A novel trajectory-based, anticipatory model for the management of emergency, intensive care, and chronic conditions, exemplified by hypertension

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Background: Conventional hypertension management relies on fixed diagnostic thresholds, most commonly 140/90 mmHg. This threshold-based approach is inherently reactive and often permits silent vascular injury to progress for years before intervention is initiated. Such delays may contribute to irreversible cardiovascular, cerebrovascular, and renal complications that ultimately present as emergencies, increasing emergency department (ED) visits and intensive care unit (ICU) admissions.

Objective: To introduce the Progressive Serial Incremental Change (PSIC) Model, a novel trajectory-based framework that reconceptualizes hypertension as a dynamic process rather than a static threshold, enabling earlier identification of pathological blood pressure evolution and anticipatory intervention.

Methods/Conceptual Framework: Serial blood pressure measurements can demonstrate gradual, progressive increases over time—such as readings evolving from 110 mmHg to 114 mmHg, 117 mmHg, and 119 mmHg at regular intervals—well before conventional diagnostic thresholds are reached. The PSIC Model identifies a transitional inflection phase occurring approximately a decade before overt hypertension, representing the earliest clinically detectable stage of vascular remodelling. Detection is facilitated by a proposed high-resolution sphygmomanometer, increasing measurement resolution from 300 to 3,000 units. This enhancement allows identification of micro-fluctuations previously obscured by measurement noise and interobserver variability, enabling individualized blood pressure trajectory profiling.

Results/Clinical Implications: Early recognition of the PSIC phase permits timely intervention using lifestyle modification combined with low-dose antihypertensive therapy. This approach has the potential to reduce polypharmacy, improve treatment adherence, minimize overtreatment, and prevent catastrophic downstream events such as myocardial infarction, stroke, and hypertensive chronic kidney disease. Failure to identify early blood pressure trajectories may partly explain residual cardiovascular risk despite optimal therapy.

Conclusion: By shifting care from reactive threshold-based intervention to anticipatory trajectory-based management, the PSIC Model has the potential to reduce ED visits, ICU admissions, and preventable hypertensive crises. This framework may transform emergency and critical care settings from crisis environments into anticipatory ecosystems. The PSIC Model represents a genuine paradigm shift in chronic and emergency disease management, exemplified by hypertension.

Keywords: Hypertension management anticipatory medicine trajectory based model early detection, prevention, blood pressure, trajectories, emergency, critical car.