Systematic Review: Risk Factors and Interventions to Prevent or Delay Long-term Nursing Home Placement for Adults with Impairments

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PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. These reports help:

Develop clinical policies informed by evidence;
Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and

- Set the direction for future research to address gaps in clinical knowledge.

The program is comprised of four ESP Centers across the US and a Coordinating Center located in Portland, Oregon. Center Directors are VA clinicians and recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Center Program and Cochrane Collaboration. The Coordinating Center was created to manage program operations, ensure methodological consistency and quality of products, and interface with stakeholders. To ensure responsiveness to the needs of decision-makers, the program is governed by a Steering Committee comprised of health system leadership and researchers. The program solicits nominations for review topics several times a year via the program website.

Comments on this evidence report are welcome and can be sent to Nicole Floyd, Deputy Director, ESP Coordinating Center at Nicole.Floyd@va.gov.

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This topic was developed in response to a nomination by Dr. Thomas O'Toole, Senior Medical Advisor, for the purpose of informing the VA Secretary's Choose Home Initiative. The scope was further developed with input from the topic nominators (*ie*, operational partners), the ESP Coordinating Center, the review team, and the technical expert panel (TEP).

In designing the study questions and methodology at the outset of this report, the ESP consulted several technical and content experts. Broad expertise and perspectives were sought. Divergent and conflicting opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

The authors gratefully acknowledge the following individuals for their contributions to this project:

Operational Partners

Operational partners are system-level stakeholders who have requested the report to inform decision-making. They recommend TEP participants; assure VA relevance; help develop and approve final project scope and timeframe for completion; provide feedback on draft report; and provide consultation on strategies for dissemination of the report to field and relevant groups.

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Technical Expert Panel (TEP)

To ensure robust, scientifically relevant work, the TEP guides topic refinement; provides input on key questions and eligibility criteria, advising on substantive issues or possibly overlooked areas of research; assures VA relevance; and provides feedback on work in progress. TEP members are listed below:

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Peer Reviewers

The Coordinating Center sought input from external peer reviewers to review the draft report and provide feedback on the objectives, scope, methods used, perception of bias, and omitted evidence. Peer reviewers must disclose any relevant financial or non-financial conflicts of interest. Because of their unique clinical or content expertise, individuals with potential conflicts may be retained. The Coordinating Center and the ESP Center work to balance, manage, or mitigate any potential nonfinancial conflicts of interest identified.

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INTRODUCTION

In fiscal year 2015, the Department of Veterans Affairs (VA) spent $5.3 billion on institutional care, and $2.1 billion for non-institutional home and community-based services (HCBS), with total costs for long-term care services making up 13% of its overall budget.[1] In fiscal year 2020, VA is projected to spend $9.8 billion overall on long-term care services for eligible Veterans.[2] This growth in VA costs for long-term care services is expected to continue, due to increased numbers of Veteran enrollees who have a high degree of service-connected disabilities.[1] At the same time, recent legislation (Caregivers and Veterans Omnibus Health Services Act of 2010[3] and VA Maintaining Systems and Strengthening Integrated Outside Networks [MISSION] Act of 2018[4]) have established and expanded financial support and services for informal caregivers – that is, family or friends who provide unpaid care for Veterans with substantial impairments. While the initial program of caregiver benefits and services was limited to Veterans who served after September 11, 2001, the VA MISSION Act expanded eligibility to those from earlier eras of service. Among Veterans requiring assistance from informal caregivers, approximately one-fifth served after 9/11 and there are substantial differences between these individuals and Veterans who served before 9/11—more post-9/11 Veterans have mental health conditions and their caregivers are twice as likely to lack support networks.[5]

In 2017, the VA Secretary launched the Choose Home Initiative to enhance VA policies and practices for supporting Veterans and their informal caregivers, and to improve collaboration with non-VA community groups.[6,7] The overall objective of this initiative is to increase support for Veterans with substantial impairments and help these individuals remain in community settings, if that is their preference. The Choose Home Initiative is led by the VA Veterans Experience Office and works with stakeholders and experts within and outside of VA, including the VA Office of Geriatrics and Extended Care, VA Caregiver Support Program, Administration for Community Living in the US Department of Health and Human Services, and the Elizabeth Dole Foundation. To help VA policymakers understand the effects of HCBS, particularly with respect to avoiding long-term nursing home placement (NHP), the VA ESP was asked to provide a review of the evidence on modifiable risk factors for and interventions that aimed to delay long-term NHP for community-dwelling adults with physical and/or cognitive impairments.

In collaboration with representatives from the Choose Home Initiative, VA Veterans Experience Office, Geriatrics and Extended Care, and Caregiver Support Program (hereafter referred to as "VA partners"), we developed the conceptual and analytic frameworks, and refined the scope for this evidence report. In addition to individuals who have existing disabilities, or are at high risk for developing impairments (due to older age and/or chronic medical conditions), our VA partners also requested evidence on risk factors and interventions for adults with posttraumatic stress disorder (PTSD) and/or traumatic brain injury (TBI), due to the higher prevalence of these conditions among Veterans with service-connected disabilities.[8] To adequately address the broad scope of risk factors and interventions for these diverse populations, and to fulfill the goal of providing specific recommendations for VA policies, we undertook an umbrella review of systematic reviews. We present qualitative summaries of results from the highest quality and most recent reviews covering the broadest range of risk factors and interventions. We also describe implications for policy and gaps in evidence.

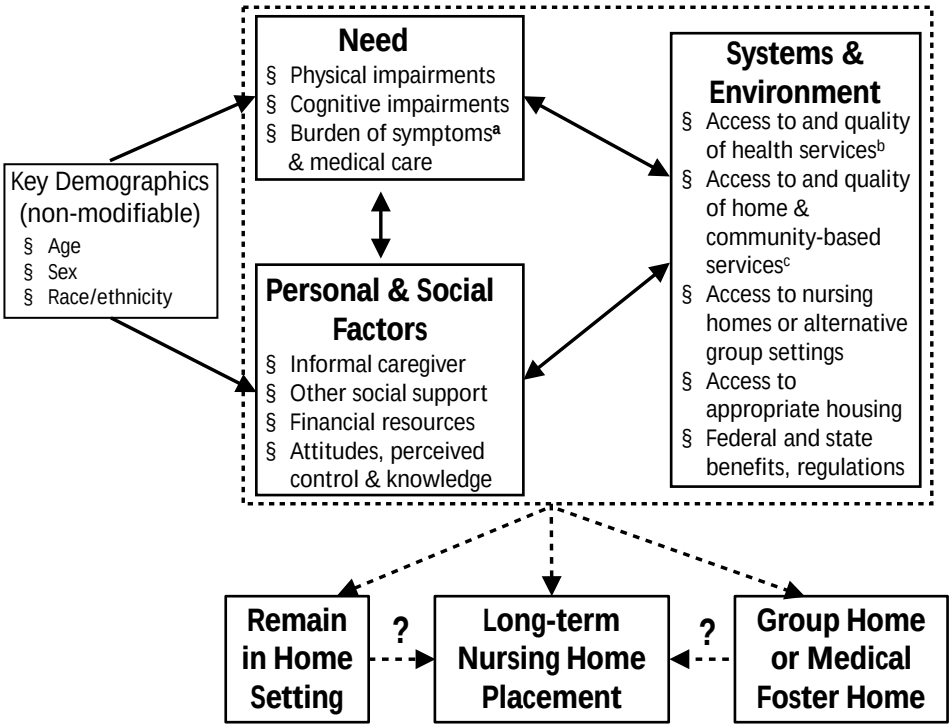
METHODS

TOPIC DEVELOPMENT

Conceptual Model and Analytic Framework

To guide scope refinement and protocol development, we first established our conceptual model of factors contributing to long-term NHP. We reviewed existing frameworks, including Andersen's Behavioral Model of Health Services Use,[9,10,11] Lawton's Person-Environment Model,[12,13] and the Vulnerable Populations Model,[14] that have been applied and adapted in past research addressing long-term NHP for adults with substantial physical and cognitive impairments. We sought to integrate and adapt key components, with the ultimate goal of generating an organizing framework to help address questions posed by our VA partners. Our conceptual model (Figure 1) included 3 categories of factors that interact: 1) needs for care due to physical or cognitive impairment and consequences of medical illness; 2) personal and social factors that may be resources or barriers to meeting needs; and 3) systems and environmental factors including access and quality of healthcare and social services. Collectively, factors in these 3 categories determine whether adults may remain at home or seek a higher level of care in nursing homes or alternative settings with substantial supports (*eg*, group homes).

Figure 1. Conceptual Model for Long-term Nursing Home Placement



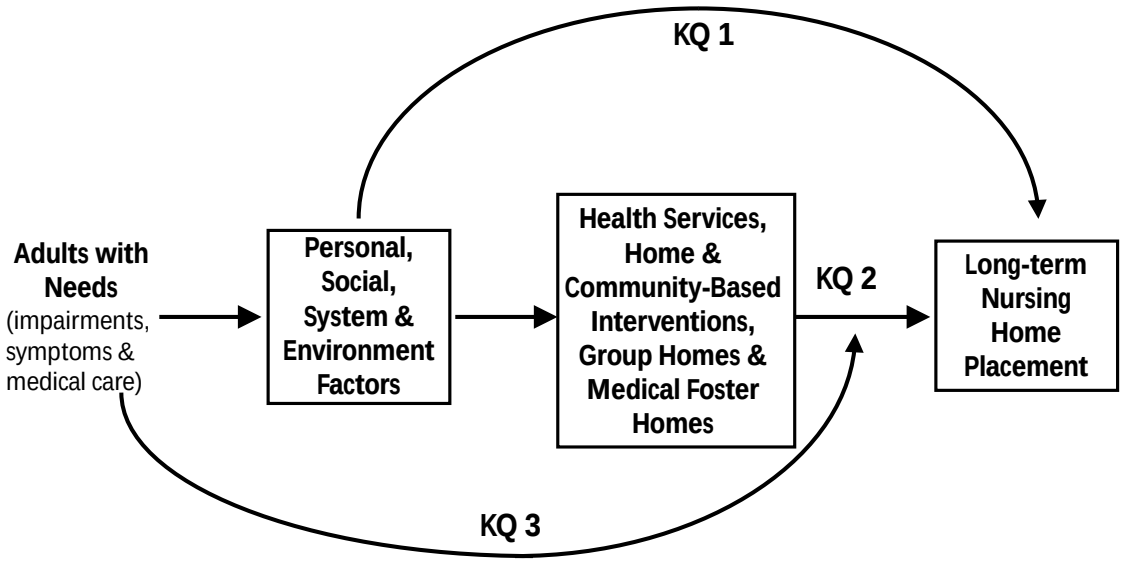
[a] Due to mental health and physical health conditions
[b] Includes outpatient and inpatient care
[c] Includes skilled healthcare at home (*eg*, nursing, physical therapy) and non-health services (*eg*, home aides)

Our conceptual model highlighted some of the complexities in the study of factors leading to long-term NHP and interventions to avoid or delay this outcome. Multiple factors across several categories likely change over time and may interact dynamically. Complex interventions

involving several components addressing multiple factors may be needed to delay or avoid long-term NHP; such interventions present substantial challenges in analysis and interpretation of effects, particularly regarding the importance of individual components. Finally, factors in the systems and environment category may have substantial effects on long-term NHP, but addressing these factors may well be beyond the scope of individual healthcare facilities or systems.

We applied our conceptual model to develop the analytic framework and guide formulation of key questions regarding risk factors and interventions seeking to delay or prevent long-term NHP (Figure 2). Our analytic framework shows that a number of factors outside of immediate needs for care may contribute to long-term NHP. Interventions may seek to change modifiable risk factors or substitute services (to address needs) in settings other than nursing homes. We were particularly interested in HCBS, but we included a broad range of interventions and alternative community settings for higher level of care. Finally, different characteristics of participants may affect the ability of interventions to delay long-term NHP.

Figure 2. Analytic Framework for Evidence Review of Risk Factors and Interventions to Prevent or Delay Long-term Nursing Home Placement



Key Questions (KQ)

For adults with physical and/or cognitive impairments:

KQ1—What are the modifiable risk factors that lead to long-term NHP?

KQ2—What is the effectiveness of home and community-based interventions, and group homes or medical foster homes, for preventing or delaying long-term NHP?

KQ3—Which characteristics of adults with impairments moderate the effectiveness of home and community-based interventions, group homes or medical foster homes, in preventing or delaying long-term NHP?

SEARCH STRATEGY

We searched for systematic reviews in the following databases, from inception until September 2018: MEDLINE, Sociological Abstracts, PsycINFO, CINAHL, and Embase. The search terms included MeSH and free text for: nursing homes and long-term care placement, populations more likely to have impairments (*eg*, older adults) or of special interest to VA (*ie*, PTSD or TBI), eligible interventions, and systematic reviews (Appendix 1). We supplemented these results with additional searches of the Cochrane Database of Systematic Reviews, Joanna Briggs Institute Database, Agency for Healthcare Research and Quality Evidence-based Practice Center (AHRQ EPC) reports, and VA ESP reports through November 2018. We also sought references from our expert advisory panel.

We anticipated that there might be areas without eligible reviews and discussed preliminary results with our VA partners and expert advisory panel. Due to the lack of eligible reviews on long-term NHP for individuals with PTSD and/or TBI, we undertook additional searches of published primary research, and ongoing observational studies and clinical trials. We queried MEDLINE from inception until November 2018 using MeSH and free-text terms for outcomes and interventions, as noted above; we removed terms for systematic reviews and older adults. For ongoing studies, we searched VA Health Services Research & Development-funded studies (www.hsrd.research.va.gov/research) and www.clinicaltrials.gov using text terms for PTSD, TBI, and interventions of interest.

STUDY SELECTION

After duplicates were removed, search results were uploaded into DistillerSR (DistillerSR, Evidence Partners, Ottawa, Canada). We screened titles and abstracts using prespecified inclusion/exclusion criteria (Appendix 2). Articles underwent full-text review if at least one reviewer deemed it eligible during abstract screening. Exclusion of articles at screening required agreement of 2 reviewers. At full-text review, 2 individuals separately determined inclusion/exclusion and then resolved any conflicts through discussion. When consensus could not be reached, disagreements were discussed with a third reviewer.

Eligible populations of interest included community-dwelling adults with existing physical or cognitive impairments, or those with high risk of developing impairments due to advanced age or existing medical conditions; no specific conditions were required or excluded. Eligible reviews addressing KQ1 could include any number or type of risk factors. Eligible reviews addressing KQ2-3 examined many different interventions, including case management and geriatric assessment, caregiver support, respite care, preventive home visits, home-based primary care, and alternative group settings for high-level care (Appendix 2). We created a preliminary list of interventions to guide searches but we allowed for new interventions to emerge during screening and selection.

Articles were included if review authors clearly intended to examine long-term NHP as an outcome of interest. We anticipated that certain reviews may not distinguish between short-term post-acute care rehabilitation in nursing homes and long-term NHP; thus, we required that eligible reviews reported intent to focus on long-term NHP (or used similar terms such as “institutionalization”) as outcomes of interest in review objectives and/or included results on long-term NHP. If a review examined “nursing home admissions” as the outcome and explicitly

counted short-term stays for rehabilitation within its definition, then the review was excluded. Although we hoped that reviews would clearly state their definition of long-term NHP (or "institutionalization") and how authors determined that included studies had measured the relevant outcome, we found that reviews rarely provided this information.

DATA ABSTRACTION & QUALITY ASSESSMENT

We assessed the quality of all eligible reviews using criteria adapted from AMSTAR 2[15] and rated overall quality as high, medium, or low (Appendix 3). In general, a high-quality review met all applicable criteria (*ie*, at least "partial Yes" for all questions). Two reviewers independently rated each eligible review, and consensus was reached through discussion.

All eligible reviews underwent data abstraction by 2 reviewers for: target population(s) of review; dates of search queries; number and characteristic of included primary studies (location, setting and study design); if and how reviews determined long-term NHP; and risk factor or intervention. For results on specific associations with or effects on long-term NHP, we focused on the highest quality and most recent eligible systematic reviews that covered the broadest range of risk factors and interventions. For example, out of all eligible reviews on case management, 4 were high quality and among these, 2 were conducted within the past 5 years (the other 2 were published in 2013); we prioritized all 4 high-quality reviews on case management for further data abstraction. Additional data abstraction included: pooled effects (or qualitative summaries) for risk factors or interventions; moderation of intervention effects by participant characteristics; datasets used and method of ascertainment for long-term NHP; quality ratings and strength of evidence (as determined by review authors); conceptual frameworks used by reviews; and total number of unique primary studies evaluating long-term NHP that were identified by all prioritized reviews for each intervention. Data abstraction was done by one reviewer and overread by a second reviewer.

DATA SYNTHESIS

Given the heterogeneity in populations, risk factors and interventions, we undertook a qualitative synthesis of results. First we noted which risk factors or interventions were addressed by eligible reviews, and determined the available evidence for different risk factors and interventions. Then we summarized the specific results on associations with risk factors or effects of intervention from the prioritized subset of higher quality, more recent, eligible reviews.

PEER REVIEW

A draft version of this report was reviewed by 6 technical experts, as well as VA operational partners. Their comments and our responses are presented in Appendix 4.

RESULTS

OVERVIEW

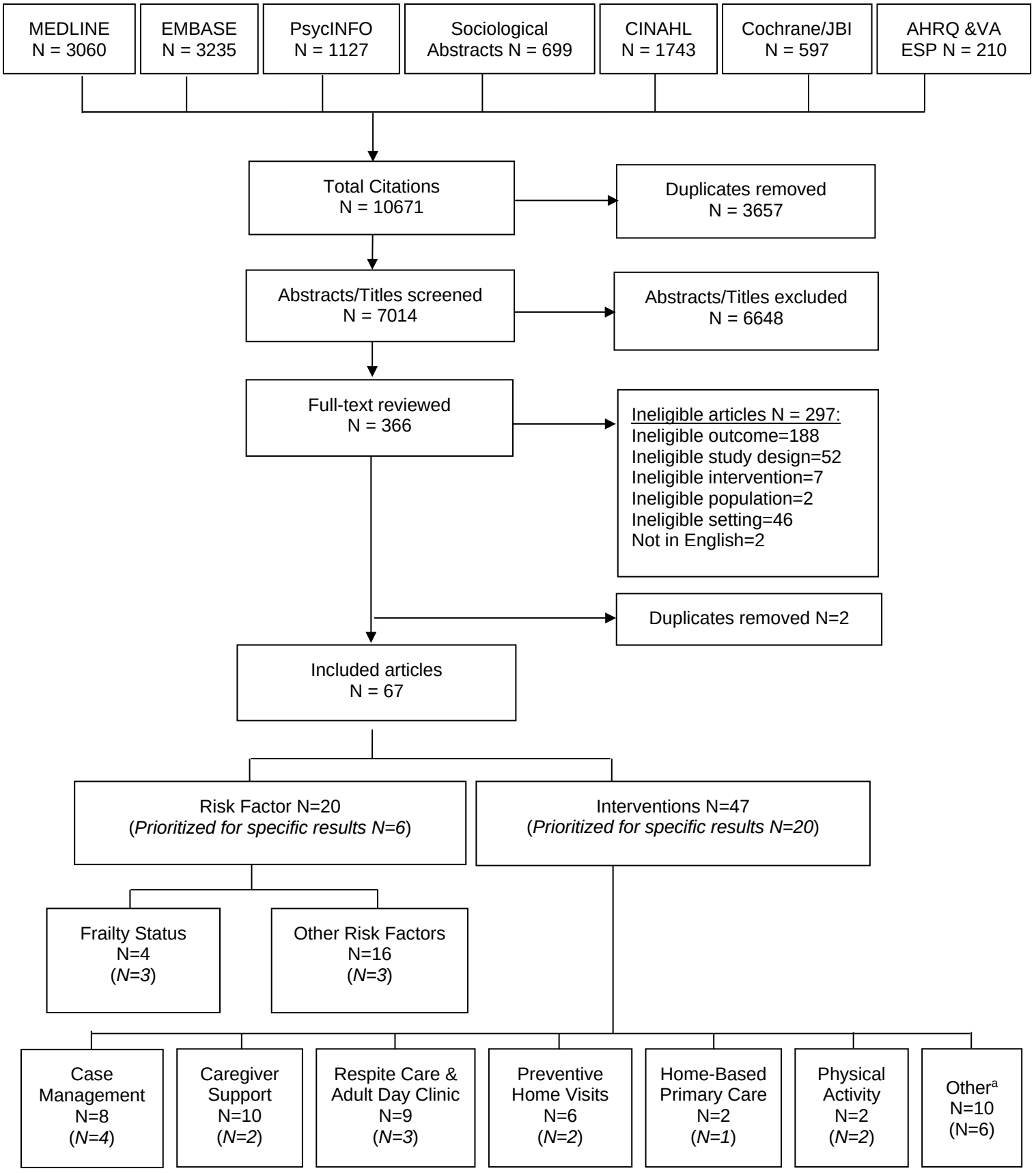
Of 7014 unique citations, 336 underwent full-text review (Figure 3). We identified 67 eligible systematic reviews, which mainly addressed older adults and/or those with dementia. We found no eligible reviews for individuals with PTSD and/or TBI. We also searched for primary research studies for individuals with PTSD or TBI; after screening 126 citations and reviewing the full text of 7 articles, we identified no eligible primary studies on long-term NHP. We did not find any ongoing clinical trials or VA funded research studies that addressed long-term NHP for these populations. Therefore, we were unable to address any of the KQ for these groups.

There were 20 eligible reviews addressing risk factors for long-term NHP, and all focused on older adults and/or those with dementia. Four reviews examined frailty status[16-19] and the remaining reviews included a wide variety of factors within each review.[20-35] Approximately half of reviews were conducted within the past 5 years, and 15% were high quality (Appendix 5.1). We prioritized all high-quality reviews[16,18,22] and 3 of the medium-quality reviews[19,27,29] (to more broadly cover populations and risk factors) for evaluating associations between specific risk factors and long-term NHP.

Of 47 eligible reviews addressing interventions to prevent or delay long-term NHP, more evaluated case management (8 reviews),[36-43] caregiver support (10 reviews),[44-53] respite care and adult day clinics (9 reviews),[54-62] or preventive home visits (6 reviews).[63-68] Fewer examined home-based primary care (2 reviews),[69,70] or physical activity interventions (2 reviews).[71,72] The remaining 10 reviews[73-82] were either very broad in scope (*eg*, all nonpharmacologic interventions for dementia) or the single review addressing that topic (*eg*, occupational therapy). A third of eligible reviews on interventions were high quality, and 40% were conducted within the past 5 years. We prioritized all 15 high-quality reviews,[38,40,41,45,51,54,59,61,65,70,73,75,77,80,83] 4 medium-quality reviews,[67,71,72,74] and one low-quality review (due to this being the only review on that topic)[82] for abstraction of results on specific intervention effects. Most prioritized reviews (60%) limited eligible studies to randomized controlled trials (RCTs).

We abstracted results for specific risk factors and interventions from a total of 26 prioritized eligible reviews (6 for risk factors[16,18,19,22,27,29] and 20 for interventions[38,40,41,43,45,51,54,59,61,65,67,70-75,77,80,82]). Characteristics of these reviews are provided in Table 1. Descriptions of these results are provided below.

Figure 3. Search, Selection, and Prioritization of Eligible Systematic Reviews



[a]2 reviews—any nonpharmacologic intervention for adults with dementia; 1—any intervention for falls prevention; 1—any intervention for patient or caregiver stress; 1—different settings for personal assistance; 1—in-home healthcare or personal assistance; 1—assistive technologies; 1—demonstration projects to integrate acute and long-term care in US and Europe; 1—occupational therapy; and 1—light therapy

Table 1. Characteristics of 26 Prioritized Systematic Reviews (SR)

	Total # SR[a]	Recent[b]	Quality of SR:		SR including:			# Unique Studies Evaluating NHP[d]
			High	Medium	Only RCTs	Multiple Study Designs[c]	US Studies	
Risk Factors:								
Frailty Status	3	2	2	1	—	2	2	8
Other Risk Factors	3	2	1	2	—	3	3	98
Interventions:								
Case Management	4	2	4	—	2	1	3	28
Caregiver Support	2	1	2	—	2	—	1	7
Respite Care & Day Clinics	3	1	3	—	2	1	3	22
Preventive Home Visits	2	—	1	1	1	1	2	32
Home-Based Primary Care	1	1	1	—	—	1	1	—
Physical Activity	2	2	—	2	2	—	1	—
Others[e]	6	3	4	1	3	3	4	11

NHP=long-term nursing home placement; RCTs=randomized controlled trials; US=United States
[a] Number of SR prioritized per category, based on better quality and most recent searches.
[b] Search conducted 2013 or later.
[c] Included RCTs and various observational study designs (eg, cohort with or without comparator).
[d] Within each category, total unique primary studies identified as reporting long-term NHP
[e] 1—interventions for falls prevention; 1—different settings for personal assistance; 1—assistive technologies; 1—demonstration projects to integrate acute and long-term care in US and Europe; 1—occupational therapy; and 1—light therapy. 1 SR (on demonstration projects) was low quality.

For older adults and/or those with dementia, what are potentially modifiable risk factors that lead to long-term nursing home placement? (KQ 1)

Of 6 prioritized reviews on risk factors, 3 focused on frailty status[16,18,19] and 3 examined a variety of other risk factors.[22,26,29] In abstracting results, we grouped factors into categories from our conceptual model (see Figure 1 and Methods), except for frailty status which we describe separately below. In these results, we focus on factors which may be addressed by healthcare providers, health systems, and/or public policies, although some of these factors may not be truly amenable to improvement or change (*eg*, degree of cognitive impairment). Demographic characteristics were not considered modifiable. Results on associations between specific risk factors and long-term NHP are summarized in Table 2. Detailed characteristics and results from prioritized reviews are found in Appendix 5.2.

Table 2. Summary of Results from 6 Prioritized Reviews[a] on Potentially Modifiable Risk Factors of Long-term Nursing Home Placement for Older Adults

Category of Risk Factor	Description	Risk for NHP	Comments on Associations
Frailty status	Frailty phenotype or frailty scores	#	2 reviews reported qualitative summaries[16,18] and 1 review reported meta-analysis (OR/RR 1.67 [95% CI 1.47, 1.89])[19]
Needs for Care	Physical and/or cognitive impairments	#	2 reviews reported qualitative summaries—1 review focused on adults with dementia,[22] 1 on older adults in general[26]
	Poor health status	1 /#	2 reviews reported qualitative summaries—1 review on adults with dementia found no association,[22] but 1 review on older adults reported greater NHP with lower self-rated health status[26]
	More behavioral & psychological symptoms (of dementia)	#	1 review reported qualitative summary, stating more symptoms "*significantly increased the risk of* [NHP] *in most but not all studies…*"[22]
	More prescriptions	#	1 review reported qualitative summary, stating that "*a high number of prescriptions…*[were] *strong predictors of NHP"*[26]
Personal & Social	Low level of physical activity	#	1 review reported qualitative summary, stating that "*low activity level …had a moderate predictive effect on NHP*."[26]
	Poor social network	#	1 review reported qualitative summary, stating moderate evidence showed greater risk for "*those with a poor social network*..."[26]
	More caregiver burden & distress	#	1 review reported qualitative summary, stating that "[i]*ncreased caregiver burden…were significant predictors of* [NHP] *in most studies…*"[22]
	Poor caregiver health	1 /#	1 review[22] reported meta-analysis for caregiver depression (HR 1.00 [95% CI 0.97-1.03]) and qualitative summary of health status ("*markers of worse caregiver health…were significant predictors…*")
Systems & Environment		**?**	1 review[22] found 1 study that "*examined the effect of several characteristics of the American continuing care system…*"

#=increased risk; 1 =no meaningful difference or effect; $=lowered risk; **?**=reviews identified none or only 1 study; ADL=activities of daily living; CI=confidence interval; HR=hazards ratio; NHP=long-term nursing home placement; OR= odds ratio; RR=relative risk ratio

[a] Prioritized based on highest quality and most recent search.

Frailty Status

Frailty has been mainly conceptualized as either a phenotype of decreased physiologic reserve (with concomitant vulnerability to health stressors)[76,77] or an accumulation of age-related deficits in health and function (*ie*, medical conditions and impairments).[84] Within our conceptual framework, frailty status is most analogous to a combination of risk factors within the needs category, although some features of the frailty phenotype (*eg*, slow gait speed) do not correspond directly to impairments or symptoms. We prioritized 2 high-quality[16,18] reviews and 1 medium-quality review[19] that examined associations between a variety of frailty measures and long-term NHP. All 3 reviews included studies that used a variety of scoring systems to operationalize and measure frailty, some of which applied the frailty phenotype, while others used the deficit-accumulation model. Overall, these reviews identified 8 unique studies evaluating the relationship between frailty and long-term NHP (Table 1).[84-91]

One high-quality umbrella review focused on validity of frailty assessment instruments for adults 60 years and older living in any setting, and examined predictive accuracy of frailty for adverse health outcomes, including institutionalization.[16] This umbrella review identified 1 systematic review[86] that evaluated diverse older adult populations, and found frailty indices (based on the deficit-accumulation model) to be "*sufficiently accurate to predict increased risk of…hospitalization and institutionalization at 12 months…"* The systematic review based its conclusions about long-term NHP on 3 observational cohort studies—1 from the Netherlands[86] and 2 from Canada.[85,88] All 3 primary studies used administrative data, sometimes in combination with interview or survey data.

One high-quality review[18] and 1 medium-quality review[19] examined frailty in community-dwelling adults 65 years and older; these reviews together included 6 studies that evaluated long-term NHP,[84,87-91] one of which was also identified by the review discussed above.[88] Of the 5 additional unique studies, 1 used US data,[90] 3 used Canadian cohorts,[84,89,91] and 1 used Italian data.[87] Long-term NHP was reported by participants or family in 4 studies,[84,87,89,90] and assessment was unclear in 1 study.[91] Three studies used frailty indices that applied the deficit-accumulation model,[84,89,91] 1 study used the frailty phenotype,[90] and one study used 2 measures that applied deficit-accumulation and phenotype models, respectively.[87] One review[18] conducted a qualitative synthesis, stating that institutionalization was one of the "*most common outcomes* [associated with] *frailty…"* The other review[19] performed a quantitative meta-analysis, showing that frailty was associated with an overall pooled hazard ratio (HR) or risk ratio (RR) of 1.65 (95% CI 1.48, 1.84) for institutionalization.

In summary, all 3 reviews addressed both frailty phenotype and deficit-accumulation frailty scores and included studies that used many different scoring systems to operationalize definitions of frailty. Overall, using a variety of measures, presence of frailty (or higher frailty scores) was associated with higher risk for long-term NHP.

Needs for Care

Three prioritized reviews (1 high-quality[22] and 2 medium-quality[20,22]) examined a wide range of risk factors. The high-quality review examined factors contributing to long-term NHP for adults with dementia,[22] while the other 2 reviews included studies on older adults in general.[27,29] Together, these 3 reviews included 98 unique primary research studies (Table 1). Two reviews

provided qualitative summaries of results for associations with specific measures of impairments, symptoms, and/or complexity of medical care,[22,27] but the third review evaluated summary risk assessment tools (excluding frailty indices) that predicted risk for institutionalization.[29] While these risk tools often included a range of factors in the needs category,[92-95] there were no results on associations with individual risk factors.[29]

Both reviews that provided results on specific risk factors applied Andersen's Behavioral Model of Health Services Use[9] to identify and describe factors. The review on risk factors in dementia[22] reported 14 studies showing increased long-term NHP associated with greater impairment in basic or instrumental activities of daily living (ADL/IADL).[96-109] Additionally, this review included 2 studies which showed no association with general health status or medical comorbidities.[96,110] Some included studies also showed that more behavioral and psychological symptoms were associated with more long-term NHP, [98,108,109,111-126] but 3 studies did not find an association.[127-129]

The other review included studies on older adults and also reported consistent associations between more ADL/IADL and/or cognitive impairment and higher risk of long-term NHP.[27] This review categorized overall results for individual factors into strong, moderate, weak, or inconclusive evidence, and highlighted the minimum and maximum associations for each factor from studies that authors rated as high quality. For example, review authors stated there was strong evidence for higher long-term NHP associated with greater IADL impairment and noted the range of hazards ratios (HR) as 1.05-2.50.[27] Similarly, there was strong evidence for associations of long-term NHP with greater ADL (HR range 1.32-3.70, odds ratio [OR] range 1.30-1.78)[130-133] and cognitive impairment (OR range 1.44-1.55, HR 1.67).[131,134,135] Additional factors with strong evidence were lower general health status (OR range 1.48-1.67, HR 3.40)[130,134,136] and higher number of prescriptions (HR range 1.04-1.67, OR 1.15).[131,136,137] Association of long-term NHP with specific health conditions such as arthritis and respiratory diseases were rated by review authors as inconclusive.

In summary, the most consistent and substantial associations were reported for functional and/or cognitive impairments, for both those with dementia and the general population of older adults. For older adults in general, poor self-reported health status and higher number of prescribed medications were associated with higher long-term NHP, but for those with dementia, general health status was not associated with long-term NHP. For those with dementia, most studies also found that behavioral and psychological symptoms were associated with long-term NHP.

Personal & Social Factors

Two prioritized reviews[22,27] provided results on specific personal and social factors, while the third review[29] examined summary risk assessment instruments and did not report associations for individual factors. The high-quality review on adults with dementia[22] reported a quantitative meta-analysis that showed no overall association between caregiver depression and long-term NHP (HR 1.00 [95% CI 0.97, 1.03], reportedly using data from 9 studies, but exact studies were not identified in review). In qualitative synthesis, this review also reported increased long-term NHP was associated with higher caregiver distress or burden (8 studies),[98,100,108,113,129,138-140] lower life satisfaction (2 studies),[112,116] or poor caregiver health (2 studies).[100,141]

The medium-quality review[27] examined risk factors for older adults in general and provided qualitative summaries. The following factors were rated as having moderate evidence for association with increased long-term NHP: poor social network (HR range 1.18-1.27, OR range 1.11-1.18)[131,133,135,142] and low physical activity (OR 1.97)[132].

Systems & Environmental Factors

Prioritized reviews on risk factors collectively found only one study that examined association of long-term NHP with specific systems or environmental factors. This study evaluated adults with dementia, was conducted more than 20 years ago, and found inconsistent results for a variety of factors.[104] Overall, there was a large gap in evidence on systems and environmental factors.

What is the effectiveness of interventions for preventing or delaying long-term nursing home placement? (KQ 2 & 3)

Results from 20 prioritized reviews on interventions are summarized in Table 3 (for 13 reviews that included only RCTs[38,40,41,45,51,54,59,65,67,72,73,75,80]) and Table 4 (for remaining 7 reviews that included multiple study designs[43,61,70,71,74,77,82]). In general, interventions were evaluated for older adults and/or those with serious chronic medical conditions (*eg*, dementia); no interventions clearly demonstrated overall benefit across studies for delaying or preventing long-term NHP. Reviews reported some interventions had positive effects in a subset of included studies (*ie*, for case management, caregiver support, and preventive home visits). Reviews on several other interventions, including home-based primary care and physical activity programs, did not identify studies that examined effects on long-term NHP. Detailed results from prioritized reviews on interventions are described below and found in Appendix 5.3 (for long-term NHP) and Appendix 5.4 (for secondary outcomes, such as mortality and hospitalizations).

Table 3. Interventions to Delay or Prevent Long-term Nursing Home Placement (NHP)—Summary of Results from 13 Prioritized Reviews that Limited Inclusion to RCTs[a]

Interventions (# prioritized SR, # unique RCTs[b])	Effect on NHP	Comments
Case Management (2, 22)	1	2 reviews reported quantitative meta-analyses for adults with dementia—1 review found inconsistent results across different follow-up intervals (reduction in NHP at 6 and 18 months, but not at 10-12 and 24 months)[40]; 1 review found no overall decrease in NHP (RR 0.94 [95% CI 0.85, 1.03]) or delay in timing (WMD 77.8 days [95% CI -70.5, 226.1])[41]
Caregiver Support (2, 7)	1 /$	1 review[45,143] reported qualitative summaries, stating interventions for caregivers of adults with dementia "*did not consistently improve…institutionalization for patients with memory-related disorders*" but also highlighted results from 2 studies that demonstrated delay in NHP
	?	1 review[51] on cognitive reframing for caregivers of adults with dementia found no RCTs reporting NHP
Respite Care & Day Clinics (2, 14)	1	1 review[54] reported quantitative meta-analysis for adult day clinics and found no overall decrease in NHP (OR 0.84, 95% CI 0.58, 1.21) or when separated by type of comparator
	?	1 review[59] on all types of respite care identified 1 RCT which showed delay to combined outcome of NHP and death
Preventive Home Visits (1, 13)	1 /$	1 review[67] reported quantitative meta-analysis and found no effect overall (RR 0.91 [95% CI 0.76, 1.09]) but suggested more intensive interventions (>9 visits) may decrease NHP
Physical Activity (2, 0)	?	2 reviews[71,72] on frail or pre-frail older adults found no RCTs reporting NHP
Other (3, 9)	1	1 review[73] on a variety of interventions for falls prevention, reported qualitative summaries that multifactorial programs and exercise-focused interventions showed inconsistent effects
	?	1 review[75] on light therapy for adults with dementia found no RCTs reporting NHP
	?	1 review[80] on assistive technologies for adults with dementia found no RCTs reporting NHP

#=increased or accelerated NHP; 1 =no meaningful difference or effect; $=delayed or prevented NHP; ? = reviews identified none or only 1 study; CI=confidence interval; HR=hazards ratio; NHP=long-term nursing home placement; OR= odds ratio; RR=relative risk ratio; RCTs=randomized controlled trial; SR=systematic review

[a] Prioritized reviews based on highest quality and most recent search; these reviews explicitly allowed only RCTs as study design of included articles.

[b] Included RCTs that reported results on NHP

Table 4. Interventions to Delay or Prevent Long-term Nursing Home Placement (NHP)—Summary Results from 7 Prioritized Reviews Including Multiple Study Designs[a]

Interventions (# prioritized SR)	Effect on NHP	Comments
Case Management (2)	1 /$	1 review[83] reported qualitative summary for adults with dementia, stating that programs ≤ 2 years did not "*confer clinically important delays in time to* [NHP]*"* (moderate strength of evidence) but interventions for those with "*in-home spouse caregivers and continue services for longer than 2 years*" may be effective (low strength of evidence)
	1	1 review[83] reported qualitative summary for adults with frailty or multimorbidity, stating no effect on NHP (low strength of evidence)
	?	1 review[38] on "reablement" interventions for older adults found only 1 study reporting NHP
Respite Care & Day Clinics (1)	#	1 review[61] reported quantitative meta-analysis of "quasi-experimental"[b] studies and found increased NHP (OR 1.79 [95% CI 1.02, 3.12])
	$	1 review[61] reported qualitative summary of observational cohort studies, stating that these *"found some support for the benefits of respite care…"*[144-146]
Preventive Home Visits (1)	1	1 review[65] reported quantitative meta-analysis and found no effect overall (RR 1.02 [95% CI 0.88, 1.18]) or by different follow-up intervals
Home-Based Primary Care (1)	?	1 review[70] found no study reporting NHP
Other (3)	?	1 review[74] on occupational therapy found only 1 study reporting NHP
	?	1 review[77] on different settings or models of personal assistance found no studies reporting NHP
	$	1 review[82] reported qualitative summary of demonstration projects to better integrate acute and long-term care, stating decreased NHP occurred in 2 projects

= increased or accelerated NHP; 1 =no meaningful difference or effect; $ = delayed or prevented NHP; ? = reviews identified none or only 1 study; CI=confidence interval; NHP= long-term nursing home placement; OR= odds ratio; RCTs=randomized controlled trial; SR=systematic review

[a] Prioritized based on highest quality and most recent search, these reviews included randomized trials and observational studies

[b] Review authors defined these as observational studies with a comparison group as control

Case Management

Four prioritized high-quality reviews[38,40,41,43] included 29 unique studies that evaluated the effects of case management on long-term NHP. Two reviews[40,41] focused on adults with dementia, while the other 2 reviews[38,83] addressed older adults with different characteristics, including multiple chronic health conditions. Reviews included a variety of case management interventions that differed on the number and types of components. Case managers had variable professional backgrounds (most commonly nursing), and employed different modalities and frequencies of patient contact. Some interventions described inclusion of comprehensive geriatric assessments among their components, while other interventions did not (though they may have included components with similar goals). Often, interventions had some element of caregiver counseling and support. Included studies had follow-up periods from 1 to more than 10 years.

The 2 reviews focusing on adults with dementia[40,41] included only RCTs and collectively identified 22 unique trials that reported effects on long-term NHP. One review[40] conducted meta-analyses using data from 9 trials,[147-155] stratifying by follow-up interval. There were decreased odds of long-term NHP at 6 months (OR 0.82 [95% CI 0.69, 0.98]) and 18 months (OR 0.25 [95% CI 0.10, 0.60]), but not at 10-12 months (OR 0.95 [95% CI 0.83, 1.08]) or 24 months (OR 1.03 [95% CI 0.52, 2.03]). The other review[41] pooled data from 16 studies,[96,147,151,152,156-167] and reported "*no statistically significant effect of dementia* [case management] *compared to usual care"* (risk ratio [RR] 0.94 [95% CI 0.85, 1.03]). Additionally, this review evaluated time to long-term NHP by meta-analysis using data from 5 studies[96,156,161,162,167] and also found no difference (weighted mean difference 77.98 days [95% CI -70.5, 226.1]).

One prioritized review on case management included observational studies in addition to RCTs.[43] This review evaluated case management for older adults with different characteristics, finding 10 studies on adults with dementia[147,149-152,155,168-171] and 2 focused on frailty or multimorbidity[172,173] that reported effects on long-term NHP. For dementia, review authors concluded that there was moderate strength of evidence that programs lasting 2 years or less did not "*confer clinically important delays in time to nursing home placement…*" However, the review also stated that interventions for adults with dementia "*who have in-home spouse caregivers and continue services for longer than 2 years*" may be effective for delaying long-term NHP (low strength of evidence). For adults with frailty or multiple chronic health conditions, review authors reported low strength of evidence that case management did not decrease long-term NHP.

One review addressed reablement or restorative care for older adults, and included RCTs and observational studies.[38] Review authors stated that reablement may not be distinct from other types of services delivered at home, and defined it as a high-intensity, time-limited intervention oriented towards optimizing function and reducing care in the future. Description of intervention elements showed substantial overlap with goals and components of case management. This review identified only one trial evaluating long-term NHP, which showed no differences.[174]

In summary, most evidence indicated that case management did not delay or reduce long-term NHP, with the possible exception of dementia programs lasting longer than 2 years and involving in-home spouses as caregivers.

Caregiver Support

Two high-quality prioritized reviews[45,51] focused on caregiver support interventions, and both included only RCTs. One review[45] was based on a VA ESP report[143] that evaluated diverse interventions for caregivers of adults with dementia or cancer. Review authors reported qualitative summary of 7 studies that evaluated long-term NHP, all of which were for caregivers of those with dementia.[96,164,166,167,171,175,176] Authors stated that caregiver involved interventions "*did not consistently improve…institutionalization for patients with memory-related disorders,*"[143] but highlighted results from 2 studies that demonstrated delay in long-term NHP (228-557 days).[171,176] Both of these studies evaluated the same model of caregiver support, which included tailored in-person counseling (6 sessions over the first 4 months), information and encouragement to attend local support groups, and ad hoc follow-up by counselors via different modalities.[171,176]

The other review[51] addressed only cognitive reframing interventions for caregivers of adults with dementia. Although review authors intended to examine long-term NHP, they did not identify any studies that reported effects on this outcome.

In summary, evidence indicated that caregiver support interventions were generally not effective for preventing or delaying long-term NHP, although a few studies have reported benefits of a particular model of high-intensity caregiver counseling.

Respite Care & Adult Day Clinics

Three high-quality reviews examined respite care and/or adult day clinics, and collectively identified 22 unique studies. Two reviews limited inclusion to RCTs; one of these reviews focused on adult day clinics for a variety of populations,[54] while the other examined respite care in any setting (*eg*, residential, at home, or at day clinics) for those with dementia.[59] The first review[54] included studies of adults with different medical conditions, and conducted quantitative meta-analysis using data from 13 RCTs.[177-189] There was no overall benefit for decreasing institutionalization (pooled OR 0.84 [95% CI 0.58, 1.21]), or in subgroup analyses by different categories of comparators (*eg*, OR 0.91 for day clinic versus comprehensive geriatric care [95% CI 0.70, 1.19]). The other review (examining respite care for adults with dementia)[59] included one RCT, but this trial used a combined outcome of days in the community, defined as not experiencing institutionalization or death.[190] This trial showed more days in the community for the intervention group (22 days on average).[190]

The third review included both RCTs and observational studies of respite care in any setting for adults with a variety of conditions.[61] This review included 8 studies on long-term NHP—1 RCT,[156] 4 "quasi-experimental" studies (non-randomized prospective studies with any comparative control),[191-194] and 3 observational cohort studies.[144-146] The 1 trial compared caregiver training program with 10 days of respite care as the control; this showed shorter time to long-term NHP for the respite care group.[156] Review authors conducted meta-analysis using data from 3 of the quasi-experimental studies,[191-193] and found increased long-term NHP in the respite care groups (OR 1.79 [95% CI 1.02, 3.12] for long-term NHP, and OR 1.54 [95% CI 1.01-2.33] for combined long-term NHP or death). One quasi-experimental study[194] was not included in the meta-analysis but review authors described that this showed "*respite users tended to keep the care recipient in the community for significantly longer than matched control subjects*."

Qualitative summary was provided for remaining 3 cohort studies[144-146]—"*observational studies found some support for the benefits of respite care…"* This review also included qualitative studies on how caregivers perceived use of respite care, and authors concluded "*it is likely… that many samples recruited to studies of respite care are at a relatively late stage in the caregiving career and respite is unlikely to have a substantial impact on institutionalization rate*."

In summary, adult day clinics do not decrease long-term NHP but the evidence for respite care (in a variety of settings) is inconclusive, due to few RCTs and concerns about confounding factors in observational study designs.

Preventive Home Visits

Two prioritized reviews[65,67] examined preventive home visits and, together, identified 32 unique studies which evaluated long-term NHP. In contrast to case management interventions, preventive home visits generally included older adults (*eg*, from population registries or general practitioner panels) who did not have known impairments, recent adverse health events, or high-risk diagnoses at the outset. Nearly all included studies employed health professionals (nurses, physicians, and/or social workers) as visitors; only 1 study used non-professional volunteers.[195] The medium-quality review[67] included only RCTs and conducted quantitative meta-analysis using data from 13 trials.[136,138,140-142,144,145,152,202,279,282-284] This review found that overall "*reduction in the risk of* [long-term NHP] *was modest and nonsignificant*" (RR 0.91 [95% CI 0.76, 1.09]), but there was evidence of substantial heterogeneity. In subgroup analysis using data from 4 studies with more than 9 visits,[196-199] authors reported "*the estimated reduction* [of long-term NHP]*…was 34% (RR, 0.66; 95% CI, 0.48-0.92) and the typical risk difference was 2.3%*." Review authors excluded "*short-term and residential or board and care-unit admissions*" in abstracting results on long-term NHP.[67]

The other review [65] was high quality and included both RCTs and studies using "*quasi-random methods that approximated the characteristics of randomization*" to allocate participants. The quantitative meta-analysis for institutionalization used data from 26 studies [108,136-143,146,149,151,201,266,268-279] and showed no overall effect of home visits (RR 1.02 [95% CI 0.88, 1.18]). Review authors concluded there was "*moderate quality evidence of no clinically important difference"* between intervention and control groups in overall effect; there were also no effects in analyses by different follow-up intervals (*eg*, RR 0.96 [95% CI 0.69, 1.33] for 8 studies with at least 3 years of follow-up[197-204]).

In summary, most evidence indicated no decrease in long-term NHP, but a few studies with greater intensity of home visits showed some reduction.

Other Interventions

One prioritized high-quality review[70] evaluated home-based primary care and sought to examine long-term NHP. This review included 19 studies but none of these reported long-term NHP. One observational study evaluated the proportion of participants with admissions to a skilled nursing facility before and after initiation of home-based primary care, but this study did not distinguish between short-term stays for rehabilitation and long-term NHP.[205]

Two prioritized reviews[71,72] examined physical activity interventions that involved mostly or exclusively exercise programs. Both were medium quality and included only RCTs with

community-dwelling older adults who were frail or pre-frail. Neither review identified any trials that reported long-term NHP.

One high-quality review[73] examined any type of intervention to reduce falls in older adults and included 9 RCTs that evaluated long-term NHP. Review authors reported evidence of heterogeneity and provided qualitative summaries of results. Seven trials[206-212] used multifactorial interventions, which varied in type of components and intensity of participant contacts, and showed inconsistent results for long-term NHP (RR range 0.43-3.07). Review authors cautioned "*prevalence of institutionalization in the control groups varied substantially, from 0.6 to 20.1 percent*" and wide confidence intervals reflected that long-term NHP were rare events. Two trials[213,214] used exercise only and showed "*no statistically significant effect on participants transitioning to institutionalized care…*" Other included studies on vitamin D, environmental modification, medication management, and psychological interventions did not report effects on long-term NHP.

One medium-quality review[74] addressed occupational therapy interventions for older adults and found only 1 RCT[215] that reported effects on long-term NHP. Review authors did not provide results from this trial. We examined this study and found that it evaluated occupational therapy at home for older adults who were recently hospitalized for falls; there were no significant differences in self-reported long-term NHP at 1 year.[215]

One high-quality review[77] focused on different models of delivering personal assistance to address ADL impairment for older adults. This review found 1 study that reported average number of days in the community (*ie,* not hospitalized or in a nursing home); no separate data for long-term NHP was provided.[216]

One high-quality review on light therapy[75] and 1 high-quality review on assistive technologies[80] both addressed adults with dementia and failed to identify any study reporting long-term NHP.

One low-quality review[82] evaluated demonstration projects that aimed to change current policies and practice towards "*comprehensive integration of acute and long-term care services, including financial mechanisms…*" Included projects occurred after the US National Long-term Care Demonstration (Channeling).[187] The review provided qualitative summaries of 7 demonstrations in US, Canada, UK, and Italy, and reported 2 of these projects evaluated rates of institutionalization.[172,217] Both programs occurred in Europe and involved case managers who assessed participants, coordinated care, and promoted utilization of HCBS; in one program, case managers directly managed the budget for HCBS and institutional long-term care services for their panels.[217] Both studies reported decreased institutionalization.[172,217]

In summary, evidence on long-term NHP was mostly not available for a wide range of interventions, and studies on interventions for falls prevention may have lacked sufficient follow-up and/or sample size to detect differences in long-term NHP.

DISCUSSION

SUMMARY OF KEY FINDINGS

To inform the VA Secretary's Choose Home Initiative, we conducted a review of reviews to examine a wide range of risk factors and interventions to delay or prevent long-term NHP. We found 67 eligible reviews addressing these questions mainly for older adults with impairments or at high risk of developing impairments. We did not find any eligible review or research studies for individuals with PTSD and/or TBI. Key findings include:

- Frailty status and higher frailty scores were associated with higher risk for long-term NHP
- Functional impairments, including difficulty with ADL/IADL, demonstrated the most consistent and substantial associations with higher risk for long-term NHP
- Caregiver distress and/or burden was associated with higher risk for long-term NHP
- Case management, caregiver support, and preventive home visit interventions demonstrated no overall benefit for delaying or reducing long-term NHP across studies, but there were a few studies in each category which showed delays
- For a variety of other interventions, such as physical activity, home-based primary care, and assistive technologies, very limited to no evidence were available for effects on long-term NHP

The lack of effectiveness in general for interventions like case management reflects the complexity of factors contributing to long-term NHP and the challenges of conducting and evaluating multicomponent programs to address these factors. Review authors highlighted multiple difficulties with summarizing effects for such complex interventions. This included lack of clarity on the exact components for various interventions, which made it difficult to understand the critical nature of any single component or the potential requirement for a specific combination of components. Moreover, review authors noted that different groups of participants with variable underlying risk for long-term NHP were enrolled in different studies. In addition to potentially different mechanisms of action (*eg*, due to heterogeneity of risk factors for long-term NHP), this variability led to difficulty with determining whether individual studies were adequately powered to detect true intervention effects. Also, because of the high degree of variability across many dimensions, reviews were limited in ability to examine intervention and participant characteristics through subgroup analyses. Overall, effects of complex interventions are particularly challenging to evaluate and synthesize due to differences in components and variation in context for the interventions (including characteristics of both participants and the healthcare or community setting).

Our results also suggest critical questions about the potential impact of interventions to delay or prevent long-term NHP. First, which participants should be selected for interventions, or alternatively, when in the course of aging or a chronic illness should someone be considered for more intensive services or programs? At earlier or less severe stages of a chronic condition, interventions have a better chance of preventing the development of impairments and disease

progression. However, challenges for such a public health approach include that many participants (in this lower risk group) must engage with the intervention, in order to see any appreciable benefit, and impacts may not be evident for many years. In the current US healthcare environment, the entity or organization that makes an upfront investment in such early interventions is unlikely to see the potential savings in resources from decreased future utilization of services. In contrast, interventions that target participants with many (or more intensive) existing care needs may have very limited ability to alter trajectories of decline for those at later stages of disability who have higher risk for long-term NHP. Current interventions aimed at these higher risk groups have largely sought to enhance coordination of services and caregiver resources, often with the hope that such efforts will enable existing informal support networks to continue meeting needs for adults with impairments. But some individuals with substantial needs will lack any support network, and social support can change quickly and dramatically (*eg*, death of a spouse). Our results suggest that many existing interventions would not sufficiently meet the needs of adults with impairments who have no informal caregiver support.

As noted above, addressing long-term NHP in the US is made more difficult by the fragmentation and complexity of the financial and regulatory environment for healthcare and long-term care services. These larger environmental factors make early investment (to reap long-term benefits) not financially feasible for many healthcare entities and community organizations. These factors also shape local availability (or lack thereof) to care and services, and thus limit the potential impact of individual interventions, such as case management, which must work with existing resources. Even limited demonstration projects of new financial benefits or incentives[218] must operate within existing local barriers to care and services, including availability and quality of service providers. While a change in state or national policy may incentivize improved access and/or higher quality of HCBS (*eg*, current Medicaid rebalancing initiatives[219,220]), it may take many years to truly change the landscape of local resources.

IMPLICATIONS FOR POLICY

As an integrated national healthcare system that provides and/or funds services across the whole continuum of healthcare and community settings (including outpatient and inpatient services, HCBS and long-term nursing home care), VA may be better situated to ensure integration of services across settings to meet the entire range of needs for eligible Veterans with impairments. However, although VA provides many services through its own facilities and staff, VA also purchases substantial amounts of care provided by non-VA community agencies and organizations. This is especially true for long-term care services, where the vast majority of Veterans receiving VA-paid HCBS and nursing home care are served by non-VA providers.[1] Thus, although VA has greater flexibility in provision and funding of services across settings, and greater ability to invest in early interventions, VA is also limited in delivery of care and services by the same local barriers to access and quality that apply to the general population of US adults with impairments. While VA spends a substantial proportion of its budget on long-term care services for eligible Veterans, this amounts to less than 10% of the annual Medicaid budget for long-term care services for elderly enrollees.[221] Therefore, it seems unlikely that VA can change the landscape of local resources (and availability of new models of care), unless it strategically partners with organizations that determine the majority of financial incentives (and regulations) for long-term care service providers in the US.

Additionally, and likely in part due to variation in local resources, VA facilities differ in the number and types of long-term care programs and services that are provided and/or funded.[222] Understanding what is available at a particular facility, and coordinating services across multiple programs within the same facility, remain key challenges for Veterans, their caregivers, and VA clinical staff.[223] While there are a range of risk factors which may contribute to long-term NHP, no single factor, or small set of factors, reliably indicate which individuals will need long-term NHP. Moreover, most factors, including the degree of functional impairment, are dynamic over time.[224,225] Thus, the salience of any particular program or service will also vary over time for individual Veterans at risk for long-term NHP. Therefore, in VA (as in non-VA settings), case management for adults with impairments may offer substantial benefits, despite the lack of effectiveness in general, as suggested by our results.

To impact long-term NHP, it is likely that case management (and other similar interventions that focus on caregiver support) should have relatively high-frequency longitudinal contacts with participants, be initiated early in the course of chronic conditions (eg, dementia), and extend for at least several years. Current VA programs likely do not provide comparable levels of support and care coordination over years, and implementing such high-intensity interventions may require substantial resources. As others have noted, there are also opportunities for VA to streamline its programs, and focus on consistently implementing a core set of evidence-based interventions across all facilities.[223] This may improve the ability of Veterans, their caregivers, and VA staff to identify and engage in appropriate care, potentially without high-intensity case management. While more consistent assessment of impairments and social resources, including caregiver support, may help clinicians and the healthcare system predict which Veterans are at higher risk for long-term NHP, we think it unlikely that improved assessment will be sufficient to improve outcomes. Thus, we recommend implementation of robust, longitudinal, and coordinated services to address needs that are identified through better assessment.

Finally, to better serve Veterans with impairments, VA should be at the forefront of advancing our understanding of the value of HCBS versus institutional nursing home care. Past work has highlighted that we lack high-quality evidence on whether (and which) outcomes are improved with HCBS.[226] Some have questioned whether the national push to shift funding to HCBS (and away from nursing homes) is wise, or if this will lead to worse outcomes for those with substantial needs,[227] especially if numeric goals (*eg*, proportion of spending on HCBS) do not adequately account for the specific mix of needs for different populations.[228] Our results support concerns that increased utilization of HCBS may not lead to appreciable changes in long-term NHP, and point to the importance of understanding the impact of HCBS on other outcomes. We agree with others who have encouraged policymakers to instead consider evaluating existing programs (and future interventions) in terms of cost-effectiveness due to improved patient and family-centered outcomes,[226,229] and not solely in terms of avoiding costs of long-term NHP. The VA should implement rigorous evaluations of patient and family-centered outcomes for VA-provided and -funded services, to help establish the value and cost-effectiveness for different types of long-term care services.

Therefore, we suggest the following:

- Organize and streamline VA programs and services according to their key goals, which may include delaying long-term NHP or other important outcomes, such as caregiver support and wellbeing

- Compare VA programs that aim to prevent or delay long-term NHP with models of high-intensity interventions (*eg*, case management, caregiver support, and/or home visits) that have some evidence for effects on long-term NHP, and consider that lower-intensity programs may have low likelihood of changing long-term NHP

- Combine implementation of improved assessment for physical and cognitive impairments and social resources with programs to provide dedicated, longitudinal care coordination over years, in order to impact long-term NHP

- Evaluate programs (including alternative residential settings that provide a high level of care) for cost-effectiveness from improved patient and family-centered outcomes, rather than cost-savings (from avoidance of long-term NHP)

- Leverage past VA experience with implementation of complex programs that have addressed both healthcare and social needs for vulnerable Veterans, and develop new models of support for Veterans with substantial impairments

EVIDENCE GAPS & FUTURE RESEARCH NEEDS

We found no review or studies that addressed risk factors or interventions to delay long-term NHP for individuals with PTSD and/or TBI. Perhaps this is because few individuals are at substantial risk of long-term NHP, although many require family support for mental health symptoms and mild cognitive impairment. However, questions regarding risk for long-term NHP should be examined in future studies.

Eligible reviews also found little evidence examining systems or environmental factors, such as local availability of HCBS, or appropriate and affordable housing. In part, this may be due to the selection criteria of eligible reviews examining risk factors, which often required longitudinal follow-up and excluded cross-sectional studies. As noted above, systems and environmental factors may be very important and limit the ability of individual interventions to address long-term NHP. Additionally, reviews did not identify evidence regarding certain personal and social factors, such as attitudes and preferences for setting of care. Some adults with impairments (and their caregivers) may have more positive attitudes toward institutional care and some preferences may change over time.[11,230]

As noted above, eligible reviews on interventions to prevent or delay long-term NHP reported difficulties with evaluation of complex interventions that often differed along multiple dimensions, including in type and number of components, settings, and frequency and modality of participant contacts. Combined with heterogeneity in participant characteristics and settings for studies, this intervention complexity and variability created substantial challenges in understanding effects on long-term NHP. As complex interventions may be the most plausible way to enhance healthcare delivery and improve outcomes for various groups with complex needs, it is imperative that we consider methodologies to improve design and evaluation of such interventions. For example, the multiphase optimization strategy (MOST) can be employed to guide selection of intervention components that may work better for certain groups or in certain settings.[231] Frameworks also exist for pragmatic trials and explicit consideration of implementation outcomes, along with effects on participant health and functioning (*eg*, stepped wedge and hybrid designs).[232,233] One important benefit of applying an implementation science

framework is the clarification between the "core" set of important components and an "adaptable periphery" of elements that can be adjusted to accommodate the local context for implementation[234]; this acknowledgment is key for considering intervention fidelity, interpreting effectiveness results, and enabling future implementation.

Therefore, we recommend the following for future research:

- Longitudinal observational studies examining whether individuals with PTSD and/or TBI are at substantial risk of long-term NHP
- Longitudinal studies on effect of factors such as attitudes and preferences for setting of care, and systems and environmental factors, including local availability of HCBS, on long-term NHP
- Randomized evaluations of complex interventions that compare models of care which differ in only 1-2 key components or characteristics (*eg*, similar types of services at home vs in clinic)
- Randomized evaluations of interventions with longer follow-up (likely > 2 years) and larger sample size, particularly if targeting individuals at lower overall risk of long-term NHP
- Consider using strategies to optimize selection of intervention components and evaluation designs that explicitly consider implementation outcomes in future studies of complex interventions to address long-term NHP

LIMITATIONS

To address the priorities of our VA partners, this work focused on long-term NHP, and reviews that did not address long-term NHP were excluded. Although we also abstracted results for other outcomes (*eg*, mortality and hospitalizations for adults with impairments), we only examined prioritized reviews that evaluated long-term NHP. We excluded reviews that only addressed caregiver outcomes. Therefore, our findings do not indicate that interventions are not effective for other important outcomes for adults with impairments or their caregivers. We prioritized highest quality and more recent reviews to provide associations and effects for specific risk factors and interventions. We relied on review authors' descriptions of interventions, quality ratings for included studies, and determination of overall strength of evidence. We examined included primary studies from only prioritized reviews, and our focus was primarily to provide an indication of the size of the underlying evidence base (*ie*, by counting the number of unique studies addressing different interventions and confirming ascertainment of long-term NHP in these studies). Most eligible reviews did not specify how they determined whether included studies addressed long-term NHP. In our examination of primary studies included in prioritized reviews, we found that most studies used participant or family reports of long-term NHP and few confirmed long-term NHP with additional data sources, such as state or federal administrative data on utilization of long-term care services. Examination of the primary studies also showed that few were conducted in the VA (a notable exception being research on HBPC, although these studies did not examine long-term NHP); however, evidence for the general population may be applicable to Veterans, given the likelihood of some shared risk factors that contribute to long-

term NHP, as well as VA's use of non-VA service providers for many Veterans with impairments. It may be that interventions in countries other than the US may be less relevant for Veterans and the VA, but we elected to include this evidence, as it may help inform future policy changes. Despite these limitations, our review provides important information about a wide range of risk factors and interventions to delay long-term NHP.

CONCLUSION

Existing evidence on a wide range of risk factors and interventions for older adults demonstrated the complexity of contributors to long-term NHP and the difficulty of preventing or delaying this outcome. There was a lack of evidence evaluating certain risk factors, especially at the level of systems and environment. Very limited evidence suggested that high-intensity models of case management, caregiver support, and home visits may delay long-term NHP. Although there are a variety of VA programs and services that seek to help Veterans with impairments, many likely do not involve similar levels of participant contact and dedicated coordination of care and services over years, compared with those interventions that were able to change long-term NHP. Policymakers should consider evaluating cost-effectiveness of current and future VA programs in terms of improved patient and family-centered outcomes, and not solely as seeking to avoid costs of long-term NHP.

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