



# Emergency Department Interventions for Older Adults

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## PREFACE

The VA Evidence-based Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of particular importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. QUERI provides funding for four ESP Centers, and each Center has an active University affiliation. Center Directors are recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Centers. The ESP is governed by a Steering Committee comprised of participants from VHA Policy, Program, and Operations Offices, VISN leadership, field-based investigators, and others as designated appropriate by QUERI/HSR&D.

The ESP Centers generate evidence syntheses on important clinical practice topics. 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 ESP disseminates these reports throughout VA and in the published literature; some evidence syntheses have informed the clinical guidelines of large professional organizations.

The ESP Coordinating Center (ESP CC), located in Portland, Oregon, was created in 2009 to expand the capacity of QUERI/HSR&D and is charged with oversight of national ESP program operations, program development and evaluation, and dissemination efforts. The ESP CC establishes standard operating procedures for the production of evidence synthesis reports; facilitates a national topic nomination, prioritization, and selection process; manages the research portfolio of each Center; facilitates editorial review processes; ensures methodological consistency and quality of products; produces “rapid response evidence briefs” at the request of VHA senior leadership; collaborates with HSR&D Center for Information Dissemination and Education Resources (CIDER) to develop a national dissemination strategy for all ESP products; and interfaces with stakeholders to effectively engage the program.

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This topic was developed in response to a nomination by Dr. Thomas Edes, Executive Director, VHA Geriatrics and Extended Care Operations, and Dr. Chad Kessler, Director, VHA Emergency Medicine, for the purpose of identifying and evaluating intervention strategies in emergency care for older adults and with the goal of implementation across 141 VA emergency departments (EDs) and urgent care centers (UCCs). 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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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 nonfinancial 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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## EXECUTIVE SUMMARY

### INTRODUCTION

Older adults, particularly those 75 years of age and older, visit the emergency department (ED) with nearly twice the frequency of their younger counterparts. Within VA, older Veterans account for 40 percent of 2.4 million annual ED visits. This figure will continue to rise as the number of older Veterans is expected to increase significantly over the next decade.

Older adults presenting to the ED can experience challenges that make care more difficult, such as multiple morbidities, polypharmacy, atypical symptoms, functional disabilities, impaired cognition, and reduced social support. To address these challenges, a range of interventions designed to improve clinical outcomes and decrease healthcare utilization in older adult ED users have been evaluated in prior studies. These include care delivery, case management, and transitional care or discharge planning. Systems-level attention to these challenges is also evident through the 2014 publication of the Geriatric Emergency Department Guidelines (hereafter referred to as the 2014 Geriatric ED Guidelines). These collaborative guidelines provide a template for staffing, equipment, education, policies and procedures, follow-up care, and performance-improvement measures, but do not include evidence-based recommendations on specific ED interventions.

Our review aims to fill gaps in the literature by synthesizing evidence about ED interventions for clinical outcomes such as functional status and quality of life and utilization outcomes including hospital admission and ED readmission. Additionally, our review carefully classifies individual intervention components and uses rigorous analytic techniques to compare the effectiveness of selected interventions on outcomes of interest.

At the request of the VHA Offices of Geriatrics and Extended Care Operations and Emergency Medicine, we conducted a systematic review and meta-analysis to address the following key question (KQ):

How effective are emergency department (ED) interventions in improving clinical, patient experience, and utilization outcomes in older adults (age  $\geq 65$ )?

### METHODS

We developed and followed a standard protocol for this review in collaboration with operational partners and a technical expert panel (PROSPERO registration number CRD42018087660).

#### Data Sources and Searches

We searched MEDLINE (via PubMed), Embase, and CINAHL through December 4, 2017. We also identified studies by reviewing the bibliographies of relevant review articles. Additionally, we performed a search of ClinicalTrials.gov and a targeted search of Scopus for publications citing the 2014 Geriatric ED Guidelines.

## Study Selection

In brief, the major eligibility criteria were studies conducted in EDs that enrolled older adults (age  $\geq 65$ ); evaluation of case management, discharge planning, medication management, and/or geriatric guideline-based intervention strategies; randomized or quasi-experimental study designs; and a clinical, patient experience, or utilization outcome. Using these prespecified inclusion/exclusion criteria, 2 reviewers independently evaluated titles and abstracts to identify potentially eligible studies. Studies that met all eligibility criteria at full-text review were included for data abstraction.

## Data Abstraction and Quality Assessment

Key characteristics, abstracted by 1 reviewer and over-read by another, included patient descriptors, intervention structure (*ie*, overall strategy and core components) and characteristics (*ie*, mode, dose), comparator, and outcomes. Based on abstracted data, we evaluated each study for the presence, or absence, of 3 key intervention components: assessment, referral plus follow-up, and bridge design (*ie*, planned contacts occurring both before and after ED discharge). Study risk of bias (ROB) was assessed independently by 2 reviewers using the Effective Practice and Organisation of Care (EPOC) guidance. We assigned a summary ROB score separately for non-patient-reported outcomes, hereafter referred to as objective outcomes (*eg*, mortality, ED readmission), and patient-reported outcomes (*eg*, quality of life).

## Data Synthesis and Analysis

We summarized the literature using relevant data abstracted from the eligible studies. Feasibility of completing meta-analyses to estimate summary effects depended on the volume of relevant literature, conceptual homogeneity of the studies, and completeness of results reporting. We aggregated outcomes when there were at least 3 studies with the same outcome, reported at similar time points; for nonrandomized studies, we required adequately adjusted analyses to be reported. All analyses were stratified by randomized versus nonrandomized study designs.

When meta-analysis was possible, dichotomous outcomes (*eg*, mortality) were combined using risk ratios in the random-effects analyses. Continuous outcomes (*eg*, quality of life) were summarized using the mean difference. When quantitative synthesis was not feasible, we analyzed the data qualitatively, giving more weight to larger, lower ROB studies. Strength of evidence (SOE) was assessed for outcomes critical to decision making using the approach described by the Grading of Recommendations Assessment, Development and Evaluation working group (GRADE).

## RESULTS

### Key Points

- The literature addressing intervention strategies for older adults presenting to EDs is diverse, with varying approaches to selecting patients for services and an array of intervention strategies that typically incorporate geriatric care and/or chronic care principles that have been effective in other settings.

- ED interventions showed a mixed pattern of effects on clinical outcomes. Evidence suggested a small benefit for functional status (very low strength of evidence [SOE]), but no effects on quality of life (QOL). However, only 2 studies reported effects on QOL.
- ED interventions did not show a reduction in mortality, but no study identified mortality as a primary outcome. This finding was based on few events, and confidence intervals do not exclude an important effect.
- Overall, there were no effects of ED interventions on hospitalization at the index visit (very low SOE), subsequent hospitalizations (low SOE), or ED readmission (high SOE).
- Studies with the greatest effects on clinical and healthcare utilization outcomes employed more comprehensive interventions, but this pattern was not consistent across all effective interventions:
  - Multi-strategy interventions, defined as those using more than 1 intervention strategy (*eg*, discharge planning, case management, medication management), may be associated with less decline in functional independence.
  - More intensive, or higher touch, interventions, as indicated by the presence of 3 key intervention components (*ie*, assessment, referral plus follow-up, and bridge design), may be associated with less decline in functional independence, and decreased hospitalization after the ED index visit and/or ED readmissions.
  - Single-contact interventions, whether delivered in the ED or after discharge, do not improve utilization outcomes.

## Results of Literature Search

We reviewed a total of 1,878 references, of which 100 were reviewed at the full-text stage. Of these, 17 references describing 15 unique studies (9 randomized and 6 nonrandomized) were included for data abstraction. All were conducted in the United States, Canada, Europe, or Australia. More than 16,000 older adults were enrolled in these studies, but no study explicitly enrolled Veterans.

## Study and Intervention Characteristics

The 15 studies recruited a broad patient population (*ie*, not limited to a specific diagnosis or condition). Just over one-half of studies enrolled older adults at higher risk for poor health outcomes as determined by either a risk-assessment tool or clinical criteria (*eg*, dependent in 1 or more activities of daily living [ADLs]). Interventions were delivered during the index ED visit, post-ED discharge, or across settings (*ie*, bridge). Case management was the most common intervention strategy (n=12), followed by discharge planning (n=7), and medication management/medication safety (n=3). Roughly one-half of studies (n=7) used more than 1 of these intervention strategies and thus were classified as multi-strategy. The most common combinations were discharge planning plus case management (n=5) and case management plus medication safety (n=2). Across the strategies, interventions included the components of risk assessment (n=12, including 8 that specified use of a comprehensive geriatric assessment), referral plus follow-up (n=6), and bridge designs (n=5). Intervention strategies typically incorporated geriatric care and/or chronic care principles that have been effective in other settings, but studies did not describe an overall conceptual model that motivated the intervention.

Measures of healthcare utilization, such as ED readmission, were the most commonly reported outcomes. The ROB for objective outcomes was judged low for 4 studies, unclear for 3 studies, and high for 7; 1 study did not report an objective outcome.

### Summary of Intervention Effects

Randomized studies showed a pattern of positive effects on functional status (4 studies, low SOE), but no effect on mortality. Effects on QOL were reported infrequently. There was no effect noted in the limited number of studies that reported this outcome. Although ED interventions did not show a reduction in mortality, there were few events, and confidence intervals do not exclude an important effect.

Five studies reported effects on patient experience, but this outcome was often measured by unvalidated scales. Overall, these studies show a mixed pattern, with 2 studies reporting higher satisfaction with care or greater patient knowledge of community resources.

Overall, interventions did not show a reduction in hospitalization at index ED visit (3 studies, very low SOE). Meta-analyses of randomized studies did not show an overall effect on subsequent hospitalizations (3 studies; relative risk [RR] 0.96; 95% CI 0.51 to 1.83; low SOE), or ED readmission (6 studies; RR 1.13; 95% CI 0.94 to 1.36; high SOE). However, a qualitative analysis that included nonrandomized studies suggested that interventions that included points of contact before and after ED discharge decreased hospital and ED readmission rates.

Multi-strategy interventions (*eg*, discharge planning and case management) may be associated with benefit on functional status and some utilization outcomes. Similarly, more intensive interventions with multiple planned contacts across settings (*ie*, both before and after ED discharge) may be associated with beneficial effects on functional status and some utilization outcomes.

### Key Findings and Strength of Evidence

In order to evaluate strategies to improve ED care for older adults, we examined intervention effects on a range of outcomes of importance to patients, clinicians, and policymakers. We used a unique approach to classifying intervention strategies and specific components, assessed ROB carefully, and included only randomized or stronger nonrandomized studies. Although the intervention approaches varied widely across studies, we were particularly interested in determining if specific intervention strategies or components were associated with greater benefit to older adults. Studies most often evaluated case management or multiple intervention strategies. Two strategies were evaluated infrequently (medication management) or not at all (guideline-informed). We found a pattern of small benefit for functional status but, overall, no benefit on ED readmission or subsequent hospitalization. Intervention effects for other outcomes were uncertain because of infrequent or incomplete reporting. Most interventions evaluated were relatively low intensity, and thus our findings are applicable only to low-intensity geriatric management strategies in the ED.

We evaluated strategies applicable to a broad range of older adults rather than focusing narrowly on condition-specific interventions. Just over half of the 15 studies enrolled high-risk older adults—patients who are similar clinically to Veterans presenting to VA EDs. The SOE was

rated high for effects on ED readmission but low, or very low, for other outcomes. This was due to concerns of high ROB, inconsistent effects, and imprecision.

### Strength of Evidence for Effects of Interventions to Improve Outcomes for Older Adults in Emergency Departments

Outcome	Studies (Patients)	Findings	Strength of Evidence (Rationale by Domain)
Physical function	Randomized: 5 (2233)	3 of 5 showed benefit; beneficial interventions were multi-strategy	Very low SOE (Serious ROB, inconsistent, imprecise)
	Nonrandomized: 1 (687)	No effect	
ED readmission	Randomized: 7 (4629)	Relative risk 1.13 (0.94 to 1.36) (9 fewer to 53 more per 1,000)	High SOE (No serious ROB, consistent, precise)
	Nonrandomized: 5 (6432)	2 of 5 showed lower readmission; beneficial interventions were multi-strategy or case management	
Hospital admission after index	Randomized: 3 (3338)	Relative risk 0.96 (0.51 to 1.83) (59 fewer to 100 more per 1,000)	Low SOE (No serious ROB, inconsistent, imprecise)
	Nonrandomized: 3 (5346)	No consistent effects on readmission	
Patient experience	Randomized: 4 (1889)	2 of 4 showed benefit for satisfaction, helpfulness, or self-esteem; beneficial interventions were multi-strategy or case management	Low SOE (No serious ROB, consistent, indirect, imprecise)
	Nonrandomized: 1 (199)	No usable data	

Abbreviations: ROB=risk of bias; SOE=strength of evidence

### Implications and Applicability to Veterans

Similar to prior reviews and the 2014 Geriatric ED Guidelines, our review suggests that ED visits should not be considered in isolation, but as an integral part of the geriatric patient's continuum of care. The diversity of interventions and outcome measures across included studies limits our ability to determine clinical utility of any 1 intervention strategy and highlights the need for interventions rooted in a conceptual model. Our structured analysis of these heterogeneous findings suggests that single-strategy interventions are less effective at improving outcomes compared with more comprehensive and more intensive interventions (*ie*, interventions including assessment, referral plus follow-up, contacts both pre- and post-ED discharge). Although none of the studies included Veteran populations, all studies were conducted in economically developed countries with community-dwelling, mostly high-risk older adults without cognitive impairment, and with broadly similar ED and geriatric staff training.

### Research Gaps/Future Research

The primary gaps in the current evidence are studies that actively recruit Veterans, studies that examine optimal dose of ED intervention strategies (number of contacts and duration) or optimal timing and setting (both within ED and after discharge), and studies that evaluate interventions

informed by the 2014 Geriatric ED Guidelines. Although 8 studies targeted high-risk patients, few studies have examined which subpopulations of older adults benefit most from ED strategies. Similarly, the existing literature often lacks complete descriptions of intervention strategies and components.

Future research may benefit from using conceptual models to guide selection of intervention strategies and hypothesize the relationship, or mechanisms of action, between such strategies and outcomes of interest. Conceptual models may also enable researchers to explore ED use through a more holistic lens, expanding beyond clinical and medical characteristics that influence use to also consider sociodemographic factors, individual preferences, and access to services. Future research should consider using innovative intervention and evaluation designs to achieve a balance between interventions that are broadly applicable to diverse, heterogeneous populations and patient-centered interventions tailored to meet the needs of high-risk subgroups. This may include adaptive intervention designs to optimize dose and content of interventions and innovative study designs, including factorial designs and hybrid designs, that allow researchers to isolate intervention components for assessing individual and interactive effects of intervention strategies and components and/or evaluate interventions in pragmatic settings. Lastly, future research should address challenges in outcome measures, including the selection of outcome measures that apply to older adults with a range medical conditions and that are responsive to change. There is substantial opportunity for patient- and stakeholder-engaged research, as well as research informed by the 2014 Geriatric ED Guidelines.

## Conclusions

We focused only on studies recruiting general patient populations as opposed to focusing on interventions for specific presenting conditions or diagnoses upon ED discharge (*eg*, falls, heart failure). Our results indicate mixed effects of ED intervention strategies on select clinical and utilization outcomes. The small number of studies using any single intervention strategy makes it difficult to draw definitive conclusions because of imprecise estimates of effect and variability in study populations, intervention strategies, and intervention components. However, we found evidence that studies evaluating multi-strategy interventions and those with a more intensive structure, as indicated by the presence of 3 key intervention components (*ie*, assessment, referral plus follow-up, and planned contacts both pre- and post-ED discharge) may be associated with a small benefit in functional status, decreased hospitalization after the ED index visit, and/or lower likelihood of ED readmission. Future research should be informed by a comprehensive conceptual model, consider emerging intervention approaches (*eg*, adaptive, or dynamic, treatment designs), employ rigorous evaluation strategies, adhere to more thorough reporting of intervention structure, and engage patients and relevant policymakers in selecting outcomes of interest.

## ABBREVIATIONS TABLE

ACEP	American College of Emergency Physicians
ADL	Activity of daily living
CI	Confidence interval
CINAHL	Cumulative Index to Nursing and Allied Health Literature database
ED	Emergency department
ESP	Evidence-based Synthesis Program
HSR&D	Health Services Research & Development
IADL	Independent activity of daily living
KQ	Key Question
MD	Mean difference
MeSH	Medical Subject Heading
OARS	Older Americans Resources and Services
OECD	Organisation for Economic Cooperation and Development
PICOTS	Population, intervention, comparator, outcome, timing, and setting
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta Analyses
QOL	Quality of life
QUERI	Quality Enhancement Research Initiative
ROB	Risk of bias
SF-36	Short-Form Health Survey
SMD	Standardized mean difference
SOE	Strength of evidence
VA	Veterans Affairs
VHA	Veterans Health Administration