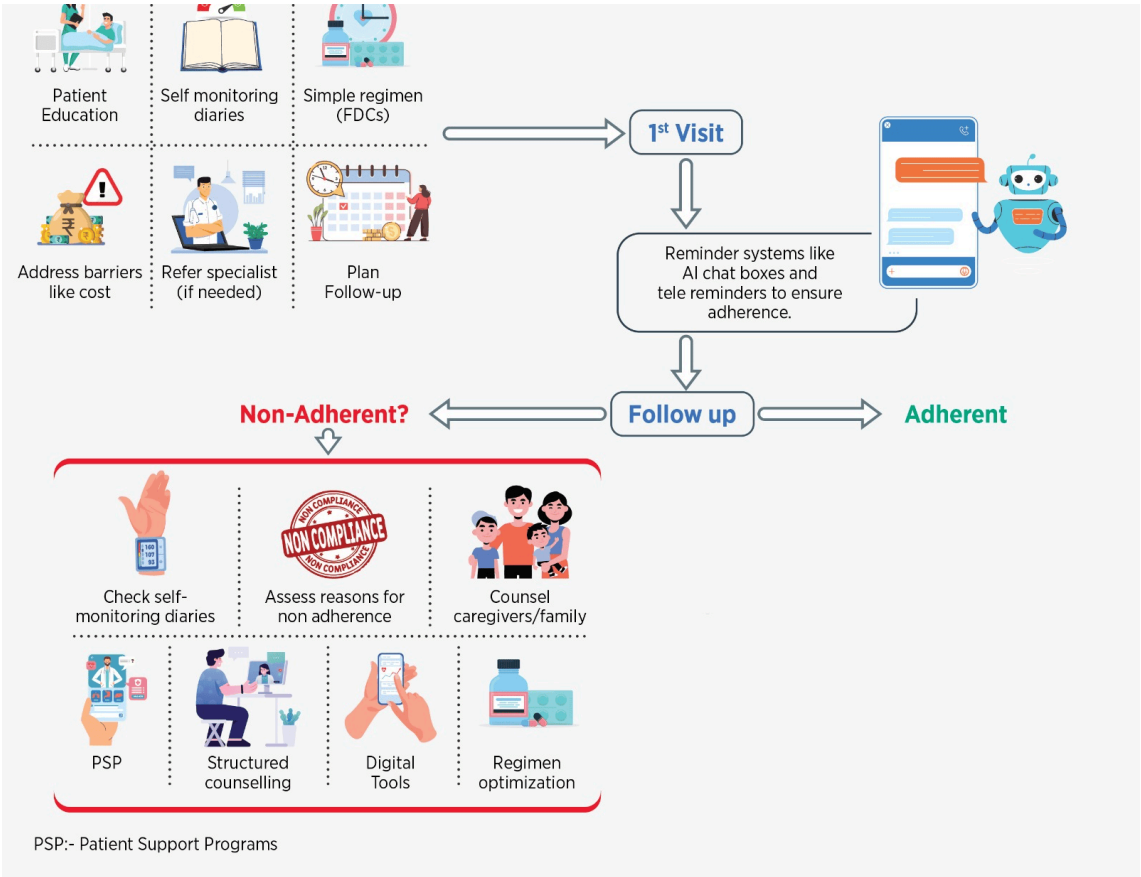

Figure 5: Physician Checklist for Patients with Cardiometabolic Risk

These findings align with the conclusions of a systematic review which synthesized evidence from 25 studies in hypertensive populations and demonstrated that communication quality including style, clarity, content, and length was positively associated with both adherence and blood pressure control [21].

4.1 Technology and Artificial Intelligence (AI) for Enabling Medication Adherence

In the age of technology and AI, 69% of the physicians believed that AI could somewhat help improve adherence in the next 5 years (Figure 6) and support the pillars of management.

AI based adherence interventions are increasingly being explored as adjuncts to conventional healthcare provider-patient communication strategies.

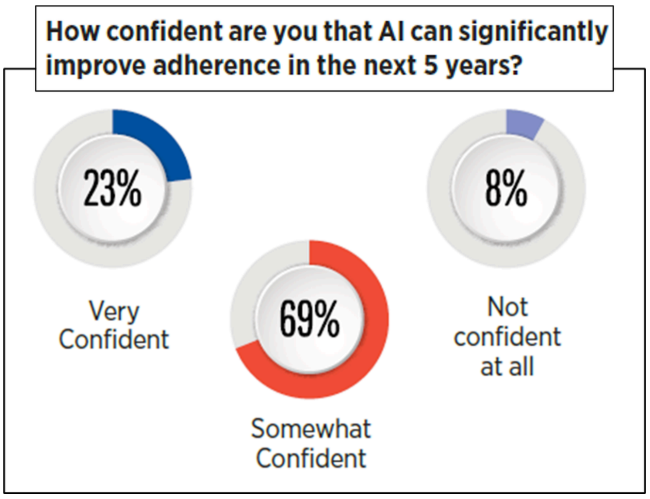

Figure 6: Polling Insights on AI and Evidence in Adherence

A recent narrative review identified multiple AI-enabled approaches, including mobile health applications, automated reminder systems, smart monitoring devices, conversational agents, and machine learning-based predictive models, aimed at monitoring and supporting medication adherence among individuals with non-communicable diseases (NCDs). These technologies facilitate functions such as individualized reminders, continuous behavior monitoring, and early identification of patients at risk of non-adherence. While several interventions were associated with improvements in adherence outcomes, the review emphasized that effective implementation is contingent upon appropriate integration within existing patient-provider communication frameworks, to support engagement and preserve the therapeutic relationship [22]. Labovitz et al. conducted a 12-week RCT involving 28 recent stroke patients on direct oral anticoagulants. An AI app using smartphone-based computer vision identified patients, confirmed drug identity, and visually confirmed ingestion. Over 12 weeks, the AI group achieved 100% median adherence compared with 50% in controls, a 67% absolute improvement, verified through plasma drug levels [23]. Real-world deployment further supports these findings. A pharmacist-led, AI-supported program used predictive analytics to identify patients at risk of non-adherence and targeted interventions accordingly, resulting in improved adherence, better disease control, and reduced healthcare costs [24].

4.2 Integration of Real-World Evidence (RWE) and Randomized Controlled Trials (RCTs)

Insights from the Cardiometabolic Asia Summit highlighted the critical role of high-quality evidence in supporting disease awareness, professional education, and informed clinical decision-making. The onsite poll on the types of evidence required to support the use of SPCs in diabetes management revealed real-world evidence (RWE) was most frequently prioritized (50%), followed by clinical practice guidelines (36%), expert opinion (11%), and other sources (4%) (Figure 7).

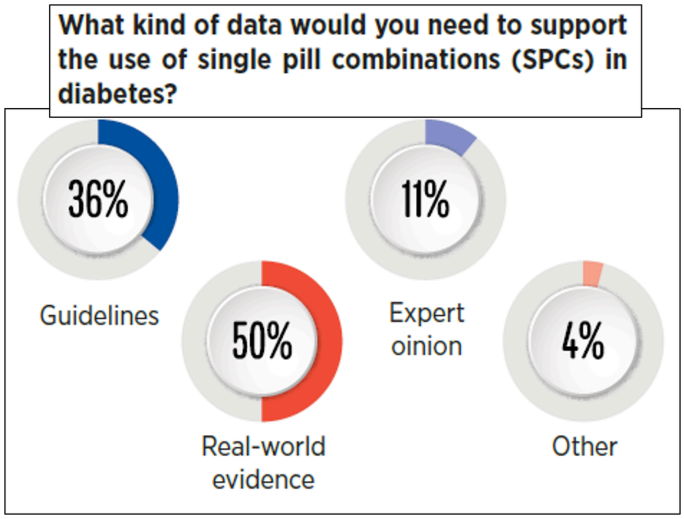

Figure 7: Polling Insights on the quality of evidence

This distribution reflects an increasing recognition of the complementary role of RWE alongside RCT data in informing routine clinical practice, particularly in capturing treatment effectiveness, adherence, and outcomes within region-specific healthcare settings.

Evidence from RCTs forms the cornerstone of diabetes management guidelines; however, strict trial inclusion and exclusion criteria often limit generalizability. In a real-world study determining the applicability of a Standards of Care management guideline for SGLT2i and GLP-1 RA to 13,350 primary care patients with type 2 diabetes in Boston, only 33% met the guideline-driven eligibility criteria, indicating that two-thirds of patients would not qualify for these agents despite having type 2 diabetes [25]. Similarly, analyses have shown that a large proportion of real-world type 2 diabetes patients would not have met the stringent cardiovascular outcome trial criteria for GLP-1 RA [26]. These findings point out that current guideline recommendations, shaped primarily by RCTs, may not adequately address the needs of most patients. RWE bridges this gap by capturing outcomes across diverse populations, broader comorbidity profiles, and varying adherence patterns. The Joint Asia Diabetes Evaluation (JADE) registry, encompassing 97,852 patients from 11 Asian countries (2007-2017), has generated extensive RWE on treatment patterns, persistence, and quality-of-life outcomes, including studies on gliclazide modified release in multi-ethnic Asian cohorts [27]. Such registries enable precision medicine by linking phenotype-driven patient profiles with real-world therapeutic responses.

5. Future Directions

- Adherence was recognized as a central determinant of treatment success. Experts highlighted the potential role of technology and artificial intelligence in supporting both diagnosis and adherence. These technologies were described as having the potential to enhance diagnostic accuracy by integrating diverse data sources, including clinical, biochemical, imaging, and wearable device data, enabling earlier disease detection, improved risk stratification, and more precise therapy selection.
- AI-assisted adherence solutions, such as predictive analytics, real-time monitoring, with patient engagement chatbots and mobile applications, were seen as possible avenues for extending care beyond traditional encounters, though their integration into existing workflows would require careful planning to maintain patient trust and usability.
- Building such trust could be facilitated by embedding accurate, evidence-based information into these platforms. In this context, experts emphasized the importance of leveraging both real-world evidence and randomized controlled trials to ensure that the information and recommendations generated are applicable across diverse patient populations.
- Given the reported lack of unified national guidelines for managing such profiles, viewing patients with multimorbidity as distinct high-risk phenotypes and developing regionally relevant guidelines could help promote comprehensive management approaches.
- The importance of a multidisciplinary healthcare team, consisting of a physician, nephrologist, endocrinologist, or other specialists as needed, a clinical pharmacist, a nutritionist, and a dietitian, was highlighted by many experts to achieve the holistic care needed for multimorbidity.

6. Summary

Prospective strategies integrating technology-facilitated interventions, region-tailored evidence development, and unified policy architectures may function as synergistic approaches to enhance cardiometabolic management across the Asia-Pacific region. Subsequent efforts could prioritize multimorbidity-centric care pathways, incorporate AI-driven and digital health technologies into standard workflows, and synchronize reimbursement structures with evidence-guided, patient-centric models. These measures possess capacity to progressively narrow disparities between existing infrastructure and escalating requirements of aging, multimorbid populations through coordinated clinical, investigative, and policymaking collaboration.

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Additional Information

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