TITLE: Tools and Devices for the Management of Dementia in Older Adults: Review of Evidence-Based Guidelines

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CONTEXT AND POLICY ISSUES

Dementia is a progressive cognitive disorder that results in the loss of ability to perform every-day tasks.[1,2] As it is a syndrome, dementia is characterized by groups of symptoms rather than a distinct disease process.[1] While the symptoms can range from mild to extreme, they typically include: memory difficulties (most often with short term memory) such as difficulty remembering the names of people or common objects; difficulties related to well-being, such as anxiety, confusion, and forgetfulness; and communication and language difficulties, such as difficulty conversing, repeating oneself, and comprehension problems.[2,3] Especially for those living at home, these symptoms can lead to feelings of isolation and depression, and can pose risks to the patient with dementia due to the risk of falls, improper use of medication (either over- or under-medicating), and fires or floods due to the declining ability to carry out household tasks.[2] Another common feature, wandering, can be especially problematic due to the risk of injury if it is not done in a safe environment and can be time consuming for care-givers and cause worry.[4]

One way to manage the symptoms of dementia in the home is through assistive technologies. Assistive technology tools can take many forms and have many functions such as:[1]

- Communication tools such as email, real-time alarms, and access to telehealthcare;
- Robotic tools such as vacuums, robotic assistance with eating and bathing,[1] and companionship;[5]
- Home automation technologies such as automated smoke alarms or fire detectors;
- Sensors for monitoring the home such as motion detection, location tags, GPS devices, and bathroom sensors.

As one in three adults older than 65 years are likely to be diagnosed with dementia[2] and the population older than 65 years in Canada increasing, tools to help manage the symptoms of dementia in the home, instead of relying on in-patient care or long term care facilities, have the

potential to increase older adults' sense of satisfaction, as well as reduce the burden on the health system.

The purpose of this report is to review the evidence-based guidelines and recommendations on the use of tools and devices that help to manage dementia in community-dwelling older adults.

RESEARCH QUESTION

What are the evidence-based guidelines for the use of tools or devices for the management of dementia in older adults?

KEY FINDINGS

A limited volume of lower quality evidence from one guideline suggests that safety locks, alarm systems, and mobile locator devices are likely useful for the management of wandering in patients with dementia.

METHODS

Literature Search Strategy

A focused literature search (with main concepts appearing in title or major subject heading) was conducted on key resources including PubMed, The Cochrane Library (2013, Issue 3), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2008 and March 19, 2013.

Selection Criteria and Methods

One reviewer screened citations to identify evidence-based guidelines regarding the use of tools to support the management of dementia in elderly adults living at home. Potentially relevant articles were ordered based on titles and abstracts, where available. Full-text articles were considered for inclusion based on the selection criteria listed in Table 1.

Table 1: Selection Criteria

Population	Elderly outpatients with Dementia
Intervention	Tools or Devices for patients with Dementia (such as assistive technologies, smart home technology, tracking devices)
Comparator	N/A
Outcomes	Independence, health resource utilization, quality of life
Study Designs	Evidence-based guidelines

N/A = not applicable

Exclusion Criteria

Articles were excluded if they did not satisfy the selection criteria, provided incomplete methods, were reviews, or were published prior to January 2008.

Critical Appraisal of Individual Studies

Guidelines were assessed for quality using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument.[6] The domains evaluated were scope and purpose, stakeholder involvement, rigor of development, clarity and presentation, applicability, and editorial independence. Instead of calculating numeric scores, the strengths and limitations of the guideline were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

The literature search yielded 182 citations. Upon screening titles and abstracts, 176 citations were excluded and six potentially relevant articles were retrieved for full-text review. An additional nine potentially relevant reports were retrieved from grey literature and hand searching. Of the 15 potentially relevant reports 14 were excluded; one had an inappropriate patient population, three examined interventions that were not of interest, one had irrelevant outcomes, eight were study types that were not of interest, and one was not available. The process of study selection is outlined in the PRISMA flowchart (Appendix 1). Additional references of potential interest are provided in Appendix 2.[2]

Summary of Study Characteristics

The included guideline is from the John A. Hartford Foundation Center of Geriatric Nursing (HCGNE) at the University of Iowa in the United States.[7] It provides recommendations regarding the management of wandering in both community-dwelling and patients in long-term care facilities with dementia. The guideline also includes recommendations regarding assessment, environmental modifications, psychosocial interventions, and caregiving support, however only the recommendations regarding technologies and tools are reviewed in this report. The recommendations were graded based on the strength of the evidence using the system described in Table 2.

Table 2: Evidence Grading Schema[7]

Grade	Description
A1	Evidence from well-designed meta-analysis or well-done systematic review with results that consistently support a specific action (e.g., assessment, intervention, or treatment)
A2	Evidence from one or more randomized controlled trials with consistent results
B1	Evidence from high quality evidence-based practice guidelines
B2	Evidence from one or more quasi experimental studies with consistent results
C1	Evidence from observational studies with consistent results (e.g., correlational, descriptive studies)
C2	Inconsistent evidence from observational studies or controlled trials

Table 2: Evidence Grading Schema[7]	
Grade	**Description**
D	Evidence from expert opinion, multiple case reports, or national consensus reports

Summary of Critical Appraisal

The overall objective, question, and population were well defined and relevant professionals were consulted during the development of the HCGNE guideline.[7] It is not clear if other relevant stakeholders such as patients and non-professional caregivers were consulted. The literature search was systematic, the criteria for selecting studies were clear, and both internal and external experts reviewed the recommendations and evidence. Evidence was graded according to rigour and the link between evidence and strength of recommendation was provided, however the strengths and weaknesses of the body of evidence not discussed. The authors did not describe a plan for updating the guideline, but as the current guideline is a revision of the original 2002 document, there may be a policy in place for updating the evidence.

The recommendations are specific, clearly presented and various options are presented in the guideline. Tools are provided to put many of the recommendations into practice, however resource implications are not discussed. Further detail is provided in Appendix 3.

Summary of Findings

The recommendation with the highest strength (grade B2) included in the guideline is to use technological devices to locate patients and monitor wandering. The strength of the evidence associated with the remaining recommendations is lower (grade C1 or lower), and the recommendations are:

- Use safety locks and disable appliances when not in use,
- Use a verbal alarm system, as they is more effective than the alternatives,
- Use mobile locator devices to quickly locate those who wander.

The guideline provides some detail regarding a low-cost patient locator system. Authors recommend that a locating device should be small, lightweight, have the potential to be sewn into clothing, and that the device should have individualized versions such as a belt buckle, or watch. A necklace is not recommended, due to strangulation concerns. Furthermore, authors suggest that it is important to determine the conditions in which the device is most effective and they recommend providing caregivers with training regarding device placement, use of the device (including how to activate a search for a patient wearing the device), and how to handle poor patient reactions to the device. Further detail is provided in Appendix 4.

Limitations

Limited evidence was identified to support the recommendations included in the HCGNE guideline with respect to technologies and tools to help manage wandering in patients with dementia. Most of the recommendations are supported by single studies, most of those studies are older (published between 1995 and 2005), and were considered to be of lower rigour by the guideline developers. While the guideline is relevant to patients with many types of dementia, it addresses the management of wandering only, and does not pertain to any other aspects of

managing dementia. As the technological landscape is continually evolving, it is possible that newer technologies exist and are effective, but have not been addressed in the included guideline, as it was published in 2008.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

One evidence-based guideline was included in this review and the recommendations regarding tools for the management of wandering were based on limited evidence.[7] No information pertaining to managing other aspects of dementia was identified. This lack of evidence is consistent with the findings of two systematic reviews[4,8] on interventions to prevent wandering, both updated in 2009 and both attempting to examine non-pharmacological interventions to prevent wandering in patients with dementia. Neither review was successful in identifying relevant studies.

Despite the limited breadth evidence, safety locks, alarm systems, and mobile locator devices are likely useful for the management of wandering in patients with dementia.[7]

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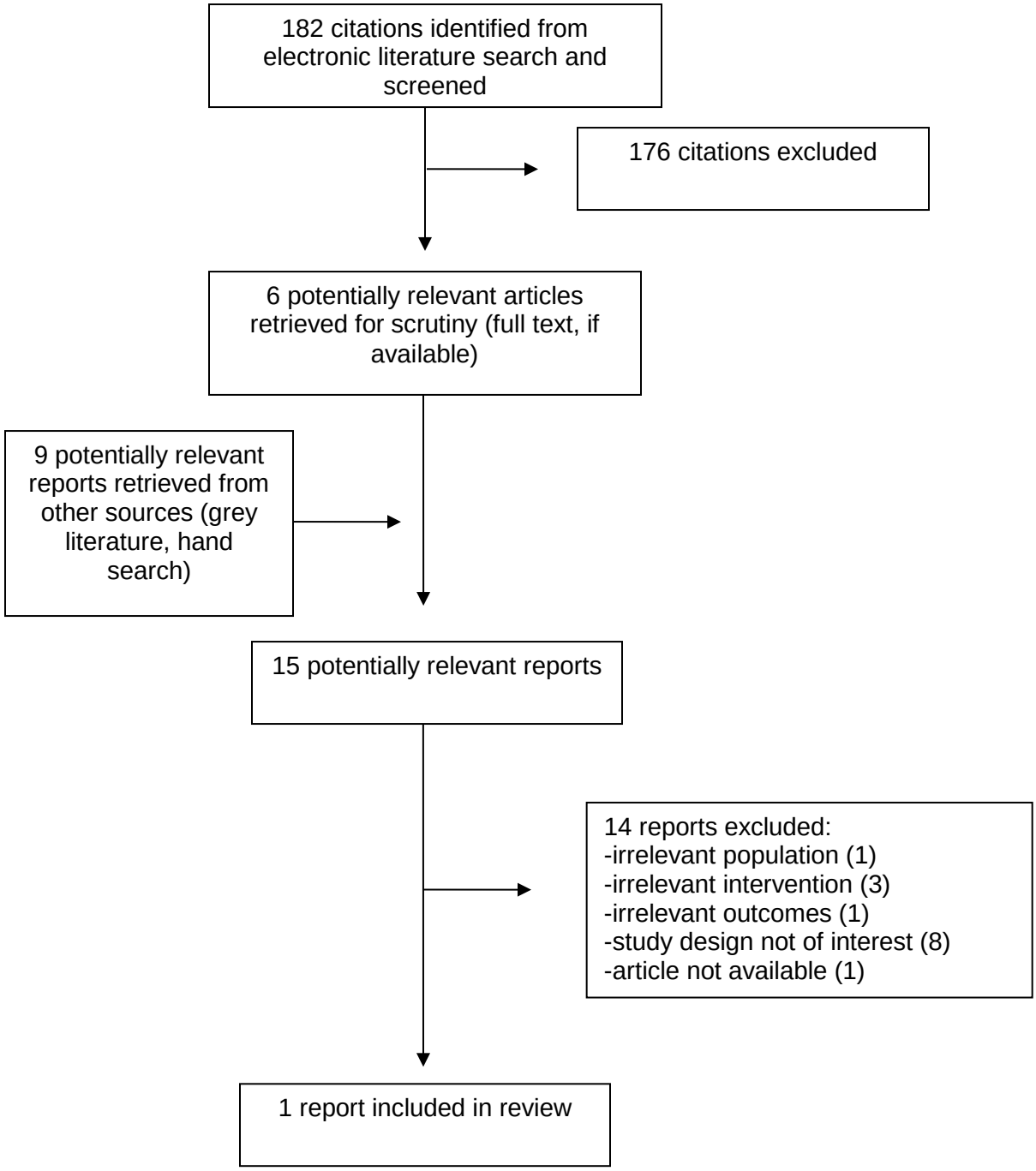
APPENDIX 1: Selection of Included Studies



APPENDIX 2: Additional Information

Review Articles

Bonner S, Idris T, Porteus J. Assistive technology as a means of supporting people with dementia: a review [Internet]. London (UK): Housing Learning & Improvement Network; 2012 Jul. [cited 2013 Mar 25]. Available from: http://www.housinglin.org.uk/_library/Resources/Housing/Support_materials/Reports/HLIN_AT_Report.pdf

APPENDIX 3: Critical Appraisal

Table 3: Summary of Critical Appraisal using AGREE II[6]

Strengths	Limitations
• Developed by relevant experts: gerontological nurses, members of the Fellows of the American Academy of Nurse Practitioners, Fellows of the Gerontological Society of America, board-certified nurse practitioners • Systematic literature search • Strength of evidence graded according to schema • Link between evidence and strength of recommendation was provided • The recommendations are specific, clearly presented and various options are presented in the guideline. • Tools are provided to put many of the recommendations into practice (scoring tools, scales, inventories, device specifications)	• Not clear if patients or non-professional care-givers were consulted • Strengths and limitations of the body of evidence not provided • Plan regarding updating the guideline not specified • Resource implications are not discussed.

APPENDIX 4: HCGNE Recommendations

Table 4: HCGNE Recommendations[7]

Strength of Evidence	Recommendation
D (Evidence from expert opinion, multiple case reports, or national consensus reports)	"Maintain safety by removing clutter, disabling appliances, and utilizing safety locks."
B2 (Evidence from one or more quasi experimental studies with consistent results)	"Use technological devices to locate and monitor wandering."
C1 (Evidence from observational studies with consistent results e.g., correlational, descriptive studies)	"Use a verbal alarm system as it is more effective than an aversive alarm system."
C1	"Use mobile locator devices for quickly locating wanderers."

HCGNE = John A. Hartford Foundation Center of Geriatric Nursing