



Evidence Brief: Effect of Geriatricians on Outcomes of Inpatient and Outpatient Care

June 2012

Prepared for:

Department of Veterans Affairs
Veterans Health Administration
Quality Enhancement Research Initiative
Health Services Research & Development Service
Washington, DC 20420

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PREFACE

Quality Enhancement Research Initiative's (QUERI) Evidence-based Synthesis Program (ESP) was established to provide timely and accurate syntheses of targeted healthcare topics of particular importance to Veterans Affairs (VA) managers and policymakers, as they work to improve the health and healthcare of Veterans. The ESP disseminates these reports throughout VA.

QUERI provides funding for four ESP Centers and each Center has an active VA affiliation. The ESP Centers generate evidence syntheses on important clinical practice topics, and these reports help:

- develop clinical policies informed by evidence,
- guide the implementation of 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.

In 2009, the ESP Coordinating Center was created to expand the capacity of QUERI Central Office and the four ESP sites by developing and maintaining program processes. In addition, the Center established a Steering Committee comprised of QUERI field-based investigators, VA Patient Care Services, Office of Quality and Performance, and Veterans Integrated Service Networks (VISN) Clinical Management Officers. The Steering Committee provides program oversight, guides strategic planning, coordinates dissemination activities, and develops collaborations with VA leadership to identify new ESP topics of importance to Veterans and the VA healthcare system.

Comments on this evidence brief are welcome and can be sent to Nicole Floyd, ESP Coordinating Center Program Manager, at nicole.floyd@va.gov.

Recommended citation: Totten A, Carson S, Peterson K, Low A, Christensen V, Tiwari, A, Helfand M. Evidence Brief: Effect of geriatricians on outcomes of inpatient and outpatient care, VA-ESP Project #09-199; 2012.

This report is based on research conducted by the Evidence-based Synthesis Program (ESP) Coordinating Center located at the Portland VA Medical Center, Portland, OR funded by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Quality Enhancement Research Initiative. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (e.g., employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

KEY MESSAGES

The currently available research on medical care involving geriatricians suggests:

- The impact of geriatrician involvement on patient function and health care utilization varies across the different models of care that include geriatricians in different roles.

INPATIENT CARE

- Patients receiving care in special geriatric units that are staffed by a team including a geriatrician have better function at discharge and are more likely to be discharged to home than patients receiving standard hospital care.
- Inpatient rehabilitation including a geriatrician resulted in lower nursing home admissions, improved function and lower mortality at followup (range 3-12 months) compared to usual care.
- Evidence about the effect of inpatient geriatric intervention on hospital readmission, length of stay, emergency visits, and outpatient visits is insufficient to draw conclusions.
- Neither inpatient geriatric units nor inpatient geriatric teams had lower patient mortality rates when compared with usual care.
- There is insufficient evidence to allow any conclusion about whether models of care that use geriatricians as inpatient consultants are effective.
- Geriatricians in special teams that conduct Comprehensive Geriatric Assessment and advise on patient care across hospital units (floating teams) do not improve patient outcomes.
- For all types of interventions involving geriatricians in inpatient care:
 - Detailed examinations of the impact of different components of the intervention, including the specific contribution of the geriatrician, are difficult to isolate from published studies.
 - More research is needed about what components of specific types of interventions are most likely to improve patient outcomes.

OUTPATIENT CARE

- Geriatricians in teams and as consultants had mixed results in terms of impact on function, living at home and health services utilization.
- Interventions in which geriatricians have direct patient contact are more likely to result in better outcomes than interventions where the interaction is limited to supporting other clinicians.
- Geriatricians as primary care providers provide more effective medication management than other clinicians.
- The evidence does not show that outpatient care involving geriatricians reduced mortality compared to usual care.

INTRODUCTION

In 2011, 42.1 percent (approximately 9 million) of all US Veterans were over 65 years old.¹ An increasing number of these older Veterans are receiving health care from the Veterans Healthcare Administration (VHA). Projections are that 43 percent of all Veterans over 65 will enroll in VHA in

2013, up from 31 percent in 2003; 20 percent of Veterans over 85 received care in VHA in 2003, and this is expected to rise to 51 percent by 2013.²

As Veterans age, their health care needs are likely to change and increase, resulting from the development of chronic illness and age-related disability. Geriatric syndromes, such as falls and incontinence, can contribute to acute or serious problems such as fractures and pressure ulcers. Cognitive impairments, regardless of the cause, make managing both daily life and chronic conditions such as diabetes challenging. Additionally, older Veterans are more likely to take multiple medications and receive health care from several clinicians. This increases the chances for adverse drug events, miscommunication, and fragmented care that can ultimately result in negative consequences for older Veterans. Multifaceted and multidisciplinary models of care for older people have been developed, such as Comprehensive Geriatric Assessment (CGA) and Geriatric Evaluation and Management (GEM). The common elements of these models are assessment and follow-up with a focus on maximizing function and quality of life while avoiding negative outcomes to the extent possible.

Addressing the needs of older Veterans requires a combination of different models of care and the involvement of health care providers with expertise in caring for older people. Geriatricians are physicians with additional training and certification in the care of the multiple and often complex health concerns of older adults. Geriatricians can play different roles in care teams; and in these care models, their roles may range from leader of a team, to occasional consultant, to clinician with primary responsibility for care.

This evidence brief summarizes the existing research available on the impact of geriatricians, acting in various roles, on selected patient outcomes in hospital and outpatient care. The Objectives and Methods sections describe included roles and outcomes in more detail.

This report was produced in response to a request for an evidence brief from the Office of Geriatrics and Extended Care and the Healthcare Delivery Committee of the National Leadership Council of VA. An evidence brief differs from a full systematic review in that the scope of work is more narrowly defined in order to provide information needed in a specific timeframe for policy and practice decisions. The scope of work was negotiated with the requestors in order to balance their information needs and time constraints. The scope of work for this brief included outcomes that were of highest priority for the requestors, used systematic reviews as the primary source of evidence, and did not include translating articles in other languages into English.

OBJECTIVES

The primary and secondary objectives of this review are:

PRIMARY: To evaluate the effectiveness of geriatricians as consultants, co-management providers, or individual primary care providers, on inpatient and outpatient care. We defined effectiveness as improvement in any of the following patient outcomes:

- Function (physical or cognitive)
- Nursing home admission, discharge to home, or living at home during follow-up period

- Health services utilization (hospital admission or readmission, length of hospital stay, emergency department visits, outpatient visits)
- Medication management (appropriateness, number, or adverse events)
- Mortality

These outcomes were prespecified in the scope of work agreed to by the requesting organization and the investigators. Studies that included only other outcomes, such as patient satisfaction, were not included. If studies included multiple outcomes, only the results for the included outcomes are summarized in this Brief.

SECONDARY: If outcomes are shown to be improved, to describe specific characteristics (either patient characteristics or care model characteristics) that led to more effective outcomes.

KEY QUESTIONS

To address the proposed objectives, we will answer the following key questions:

Key Question 1A: *What is the effectiveness of geriatric teams, consultative services or geriatric co-management for inpatient medical and surgical patients?*

Key Question 1B: *If increased effectiveness is demonstrated, are there specific characteristics (either of the patient or the care model) that lead to improved outcomes for inpatients?*

Key Question 2A: *What is the effectiveness of geriatric consultation, co-management, or geriatricians as primary care providers for outpatient primary care?*

Key Question 2B: *If geriatric care is shown to lead to improved outcomes, are there specific characteristics (either of the patient or care model) that lead to more effective outcomes among the primary care outpatient population?*

METHODS

We searched for systematic reviews, trials, and observational studies in PubMed, the Cochrane Database of Systematic Reviews[®], the Cochrane Central Register of Controlled Trials[®], and the Cochrane Database of Reviews of Effects on March 2, 2012, using standard search terms (for full search strategy, see Supplemental Materials) back to 1985. Additional citations were identified from reference lists, hand searching, and consultation with content experts. We limited the search to published and indexed articles involving human subjects and available in English. We did include studies conducted in countries other than the United States if they were available in English. Titles, abstracts, and articles were reviewed in duplicate by investigators and research associates trained in the critical analysis of literature.

For studies to be included, interventions had to include a geriatrician and involve inpatient or outpatient medical care. Systematic reviews had to include enough information about the interventions in the included studies for us to determine which studies included geriatricians. Long-term care and care models that integrate long-term and acute care were not included. Studies had to include a comparator,

that is they could not simply describe an intervention, but rather the intervention had to be evaluated. The studies also had to report at least one of our prespecified outcomes. Studies that were part of an included systematic review were not considered separately—that is they are not reported twice—in our evidence synthesis. Detailed inclusion and exclusion criteria are provided in the Supplemental Materials.

Quality assessment of all included systematic reviews was performed by investigators and research associates using the AMSTAR criteria.³ Systematic reviews that met at least six of the 11 AMSTAR criteria were considered high quality and used as the basis for the summary of evidence in this Evidence Brief. We assessed study quality of additional controlled trials and observational studies according to adapted criteria proposed by Downs and Black (observational studies) and methods developed by the U.S. Preventive Services Task Force.^{4,5} Studies assessed as fair or good quality according to these criteria and not covered in one of the included systematic reviews are described separately in the Results below. Detailed quality assessment criteria and results of our assessments for all included studies are provided in the Supplemental Materials. Brief information on primary studies rated as poor quality is also provided in the Supplemental Materials, but these studies did not contribute to our synthesis of the evidence.

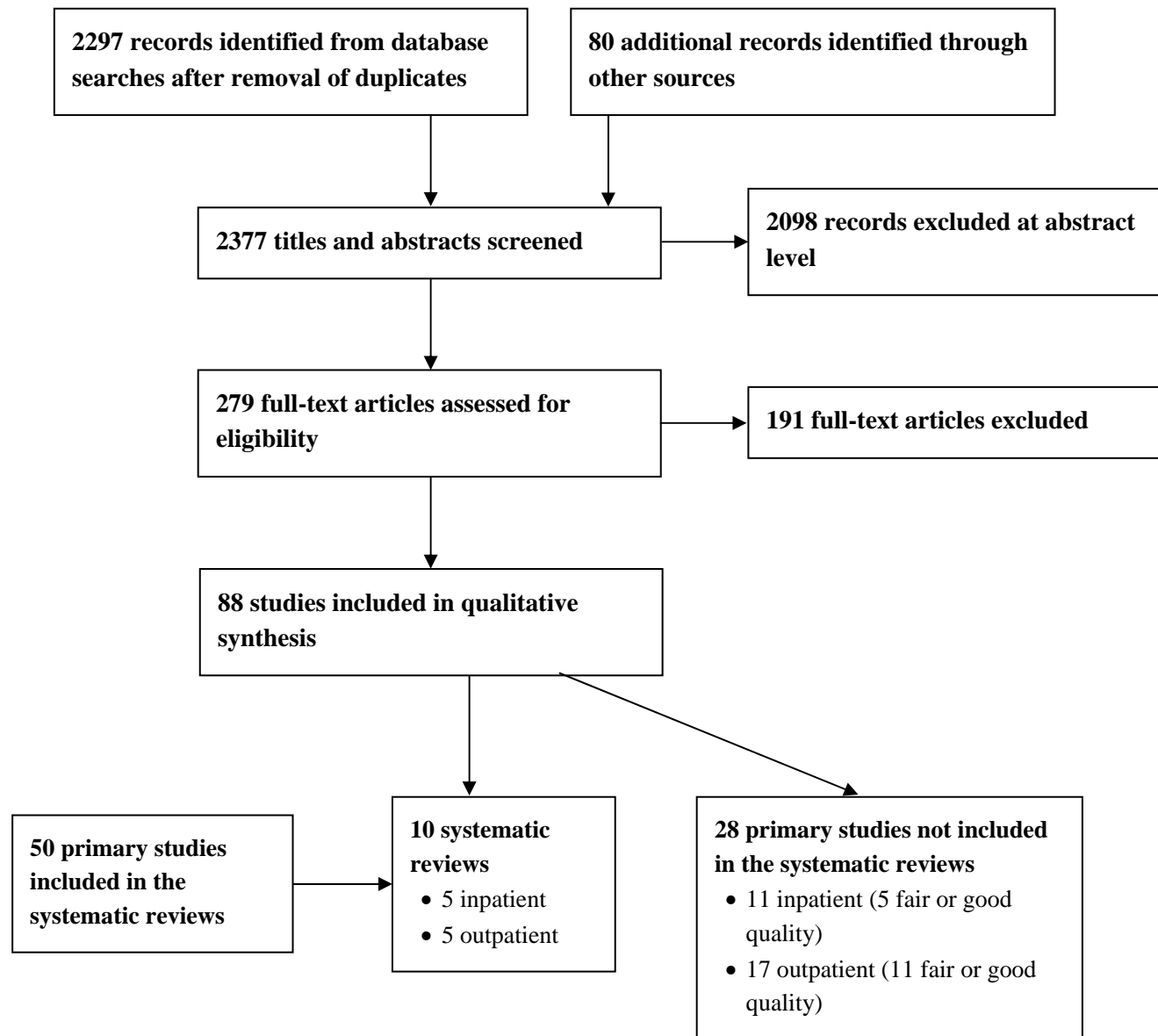
A draft version of this evidence brief was reviewed by five technical experts, as well as representatives of the organizations that requested this brief. Reviewer comments were addressed and our responses were incorporated in this final version of the Evidence Brief. A disposition of comments table is included in the Supplemental Materials.

RESULTS

Figure 1 below provides details on the number of articles identified and their disposition at each step of the review. The primary reason for exclusion at the screening phase was that the study was about a topic that did not match the objectives of the review. The most common reasons for exclusion at the full-text level were lack of a geriatrician in the intervention, lack of an included outcome, or the article was descriptive, with no comparison made between the intervention and another group or pre-intervention time period.

We identified 10 good quality systematic reviews and 78 articles reporting primary research. Of the 78 articles, 50 were included in one or more of the 10 systematic reviews and their results are not discussed separately. The 28 not included in the systematic reviews were evaluated and are presented separately.

Figure 1. Literature Flow Chart



KEY QUESTION 1A: What is the effectiveness of geriatric consultative services or geriatric co-management for inpatient medical and surgical patients?

OVERVIEW OF IDENTIFIED STUDIES

We included five recent, good quality systematic reviews of inpatient geriatric care involving geriatricians.⁶⁻¹⁰ We also identified four fair or good quality randomized trials¹¹⁻¹⁴ and one fair quality observational study¹⁵ of inpatient care that were not included in these systematic reviews and therefore are described separately. Information on the systematic reviews is provided in Table 1 and information on the additional primary studies is reported in Table 2. Six studies were rated as poor quality¹⁶⁻²¹ and are

not included in our synthesis. Brief information on these studies is provided in the Supplemental Materials.

These reviews and primary studies evaluated several different models of care that included geriatricians:

- **Comprehensive Geriatric Assessment (CGA)** involves a coordinated multidisciplinary assessment designed to identify medical, physical, social and psychological problems and serve as the basis for a plan of care.
- In hospitals, CGA may be the basis for care that is provided in **inpatient geriatric units** known by names such as Acute Care for the Elderly (ACE) and Geriatric Evaluation and Management Units (GEMU). These units may have physical, organizational and staff characteristics designed specifically for geriatric care.
- CGA may be also used by **multidisciplinary teams** that provide care for patients throughout the hospital, in the different units to which older patients are admitted.
- Individual geriatricians may provide **inpatient geriatrics consultations** about patients under the care of other physicians. These consultations may be routinely provided for certain types of patients, or provided in response to requests by other physicians.

Comprehensive Geriatric Assessment

A 2011 Cochrane review of CGA for hospitalized patients⁶ updated a technology assessment⁹ and two earlier reviews conducted in 1993²² and 2005.²³ This 2011 review identified 22 trials that included 10,315 patients and evaluated the overall impact of CGA as well as whether the impact on outcomes varied by characteristics of the CGA intervention. Twenty of the 22 trials included a geriatrician as part of the CGA team.

The review authors conclude that **older patients who receive CGA in the hospital have more positive outcomes than patients receiving usual care**. They were:

- More likely to be living at home during the follow-up period after discharge
 - OR 1.25, 95% CI 1.11–1.42, p=0.0002; six months post-discharge
 - OR 1.16, 95% CI 1.05–1.28, p=0.003; end of follow-up (median one year)
- Less likely to be institutionalized
 - OR 0.79, 95% CI 0.69–0.88, p<0.00001
- Less likely to have deteriorated in their level of function
 - OR 0.76, 95% CI 0.64–0.90, p=0.001
- More likely to have improved cognitive function
 - OR 1.11, 95% CI 0.02–2.01, p=0.002

However, CGA had no effect on mortality (OR 0.99, 95% CI 0.80–1.05, p=0.20).

Inpatient Geriatric Units

Special geriatric hospital units have been the subject of many studies since the 1980s. The 2011 Cochrane review of CGA for hospital patients⁶ concluded that **the positive impact of CGA in hospitals**

are primarily the result of CGA that is incorporated into care in special geriatric units and not CGA teams that cover multiple units.

The reviewers split the interventions according to whether the CGA was based in a specialized geriatric acute care hospital unit or ward (15 studies) or the CGA was conducted by a team that ‘floats’ or treats patients in the various acute care units to which patients were admitted (7 studies). These reviewers conducted analyses of these subgroups to estimate the contribution of these two models to improvement in outcomes. Results showed that:

- CGA in special hospital units improved the odds of living at home after discharge and avoiding institutionalization when compared to usual care.
- Floating teams produced results that *did not* differ significantly from the outcomes of usual care.
- The authors of this review speculate that this may be because special units allow the geriatric team to have more control over care, including implementation of the recommendations based on CGA, and permit the development of greater expertise among everyone who works on the unit.

Two other systematic reviews summarized smaller numbers of studies of special inpatient units,^{8,10} and their findings were consistent with those of the larger review.⁶

One systematic review evaluated comparisons of acute geriatric units to conventional hospital units.⁸ Reviewers identified 11 studies including five randomized trials, four non randomized trials, and two case control studies. Not all interventions included a geriatrician, but sensitivity analyses limiting to those that did include a geriatrician, did not change results. Meta-analyses of the results from the randomized trials (included in parentheses) as well as global analyses of all included studies found:

- **Patients treated in geriatric units had lower risk of functional decline at hospital discharge** (OR 0.82 , 95% CI 0.68–0.99),
- But there was **no significant difference in mortality either in hospital** (OR 0.83 , 95% CI 0.60–1.14) or **mortality at three months post-discharge** (OR 0.95, 95% CI 0.78–1.16),
- And **no difference in readmission at three months** (OR 1.11, 95% CI 0.92–1.35) among the patients treated in the special geriatric units compared to conventional units.

Another review focused on **inpatient rehabilitation, comparing care specifically designed for older patients (all interventions models included geriatricians) to usual care.**¹⁰ The 17 randomized trials included were split between general geriatric rehabilitation (8 studies) and rehabilitation follow-up for hip fracture (9 studies). **In a meta-analysis of outcomes at discharge and at end of follow-up for all studies** (range of the follow-up periods was 3-12 months) there were:

- Lower nursing home admissions (discharge: RR 0.64, 95% CI 0.51–0.81; follow-up: 0.84, 95% CI 0.72–0.99); and
- Improved function (discharge: OR 1.75, 95% CI 1.31–2.35; follow-up: OR 1.36, 95% CI 1.07–1.71).
- Lower mortality (in hospital: RR 0.72, 95% CI 0.55–0.95; follow-up: RR 0.87, 95% CI 0.77–0.97);

No additional primary studies of special geriatric units were identified. All the primary trials or observational studies we identified and rated as fair or good quality were included in the systematic reviews.

Inpatient Geriatric Teams

In addition to the 2011 Cochrane review,⁶ we identified one other systematic review,⁷ and five individual studies (not included in the systematic reviews) that assessed the impact of inpatient, multidisciplinary teams that included geriatricians.^{12-15, 18} The primary studies included three fair quality randomized trials¹²⁻¹⁴ and one fair quality observational study.¹⁵ The fifth study¹⁸ was rated poor quality and is not included in our evidence synthesis (information available in Supplemental Materials).

The additional systematic review on inpatient teams had a narrow focus. Also published in 2011, it summarized the impact of CGA conducted by teams for patients who were going to be rapidly discharged from an emergency department or urgent care/assessment units.⁷ The five identified studies all included geriatricians. In two of these studies the intervention was geriatrician-led and targeted toward patients who sought care after falling, while in the other three studies, nurses led the assessment and the studies included patients admitted for any reason. This analysis found **no significant reductions in falls over one year, readmission after 30 days or death or nursing home admission within three months for patients cared for by inpatient CGA teams** compared to usual care. The small number of studies and the fact that the overall quality of these trials was reported as poor reduces the utility of this review.

The five **additional individual studies do not provide sufficient evidence to counter the conclusion arrived at in these reviews that inpatient geriatric teams provide no additional benefit compared to standard care.** Information from four of these individual studies is listed in Table 2.¹²⁻¹⁵ All four were of fair quality, conducted in the 1990s, and the three studies^{12, 14, 15} that examined function report small positive effects. (We have provided limited information on the study with poor methodological quality¹⁸ in the Supplemental Materials.)

Inpatient Geriatric Consultation

Another approach to geriatric inpatient care is the use of individual geriatricians as consultants, similar to any other specialist who might advise or contribute to the care of a patient in the hospital. This model of geriatric care was not included in the systematic reviews we identified. It was the subject of some individual studies, but **differences in the nature of the consultation, the hospitals and time periods of the studies, as well as the generally low quality of the studies make it difficult to draw firm conclusions about the inpatient consultation model.**

A good quality randomized controlled trial compared the effect of a comprehensive discharge planning intervention conducted by a geriatrician with standard care in 655 patients admitted to an acute geriatric inpatient unit.¹¹ In this study, standard care included care by a geriatrician affiliated with the acute geriatric inpatient unit and the intervention added a second geriatrician who was not part of the unit team who focused on discharge planning. The percentage of people in the intervention group with at least one emergency department visit was lower than usual care at three months (23% vs. 30.5%; $p=0.03$) but not

significantly different at six months (35.3% vs. 40.8%; $p=0.15$); similarly, survival was better in the intervention group at the three-month follow-up with no significant difference at six months.

Four other studies were of poor methodological quality.^{17, 19-21} They are listed in the Supplemental Materials.

KEY QUESTION 1B: Are there specific characteristics that lead to improved outcomes among inpatients?

Given the diversity among hospitals and patients, we are also interested in whether inpatient geriatric care is more effective for certain patients or if there are specific components of an intervention that are essential for positive outcomes. Three of the systematic reviews^{6, 8, 10} included in this Evidence Brief attempted to answer these types of questions.

In addition to comparing special geriatric units to floating teams, the authors of the 2011 Cochrane review conducted several additional sub group analyses.⁶ They compared: a) interventions that targeted patients who were frail and most at risk of nursing home admission or functional or cognitive impairment to interventions that enrolled patients based on age; b) interventions that initiated the CGA at different times (at admission to the emergency department, within 72 hours, or later in treatment); and c) whether the inpatient CGA provided outpatient follow-up or not. They found:

- No difference in outcomes attributable to targeting patients by selected criteria as opposed to age alone;
- Timing of the CGA was difficult to evaluate as this information was not always specified by study authors; and
- No clear link between post discharge geriatric follow-up and program benefits, defined as better outcomes.

The review of inpatient geriatric hospital units⁸ concluded that lack of detailed information on the usual care in inpatient units (the comparator) makes it difficult to isolate the effective components of the special geriatric acute care units. This is particularly true since it is likely that ‘usual care’ varies according to characteristics such as geographic area or type of hospital. The authors were unable to conduct planned analyses by patient characteristics because the studies did not report them adequately or because the range of patients’ ages was limited.

Similarly, the review of inpatient geriatric rehabilitation¹⁰ was unable to address whether targeting patients for enrollment or program characteristics make geriatric inpatient programs more effective, because few detailed descriptions of the interventions were available.

SUMMARY: Inpatient Care

Patients receiving care in special geriatric units that are staffed by a team including a geriatrician have better function at discharge and are more likely to be discharged to home than patients receiving standard hospital care.

Evidence about the effect of inpatient geriatric intervention on hospital readmission, length of stay, emergency visits, and outpatient visits is insufficient to draw conclusions.

Neither inpatient geriatric units nor inpatient geriatric teams had lower patient mortality rates when compared with usual care.

There is insufficient evidence to allow any conclusion about whether models of care that use geriatricians as inpatient consultants are effective.

Geriatricians in special teams that conduct Comprehensive Geriatric Assessment and advise on patient care across hospital units (floating teams) do not improve patient outcomes.

For all types of interventions involving geriatricians in inpatient care:

- **Detailed examinations of the impact of different components of the intervention, including the specific contribution of the geriatrician, are difficult to isolate from published studies.**
- **More research is needed about what components of specific types of interventions are most likely to improve patient outcomes.**

TABLE 1. INPATIENT: SYSTEMATIC REVIEWS SUMMARY

| Year, First Author (AMSTAR Rating) # of Included Studies # of Subjects | Type of Intervention | Subject of Study | Geriatrician Role/Tasks | Key Outcomes* | | | | |
|--|------------------------------------|---|--|--|--|--|--|-------------|
| | | | | Mortality | Function | Nursing Home Admission/ Living at Home | Length of Stay/ Rehospitalizations | Medications |
| 2010, Bachmann ¹⁰ (10/11) 17 RTs 4780 | Special Units | Inpatient rehabilitation specifically designed for geriatric patients | All teams included geriatricians | +++ | +++ | +++ | NR | NR |
| 2009, Baztan ⁸ (8/11) 11 studies NR | Special Units | Acute geriatric units compared with conventional care units | 8 of 11 specify a geriatrician is part of unit team | ~~~ | +++ | +++ | ~~~ | NR |
| 2011, Conroy ⁷ (9/11) 5 RTs | Teams | CGA for older patients in the hospital who were assessed, treated and discharged in a short period of time | 2 of 5 interventions were geriatrician-led; 3 of 5 were nurse-led with geriatrician on team | ~~~ | ~~~ | ~~~ | ~~~ | NR |
| 2004, Day ⁹ (8/11) 58 primary research; 9 SRs | Multiple, inpatient and outpatient | Specialist Geriatric Services | All studies included people training in geriatrics, but it was not always clear whether it was a physician | ~~~ | +++ | +++ | +++ | NR |
| 2011, Ellis ⁶ (9/11) 22 RTs 10, 315 | Special Units and Teams | CGA in hospital for patients admitted as an emergency overall and to compare interventions on key characteristics | 20 of 22 studies included geriatricians assigned to special units (7) or teams (13) | Overall ~~~ Unit ~~~ Team ~~~ | Overall +++ Unit ??? Team ??? | Overall +++ Unit +++ Team ~~~ | Overall ??? Unit ??? Team ??? | NR |

* For systematic reviews, impact on key outcomes is limited to included studies that involve geriatricians.

Abbreviations: CGA = Comprehensive Geriatric Assessment; Obs = Observational study; RT = Randomized trial; SR = Systematic Review.

Systematic Reviews, Summary Impact: +++ = Positive Impact; --- = Negative Impact; ~~~ = No difference; ??? = Unable to determine; NR = Not studied or reported

TABLE 2. INPATIENT: ADDITIONAL PRIMARY STUDIES SUMMARY

| Year, First Author (Quality Rating) Type of Study (# of Subjects) | Type of Intervention | Subject of Study | Geriatrician Role/Tasks | Key Outcomes | | | | |
|---|----------------------|--|--|----------------------------|----------|---------------------------------------|------------------------------------|-------------|
| | | | | Mortality | Function | Nursing Home Admission/Living at Home | Length of Stay/ Rehospitalizations | Medications |
| 1995, Germain ¹³ (Fair) RT (108) | Teams | Geriatric assessment and management of inpatients who would qualify for a special unit | Assessment and responsibility for treatment | ~ | NR | + | + | NR |
| 1990, Hogan ¹⁴ (Fair) RT (132) | Teams | Usefulness of geriatric consult teams in acute care | Geriatrician was part of team including a nurse coordinator, an occupational therapist, a physiotherapist, a social worker, a dietitian and a representative from pastoral care. | NR | + | NR | NR | NR |
| 1993, Inouye ¹⁵ (Fair) Obs (258) | Team | Evaluation of a nurse-centered intervention. | Geriatricians provided support for geriatric resource nurses on intervention units; in one unit geriatricians participated in rounds, in the second they did not. | NR | + | NR | NR | NR |
| 2011, Legrain ¹¹ (Good) RT (655) | Consultation | A comprehensive discharge planning intervention conducted by a geriatrician | Geriatrician, not part of regular care team, was responsible for the intervention. | 3 months: + 6 months: ~ | NR | NR | 3 months: + 6 months: ~ | NR |
| 1997, Slaets ¹² (Fair) RT (237) | Teams | Inpatient multidisciplinary team focused on optimal function | Geriatricians conducted assessments, then generated and implemented a care plan | NR | + | + | + | NR |

Abbreviations: Obs = Observational study; RT = Randomized trial.

Individual Studies, Impact: + = Positive Impact; - = Negative Impact; ~ = No difference; ? = Unable to determine; NR = Not studied or reported

KEY QUESTION 2A: What is the effectiveness of geriatric consultations, co-management, or geriatricians as primary care providers for outpatient primary care?

OVERVIEW OF IDENTIFIED STUDIES

We identified five systematic reviews²⁴⁻²⁸ that summarize studies about models of geriatric outpatient care (Table 3). Systematic reviews were not included in our assessment of evidence if they did not include any studies in which geriatricians were part of the intervention or if the interventions in the included studies were not described.

Three of the identified systematic reviews focus on complex interventions, including CGA,²⁴⁻²⁶ while the other two reviews were about home visits and screening assessments.^{27, 28}

We also identified 11 fair- or good-quality randomized trials and observational studies that were not covered by these reviews (Table 4): five evaluated team care or comprehensive models,²⁹⁻³³ four studied geriatricians acting as consultants,³⁴⁻³⁷ and two assessed geriatricians who provided primary care.^{38, 39}

The role of the geriatrician varied in these studies. In some, the geriatrician conducted the assessment and/or follow-up visits with the patients. In Table 4, we have labeled these as ‘Direct’ to indicate that the geriatrician was directly involved in patient care. In other interventions, the geriatrician reviewed assessments or plans made by other health care providers and advised, but did not interact with the patients. We labeled these as ‘Indirect’ in Table 4.

The systematic reviews of complex interventions are similar in scope to the additional primary studies of care by geriatric teams we identified, and they are summarized with these studies. The home visit and screening reviews are more closely related to primary care functions and, therefore, these reviews are reported with additional individual studies of primary care provided by geriatricians.

Geriatricians in Teams or Complex Models of Outpatient Care

Most of the studies included in the reviews, as well as our assessment across systematic reviews, found **limited and inconsistent evidence of better outcomes from outpatient care provided by multi-disciplinary teams including geriatricians compared with usual care.** The results are contradictory and interventions and outcome measures differed across studies.

One systematic review published in 2009 focused on coordinated and integrated interventions targeting frail elders, and identified nine randomized trials published between 1997 and July 2007.²⁴ Three of the nine studies include geriatricians in the intervention. The reviewers provided details on individual studies and a narrative analysis. Results of the studies with geriatricians paralleled the overall conclusions of the review that **results are mixed with limited evidence of benefit.** For example:

- One of the three studies including geriatricians documented improvement in function, while two found no difference compared to standard care; and
- One study found an increase in health services by the intervention group; the second reported a decrease in health services utilization; and the third reported no effect on hospital days.

Another review by Beswick and colleagues identified 89 trials of complex interventions including 19 studies of care that involved geriatricians.²⁵ The review subdivided interventions into 28 studies of CGA for elderly in general (geriatricians in six); 24 of CGA targeted to frail elders (geriatricians in eight); 21 of community-based follow-up post hospital discharge (geriatricians in four); 13 of fall prevention programs (geriatricians in one); and three about group counseling (none involved geriatricians). The review found that targeted and untargeted CGA and community follow-up were associated with:

- **Fewer nursing home admissions** (0.87, 95% CI 0.83–0.90)
- **Improved physical function** (standardized mean difference -0.08, 95% CI -0.11– -0.66)
- **Lower risk of hospital admissions** (0.94, 95% CI 0.92–0.97)
- **No difference in mortality** (1.00, 95% CI 0.97–1.02)
- Subgroup analyses of interventions compared by intensity or the involvement of multiple disciplines (studies with geriatricians were higher intensity and involved multiple disciplines) did not change the results.

Trials that were conducted prior to 1993 were more likely to find a positive effect than trials conducted later. The authors of the review speculate that this may be the result of the diffusion of geriatric best practices into general care.

The third synthesis of complex interventions we identified was a meta-analysis of the impact on mortality of CGA provided either as primary care or as an outpatient consultation.²⁶ All the interventions in the included studies involved a geriatrician. The authors hypothesized that prior individual trials found no effect due to small sample sizes and conducted a meta-analysis to determine if merged data would produce a different conclusion. Instead, the meta-analysis affirmed that **CGA does not result in lower mortality**. There was:

- No effect of CGA on mortality (risk ratio: 0.95, 95% CI 0.82–1.12, p=0.62).
- No effect of CGA on mortality in any of the subgroup analyses, including:
 - Characteristics of the intervention
 - How long the patients were managed by the team conducting the CGA.
- No effect on mortality across subgroup comparisons of studies that were conducted in VA and not in VA.

We identified five additional good or fair quality randomized controlled trials of geriatricians in team outpatient care.²⁹⁻³³ Two studies rated as poor quality primarily because the articles did not provide sufficient information on the study.^{40, 41} These are described in the Supplemental Materials.

Two^{31, 33} of the three studies that involved geriatricians working directly with patients reported benefits including lower nursing home admissions and better medication management from team care, while one study reported a higher mortality rate that the researchers were unable to explain.³⁰

- A study conducted in Finland targeted couples in which one had dementia.³¹ This randomized trial evaluated a multicomponent intervention including a caseworker, geriatrician, support

groups, education, coordination of social services and collaboration with primary care providers. Control group couples received usual health and social services.

- Results included a lower nursing home admission rate at 18 months (11.9% vs. 24.2%, $p=0.05$) but no significant difference at two years (24.2% vs. 28.3%, $p=0.64$).
- Overall costs per year for the couples was significantly lower for the intervention group (15,568 EURO vs. 23,553; $p=0.03$).
- A study of both inpatient and outpatient Geriatric Evaluation and Management (GEM) followed Veterans for 12 months to monitor adverse drug events, inappropriate drug use and underuse.³³ GEM was compared to usual VA care.
 - In-patient GEM was associated with a decrease in unnecessary drugs, but no difference in serious adverse reactions.
 - Outpatient GEM was associated with significantly fewer serious adverse reactions (RR=0.65, 0.45 - 0.93, $p=0.02$) and fewer instances where drugs were omitted although they were indicated for the condition.
- A randomized trial of an intervention in which a geriatric team, including a geriatrician, NP, and pharmacist, working with primary care providers and patients, was conducted in primary care practices in Seattle, Washington.³⁰
 - The intervention produced no significant differences in function, hospitalization or high-risk prescribing.
 - Significantly more people died in the intervention group than in the control group (11.4% vs. 7.1%, $p=0.03$) and the researchers were unable to explain this difference. They speculated it could have been due to unmeasured differences in illness severity or to confusion about whether the geriatrician or the primary care provider was making clinical decisions.

In the other two studies of teams, geriatricians supported other clinicians.^{29, 32} **These studies of indirect geriatrician care in teams found small differences in health services utilization and cost, but no significant differences in mortality or function.**

- The results of a randomized trial of an outpatient model called GRACE that targeted low-income seniors in Indianapolis, Indiana were reported in two articles.^{29, 42} The intervention consisted of a support team of a nurse practitioner and social worker who conducted home visits and followed patients and coordinated care with primary care physicians. An interdisciplinary team, led by a geriatrician, reviewed cases weekly and contributed to care plans and management recommendations.²⁹
 - At two years, there was no difference in mortality, function or hospitalizations.
 - There was some impact on utilization:
 - Lower emergency department (ED) visit rates per 1000 (1445 vs. 1748, $p=0.03$) in the total sample
 - Lower ED visits and hospitalizations rates for the predefined subgroup of patients at high risk of hospitalization (ED: 848 vs. 1314, $p=0.03$; Hospitalization: 396 vs. 705, $p=0.03$)
 - A follow-up cost analysis⁴² found no difference in costs during the two years of the intervention for either all subjects or the high risk subgroup, but in the third year, one year after the intervention period, costs were lower for the intervention group (\$5,088 vs. \$6,575, $p<0.001$).

- A randomized study in the VA evaluated an intervention in which primary care patients were screened and assessed by a physician assistant who referred patients requiring follow-up to a team including geriatricians for outpatient geriatric assessment. The comparison group received normal primary care.
 - The results included increased identification and evaluation of geriatric conditions but no improvements in function or reductions in hospitalization at follow-up in one, two and three years after the initial screening.³²

Geriatricians as Outpatient Consultants/Specialists

Another model of outpatient care is one in which geriatricians provide consultations about older, frail patients to another clinician who has primary responsibility for the patient's care. In some cases, the consultation involves direct contact with patients and in others, the consultation is limited to record review and discussions with the clinicians providing care. Two of the studies we identified evaluated geriatrician consultation that included direct contact with patients^{34, 35} and two examined consultations that did not.^{36, 37} **The studies of consultations that include direct involvement in patient care show some improvement in outcomes in patients who are at high risk of frailty or identified as high service users.** Two additional studies^{43, 44} were rated as low quality and are described in the supplemental materials.

A trial of a geriatric intervention in primary care randomized patients into two groups and then assessed all participants' risk of frailty.³⁵ Control group patients received usual care. The experimental group patients at low risk of frailty attended a group educational session, while those at high risk received a visit from a geriatrician who made recommendations to the patient and put these recommendations in the patients' charts for their primary care provider and nurse.

- Comparisons between the entire intervention and control group found no effect on occurrence of, or time until, the primary outcome (a composite of death or admission to nursing home or home care).
- When only the patients at high risk of frailty were compared, there was a lower rate of death or admission to long-term care in the intervention group versus the control group (16.3% vs. 28.4%, $p=0.028$).
- Additionally, more of the high-risk patients in the intervention group compared to the control group reversed their frailty status (27.9% vs. 13.5%, $p=0.027$).

An observational study evaluated an intervention in which geriatricians met twice with patients who had high numbers of outpatient visits.³⁴ During these consult visits, the geriatrician assessed the patient, solved problems and developed plans that were shared with the primary care physician as well as the patient. Patients seen by the geriatricians were compared to a group of patients from other primary care clinics in the same health system created by matching on sex and propensity scores.

- Intervention patients had a lower rate of hospitalization (0.57, 95% CI 0.37–0.86, $p=0.01$) and health care costs that were 26.3 percent lower ($p=0.04$).
- No significant differences in mortality, nursing home admission, high-risk prescriptions or other health care utilization were identified.

Two trials of consultation by geriatricians who advised other clinicians report limited impact on function.^{36, 37}

A randomized trial conducted in the 1990s in California tested an intervention that included home-based assessments and follow-up visits by nurse practitioners who were supported by geriatricians in making diagnoses and developing care plans.³⁷ The investigators reported that the impact on function varied depending on the baseline values. Specifically:

- The intervention group with no Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL) dependency at baseline spent more time at a lower level of disability (IADL only) and less time at a higher level (IADL and ADL) compared to similar patients in the control group. The investigator's interpretation of the pattern of the results is that the intervention delayed or decreased dependency even if dependence was not completely prevented.

A randomized trial in Taiwan evaluated an intervention in which community elders were assessed by nurses and then geriatricians used the assessment to develop treatment plans to be carried out by community physicians.³⁶

- There was a small and not statistically significant greater rate of improvement in functional status in the intervention group compared with the group receiving usual care.

Geriatricians as Primary Care Providers

The evidence about geriatricians as primary care providers is limited. This model of care was not directly covered in the identified systematic reviews. However, we have included two systematic reviews, one of screening home visits²⁸ and the other of health assessments²⁷ as the scope of these interventions resembles primary care. We found no randomized trials evaluating geriatricians as primary care providers. Three observational studies of this model of care either have a narrow focus on one outcome^{38, 39} or have methodological issues and were rated low quality due to a high risk of bias.⁴⁵

A meta analysis of results of trials of **preventive home visits** published between 2001 and 2007 was conducted to update a prior review.²⁸

- This analysis reported **favorable but not statistically significant effects on mortality, nursing home admission and function.**
- **The authors stratified the studies by several intervention characteristics, including whether a geriatrician was involved, and found no significant effect on any of the outcomes.**
- The inclusion of a clinical examination in the home visit was associated with a reduction in functional decline (OR 0.64, 95% CI 0.48–0.87).

The second systematic review aggregated studies of the impact of health assessments for older adults.²⁷ This review is older (studies published between 1970 and 1999) and most of the trials tested assessments conducted by health care workers other than physicians with only two trials that included geriatricians. The authors did no subgroup analyses and highlighted the need for more information and research on the effectiveness of specific components of health assessments.

- The two studies included in this review with geriatricians involved in the intervention came to conflicting conclusions:
 - One found that health assessments produced no change in health outcomes and were cost neutral.
 - Another reported improvement in health outcomes at higher cost.

Two studies not included in the systematic reviews^{38,39} compared geriatricians to generalist physicians who provided primary care to older adults. Both studies examined only medication management outcomes. **The results of these studies suggest that geriatricians manage medications better for older adults than other clinicians.**

- One study randomly sampled patients from a geriatric clinic or general family practice clinic at an academic medical center in the Pacific Northwest region of the US. Patients had to have designated a clinic physician as their primary care provider and had at least two visits in the past two years. Chart reviews were used to collect data on inappropriate medications and this was scored, with a high number representing less inappropriate medications.
 - Geriatricians scored better than generalists (14.2 vs. 11.8, $p=.004$); and in multivariate regressions, patient factors, such as age, were not associated with the score; while having a geriatrician as a primary care provider predicted a better score.³⁹
- An observational study was similar in terms of its research questions, but involved patients and primary care practices in Mexico City. Medications prescribed over a one-year period were evaluated as potentially inappropriate or not for patients followed by geriatricians or other physicians.
 - Patients who did not have a geriatrician as their physician were found to be more than two times as likely to have a potentially inappropriate medication (adjusted odds ratio 2.59, 95% CI 1.54–4.34; $p<0.001$).³⁸

KEY QUESTION 2B: Are there specific characteristics that lead to more effective outcomes among outpatients?

As was the case for inpatient studies, the **evidence provides only limited insight into what components of geriatrician outpatient care might work best for what types of patients.** The two systematic reviews of teams/complex interventions that attempted subgroup analyses^{25,26} failed to identify any characteristic that was more likely to be associated with any positive outcome. In our attempt to summarize the evidence, we separated team and consulting interventions according to whether the geriatrician provided direct patient care or not. The studies of **interventions involving direct care appear to report more positive results for the outcomes studied than those involving indirect care.** This difference is difficult to assess in a qualitative synthesis, and may be a fruitful topic for further research and synthesis. The available evidence about geriatricians as primary care providers is limited in terms of scope and quality. Additional studies are needed to determine if geriatric primary care is more effective for specific subgroups of patients or if there are aspects of geriatrician-provided primary care that are more likely to produce benefits.

SUMMARY: Outpatient Care

Evidence is mixed regarding the effects of geriatricians, in teams or as consultants, on function, living at home, and health services utilization

Interventions in which geriatricians have direct patient contact are more likely to result in better outcomes than interventions where the interaction is limited to supporting other clinicians.

Geriatricians as primary care providers provide more effective medication management than other clinicians.

The evidence does not show that outpatient care involving geriatricians reduced mortality compared to usual care.

TABLE 3. OUTPATIENT: SYSTEMATIC REVIEWS SUMMARY

| Year, First Author (AMSTAR Rating) # Studies # Subjects (if available) | Type of Intervention | Subject of Study | Geriatrician Involvement | Key Outcomes* | | | | |
|--|------------------------------------|--|--|--|----------|---|--|-------------|
| | | | | Mortality | Function | Nursing Home Admission/ Living at Home | Utilization (Length of stay/ Rehospitalizations/ Emergency Department use) | Medications |
| 2008, Beswick ²⁵ (8/11) 89 RTs 97,984 | Teams/ complex interventions | Community-based complex interventions to improve function and maintain independence | Geriatricians in 19 of the 89 interventions: 6 in studies of CGA; 8 in studies of targeted CGA; 4 in community follow-up post hospitalization; and 1 in a fall prevention program. | ~~~ | ~~~ | +++ | +++ | NR |
| 2000, Byles ²⁷ (6/11) 21 RTs | Primary and Preventive Care | Health assessments for older adults | Two studies specifically include geriatricians. | Merged in review as health outcomes: Inconsistent results across the studies with geriatricians | | | | NR |
| 2009, Ekland ²⁴ 7/11 9 RTs | Teams/ complex interventions | Coordinated and integrated interventions targeting frail elderly | In 3 of the 9 studies geriatricians are part of the intervention team. | NR | ~~~ | NR | --- | NR |
| 2008, Huss ²⁸ (8/11) 21 RTs 14,603 | Primary and Preventive Care | Multidimensional Preventive Home Visits | Geriatricians were involved in 6 trials; subgroup analyses conducted comparing interventions with and without a geriatrician. | ~~~ | ~~~~ | ~~~ | NR | NR |
| 2004, Kuo ²⁶ (6/11) 9 RTs 3,750 | Teams/ complex interventions | Effect of CGA on mortality | Geriatricians were involved in the intervention in all included studies. | ~~~ | NR | NR | NR | NR |

* For systematic reviews, impact on key outcomes is limited to included studies that involve geriatricians.

Abbreviations: CGA = Comprehensive Geriatric Assessment; RT = Randomized trial.

Systematic Reviews, Summary Impact: +++ = Positive Impact; --- = Negative Impact; ~~~ = No difference; ??? = Unable to determine; NR = Not studied or reported

TABLE 4. OUTPATIENT: ADDITIONAL PRIMARY STUDIES SUMMARY

| Year, First Author (Quality Rating) Type of Study (# of Subjects) | Type of Intervention | Subject of Study | Geriatrician Role/Tasks | Key Outcomes | | | | |
|---|----------------------|---|---|--------------|----------|--|--|-------------|
| | | | | Mortality | Function | Nursing Home Admission/ Living at Home | Utilization (Length of Stay/ Rehospitalizations/ Emergency Department use) | Medications |
| 2008, Avila-Beltran ³⁸ (Fair) Obs (376) | Primary Care | Comparison of primary care provided by geriatricians and generalist physicians | DIRECT Primary care; outpatient prevention and management. | NR | NR | NR | NR | + |
| 1999, Bula ³⁷ (Fair) RT (681) | Consultation | Preventive in home CGA for people with different baseline functional status | INDIRECT Geriatricians consulted with NPs who did the assessment and follow-up on the treatment plan. | ~ | + | NR | NR | NR |
| 2007 & 2009, Counsell ^{29, 42} (Good) RT (951) | Team | Geriatric care model for low-income seniors | INDIRECT NP and Social worker conducted home visits and follow-up. They were supported by a team including a geriatrician. | ~ | ~ | NR | + | NR |
| 2009, Eloniemi-Sulkava ³¹ (Good) RT (125) | Team | An outpatient multidimensional intervention for people with dementia that included services for spouse caregivers | DIRECT Geriatrician conducted assessment and ongoing visits after home visit by case manager, and collaborated with primary care provider. | NR | NR | + at 18 months ~ at two years | NR | NR |
| 2006, Fenton ³⁴ (Fair) Obs (583) | Consultation | Geriatric assessment and planning in primary care | DIRECT Geriatricians met with patients twice to complete assessment and screening, and set goals and address problems. | ~ | NR | ~ | + | ~ |

| Year, First Author (Quality Rating) Type of Study (# of Subjects) | Type of Intervention | Subject of Study | Geriatrician Role/Tasks | Key Outcomes | | | | |
|---|----------------------|--|---|------------------------|----------|---------------------------------------|--|-----------------------------------|
| | | | | Mortality | Function | Nursing Home Admission/Living at Home | Utilization (Length of Stay/Rehospitalizations/Emergency Department use) | Medications |
| 2010, Li ³⁶ (Fair) RT (310) | Consultation | CGA of community-dwelling elders | INDIRECT Geriatricians reviewed assessments and prescribed treatment conducted by community doctors. | NR | ~ | NR | NR | NR |
| 2010, Monteserin ³⁵ (Fair) RT (620) | Consultation | Follow-up intervention in Primary Care based on results of an Assessment | DIRECT Patients in intervention group assessed as at risk of frailty were visited by a geriatrician, and recommendations were made to their general practitioner. | ~ | + | + | NR | NR |
| 2007, Phelan ³⁰ (Good) RT (784) | Team | Senior Resource Team included in Primary Care | DIRECT Geriatrician reviews assessments done by nurse practitioner and pharmacist, and develops care plan. Geriatrician reviews plan with primary care providers and with patient in person; and participates in intense follow-up for two months for all, and longer as needed on a case-by-case basis. | - Higher death rate | ~ | ~ | NR | ~ |
| 2008, Phelan ³⁹ (Good) Obs (140) | Primary Care | Comparison of primary care provided by geriatricians and generalist physicians | DIRECT Geriatricians provided primary care; outpatient prevention and management. | NR | NR | NR | NR | + Avoiding in appropriate meds |

| Year, First Author (Quality Rating) Type of Study (# of Subjects) | Type of Intervention | Subject of Study | Geriatrician Role/Tasks | Key Outcomes | | | | |
|---|----------------------|---|---|--------------|----------|---------------------------------------|--|-------------|
| | | | | Mortality | Function | Nursing Home Admission/Living at Home | Utilization (Length of Stay/Rehospitalizations/Emergency Department use) | Medications |
| 2007, Rubenstein ³² (Fair) RT (792) | Team | Team approach to primary care for Veterans | INDIRECT Geriatricians supervised physician assistant case manager who did assessments and made referrals. | NR | ~ | NR | ~ | NR |
| 2004, Schmader ³³ (Good) RT (864) | Team | The effect of GEM on adverse drug events and suboptimal prescribing | DIRECT Geriatricians are part of GEM team responsible for treatment and management. | NR | NR | NR | NR | + |

Abbreviations: CGA = Comprehensive Geriatric Assessment; GEM = Geriatric Evaluation and Management; Obs = Observational study; RT = Randomized trial.
 DIRECT = Geriatrician interacted with patients; INDIRECT = Geriatrician did not interact with patients.
 Individual Studies, Impact: + = Positive Impact; - = Negative Impact; ~ = No difference; ? = Unable to determine; NR = Not studied or reported

LIMITATIONS

We identified numerous studies of geriatric models of inpatient and outpatient care, though both the identified models and how they were evaluated varied. Furthermore, the literature is limited in that it does not facilitate easy understanding of the contribution of the different components of these care models to better outcomes for older adults. This is because the model was usually evaluated, not the different components. Relevant to this review and brief, the contribution of geriatricians was not always delineated. The contribution of geriatricians was occasionally, but not frequently, studied independently of interconnected services that are often part of complex, integrated, or models of care. For this Evidence Brief, we have attempted to separate out information regarding the effectiveness of geriatricians that was included in studies of complex interventions; however, the need to do this is a serious restriction on our ability to use the currently available literature as the evidence on the effectiveness of geriatricians. We also identified and included studies of geriatricians acting more independently as consultants or primary care providers, but we identified fewer of these studies than studies of geriatric teams or other complex models.

There are several limitations that must be acknowledged given that this is an Evidence Brief and not a full systematic review. Brief or rapid review methodology is still developing and there is not yet consensus on what represents best practice. While we conducted an extensive bibliographic search, we limited the number of databases we searched, and we did not search for grey literature or research in progress. We used existing systematic reviews as the foundation for our evidence base, and we did not re-review all of the studies included in these. While we rated the quality of the reviews and focused on those that were both most relevant to our topic and of higher quality, we are dependent on the quality of these prior reviews.

SUPPLEMENTAL MATERIAL

The following supplement materials are available on ESP website with this Evidence Brief:

1. Search strategy
2. Detailed inclusion and exclusion criteria
3. Quality assessments for systematic reviews
4. Quality assessments for individual studies
5. Description of included studies with a quality rating of ‘poor’
6. Review comments and author responses
7. List of excluded studies

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