**Reimagining Early Detection of Ischemic Heart Disease**

**By Fareehah Oyolola**

# **The Silent Killer**

Every beat of the human heart is a testimony of life. Yet to millions, every beat carries a secret danger: ischemic heart disease (IHD). More than 16% of total deaths are reported annually, with IHD being the leading cause of death globally, states the World Health Organisation (WHO). Unbeknownst to most, its killer nature, early detection remain elusive. Traditional diagnostic methods — imaging, stress testing, and angiography — will often identify IHD only after there has been considerable damage. Clearly and acutely lacking is a non-invasive, low-cost, and continuous method for finding early signs of ischemia before its lethal outcome.

# **Why Early Detection Matters**

The burden of IHD is overwhelming. Estimates by the Centres for Disease Control and Prevention put the number of Americans experiencing a heart attack at 805,000 each year, of which one in five is silent, having resulted from damage without notice of the symptoms. Heart attacks, strokes and sudden deaths of the heart typically occur without warning, destroying families and overwhelming health care systems. Even greater-risk groups exist among low- and middle-income countries where the majority of deaths related to cardiovascular disease occur. The tragedy is not just the loss of life, but that much of it can be prevented if early warning signs are recognised and acted upon.

# **Introducing PulseSense**

Imagining a future where heart disease can be caught in its earliest whispers, I propose the development of PulseSense: a revolutionary wearable smart patch that continuously monitors cardiovascular health. Designed to be as simple to use as a bandage, PulseSense would integrate electrocardiogram (ECG) sensors and photoplethysmography (PPG) technology to detect subtle changes in heart rhythm and blood oxygen levels — the earliest markers of ischemia.

What sets PulseSense apart is not just its sensors, but its intelligence. Powered by machine learning software, the patch would read in real-time to predict ischemic events before they happen. The artificial intelligence (AI) would establish a person's baseline behaviour, learning and becoming smarter over time. In contrast to today's devices, which only react after symptoms appear, PulseSense would be prophylactic, cautioning patients and physicians of risk patterns quietly forming beneath the surface.

# **Designed for Everyone, Everywhere**

PulseSense would be manufactured using inexpensive, biodegradable plastics and would be wirelessly connected to a smartphone app. As more than 80% of the world's population has a smartphone (Statista, 2023), the app would give real-time feedback on heart health and make recommendations tailored to each individual. Notably, the system would be offline-enabled to benefit communities with restricted internet and network connectivity.

# **Transformative Impact**

The potential impact is transformative. Early diagnosis would shift from emergency care to prevention of disease. Studies have shown that preventive cardiovascular care could prevent between 30% of hospitalisations, indicating the individual and economic benefits of taking a proactive approach to monitoring patients. PulseSense would empower individuals to own their heart and whole health journey, which is a daily priority and not a concern for the future. In hospitals, it would reduce the number of emergency admissions, taking the strain off emergency services and allowing health professionals to intervene sooner and more effectively.

# **Innovation Inspired by Nature**

Innovation drives this concept at all levels — from putting predictive analytics into wearable devices, to developing a cheap patch that can be marketed in community clinics and schools. The idea draws inspiration from nature's warning systems: how birds can sense earthquakes or whales can hear sounds underwater hours before disaster strikes. If animals have evolved the ability to predict danger, why not humans use technology to do it for their most vital organ?

# **A Future with Fewer Goodbyes**

PulseSense is not just a device; it's the promise of a future where heart attacks are the exception, not the norm. A future in which lives aren't saved by accident, but by design — the design to sense the heart's earliest warnings, and not its final cries.

In a world that tends to concentrate on treating disease after it has hit, it is time to revolutionise prevention with the same fervour. PulseSense is at the leading edge of that revolution, providing a heartbeat's worth of hope every second of every day.