

Project Title: NeoNurse+: AI-Driven Personalised Care Ecosystem for Cardio-Metabolic Multimorbidity in Nursing Homes

Call: EP PerMed JTC2026

Coordinator: NeoKod (Turkey)

1. Project Abstract

NeoNurse+ is a translational personalised medicine project designed to revolutionize care for elderly residents in nursing homes suffering from **Cardiovascular-Kidney-Metabolic (CKM) multimorbidity**. Currently, monitoring in care facilities is fragmented, manual, and reactive. NeoNurse+ introduces a "Room-Centric" intelligence ecosystem comprising two layers:

(1) The **Room-Core Device (RCD)**, a smart hardware hub for secure in-room medication management and connectivity, and

(2) **Modular Multimorbidity Sensor Kits (MMSK)** tailored to specific patient profiles.

By fusing continuous vital data with multi-omics biomarkers (e.g., proteinuria, glucose trends) and medication adherence logs, our AI engine predicts deterioration events (e.g., heart failure decompensation, falls, hypoglycaemia). The project includes a robust Implementation Research framework to validate clinical utility, cost-effectiveness, and ethical compliance across EU and Turkish pilot sites.

2. Excellence & Innovation

The Unmet Need: Nursing home residents often have overlapping chronic conditions (Heart Failure, Diabetes, CKD, Dementia). Current "one-size-fits-all" monitoring misses early warning signs, leading to avoidable hospitalizations. **The Solution:**

- **Hyper-Personalised Hardware:** Instead of generic monitoring, residents receive disease-specific kits (e.g., a "Kidney/Heart Kit" with a smart bed sensor for urine/weight tracking and a cuff for BP).
- **Multi-Omics Integration:** We go beyond vitals by integrating point-of-care biomarker data (urine albumin/creatinine, interstitial fluid glucose) into the digital twin model.
- **AI-Driven Decision Support:** Algorithms analyze the correlation between medication adherence (tracked by RCD) and physiological response to optimize treatment pathways.

3. Work Plan & Methodology

The project is structured into 7 Work Packages (WPs) over 36 months, covering the full translational path from engineering to real-world validation.

- **WP1: Project Management & Coordination (Lead: NeoKod)** Administrative, financial, and risk management. Ethics/Regulatory compliance.
- **WP2: NeoNurse+ Ecosystem Engineering (Hardware & Connectivity)** Development of the Room-Core Device (RCD) with secure pill dispensing and IoT gateway capabilities. Ensuring interoperability with Hospital Information Systems (HIS).

- **WP3: Multimodal Sensors & Omics Integration** Engineering of disease-specific sensor kits (Smart Bed with pressure/urine sensors). Integration of biochemical data streams (Omics/Lab data) for kidney and metabolic profiling.
- **WP4: Data Fusion, AI Models & Decision Support** Developing AI models to predict adverse events (falls, decompensation) by fusing sensor data, omics profiles, and medication logs. Creation of the Clinician Dashboard.
- **WP5: Clinical Pilots & Validation (Multi-Country)** Real-world deployment in nursing homes (TR + EU). Data collection from multimorbid cohorts to validate diagnostic accuracy and usability.
- **WP6: Implementation Research, ELSA & Health Economics** (*Critical WP*). Assessing the cost-effectiveness Health Technology Assessment (HTA) of the system. Analyzing ethical issues (privacy in elderly care) and organizational workflow integration (Implementation Science).
- **WP7: Communication, Dissemination & Patient Involvement** Engagement with patient advocacy groups (Patient Advisory Board). Dissemination of results to scientific and industrial communities.

4. Consortium & Partner Search Profile

Coordinator (NeoKod - TR): Expertise in Medical Software, AI/ML development, Cloud Architecture, and Project Management.

We are actively seeking partners for the following roles:

1. **Hardware Engineering Partner (SME/Industry):** To design and prototype the Room-Core Device (electronics, mechanical pill locking mechanism) and integrate sensors (BLE/Sub-GHz).
2. **Clinical Partner (Nursing Homes / Geriatric Depts):** To host pilot studies, provide access to multimorbid patient cohorts (Heart Failure, Diabetes, CKD), and support clinical protocol design.
3. **Research Institute / Academic Partner (Omics/Biomarkers):** Expertise in biosensors or integrating laboratory biomarker data (metabolomics/proteomics) with digital health platforms.
4. **Implementation / HTA Expert (Academia/Public Body):** To lead WP6. Expertise in Health Technology Assessment, Health Economics, and ELSA (Ethical, Legal, Social Aspects).

5. Expected Impact

- **Clinical:** Reduction in unplanned hospital admissions for heart failure and metabolic crises.
- **Economic:** Decreased healthcare costs via preventive interventions and automated workflows.
- **Social:** Enhanced safety and dignity for elderly residents through non-invasive, room-based monitoring.