

Turning Home Sensor Data Into Actionable Clinical Insights for Dementia Care

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KEY TAKEAWAY: In-home passive sensor data can provide clinically actionable insights for dementia care. Minder algorithms can be used to summarise activities and routines, flag anomalous events, and support objective evaluation of changes in activity following clinically relevant events and interventions.

REMOTE MONITORING IN DEMENTIA

Activity Monitoring:

- Identifies functional issues, safety risks, and changes over time.
- Supports occupational therapy assessment and intervention.

Minder:

Uses in-home sensors to monitor movement, appliance use, door activity, and sleep.

Minder Activities & Routines:

Uses sensor data of people with dementia who live alone to

- Detect changes in daily activities and routines.
- Translates sensor data into clinically interpretable summaries.

Effects on Activity:

- Compares activity patterns before and after events and interventions.

METHOD

- Activities & Routines** algorithm stratifies sensor data into day/night windows, aggregates daily feature vectors, and applies z-score standardisation to quantify deviations from baseline (Fig. 1).
- Clinical report** co-designed through 3 clinician workshops and integrated within the Minder platform (Fig. 2).
- Anomalous event alerts algorithm** configured using a rules-based approach to detect lack of activity for over 24 hours (Fig. 3).
- Effects on Activity** quantifies changes in activity associated with clinically relevant events and interventions using a statistical time-series data analysis framework.

RESULTS

Clinical Report:

Individualised summaries of daily activity patterns using visual graphs, occupancy charts, and RAG plots, showing 90-day trends, baseline versus recent comparisons, room occupancy, door usage, bed occupancy, and kitchen appliance use.

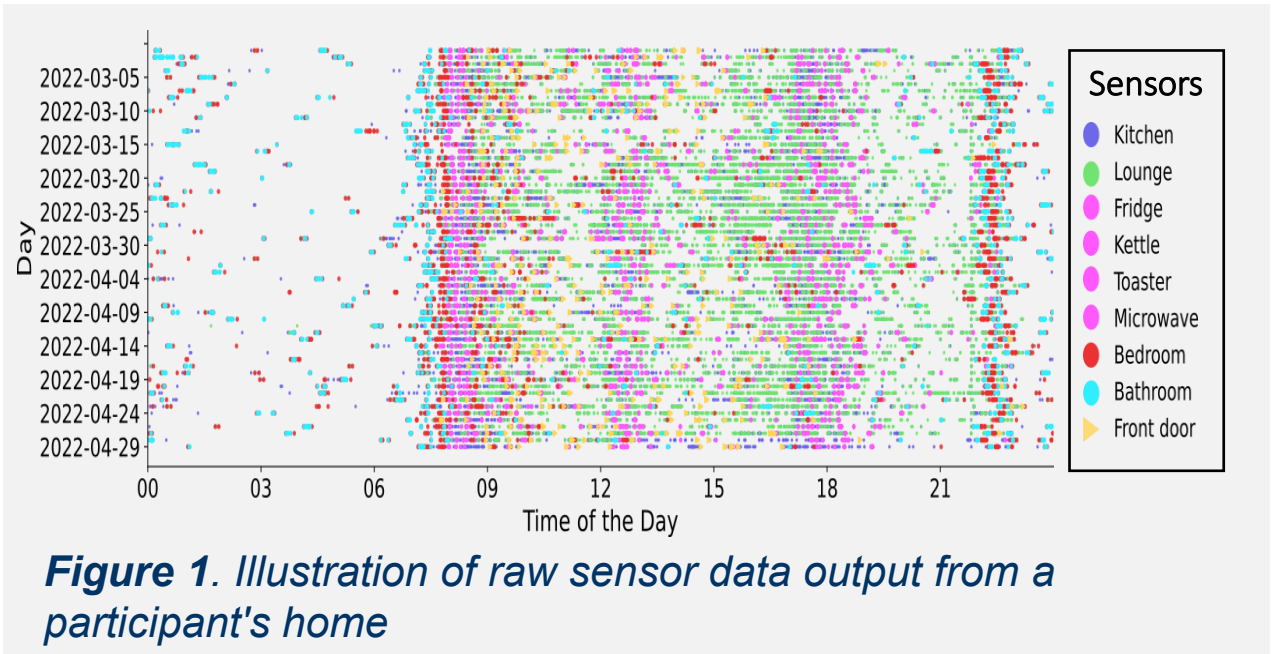
Anomalous event alerts:

Flags for the absence of sensor data for 24 hours or longer from the kitchen, bathroom, front door, or bed activity.

Effects on activity:

Individual-level before-and-after analyses demonstrate measurable changes in activity patterns following clinical, social, or functional events using mean differences, percentage change, p-values, and effect sizes (Cohen's d and Hedges' g) (Figures 4,5 & 6).

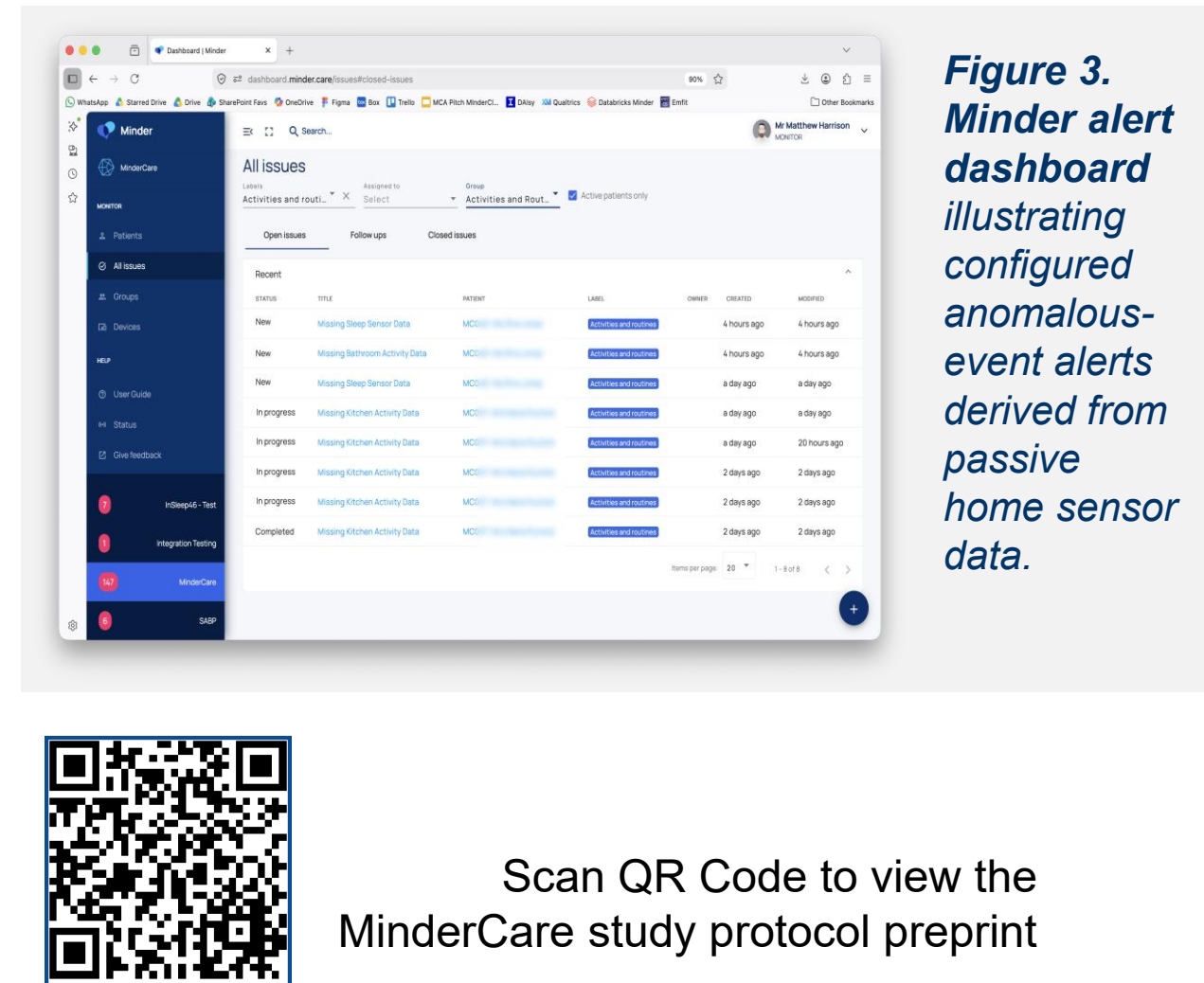
In-home sensor data



Clinical report

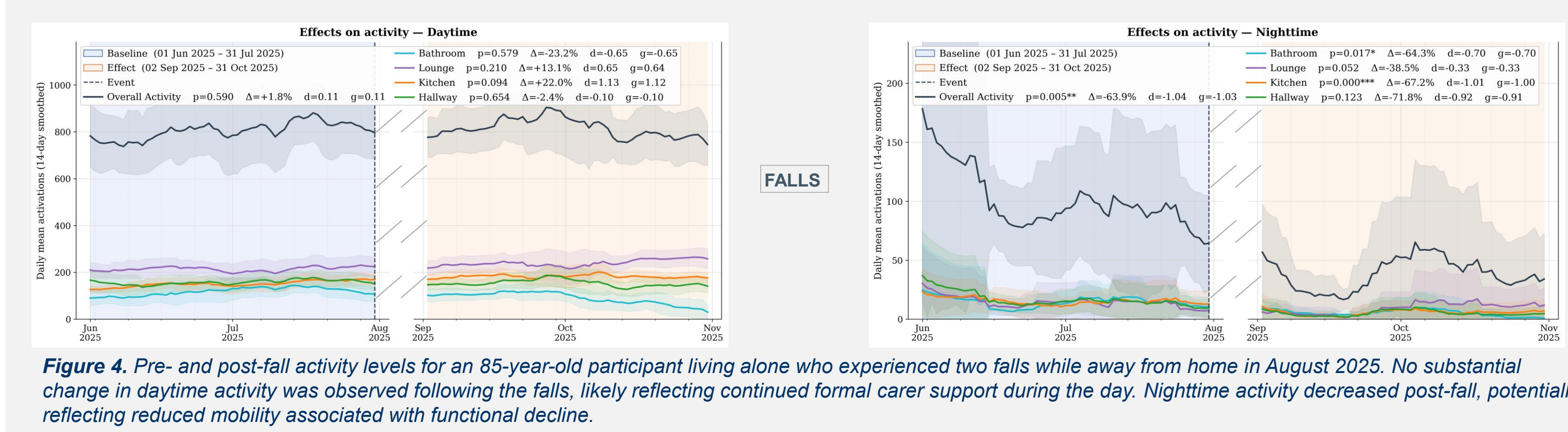


Anomalous event alerts

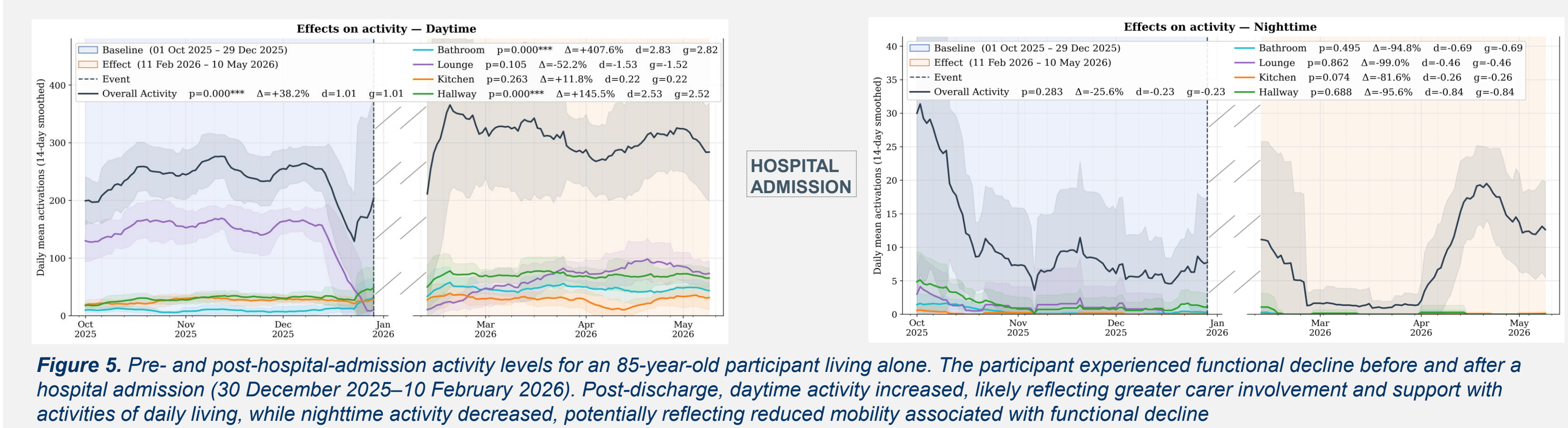


Effects on Activity: n-of-1 analyses

Case study 1



Case study 2



Case study 3

