

From Reactive to Preventive:

A New Model for Accessible Healthcare Through AI-Enabled Facial Vital Sign Screening and FHIR-Integrated Care



AI-Enabled
Non-Invasive Screening



Continuous
Wellness Monitoring



Telemedicine
& Connected Care



FHIR-Integrated
Interoperable
Health Records



Empowering early insights.
Enabling better outcomes.
Building a healthier Malaysia.



1. Executive Summary

Malaysian households spend an estimated 5.1% of total monthly household expenditure on healthcare, a figure that reflects a system still weighted toward treating illness rather than preventing it. The economic and human cost of this approach falls disproportionately on working adults and ageing populations who have limited access to regular, affordable health monitoring.

eHealth, developed by TM Research & Development (TM R&D), is an AI-enabled preventive care platform that makes early health screening accessible, non-invasive, and clinically meaningful. The platform is designed to capture vital signs and risk indicators without physical contact, and connects users to telemedicine services, wellness monitoring, and care networks through a single integrated system. It is interoperable with existing health information systems through HL7/FHIR standards and hosted on TM's sovereign cloud infrastructure to ensure data security and regulatory compliance.

eHealth has been deployed at TM R&D's headquarters as part of a staff wellness programme, showcased at the launch of Malaysia's National AI Office (NAIO) in December 2024, validated in a clinical trial at Hospital Pakar Universiti Sains Malaysia (HUSM), and classified as a medical device by Malaysia's Medical Device Authority (MDA) in August 2025.

This white paper outlines the problem eHealth addresses, how the platform works, the evidence behind it, and the pathway toward broader deployment across Malaysia's healthcare ecosystem.

2. Introduction

Preventive healthcare is not a new concept, but in practice, it remains out of reach for most people. The barriers are familiar: inconvenient clinic hours, long waiting times, the cost and friction of routine check-ups, and a cultural tendency to seek medical attention only when symptoms become impossible to ignore. By the time many Malaysians are diagnosed with hypertension, diabetes, or cardiovascular risk, the condition is already advanced enough to require intensive management.

Digital health technologies have long been positioned as the bridge between where healthcare is today and where it needs to be. Wearables, health apps, and telemedicine platforms have made genuine inroads. But most of these tools still require the user to own dedicated hardware, maintain consistent habits, or navigate fragmented systems that do not communicate with one another or with clinical providers. eHealth is designed to work with what people already have – a standard smartphone or through a shared kiosk installation, removing the hardware ownership barrier entirely.

TM R&D's eHealth platform was built to address these gaps directly. It requires no wearable device, no specialist training, and no prior setup by the user. A person walks up to a kiosk or opens an app on their phone, looks into a camera, and within approximately one minute receives a vital sign assessment. That data is then connected to a broader care ecosystem: wellness tracking, virtual consultations, and interoperable health records that practitioners can access when needed.

This paper presents eHealth as a case study in practical, scalable preventive care infrastructure, one built by a Malaysian telecommunications and research organisation with both the technical capability and the national connectivity footprint to deploy it meaningfully.

3. Problem Statement

3.1 The Cost of a Reactive Healthcare Model

According to the National Health and Morbidity Survey 2019 (NHMS 2019), Malaysian households spend an average of 5.1% of their monthly household expenditure on healthcare. This figure does not capture the full economic burden: it excludes productivity losses, informal caregiving, and the long-term costs of managing chronic conditions that could have been detected and addressed far earlier.

Non-communicable diseases (NCDs), including cardiovascular disease, hypertension, and type 2 diabetes, account for a significant and growing share of Malaysia's disease burden. These conditions do not emerge suddenly; they develop over years, with measurable risk indicators that go undetected precisely because routine screening remains inconvenient and infrequent for most of the population.

3.2 Barriers to Early Detection

The obstacles to early detection are structural as much as behavioural:

- Clinic-based screening requires an appointment, travel, and often an out-of-pocket payment. For working adults, the time cost alone is a deterrent.
- Existing digital health tools are fragmented. Wearable devices, health apps, and telehealth platforms rarely connect to clinical records or to each other.
- Healthcare data is siloed. A patient's records at a private clinic are inaccessible to a public hospital, and vice versa, creating gaps in continuity of care.
- Awareness remains low. Many Malaysians do not know their own blood pressure, resting heart rate, or respiratory baseline, fundamental indicators that, if tracked over time, can signal risk before symptoms emerge.

The result is a system where prevention is talked about extensively but practised inconsistently. eHealth was designed to lower the barrier to entry for preventive care — to make the first step so simple and accessible that it no longer requires a deliberate decision to seek it out.

4. Solution Overview

eHealth is a digital healthcare platform that delivers AI-powered, non-invasive vital sign screening, continuous wellness monitoring, telemedicine services, and interoperable health data management through a single unified system. It operates across two deployment models: a kiosk-based installation designed for public or institutional spaces, and a mobile application for personal or enterprise use.

4.1 How It Works: Facial Vital Sign Screening

At the core of eHealth is a camera-based AI screening engine. Using remote photoplethysmography (rPPG) techniques, the platform analyses subtle changes in facial skin tone caused by blood flow beneath the surface. From this signal, it derives key vital sign indicators including heart rate, respiratory rate, blood oxygen saturation, and stress-related metrics, all without physical contact and within a brief interaction window.

This approach eliminates the need for pulse oximeters, blood pressure cuffs, or wearable sensors. The screening can be completed in under a minute, requires no prior instruction, and produces

results that are immediately visible to the user and, where consent is given, shareable with a clinical practitioner.

4.2 Deployment Models

eHealth is available in two configurations:

Deployment Model	Description	Best Suited For
Kiosk-Based	A standalone screening station installed in offices, hospitals, clinics, or public spaces. Users interact via a touchscreen interface and front-facing camera.	Corporate wellness, hospital lobbies, pharmacies, community health centres
Mobile Application	An APK-based mobile app that enables individual users to conduct screenings from their own devices, book virtual consultations, and track wellness over time.	Remote workforces, home monitoring and individual health management

4.3 Platform Features

The eHealth platform integrates several capabilities into a coherent care journey:

Feature	What It Does
AI Vital Sign Screening	Camera-based facial analysis delivers contactless, real-time vital sign and risk assessment with no physical hardware required.
Continuous Wellness Monitoring	Tracks health trends over time, with particular focus on conditions such as hypertension that benefit from longitudinal observation.
Google Health & Apple Health Integration	Syncs with mainstream consumer health platforms to consolidate health data and enable early alerts for at-risk individuals.
Telemedicine & Appointment Booking	Connects users to virtual consultations and simplifies scheduling, reducing the friction between a screening result and a clinical response.
Secure Data Sharing	Encrypts and controls access to health data, ensuring it is shared only with authorised parties and in compliance with applicable regulations.
HL7/FHIR Interoperability	Enables connection to Health Information Exchange (HIX) networks, making patient data accessible across participating healthcare providers.
Configurable Clinical Workflows	Allows healthcare organisations to tailor screening and triage processes to their specific operational and clinical contexts.

4.4 Infrastructure and Data Sovereignty

The eHealth platform is hosted on TM's sovereign cloud infrastructure, ensuring that patient health data remains within Malaysia's jurisdiction and subject to local data governance frameworks. This architecture also positions eHealth as a potential national healthcare information exchange hub, capable of interconnecting practitioners, insurers, and public health systems within a secure and controlled environment.

4.5 Comparison with Alternative Approaches

Traditional screening methods require physical hardware, clinical staff, and a structured appointment. Consumer wearables offer continuous monitoring but require device ownership, ongoing charging, and produce data that rarely integrates with clinical systems. Standalone telemedicine apps facilitate consultations but do not generate objective vital sign data at the point of interaction.

eHealth combines the objective measurement of clinical screening, the accessibility of consumer technology, and the connectivity of a telemedicine platform, without requiring the user to own any dedicated device or navigate multiple disconnected services. For users who do use wearables, eHealth also supports wearable device integration as an optional complement, allowing existing health data to feed into the platform alongside the screening output.

5. Supporting Evidence

5.1 Internal Deployment: TM R&D Staff Wellness Programme

The first operational deployment of eHealth was at TM R&D's headquarters in Kuala Lumpur, where the kiosk system was installed at the office entrance as part of the organisation's staff wellness programme. This deployment served as both a working proof-of-concept and a data collection exercise, generating aggregate health insights from staff screening sessions that were subsequently used to inform wellness programme design.

The internal rollout demonstrated that the system could operate reliably in a high-footfall institutional setting, required no dedicated technical support for daily operation, and was accepted by users with minimal onboarding. Within the first two weeks of deployment, 420 staff members used the kiosk - a figure that reflects both the system's accessibility and the level of organic interest in self-screening among the workforce.

5.2 National AI Office Launch: December 2024

eHealth was selected as one of the featured solutions at the official launch of Malaysia's National AI Office (NAIO) on 12 December 2024, where the platform was demonstrated to government officials, industry representatives, and members of the media. The platform's inclusion in a nationally significant event underscored its alignment with Malaysia's broader digital health and AI development agenda.

The platform has since been showcased at several TM-organised events, including the ASEAN AI Summit 2025, reinforcing its position as a flagship example of locally developed, AI-driven health technology.

“We’re happy to support this initiative, which brings together non-invasive AI screening, open digital health standards, and virtual care to support preventive healthcare. The use of facial vital sign screening and FHIR-based integration shows real potential to improve early risk detection, make care more accessible, and improve overall efficiency. This initiative fits well with our focus on practical, scalable, and patient-centric digital health solutions.”— Ahmad Shahzi Bin Ahmad, Director of Public Sector & Healthcare, TM Digital Innovation – Credence

5.3 Clinical Trial at Hospital Pakar USM

In December 2025, TM R&D commenced a formal clinical trial with Hospital Pakar Universiti Sains Malaysia (HUSM) to validate the accuracy of eHealth’s AI-based vital sign screening in a clinical environment. The trial ran from 12 December 2025 to 13 February 2026 and aimed to benchmark the platform’s output against standard clinical measurement tools and assessing its viability for use in hospital triage workflows.

Clinical validation of this kind is a critical step for any diagnostic or monitoring technology seeking adoption within the formal healthcare system. The HUSM partnership positions eHealth within an academic medical centre context and provides the evidence base required for broader clinical endorsement.

5.4 Medical Device Authority Classification: August 2025

On 11 August 2025, eHealth received formal classification as a medical device from the Medical Device Authority (MDA) Malaysia. This classification is significant for two reasons: it confirms that the platform meets the regulatory criteria for a medical device under Malaysian law, and it provides the compliance foundation necessary for deployment in regulated healthcare environments such as hospitals, clinics, and government health facilities.

MDA classification is not granted automatically. It requires the submission of technical documentation, evidence of safety and performance, and adherence to the Medical Device Act 2012. It is important to note that MDA classification is a categorisation process and does not constitute certification or approval for clinical use. For eHealth, achieving this classification is nonetheless a meaningful regulatory milestone, confirming that the platform has been assessed against the requirements of the Medical Device Act 2012 and sits within the formal medical device ecosystem.

6. Implementation Pathway and Next Steps

eHealth is now focused on broadening its reach and deepening its integration within Malaysia’s healthcare ecosystem. The following are the next steps TM R&D is working toward.

- Connect to Health Information Exchange (HIX) networks to enable cross-institutional data sharing.
- Extend mobile application access to patients for home monitoring and pre-consultation screening.
- Explore integration with national health data initiatives, including MySejahtera and the broader Digital Health Blueprint.
- Scale to additional sites as the platform matures and deployment experience grows.

TM R&D is open to collaboration with healthcare providers, government agencies, and technology partners to advance these next steps. The team provides technical implementation support, platform maintenance, and ongoing development as operational requirements evolve.

7. Conclusion

The shift from reactive to preventive healthcare will not happen through policy declarations alone. It requires tools that meet people where they are - at work, in transit, or at the pharmacy, and make the act of checking one's health as routine as checking the time.

eHealth represents a credible step in that direction. It combines clinically validated AI screening technology, FHIR-based interoperability, sovereign cloud infrastructure, and an accessible user experience into a platform that is already operating in real-world environments. Its recognition at the NAIIO launch, its clinical validation with HUSM, and its MDA classification collectively demonstrate that eHealth is not a prototype, it is a deployable solution that has taken meaningful early steps toward establishing the regulatory standing and institutional partnerships needed to grow.

For Malaysia to meaningfully reduce its NCD burden and the household healthcare costs associated with it, early detection must become the norm rather than the exception. eHealth offers a practical, locally built, and interoperable pathway to make that possible.

8. Call to Action

TM R&D welcomes discussions with healthcare providers, corporate organisations, government agencies, and technology partners interested in deploying or collaborating on the eHealth platform. Whether you are exploring a pilot installation, research partnership, or integration with an existing health system, the team is available to guide you through the platform's technical architecture, clinical evidence, and deployment requirements.

9. References and Sources

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