

Protocol Summary

Title: Effectiveness of Non-Wearable Remote and Ambient Monitoring Technologies for Detecting and Preventing Wandering and Falls in Community-Dwelling Adults with Alzheimer's Disease and Related Dementias: A Systematic Review

Domain being studied:

Alzheimer's disease and related dementias (ADRD) in community-dwelling adults, with a focus on wandering and fall-related outcomes as monitored by non-wearable remote and ambient technologies, including smart-home sensors, GPS-based location systems, and passive environmental sensors.

Rationale for the review:

Wandering and falls are among the most dangerous and distressing complications of Alzheimer's disease and related dementias (ADRD) for people living at home, frequently resulting in injury, hospitalization, or early transition to institutional care. Non-wearable ambient monitoring technologies offer a way to detect or prevent these events without requiring patients to wear or actively operate a device, addressing a key barrier for people with cognitive impairment. However, evidence on the effectiveness of these technologies remains fragmented across small, heterogeneous studies, and no existing systematic review has synthesized findings specifically for non-wearable systems addressing both wandering and falls in community-dwelling adults with ADRD. This review will consolidate the available evidence to determine whether these technologies detect, prevent, or reduce wandering and falls more effectively than usual care, and to identify where the evidence base remains weak.

Review objectives:

To determine the effectiveness of non-wearable remote and ambient monitoring technologies (smart-home sensors, GPS-based location systems, and passive environmental sensors) compared with usual care or no monitoring, for detecting, preventing, or reducing wandering and falls among community-dwelling adults with Alzheimer's disease or related dementias.

Keywords:

Alzheimer's disease; dementia; ambient monitoring; smart-home sensors; GPS tracking; wandering; falls; community-dwelling

Country:

Egypt

Eligibility criteria

	Inclusion criteria	Exclusion criteria
Population	Community-dwelling adults with Alzheimer's disease or a related dementia, living at home or in the community	Adults with dementia residing in nursing homes or long-term residential care facilities at baseline; populations with mild cognitive impairment (MCI) only, without a dementia diagnosis; other neurological conditions without dementia diagnosis.
Intervention/Exposure	Non-wearable remote and ambient monitoring technologies used to detect, prevent, or reduce wandering or falls.	Wearable devices; interventions requiring active patient input or operation; purely diagnostic or cognitive-assessment technologies unrelated to wandering/falls.
Comparator/Control	Usual care, no monitoring, standard supervision, or wait-list control.	Comparisons only against another active ambient/remote monitoring technology with no usual-care or no-monitoring arm
Study design	Randomized controlled trials, quasi-experimental studies, prospective and retrospective cohort studies, before-after studies with a comparator.	Case reports, single-case studies, qualitative-only studies, conference abstracts without full data, reviews, and opinion pieces.
Context	Community/home settings; any country or healthcare system; studies published in English; studies published from January 2015 to present.	Hospital or acute-care settings; institutional/nursing-home-based interventions; studies published before 2015.

Review timeline

Start date: 8/8/2026

Expected end date:8/4/2027

Availability of full protocol

No

Searching and screening

Search for unpublished studies

No

Main bibliographic databases that will be searched

- PubMed
- Scopus
- Cochrane library
- Web of science
- IEEE Xplore
- Embase

Search language restrictions

English

Search date restrictions

Studies published from January 2015 to present

Other methods of identifying studies

- reference list checking (backward citation searching)
- looking through all the articles that cite the papers included in the review ("snowballing" or forward citation searching)

Link to search strategy

<https://zenodo.org/records/21966187>

Selection process

Studies screened independently by at least 2 people with a process to resolve differences

Data collection process

Data extraction from published articles and reports

Data will be extracted independently by at least two people with a process to resolve differences

Study risk of bias or quality assessment

The risk of bias of the included studies will be assessed independently by two reviewers using design-specific validated tools:

Study design	Tool
RCT	Cochrane RoB 2
Quasi-experimental	ROBINS-I
Prospective Cohort	Newcastle–Ottawa Scale (NOS)
Retrospective Cohort	Newcastle–Ottawa Scale (NOS)
Before-after with comparator	ROBINS-I

Any disagreements between the reviewers will be resolved through discussion or consultation with a third reviewer.

Reporting bias assessment

Yes - risk of bias due to missing results will be assessed

Certainty assessment

Yes - certainty of findings will be assessed

Outcomes to be analysed

Main outcomes

- Incidence or frequency of wandering episodes detected or prevented
- Incidence or frequency of falls detected or prevented
- Time to detection of wandering or fall events
- Time to caregiver notification following detection

Additional outcomes

- Safety-related events and injuries
- Emergency healthcare utilization (e.g., ED visits, ambulance calls)
- Technology performance (sensitivity, specificity, false alert rate, reliability)
- Caregiver burden and satisfaction
- Quality of life

- Independence/functional status
 - Healthcare costs
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Planned data synthesis

Is formal data synthesis planned?

Yes

How will data be combined?

Findings will initially be synthesized narratively and organized by technology type and outcome. Where two or more studies report sufficiently comparable outcomes, interventions, populations, study designs, and effect measures, a meta-analysis will be conducted using a random-effects model. Where appropriate, effect estimates such as risk ratios (RRs), odds ratios (ORs), hazard ratios (HRs), or mean differences (MDs) will be pooled. If randomized and non-randomized studies are both eligible for pooling on the same outcome, they will be analysed separately or assessed via subgroup analysis to account for differences in risk of bias. Given the anticipated heterogeneity in interventions, populations, study designs, and outcome measurements, meta-analysis may not be feasible for some outcomes. In such cases, findings will be presented in structured summary tables and synthesized narratively in accordance with the SWiM (Synthesis Without Meta-analysis) reporting guideline.

Current review stage

Preliminary searches

Publication of review results

Results will be submitted for publication in a peer-reviewed journal upon completion of the review.

Review affiliation, funding and peer review

Review team members

- Motaz Mazen Al-Qawasma – Alexandria University
- Maher Belal Abohasna - Hebron University
- Moaaz Mohamed Sherif - Benha National University
- Abdalaziz Swaitti - Hebron University

Funding source

Review has no funding and no agreed support from an academic institution and is done in authors' own time

Peer review

Not peer reviewed

Additional information

This review builds on existing evidence examining sensor-based technologies for behavioural symptoms in dementia and technologies aimed at preventing wandering. However, it differs from previous reviews by specifically focusing on non-wearable remote and ambient monitoring technologies and by examining both wandering and fall-related outcomes among community-dwelling adults with Alzheimer's disease or related dementias (ADRD), compared with usual care or no monitoring. The search will be restricted to studies published from January 2015 onward to reflect recent advances in ambient monitoring technologies and to ensure that the evidence reflects technologies with potential relevance to current community-based care.

Review of conflict of interest

No other potential conflicts of interest to declare for this review

Medical Subject Headings

Alzheimer Disease; Dementia; Accidental Falls; Wandering Behaviour; Environmental Monitoring