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Non-Communicable Disease Care Pathways: Improving Service Delivery and Treatment Outcomes in Malaysian Community Clinics

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Abstract

Malaysian primary healthcare is under sustained pressure due to non-communicable diseases (NCDs), specifically diabetes, hypertension, dyslipidaemia and their common co-occurring nature. Community clinics are placed to organize prevention, early diagnosis, treatment and long term follow-up and do not necessarily guarantee continuity and disease control, clinical contacts. The paper is a critical analysis of the ways in which NCD care pathways can enhance service delivery and treatment outcomes in Malaysian community clinics in the public. An integrated synthesis of peer-reviewed Malaysian literature (structured integrative review) was conducted on comparative peer-reviewed primary-care literature and national health reports up to October 2026. The evidence was systematized in terms of the Chronic Care Model and the structure-process-outcome framework and focused on clinical effectiveness, patient experience, implementation feasibility and equity. Findings of national surveys show that there is a high prevalence of NCD and undiagnosed disease. Malaysian reviews reveal integrated pathway interventions have a positive impact on screening, risk assessment and documented processes, but less predictable effects on glycated haemoglobin and blood pressure. Cluster-randomised and pharmacy-led studies offer greater evidence of the selected gains in diabetes control whereas qualitative studies reveal workload, broken appointments, health literacy, and referral barriers. The article suggests a co-ordinated action plan incorporating risk-based entry, multidisciplinary assessment, shared care planning, medication optimisation, active recall, referral feedback and routine quality monitoring. Implementations need to be successful, with team roles that are secured, usable information systems, culturally responsive counselling and outcomes-based evaluation. A combination, equity-based strategy provides a plausible path towards improved NCD management without assuming that all procedural benefits are promptly translated into clinical benefit.

Key words: *non-communicable diseases, primary healthcare, Malaysia, community clinics, care pathways, diabetes, hypertension*

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1. Introduction

The presence of non-communicable diseases (NCDs) is a characteristic of contemporary health systems since it only takes collective activity over several years to prevent and treat these diseases. Diabetes,

hypertension and dyslipidaemia are often comorbid and predispose to cardiovascular and renal risks, necessitating recurrent evaluation, medications, lifestyle management and monitoring of complications. Clinics that are primarily composed of discrete illness episodes may not be able to deliver such functions consistently. The Chronic Care Model thus promotes ready clinical teams, knowledgeable patients, planned follow-up decision support and systems instead of reactive consultations only (Wagner et al., 2001; Bodenheimer et al., 2002). In the case of Malaysia, community-based primary care plays an important role in transforming this strategy into convenient service.

The National Health and Morbidity Survey (NHMS) 2023 estimated that 15.6% of adults had diabetes, 29.2% hypertension and 33.3% hypercholesterolaemia; its estimates are inclusive of individuals whose conditions had not been diagnosed (Institute for Public Health [IPH], 2024). In a similar survey, 54.4% of adults were found to be overweight or obese. These statistics indicate the risk of the population as a whole and not the result of individual clinics, and indicate why only opportunistic treatment is not enough. Unidentified conditions, late onset of treatment and follow-up result in areas of unnecessary loss between community-based screening and durable control. The high workload also implies that the comparatively limited pathway inefficiencies are replicated thousands of times.

In this article, community clinic refers mostly to government primary health clinics, or Klinik Kesihatan, in Malaysia that diagnose and treat common chronic conditions and refer patients to hospital and specialist services. The exact resources and staffing of these facilities is flexible and community-based private general practice offers another access point into care. The public clinics are particularly useful in the study of the change at the system level since the overall guidance by the Ministry of Health exists with a significant local difference in the structure of clinical organisations. Mustapha et al. (2020) have found one-stop services and individual approaches in certain Malaysian clinics, as well as repetition of appointments, the lack of continuity and the possibility to use the time of the staff more effectively.

A care pathway is more than a clinical guideline or a checklist. It is a concurring chain of events linking the identification of the risk, diagnosis, risk prioritization, treatment, education, monitoring, referral and re-entry into the continued care. It assigns roles, outlines decision points and establishes mechanisms to identify uncontrolled and missed review patients. This pathway must be adequately standardised to minimise omissions but adaptable enough to capture multimorbidity, patient preferences and local capacity. The difference between structures, care processes and outcomes proposed by Donabedian (1988) is the reason why a pathway is to be evaluated with both what clinics are doing and what is happening to patients.

Malaysia has already produced some valuable evidence on pathway redesign. EnPHC programme was the pilot of integrated care processes in the public clinics and EMPOWER-PAR assessed the team-based chronic disease management using a pragmatic cluster trial. Several states have also looked into pharmacist-managed medication adherence services. The combination of these studies demonstrates possible improvements, although they are not sufficient to consider all programmes as universal. Specifically, enhanced testing and risk documentation can be a precursor to, instead of an assurance of, enhanced physiological control (Husin et al., 2023; Ramli et al., 2016).

The enhancement of a pathway also requires a consideration of the difference between the coverage and the effective coverage. A patient might visit a clinic, get blood tests and walk away with medicines and still be vulnerable to preventable injuries in case of follow-ups are not carried out, side effects are ignored or instructions are not affordable. Measures of improvement should thus reflect the percentage of individuals who get the care they deserved, at the right time and feel a significant improvement. This view is in line with the general evidence that effective primary care requires holistic/coordinated relationships and not isolated contacts (Starfield et al., 2005).

This article will critically analyze current NCD care pathways and create an evidence-based model of enhancing service delivery and treatment outcomes in community clinics in Malaysia. Its particular aims are to review existing pathway dilemmas, evaluate evidence of multidisciplinary and patient-centred interventions, pinpoint obstacles to its implementation and suggest quantifiable solutions. The review is based on the adult diabetes, hypertension and dyslipidaemia since they are the most common, co-occurring conditions that contribute a significant portion of the evidence available in the Malaysian scenario. Broader cardiovascular and renal prevention implications are taken into account where appropriate.

2. Literature Review

2.1 Conceptualising chronic care pathways

A good guideline to long-term provision of NCD care is the Chronic Care Model (CCM). The six interacting domains it has relate to health system organisation, design of the delivery system, decision support, clinical information systems, self-management support and community resources (Wagner et al., 2001). The model questions clinic processes whereby individual providers handle individual visits separately. Rather, continuity between consultations is provided through team-based encounters, patient registers, structured reviews and scheduled escalation. According to Oberheimer et al. (2002), the practice teams that engage in active practice and communicate with patients who can safely practice self-care are effective in managing chronic diseases. Such principles are especially crucial in cases when a patient has to deal with multiple treatments at the same time.

In addition to the CCM, the framework by Donabedian (1988) differentiates between structural inputs like staffing, diagnostic capacity and information technology and process indicators like annual testing of HbA1c levels, blood pressure monitoring and medication reconciliation. Possible results are control of the disease, complications, quality of life and avoidable admissions. The difference avoids a usual fallacy of analysis: the increased test completion is taken as evidence of better treatment results. Accessibility, responsiveness and patients ability to use service must also be seen in quality. Starfield et al. (2005) have created a list of the core competencies of good primary healthcare systems and made continuity, first-contact access, comprehensive and coordination as the core competencies.

2.2 Disease burden and service demand in Malaysia

Malaysian NCD burden is a mixture of established disease plus a large pool of risk that had never been identified before. The proportion of adults who did not have known raised blood glucose levels but had previously unrecognised raised blood pressure was 5.9% in the NHMS 2023 estimates, and 11.9% in the estimates of the percentage of adults who did not have known raised blood glucose levels (IPH, 2024). These are population-wide indicators, and not screening failure rates in individual facilities. Nevertheless, they support avenues that link community case-finding to confirmatory assessment and timely and documented follow-up as opposed to stand-alone screening campaigns.

Multimorbidity complicates clinical work and treatment decisions. Nordin et al. (2025) used NHMS data 2019 and reported a multimorbidity rate of 11.4% among adults in the analysed sample and that multimorbidity was positively related to outpatient services utilisation. This makes the argument of integrating diabetes, hypertension and lipid control into one plan rather than scheduling disjointed visits to various diseases. It also emphasises the significance of multimorbidity-sensitive medication reviews, personalised targets and prioritisation of risk with the most significant consequences. Primary care needs to be available, but the longitudinal quality of contact predetermines the reduction of cumulative risk.

2.3 Integrated care and multidisciplinary teams

There exists strong, but disparate evidence of integrated Malaysian pathways. EnPHC integrated new care processes, screening and coordination processes at participating clinics. Husin et al. (2023), who studied

12,017 records of diabetes patients in 20 clinics of intervention and 20 control clinics, identified seven out of fourteen processes measured as improved, such as HbA1c, lipid and urine albumin, body mass index documentation and cardiovascular risk assessment. Nevertheless, there were no statistically significant differences in intermediate clinical outcomes. This opposition teaches: improved processes can enhance the premises of care, but it takes more time, sufficient therapeutic reaction and patient involvement before alteration in biological outcomes will occur.

An offset population-based assessment of EnPHC reported screening gains and a decrease in the chosen undiagnosed NCD measures in intervention regions relative to controls (Mohd Yusoff et al., 2024). Overweight, obesity or smoking also did not show any effect on the relatively short period of observation by the authors. It should be interpreted as an added value in the pathway reach and clinical practice rather than proved to be a solution to all dangerous metabolism. The difference between the study designs and target populations also warns against direct comparison of their estimates of the effect.

The experimental results of EMPOWER-PAR give support to a more explicitly multidisciplinary model. The pragmatic cluster-randomised study recruited 888 patients with type 2 diabetes in ten primary care clinics which were publicly operated. One-year later, the participants of intervention clinics had a better chance of reaching the HbA1c target of the trial as compared to the participants of usual care, with some secondary clinical outcomes not improving significantly (Ramli et al., 2016). The programme was a combination of team strengthening, decision support and patient self-management tools. Its outcomes indicate that structured interventions can lead to clinical improvements, though the results are relevant to its particular intervention, environment and outcome measure.

2.4 Medication management and patient self-care

Pharmacists may enhance the capacity of pathways through regimen knowledge, compliance, pharmacotherapy-related issues and escalation requirement. The researchers, Alison and Anselm (2020), conducted a primary care randomised trial in Malaysia and discovered a higher decrease in HbA1c in 12 months when the patients were given extra Diabetes Medication Therapy Adherence Clinic (DMTAC) contacts compared to those receiving normal care. Lim et al. (2023) evaluated DMTAC data of hospitals and primary clinics and related follow-up completion with improved glycaemic outcomes. Beh et al. (2022) studied the DMTAC appointment intervals in Perak, and Tai (2025) found that several indicators improved in the participating Johor clinics. These results support the idea of an organized pharmacist intervention, but the retrospective studies are susceptible to selection bias and attendance bias.

Self-management support should not merely consist of instructions. Abdullah et al. (2020) discovered that individuals with diabetes in four Malaysian clinics had diverse difficulties in accessing, comprehending, evaluating and utilizing health information. The same need was also identified by Neblett et al. (2019) in terms of practical and culturally relevant food, activity and medicines advice among ethnically diverse patients. Decision aids can assist patients in thinking over tough decisions, yet Syed et al. (2017) showed that the practice of communication by clinicians can restrict their utility even in the presence of decision aids. Good connections thus entail teach-back, collaborative choices and custom assistance as opposed to merely dispersing educational flyers.

2.5 Continuity, equity and implementation

Longitudinal relationships are important since repeated contact is essential to adherence, clinical reassessment and timely escalation. In a systematic review, Pereira Gray et al. (2018) found that higher continuity with doctors was usually related to reduced mortality, but recognized the observational characteristics of the evidence. Palafox et al. (2025) demonstrated the role of the route selected by individuals in low-income communities in Malaysian hypertension care to affect the continuity of treatment

and blood pressure control. Their results highlight that individual motivation is not necessarily the cause of missed treatment; one should also take into account clinic navigation and socioeconomic factors.

Teh et al. (2026) scoping review of 32 interventions in 39 publications of Malaysia demonstrated that the majority of interventions were concerned with diabetes, patient education and delivery system design. There were only three interventions regarding community linkages. An independent synthesis of 109 publications on diabetes quality indicators was conducted by Abas et al. (2026), who reported ongoing poor performance in HbA1c and blood pressure control, but some improvement in LDL-cholesterol indicators. Combined, these reviews demonstrate an unbalanced approach of interventions tested to the little change of routine control outcomes. They also support the idea of greater systematic focus on hypertension, dyslipidaemia and underserved communities.

3. Methodology

3.1 Review design and scope

This article was based on an organized integrative literature review, rather than on the main clinical survey or a novel meta-analysis. It was chosen to integrate quantitative programme appraisals, randomised trials, observational studies, qualitative narratives and national reports in the analysis of the functioning of NCD pathways. The review question was: What can the Malaysian community clinics do to arrange NCD care pathways to enhance service delivery and treatment outcomes among adults with diabetes, hypertension and dyslipidaemia? The integrative approach would be suitable, as the solution lies in both the effects of the interventions and the organisational limitations and patient experience.

3.2 Evidence identification and eligibility

The identification of relevant studies was performed with the help of targeted search of the material indexed by PubMed, the websites and reference lists of academic journals, and the publications of the Ministry of Health and the Institute of Public Health were used as supplement. Search terms were Malaysia, primary healthcare, community clinic, Klinik Kesihatan, non-communicable disease, diabetes, hypertension, dyslipidaemia, integrated care, care coordination, medication adherence and treatment outcomes. Literature until October 2026 was taken into account, and the emphasis was placed on the Malaysian empirical research published since 2015 and the latest syntheses. Prior conceptual and seminal primary-care documents were retained when they provided fundamental conceptual underpinnings.

Eligible evidence related to adult NCD detection, assessment, treatment, self-management, clinical outcomes, continuity or service organisation, especially Malaysian public primary care. Although there were relevant studies in the domain of private primary care, hospital-based pharmacy programmes and international primary-care settings, they were relevant and were taken into consideration when they elucidated transferable pathway components. The synthesis was not focused on studies that were limited to specialist inpatient treatment, but did not have a significant community-care relationship. The reports of the national survey and registries provided contextual estimates and performance indicators instead of causal estimates of the effectiveness of intervention.

3.3 Data analysis and critical appraisal

Evidence was conceptualised into five domains, including case-finding and entry, diagnosis and risk assessment, treatment and medication optimisation, follow-up and referral, and outcome monitoring. The publications were evaluated based on their population, setting, design, measured outcomes and key limitations. A higher level of inferential importance was assigned to controlled trials as causal effectiveness; quasi-experimental studies were used to implement the system; qualitative studies to shed light on experiences and barriers; and observational and registry data to describe the performance of the services and

trends. Narrative synthesis and proposed care model were informed by the CCM and structure process outcome framework.

To be transparent, the synthesis differentiated three degrees of certainty. Cautiously causal interpretations would be supported with randomised and controlled intervention comparisons when the intervention and comparator is well described. Registry based, cross sectional, retrospective studies were viewed as description or association studies with consideration of confounding and selection. The knowledge of barriers relied on qualitative studies without claiming prevalence. In cases where multiple papers published reports about the same programmes, their results were not factored into as independent replications without taking overlap into account.

No aggregate effect size, formal risk-of-bias rating or exhaustive systematic-review flow number was computed. In this regard, the findings do not purport to be complete systematic reviews or provide a nationally representative causal impact of any one pathway. No ethics approval or participant recruitment were needed to conduct this secondary synthesis and published studies were not considered as new patient observations. The main limitations were the publication bias, imbalanced evidence across regions, disparity in clinical targets, and differing follow-up durations and potential overlap of primary studies in subsequent reviews.

4. Findings

4.1 Screening and pathway entry remain vulnerable to loss

The first conclusion is that timely diagnosis should be linked to trusted care admission. According to the estimates of NHMS 2023, there is a high number of undiagnosed diabetes patients, elevated blood pressure and hypercholesterolaemia (IPH, 2024). The presented community-facing assessment by EnPHC indicated that screening coverage and the prevalence of certain undiagnosed conditions decreased after implementation (Mohd Yusoff et al., 2024). This justifies opportunistic risk assessment during regular visits and during focused outreach especially among individuals with obesity, family history or multiple risk factors. But a screening event cannot be deemed clinically complete until abnormal result gives confirmation, documented communication and appointment with a clearly responsible provider.

Practical entry pathway must determine eligibility, document validated measures, organize confirmatory testing as per national guidelines, designate risk level and follow up with. With a single register of diabetes, hypertension and dyslipidaemia, fragmented case-finding would be minimized, and the staff would identify missed diagnostic steps. The pathway must also identify first-time diagnosis and patients who move between clinics or those who have been away long before. In the absence of this difference, recurrent screening may increase the levels of activity when the untreated population is still significant. The evidence foundation underlines the enhancement of linkage instead of presuming that screening intensity can decrease significant clinical occasions on its own.

4.2 Assessment and guideline-supported treatment are inconsistent

The second observation is the difference between clinical guidance and actual care. Guidelines on Malaysian type 2 diabetes indicate that it should be assessed and managed in the long term (Ministry of Health Malaysia, 2020). Nonetheless, Mustapha et al. (2020) reported variability in ten government clinics regarding the structuring of investigations and consultations, with some patients having to visit some extra times to obtain related services. A patient can thus possess technically attainable foot examination, retinal referral or lab test but have significant practical impediments to achieving it. The problem of coordination failures is a service-quality issue even in cases where written protocols suffice.

Husin et al. (2023) proved that the integrated care is able to enhance documented testing, counselling and risk assessment. The insignificant variations in measured HbA1c, lipids and blood pressure are indications

that clinical pathways are not limited to raising the frequency of measurements. Findings must prompt prompt actions: checking compliance, modifying therapy where necessary, evaluating side effects and making follow-up to verify compliance. This holds great significance particularly with patients who have several risk factors where the sole attention on glucose can hide uncontrolled blood pressure or dyslipidaemia. The Abas et al. (2026) ABC synthesis support the need to consider a combination of these outcomes instead of improved documentation as a satisfactory result.

4.3 Team-based follow-up improves selected outcomes

A well-organized team with a defined responsibility to follow-up is the most supported intervention evidence. The multidisciplinary care and self-management support has shown evidence to be effective in public clinics, as EMPOWER-PAR achieved a statistically significant change in its predetermined diabetes target (Ramli et al., 2016). It cannot be generalised to all patients groups or treatment targets because the results of the secondary outcomes were not equally improved. The Malaysian programme, CORFIS, which includes hypertension control and lifestyle management also demonstrates the possibility of interventions of cardiovascular risk in the primary care (Low et al., 2013).

One tangible way of enhancing such teams is through the involvement of pharmacists. Alison and Anselm (2020) reported an HbA1c change of 1.58 percentage points in the intervention group and 0.48 percentage points in usual care in twelve months in the DMTAC trial. Another multicentre retrospective study by Lim et al. (2023) similarly associated DMTAC follow-up with a better glycaemic control in patients, but showed worse results in patients who did not attend appointments. Since attendance and prognosis can affect each other, this relationship cannot be construed as a randomised comparison. However, across-design evidence suggests that medication reviews, counselling and structured contacts are reasonable pathway components.

A more robust model would deploy nurses to scheduled monitoring and education, medical officers and family medicine specialists to diagnostic and therapeutic decision making, pharmacists to medication reconciliation and adherence assistance and dietitians or other specialists to specific lifestyle counselling where feasible. Task-sharing, case reviews and referral networks that are scheduled at a smaller clinic can be used instead of trying to replicate the staffing of larger centres. Effective task-sharing involves written escalation policies, supervision and understanding of prescribing authority. It constitutes a redesign of clinical responsibility rather than an assumption that the issue of limited staffing can be addressed through a transfer of all the extra work to nurses.

4.4 Hypertension and multimorbidity need greater priority

Pathway research in Malaysia has been skewed towards diabetes. In their review, Teh et al. (2026) discovered that around 72% of the intervention publications revolved around diabetes, meaning that limited evidence of intervention with hypertension and dyslipidaemia. This disparity is hard to balance with the burden that is found by NHMS 2023. In 2026, a study involving 191 young adults with hypertension who attended a Klang Valley primary-care clinic revealed that 78% of the sample had poor blood pressure control and that hypertension was linked to the presence of coexisting diabetes (Ibrahim et al., 2026). The results obtained in these clinics cannot be generalized to all Malaysian young adults but they suggest a possibly unnoticed high-risk group.

In another 2026 cross-sectional study in a primary clinic in Melaka, the control of blood pressure in 41.5% of researched patients with hypertension was detected (Baharudin et al., 2026). Population differences and clinical targets make it hard to compare with other studies. Seven Malaysian public clinics reported issues with patient adherence, clinician uncertainty, time constraints, and limitation in diagnosis and limited medication choices and unclear referrals in the treatment of apparently resistant hypertension in qualitative research (Elias et al., 2026). These observations allow certain pathway responses: repeat measurements,

evaluation of potential white-coat effects where achievable, systematic review of drug regimens, available home monitoring, explicit specialist referral criterion.

The prevalence of multimorbidity pathways needs to be based on the priority of overall cardiovascular risk, the feasibility of adverse events prevention and treatment. Nordin et al. (2025) revealed the higher outpatient demand of various NCDs, and Palafox et al. (2025) emphasized nonlinear, interrupted care patterns of less advantaged patients. One coordinated appointment with major metabolic risks would eliminate duplicative travels and lack of investigations. The optimal arrangement can be different, yet coordination is to be considered an outcome-relevant clinical activity and not an administrative convenience.

4.5 Patient-centred communication affects implementation

The fifth observation is that quality of pathways relies on what patients know and are able to realistically do between appointments. As demonstrated by Abdullah et al. (2020), language, interpretation of information and self-efficacy are the determinants of health literacy. Neblett et al. (2019) noted that among Malaysian patients of different ethnic backgrounds, there were practical issues, such as meals, exercise and medication regimes. Karupaiah et al. (2015) associated the presence of reported movement towards healthier behaviours with positive outcomes in blood pressure and anthropometric measures of participants in a hypertension programme. These researches promote action schemes that are negotiated and specific as opposed to generic education messages.

Consultation behaviour is also needed to change in shared decision-making. In a study by Syed et al. (2017), an insulin initiation decision aid did not necessarily lead to meaningful deliberation between the patient and the clinician, as clinicians occasionally organized their dialogue around limited information checks. Clinics are thus advised to train professionals to evoke beliefs, economic and family situations, treatment choices and red flags, and employing teach-back to ascertain comprehension. Patient experience and treatment feasibility and the availability of an education entry in the clinical record should also be used to measure consultation quality.

One of the implementation endpoints of particular relevance is medication persistence. Kini and Ho (2018) performed a review of interventions to enhance the adherence rate and found such practices as the simplification of regimens, co-management and reminders with a pharmacist. Malaysian DMTAC researches uphold the applicability of follow-up intensity, yet attendance is not equal (Beh et al., 2022; Hassan et al., 2024). The patient-sensitive recall system must also be able to provide flexible scheduling, phone-based or assisted digital reminders, without punishing individuals who do not have a smartphone, reliable internet connection or personal space to make a call. This should be used to complement clinical assessment and not to substitute face-to-face assessment.

4.6 A feasible integrated pathway and monitoring framework

The synthesis of the evidence makes an indication of a seven-stage NCD pathway. To begin with, patients come in either by the community screening, opportunistic clinic assessment or hospital discharge. Second, employees validate diagnoses and stratify cardiovascular, renal and multimorbidity risk. Third, the team formulates a common plan with treatment objectives, inquiries, drug selections and patient priorities. Fourth, treatment support is given by pharmacists and educators. Fifth, a risk-based recall plan prompts review of the results and increase in treatment. Sixth, referral pathways specify indications, urgency and feedback into primary care. Lastly, monthly clinic audits look at action completion and patient outcomes. The whole process relies on documentation that can be used and named accountability.

To deliver services, a balanced dashboard may report the percentage of eligible patients with completed HbA1c, blood pressure, lipid and renal evaluation; recorded cardiovascular risk; medication review; attended planned follow-up; and recorded referral feedback. Risk-adjusted or clearly stratified achievement of individualised HbA1c and blood pressure goals, lipid control where clinically relevant, hypoglycaemia,

acute complications and avoidable hospital use should be displayed separately as clinical outcome indicators. These measures should be complemented by patient-reported understanding, satisfaction, and treatment burden and travel time. The National Diabetes Registry provides a current foundation of routine monitoring, but it cautions against comparing tests coverage and case mixes (Ministry of Health Malaysia, 2024).

Performance targets are to be read between the lines. The Registry indicated that 34.38% of audited or registered patients in its corresponding 2023 reporting had HbA1c of 6.5% or less, but this measure is influenced by eligibility, availability of tests, and the threshold selected (Ministry of Health Malaysia, 2024). It is not to be confused with the proportion of all Malaysians with diabetes whose diabetes is under control. Clinics are suggested to analyze denominators and missing data, stratify findings by age, gender, locality and multimorbidity, and follow-up periods. The improvement should be based on the audit feedback and not on the punitive ranking of clinics that serve various populations.

Implementation must be equitable. Rural clinics, individuals with limited transportation or those on several drugs or aged patients with co-morbidities might require alternative appointment structures and outreach options to urban clinics. Patient partners can contribute to testing the hypothesis of whether reminders are comprehensible, whether scheduling appointment conflicts with the work and caring issues, and whether the involvement of the family members is facilitating or threatening. Enhancements ought to be considered on the unintended consequences, such as increased queues, loss of privacy or increased access inequalities to pharmacist and digital services.

The implementation should be in phases. The first phase would be to map the local workflow and determine what was not done in follow-up, and then a small trial of integrated appointments, shared care plans and a standard recall register. The later cycles would experience balancing actions like waiting time, employee workloads, referral delays, and patient traveling expenses. Follow-up should be longer to ascertain whether an improvement in processes leads to a long-term control and a reduction in the number of cardiovascular events. The CCM provides a consistent organising framework, but its effectiveness hinges on resources, local adaptation and ongoing assessment, and not adoption of a pathway document alone (Wagner et al., 2001; Teh et al., 2026).

5. Conclusion and Recommendations

This review indicates that the Malaysian community clinic can significantly enhance its NCD care through treating diagnosis, medication management, self-management, follow-up and referral as a single clinical pathway. National evidence sets a high level of diabetes, hypertension and hypercholesterolaemia, including undiagnosed disease. Malaysian reviews demonstrate improvement in screening and documented clinical procedures, but glucose and blood pressure control is not consistent. The controlled intervention studies however show it is possible to achieve gains when teams, medication support and patient engagement are made a deliberate combination. The data also reveals the underinvestment in hypertension-specific pathways, community connections and lifetime analysis.

To begin with, the clinic managers and the Ministry of Health is to adopt a shared, risk-stratified NCD pathway that incorporates diabetes, blood pressure, lipid and kidney-risk assessment into standard primary care. The presence of standardised decision points should be accompanied by personalised clinical targets and multimorbidity adaptations. Second, clinics need to enhance multidisciplinary practice by clearly defining the roles of nurses, medical officers, family medicine specialists and pharmacists, with plausible facilities to include dietetic, rehabilitation and specialist contributions. The essential elements needed to make shared responsibility work are protected case-review time and defined rules of escalation.

Third, patient follow-up is to be transformed into active recall as opposed to the previously used unscheduled return visit. Multilingual and culturally appropriate educational support should be provided based on shared

and teach-back decision making. Fourth, an equal mix of process, clinical and patient-experience indicators should be monitored. Audits should be done regularly to detect those patients who have not been controlled even after repeated visits instead of trying to count the number of investigations made. The comparisons of clinics should be done with regard to the case mix, the completeness of data and available resources to prevent biased judgments.

Fifth, pragmatic multi-site trials and longer-term cohorts should be considered in rural, lower-resource and geographically varied settings in the future. Sustained HbA1c and blood pressure control, cardiovascular and renal complications, continuity, patient costs and equity are the priority outcomes. The needs of the 2026 syntheses are more rigorous studies beyond diabetes and interventions that establish connections between clinics, families, and communities (Abas et al., 2026; Teh et al., 2026). Lastly, implementation research must record fidelity, costs and sustainability. A route that can be accommodated during temporary staffing of projects with project staff might not be supported with regular clinic budgets. Subsequent comparisons must then make a distinction between initial start-up resources and recurrent staffing, laboratory, transport and information-system costs. Engaging frontline staff and patients in the interpretation of the outcomes of audits would assist decision-makers to recognize changes that can be implemented at the large scale as opposed to being successful in small pilots.

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