

# Appendix A. Methods

We performed the systematic review in accordance with the Evidence-based Practice Center (EPC) methods guides.<sup>1</sup>

## Criteria for Inclusion/Exclusion of Studies in the Review

The criteria for inclusion and exclusion of studies were designed to identify studies that answer the Key Questions and are based on population, interventions, comparators, outcomes, timing, setting (PICOTS),

**Table A-1. Inclusion and exclusion criteria**

	<b>Include</b>	<b>Exclude</b>
<b>Population</b>	Adults with chronic illnesses or disabilities	Children with special needs Adults being assessed for a single risk factor or condition Well elderly
<b>Intervention(s)</b>	HBPC as defined above	Care models that do not include the four required characteristics. Examples of excluded care; preventive home visits, single visit home assessments, single purpose visits (fall risk assessments), care for a single condition, short-term home-based care such as Hospital at Home programs.
<b>Comparator(s)</b>	Any other model of primary care	Services that are not primary care
<b>Outcomes</b>	Health Care Outcomes Patient and Caregiver Experience Utilization of Services	None
<b>Timing</b>	Longitudinal care, expected to continue until change in status	Short-term, time-limited home-based care such as Hospital at Home programs.
<b>Setting(s)</b>	Patients' homes, broadly defined United States or other developed countries	Institutions such as nursing homes or prisons Countries with extremely different economies and/or health care systems
<b>Study Design</b>	<ul style="list-style-type: none"> <li>• Randomized Controlled Trials</li> <li>• High quality observational studies including: comparative cohort studies and time series</li> <li>• Pre/post studies with or without a comparison group</li> </ul>	<ul style="list-style-type: none"> <li>• Descriptive studies</li> <li>• Case series or reports</li> <li>• Nonsystematic reviews</li> </ul>
<b>Publication Type</b>	Peer reviewed journals Gray literature (if the study meets all other criteria)	Editorials or commentaries

We included studies that evaluated the effect of HBPC interventions, including randomized controlled trials (RCTs) and high-quality observational studies such as comparative cohort studies and time series. We included pre/post studies with or without a comparison group, though

we highlighted the relative higher risk of bias in studies without a comparison group and we may have given more weight and attention to more rigorous study designs. We excluded case series and case reports as they are descriptive rather than assessments of effectiveness. We did not exclude studies based on any specific comparator or outcome; however, the comparators and approach to measuring the outcomes were considered as part of the assessment of the quality of an individual study and of the quality of the body of evidence.

Systematic reviews were used only to identify individual studies we may not have identified through our searches. This approach was based on our knowledge of the field and the results of Topic Refinement and preliminary searches, which suggested that there is not a large volume of literature and that the scope and purpose of reviews conducted to date differ in key ways from those for this review.

We restricted inclusion to English-language articles and reviewed English-language abstracts of non-English-language articles in order to identify studies that would otherwise meet inclusion criteria and to assess the likelihood of language of publication bias.

## Literature Search and Triage

The primary searches included articles published between 1995 and 2014. We confirmed through our literature scan and discussion with our Technical Expert Panel (TEP) that the majority of programs began after 1997. We also checked reference lists of the included studies and systematic reviews to confirm that earlier studies were not missed. Library searches were designed and conducted by a medical librarian familiar with systematic reviews in consultation with the review team. Suggestions about search terms were requested and received from TEP members and these were evaluated and included when appropriate. Ovid MEDLINE, CINAHL, Clinical Trials.gov, and Cochrane Database of Systematic Reviews were searched to capture published literature. Gray literature will be identified by searching the NYAM gray literature database and the websites of organizations that may fund or produce research evaluating HPBC.

Requests for unpublished evaluation data on HBPC interventions were sent to professional organizations, organizations that fund or conduct research, and government agencies. Submissions were reviewed by the review team and assessed for relevance and quality. Reference lists of included articles were also be reviewed for includable literature. If information regarding methods or results appeared to be omitted from the published results of a study, or if we were aware of unpublished data, we emailed the authors and request this information.

We established the criteria used to determine eligibility for inclusion and exclusion of abstracts in accordance with the Key Questions and the *Methods Guide for Effectiveness and Comparative Effectiveness Reviews*.<sup>1</sup> To ensure accuracy, all excluded abstracts were dual reviewed. The full text was retrieved for all citations deemed appropriate for inclusion by at least one of the reviewers. Each full-text article, including any articles suggested by peer reviewers or that may arise from the public posting process, was independently reviewed for eligibility by two team members. Any disagreements will be resolved by consensus.

The searches will be updated while the draft report is posted for public comment and peer review to capture any new publications. Literature identified from the updated search will be assessed by following the same process of dual review as all other studies considered for inclusion in the report. If any pertinent new literature is identified for inclusion in the report, it will be incorporated before the final submission of the report.

## Data Abstraction and Data Management

After studies were selected for inclusion, data was abstracted into categories including but not limited to: study design, year, setting, geographic location, sample size, eligibility criteria, patient characteristics, HBPC intervention characteristics, organizational characteristics, and results relevant to each Key Question as outlined in the PICOTS section. Information that was abstracted and relevant for assessing applicability includes the characteristics of the population, intervention, and care settings.

Abstracted study data was verified for accuracy and completeness by a second team member. A record of studies excluded at the full-text level with reasons for exclusion is included in Appendix C.

## Assessment of Risk of Bias

Predefined criteria were used to assess the quality of individual controlled trials, systematic reviews, and observational studies by using clearly defined templates and criteria as appropriate. Randomized trials and observational studies were evaluated according to criteria recommended in the AHRQ methods chapter, *Assessing the Risk of Bias of Individual Studies When Comparing Medical Interventions*.<sup>1</sup> Individual studies were rated as “good,” “fair,” or “poor,” or as specified by the particular criteria. Studies rated “good” are considered to have low risk of bias and their results considered valid. Good-quality studies include clear descriptions of the population, setting, interventions, and comparison groups; a valid method for allocation of patients to treatment or identifying the treatment and control groups in observational studies; low dropout rates and clear reporting of dropouts; appropriate means of controlling for confounding; and appropriate measurement of outcomes.

Studies rated “fair” are susceptible to some bias, though not enough to invalidate the results. These studies may not meet all the criteria for a rating of good quality, but no flaw is likely to cause major bias. The study may be missing information, making it difficult to assess limitations and potential problems. The fair-quality category is broad, and studies with this rating will vary in their strengths and weaknesses. The results of some fair-quality studies are likely to be valid, while for others the validity may be uncertain.

Studies rated “poor” have significant flaws that imply biases of various types that may invalidate the results. They have a serious or “fatal” flaw in design, analysis, or reporting; large amounts of missing information; discrepancies in reporting; or serious problems in the delivery of the intervention. The results of these studies are likely to reflect flaws in the study design as the true difference between the compared interventions. We did not exclude studies rated as being poor in quality *a priori*, but poor-quality studies were considered to be less reliable than higher-quality studies when synthesizing the evidence, particularly if discrepancies between studies of differing quality were present.

Each study evaluated was dual-reviewed for quality by two team members. Any disagreements were resolved by consensus.

## Data Synthesis

We constructed evidence tables identifying the study characteristics, outcomes, and quality ratings for all included studies.

We reviewed and highlighted studies using a hierarchy-of-evidence approach. The best evidence available was the focus of our synthesis for each Key Question. If high-quality

evidence was not available described any lower-quality evidence we were able to identify, but underscored the issues that make it lower quality. We assessed and stated whether the inclusion of lower-quality studies would change any of our conclusions.

Meta-analyses was considered and conducted to summarize data and obtain more precise estimates on outcomes for which studies are homogeneous enough to provide a meaningful combined estimate. The feasibility of a quantitative synthesis was dependent on the number and completeness of reported outcomes and the amount of heterogeneity among the studies. To determine whether meta-analysis could be meaningfully performed, we considered the quality of the studies and the heterogeneity among studies in the design, patient population, interventions, and outcomes. The Key Questions were designed to assess the comparative effectiveness and harms by patient demographics, comorbidities, and treatment features. Meta-regression was conducted to explore statistical heterogeneity using additional variables on methodological or other characteristics (e.g., quality, randomization or blinding, outcome definition and ascertainment) given a large enough number of studies.

## **Grading the Strength of Evidence**

The strength of evidence for each Key Question was initially assessed by one researcher for each outcome (see the PICOTS above), using the approach described in the AHRQ Methods Guide.<sup>1</sup> To ensure consistency and validity of the evaluation, the grades were reviewed by the entire team of investigators for:

- Study limitations (low, medium, or high level of study limitations based on study design and the quality of the included studies)
- Consistency (consistent or inconsistent findings, or unknown)
- Directness (direct or indirect evidence)
- Precision (precise or imprecise estimates of effect)
- Reporting bias (suspected or undetected).

The strength of evidence was assigned an overall grade of high, moderate, low, or insufficient according to a four-level scale by evaluating and weighing the combined results of the above domains:

- **High**—We are very confident that the estimate of effect lies close to the true effect for this outcome. The body of evidence has few or no deficiencies. We believe that the findings are stable, i.e., another study would not change the conclusions.
- **Moderate** —We are moderately confident that the estimate of effect lies close to the true effect for this outcome. The body of evidence has some deficiencies. We believe that the findings are likely to be stable, but some doubt remains.
- **Low**—We have limited confidence that the estimate of effect lies close to the true effect for this outcome. The body of evidence has major or numerous deficiencies (or both). We believe that additional evidence is needed before concluding either that the findings are stable or that the estimate of effect is close to the true effect.
- **Insufficient**—We have no evidence, we are unable to estimate an effect, or we have no confidence in the estimate of effect for this outcome. No evidence is available or the body of evidence has unacceptable deficiencies, precluding reaching a conclusion.

## Assessing Applicability

Applicability considers the extent to which results from a study or a body of evidence can be used to answer the questions of interest. Variability in the studies or studies with unique attributes may limit the ability to generalize the results to other populations, and settings. What may affect applicability can vary depending on the question of interest and currently the assessment of applicability is not standardized.

For this review we considered if applicability is affected by the characteristics of the patient populations (e.g., demographic characteristics, reason for receiving home-based care, primary condition or disability, presence of comorbidities) and the setting of the study (including geographic location and practice context).

## Reference

1. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. AHRQ Publication No. 10(14)-EHC063-EF. Rockville, MD: Agency for Healthcare Research and Quality; January 2014 Chapters available at: <http://www.effectivehealthcare.ahrq.gov>.

## Appendix B. Included Studies

Please refer to this section as a reference list for Appendixes E and F

1. Aabom B, Kragstrup J, Vondeling H, et al. Does persistent involvement by the GP improve palliative care at home for end-stage cancer patients? *Palliative Medicine*. 2006 Jul;20(5):507-12. PMID: 16903404.
2. Anetzberger GJ, Stricklin ML, Gauntner D, et al. VNA HouseCalls of greater Cleveland, Ohio: development and pilot evaluation of a program for high-risk older adults offering primary medical care in the home. *Home Health Care Services Quarterly*. 2006;25(3-4):155-66. PMID: 17062516.
3. Beales JL, Edes T. Veteran's Affairs Home Based Primary Care. *Clinics in Geriatric Medicine*. 2009 Feb;25(1):149-54, viii-ix. PMID: 19217499.
4. Beck AM, Kjaer S, Hansen BS, et al. Follow-up home visits with registered dietitians have a positive effect on the functional and nutritional status of geriatric medical patients after discharge: a randomized controlled trial. *Clinical Rehabilitation*. 2013 Jun;27(6):483-93. PMID: 23258932.
5. Chang C, Jackson SS, Bullman TA, et al. Impact of a home-based primary care program in an urban Veterans Affairs medical center. *Journal of the American Medical Directors Association*. 2009 Feb;10(2):133-7. PMID: 19187882.
6. Cooper DF, Granadillo OR, Stacey CM. Home-based primary care: the care of the veteran at home. *Home Healthcare Nurse*. 2007 May;25(5):315-22. PMID: 17495561.
7. Counsell SR, Callahan CM, Clark DO, et al. Geriatric care management for low-income seniors: a randomized controlled trial. *JAMA*. 2007 Dec 12;298(22):2623-33. PMID: 18073358.
8. De Jonge E, Taler G. Is there a doctor in the house? *Caring*. 2002 Aug;21(8):26-9. PMID: 12739350.
9. Edes T, Kinoshian B, Vuckovic NH, et al. Better access, quality, and cost for clinically complex veterans with home-based primary care. *J Am Geriatr Soc*. 2014 Oct;62(10):1954-61. PMID: 25333529.
10. Hughes SL, Weaver FM, Giobbie-Hurder A, et al. Effectiveness of team-managed home-based primary care: a randomized multicenter trial. *JAMA*. 2000 Dec 13;284(22):2877-85. PMID: 11147984.
11. Neergaard MA, Vedsted P, Olesen F, et al. Associations between successful palliative trajectories, place of death and GP involvement. *Scandinavian Journal of Primary Health Care*. 2010 Sep;28(3):138-45. PMID: 20698730.
12. Neergaard MA, Vedsted P, Olesen F, et al. Associations between home death and GP involvement in palliative cancer care. *British Journal of General Practice*. 2009 Sep;59(566):671-7. PMID: 19761666.
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14. North L, Kehm L, Bent K, et al. Can home-based primary care: cut costs? *Nurse Practitioner*. 2008 Jul;33(7):39-44. PMID: 18600171.
15. Ornstein K, Smith KL, Boal J. Understanding and improving the burden and unmet needs of informal caregivers of homebound patients enrolled in a home-based primary care program. *Journal of Applied Gerontology*. 2009;28(4):482-503. PMID: 2010396410. Language: English. Entry Date: 20091002. Revision Date: 20091218. Publication Type: journal article.
16. Ornstein K, Smith KL, Foer DH, et al. To the hospital and back home again: a nurse practitioner-based transitional care program for hospitalized homebound people. *Journal of the American Geriatrics Society*. 2011 Mar;59(3):544-51. PMID: 21391944.

17. Ornstein K, Wajnberg A, Kaye-Kauderer H, et al. Reduction in symptoms for homebound patients receiving home-based primary and palliative care. *Journal of Palliative Medicine*. 2013 Sep;16(9):1048-54. PMID: 23746230.
18. Rosenberg T. Acute hospital use, nursing home placement, and mortality in a frail community-dwelling cohort managed with Primary Integrated Interdisciplinary Elder Care at Home. *Journal of the American Geriatrics Society*. 2012 Jul;60(7):1340-6. PMID: 22694020.
19. Wajnberg A, Wang KH, Aniff M, et al. Hospitalizations and skilled nursing facility admissions before and after the implementation of a home-based primary care program. *Journal of the American Geriatrics Society*. 2010 Jun;58(6):1144-7. PMID: 20487075.

## Appendix C. Excluded Studies

1. Abarshi E, Echteid M, Van den Block L, Donker G, Deliens L, Onwuteaka-Philipsen B. Transitions between care settings at the end of life in the Netherlands: results from a nationwide study. *Palliative Medicine*. 2010;24(2):166-74. *Excluded: Wrong intervention, Code: 6*
2. Amruso NA, O'Neal ML. Pharmacist and physician collaboration in the patient's home. *Annals of Pharmacotherapy*. 2004;38(6):1048-52. *Excluded: Wrong intervention, Code: 6*
3. Auer P, Nirenberg A. Nurse practitioner home-based primary care: a model for the care of frail elders. *Clinical Scholars Review*. 2008;1(1):33-39. *Excluded: Background paper only, Code: 2*
4. Avlund K, Jepsen E, Vass M, Lundemark H. Effects of comprehensive follow-up home visits after hospitalization on functional ability and readmissions among old patients. A randomized controlled study. *Scandinavian Journal of Occupational Therapy*. 2002;9(1):17-22. *Excluded: Wrong intervention, Code: 6*
5. Avlund K, Vass M, Kvist K, Hendriksen C, Keiding N. Educational intervention toward preventive home visitors reduced functional decline in community-living older women. *Journal of Clinical Epidemiology*. 2007;60(9):954-62. *Excluded: Primary care but no Provider home visits, Code: 16*
6. Baldwin G. Home sweet medical home. Growing numbers of primary care practices are embracing the I.T.-intensive model of care delivery. *Health Data Management*. 2013;21(1):12-6. *Excluded: Background paper only, Code: 2*
7. Banerjee S, Shamash K, Macdonald AJ, Mann AH. Randomised controlled trial of effect of intervention by psychogeriatric team on depression in frail elderly people at home. *BMJ*. 1996;313(7064):1058-61. *Excluded: Wrong intervention, Code: 6*
8. Beaussier M, Vons C. [Post-hospital home care after ambulatory surgery]. *Presse Medicale*. 2014;43(3):305-8. *Excluded: Wrong intervention, Code: 6*
9. Beck AM, Kjaer S, Hansen BS, Storm RL, Thal-Jantzen K. Study protocol: follow-up home visits with nutrition: a randomised controlled trial. *BMC Geriatrics*. 2011;11:90. *Excluded: Background paper only, Code: 2*
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11. Birk S. Making the transition to medical homes: from primary care to patient-centered care. *Healthcare Executive*. 2011;26(2):26-8, 30-2, 34. *Excluded: Background paper only, Code: 2*
12. Bitton A. Who is on the home team? Redefining the relationship between primary and specialty care in the patient-centered medical home. *Medical Care*. 2011;49(1):1-3. *Excluded: Background paper only, Code: 2*
13. Bobrie G, Chatellier G, Genes N, et al. Cardiovascular prognosis of "masked hypertension" detected by blood pressure self-measurement in elderly treated hypertensive patients. *JAMA*. 2004;291(11):1342-9. *Excluded: Wrong intervention, Code: 6*
14. Boulton C, Reider L, Leff B, et al. The effect of guided care teams on the use of health services: results from a cluster-randomized controlled trial. *Archives of Internal Medicine*. 2011;171(5):460-6. *Excluded: Primary care but no Provider home visits, Code: 16*

15. Bouman A, van Rossum E, Evers S, Ambergen T, Kempen G, Knipschild P. Effects on health care use and associated cost of a home visiting program for older people with poor health status: a randomized clinical trial in the Netherlands. *Journals of Gerontology Series A-Biological Sciences & Medical Sciences*. 2008;63(3):291-7. *Excluded: Wrong intervention, Code: 6*
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17. Bourdi E, Breton C, Plancon S. [Medico-social decisions: aging and staying at home]. *Soins*. 1999;Gerontologie.(20):36-9. *Excluded: Wrong intervention, Code: 6*
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33. Cho CY, Alessi CA, Cho M, et al. The association between chronic illness and functional change among participants in a comprehensive geriatric assessment program. *Journal of the American Geriatrics Society*. 1998;46(6):677-82. *Excluded: Wrong intervention, Code: 6*
34. Contel JC, Badia JG. Home care in Spain: teamwork is the standard. *Caring*. 1998;17(12):42-4. *Excluded: Wrong publication type, Code: 9*
35. Corrieri S, Heider D, Riedel-Heller SG, Matschinger H, Konig HH. Cost-effectiveness of fall prevention programs based on home visits for seniors aged over 65 years: a systematic review. *International Psychogeriatrics*. 2011;23(5):711-23. *Excluded: Systematic review not meeting requirements, Code: 14*
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54. Elphick PR. House calls. *CMAJ Canadian Medical Association Journal*. 2004;171(12):1474-5. *Excluded: Wrong publication type, Code: 9*
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# Appendix D. Included and Excluded Studies Criteria

## Full-Text Paper Inclusion/Exclusion Code: Reasons for paper inclusion or exclusion

### Inclusion:

1 = Paper included as evidence (see above for inclusion criteria)

### Exclusion:

- 2 = Background paper only, no data for evidence
- 3 = Discussion paper only (clinical subgroups, see above), no data for evidence
- 4 = Discussion paper only (demographic subgroups, see above), no data for evidence
- 5 = Wrong population (children and adolescents, patients with other underlying diagnosis, not applicable to clinical setting, patients with single conditions)
- 6 = Wrong intervention (not listed above), Hospital at Home, PACE, PCMH, Post surgery care, visits by (RN, LPN social workers only )—APN, NPs are included
- 7 = Wrong outcomes (not listed above)
- 8 = Wrong study design (case-control studies, cross-sectional, case-series, case reports, not described)
- 9 = Wrong publication type (opinions, letters to the editor, conference proceedings, abstract only)
- 10 = Not English language but otherwise relevant\*
- 11 = Not human population
- 12 = Inadequate care duration - Short-term, time-limited home-based care, one- time visits
- 13 = Study published before 1995
- 14 = Systematic review not meeting requirements (wrong study designs included, no quality rating, only 1 library searched, nonsystematic reviews)
- 15 = Inadequate sample size (n<20)
- 16 = Primary care but no Provider home visits

\*NOTE: If foreign language but possibly relevant, code as 10. If foreign language and not included for another reason, use exclusion code for the other reason)

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Aabom, 2006	Retrospective Cohort	Analyze the effect of GP home visits for end-stage cancer patients receiving palliative care	Denmark Island of Funen	Patient's home	National Healthcare System for Denmark	1997-1998	Terminal care provided by primary care. Details not provided	NR	NR	Number of GP home visits is a variable in analysis	National HealthCare System

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Aabom, 2006	Resident at home at time of death  Cancer patient who died in 1997 or 1998	Resident in nursing home at beginning of study period or in 3 months prior to death	Patients who received GP home visits	Patients who did not receive GP home visits	Place of death Terminal Declaration (acknowledge of terminal diagnosis with death expected within 6 months, must be signed by patient)	Median Age at death: 74 Sex: 49% Female Race: NR	Screened: NR Eligible: 2025 Enrolled: 2025 Analyzed: varied by analysis	NR	56% died in hospital 38% received a TD  GP home visit before TD 1 week before adjusted OR 16.8 (95% CI 8.2- 34.4) 4 weeks before adjusted OR 9.7 (95% CI 46.4-14.6)  GP home visits association with death in hospital with TD OR 0.18 (95% CI 0.11-0.29 and group without TD OR: 0.08 (95% CI 8.2-34.4)	Fair

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Anetzberger, 2006	Post Only Pilot Evaluation with some repeated measures during enrollment	Evaluation of Primary Care in the home for high-risk older adults	United States Cleveland Ohio	Patient's home	Visiting Nurse Association	March 2003 - October 2003	Diagnosis Care coordination Medication management Caregiver support Health education Referrals	NR	Physicians NP	Average 4 times Range 1-9, SD 2.33 and received one telephone contact (range 0-7, SD 1.43) during the 4 month period Monitored no less frequently than every 3 months	Medicare	50 and older Physical impairment and find it difficult to travel Bed bound History of falls Received initial assessment and at least one followup visit
Beales, 2009	Pre/post No comparison group 2 cohorts	Estimate the impact of HBPC on utilization of services	United States	Patient's home	Veterans Health Administration	1 year (6 months prior to HBPC enrollment and 6 months post)	PCP Interdisciplinary Team including MD, nurses, social worker, rehabilitation therapist, pharmacist, dietitian and psychologist Access to and coordination of other VA programs Case management by RN	NR	MD/NP/PA can be PCP, RN case manager others members of team	Enrollment average 315 days 3 visits per month	VA	Veteran who meets program requirements and receives care from Veterans Health Administration

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Anetzberger, 2006	Patients where data was insufficient medical consultation patients	Visiting Nurse Association House Calls	Before Intervention	Functional Status Feeling of Well being Hospitalization or use of ED Satisfaction with quality of care	Mean Age: 76 Sex: 67% Female White 66% Black 34% More than 1/2 a dozen diagnosis Specific : NR	Screened: NR Eligible: 343 Enrolled: NR Analyzed: varies by outcome: all for hospitalizations, 17 for ADLs; 16 for health maintenance	NR	No statistical tests reported 13% of patients had hospitalizations or ED visits post enrollment  ADLs/IADLs 21% improved 75% remained the same 4% Declined  Health Maintenance Ratings 31% improved 38% Remained the same 31% Declined	Poor
Beales, 2009	Non-Veterans	6 months prior to enrollment in HBPC 6 months post enrollment in HBPC	Pre enrolment to post enrollment	Hospital bed days Nursing home bed days Total inpatient days (hospital and nursing home) Inpatient admissions Cost of Care	Mean Age: 76.5 years Sex: 96% Male Race: NR 47% Dependent in 2 or more ADLs	Screened: NR Eligible: NR Enrolled: NR Analyzed for 2002: 11,334	NR	2002 62% reduction in hospital bed days 88% reduction in nursing home bed days 24% decrease in mean total cost of care (from \$38k to \$29k) 264% increase in all home care visits 2007 59% reduction in hospital bed days 89% reduction in nursing home bed days 21% reduction in 30-day hospital readmission	Poor

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Beck, 2009	Pre/Post No comparison group	Describe how House Calls for Seniors affected health care utilization	United States Indianapolis Indiana	Patient's home	Private health plan and academic geriatrics program	1999 to 2007	Initial assessment by geriatrician and social work followup visits Urgent visits Portable X-ray and electrocardiogram weekly team meetings	After hours telephone	Geriatric NP Social worker Nurse Patient service Assistant Practice Manager	Patients see a provider 9 times on average the first year	Healthcare system (62%) Provider billing (36%) Philanthropy (2%)	65 and older Live within Marion County Accept House Calls providers as their primary providers Accept Wishard Hospital as their primary hospital Be homebound according to the definition created by the team
Chang, 2009	Retrospective Review 6 months Before 6 months After HBPC	Describe how an interdisciplinary HBPC program affected hospital and ED use in an urban VA medical center	United States Washington DC	Patient's home	VA	January 1, 2001 - December 31, 2002	Pre-pour meds Draw blood Educate caregiver or home health on wound care Foley changes, home safety assessments and other evaluations Case management of VA - Medicare services such as subspecialty consults, pharmacy, prosthetics, home oxygen, respite, adult day care and home health aide services	Problems that occurred on evenings and weekends were triaged by phone by ED Nurses and physicians 911 called when indicated	NP served as primary care provider, while Registered Nurse performed routine nursing duties	At least monthly by a team member (physician, NP or registered nurse) Occasionally frequency of visits increased to weekly if indicated	VA	HBPC patients who were admitted to HBPC for at least 6 months Dependency in 2 or more ADLs Residence within 35 mile radius

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Beck, 2009	NR	Year After Enrollment	Year Before Enrollment	Healthcare Utilization	Mean Age: 80.2 Sex: (78.2% Female) Black: 63.5% White: 35.9% 71% impaired in at least one ADL 53% had a mini mental state score of 23 or less	Screened: NR Eligible: NR Enrolled: 468 Analyzed: 468	Of 48 withdrawals 19% transferred to SNF 73% died	No statistical tests reported ED visits Before 805 After 686 (14.7% decreased) Hospitalizations Before 330 After 356 (7.8% increase)  Primary Care Before 1,111 After 193 House Calls for Seniors Before 187 After 4,073 Mental Health home visits Before 188 After 1,978 Specialty Care Before 1,100 After 696  Mean total charges \$10,244 before \$12,573 after (22.7% increase)	Fair
Chang, 2009	Patients with less than 6 months to live Patients who required visits more than weekly Patients under active investigations by Adult Protective Services Patients requiring in home nursing or home hospital services	HBPC	Same patients before HBPC	Hospital Admissions Hospitalized Days Emergency Department visits	Mean age; 73.6 Range: 36-95 Female: 8 (4.4%) African American: 130 (71.0%) Caucasian 53 (29.0%) <u>Common diagnosis</u> Hypertension: 140 (76.5%) Dementia: 118 (64.5%) Anemia: 104 (56.8%) Depression: 99 (54.1%) Urinary incontinence: 98 (53.6%) Degenerative joint disease/amputations: 84 (45.9%) Cerebral vascular accident: 75 (41.0%) Diabetes: 69 (37.7%) Coronary artery disease: 63 (34.4%) Other neurologic conditions (ALS, MS, TBI, epilepsy): 70 (38.3%) Pressure ulcers: 70 (38.3%) Chronic renal insufficiency: 44 (24.0%) Chronic obstructive pulmonary disease: 43 (23.5%) Percutaneous endoscopic gastrostomy tubes: 17 (9.3%) Methicillin-resistant Staphylococcus aureus: 15 (8.2%) Blind: 11 (6.0%) Home O2/Bilevel positive airway pressure/ventilator: 10 (5.5%) Indwelling Foley/Suprapubic catheter: 10 (5.5%)	Screened: NR Eligible: NR Enrolled: 183 Analyzed: 183	NR	Total number of ED visits Pre-HBPC: 130 HBPC: 106 Percent change: 18.5% Total number of hospitalizations Pre-HBPC: 126 HBPC: 71 Percent change: 43.7% Total number of days in hospital Pre-HBPC: 1033 HBPC: 518 Percent change: 49.9%	Good

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Cooper, 2007	Pre/Post No comparison group	Describe the impact of the HBPC program in VA	United States	Patient's home	VA	First 3 quarters of fiscal year 2006	Assessment for health and social work care plan Revisions and reassessments weekly meetings	NR	NP or PA as PCP	Within 30 days and at least every 3 months	VA	Frail, chronically ill veterans who require the skills of an interdisciplinary healthcare team to cover their complex medical, social, rehabilitative, and behavioral care needs
Counsell, 2007	RCT	Test the effectiveness of a geriatric care management model on improving the quality of care for low-income seniors	United States IndianapolisIndiana	Patient's Home	Health Plan	January 2002 to August 2004	Initial Geriatric assessment Individualized care plan Medication management Physical Therapy Mental health social worker Community based services	NR	NP	Minimum of one in-home followup, one telephone or face-to-face contact per month Face-to-face home visit after any ED visit or hospitalization. Increased visits as deemed appropriate	Nina Mason Pulliam Charitable Trust and Wishard Health Services	Age 65 and older 1 visit to a primary care clinician at the same site within the past 12 months Income less than 200% of the federal poverty level

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Cooper, 2007	NR	HBPC enrollees	6 months prior to enrollment	Hospital admissions In patient days Patient satisfaction Disease management indicators	Mean age:76.7 years old Sex: 95.6% Male Race: NR Average of 19.36 diagnoses and 15 active medications 60% with cognitive impairment 42% being treated for depression	Screened: NR Eligible: NR Enrolled: NR Analyzed: 20,783	NR	27% reduction in hospital admissions 69% reduction in hospital days 98% rate care as excellent or good Hemoglobin A1C <8 78% Blood pressure <140/90 (with diagnosis of hypertension) 84% Low-density lipoproteins <100 (with diagnosis of acute myocardial infarction>8 weeks) 80% no p-value reported for any of the above	Poor
Counsell, 2007	Residence in a nursing home Living with a study participant already enrolled in another research study Receiving dialysis Severe hearing loss English-language barrier No access to a telephone Severe cognitive impairment Without an available caregiver to consent	Geriatric Resources for Assessment and Care of Elders (GRACE)	Access to all primary and specialty care services available as part of usual care	Medical Outcomes SF - 36 Activities of Daily Living ED Visits Hospitalizations	Mean age Intervention Group: 71.8 (5.6) Control Group: 71.6 (5.8) Sex: Intervention Group: 75.5% Female Control Group: 76.5% Female Black Intervention Group: 57.6% Control Group: 62.4%	Screened: 2486 Eligible: 2237 Enrolled: 951 Analyzed: 951 in Primary Analysis Loss to Followup: 10.6% at 6 months	NR	SF-36 Scores at 24 months Improvements for intervention patients compared with usual care in 4 of 8 scale General health (0.2 vs. -2.3, p=0.045) Vitality (2.6 vs. -2.6, p=0.001) Social functioning (3.0 vs. -2.3, p=0.008) Mental health (3.6 vs. -0.3, p=0.001)  Also in the Mental Component Summary (2.1 vs. -0.3, p=0.001) No differences for ADLs No difference for death 2-year ED visit rate per 1000 Intervention group 1445 [n=474] vs. 1748 [n=477], p=0.03 Hospital admission rates (700 [n=474] vs. 740 [n=477], p=0.66). Subgroup at high risk of hospitalization ED visit in the second year (848 [n=106] vs. 1314 [n=105]; p=0.03 Hospital admission rates [n=106] vs. 705 [n=105]; p=0.03	Good

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De Jonge, 2014	Cohort study	To determine the effect of home-based primary care on Medicare costs and mortality in frail elders	United States District of Columbia Washington	Patient's home	Medicare fee for service arena	2004 to 2008	Case Management Follow patients in hospital and home Social work	On call telephone coverage 24-7	Physician NP Social Workers Licensed Practical Nurses	Physician performs initial visit and visits every 3 to 4 months NPs make frequent visits ranging from every 8 weeks to several times a week depending on medical necessity	Medicare	Age 65 and older and without health maintenance organization coverage during the month of enrollment and for 3 months before. Medicare SNF Stay, but not long term care
Edes, 2014	Cost projections using a hierarchical condition category model	Assess the impact of HBPC on all federal costs (VA and Medicare) for enrollees	United States	Patient's home	VA	October 1 2005 to September 30, 2006	Unified Care Plan Medication Reconciliation Caregiver Training Attending to people at home	NR	An interdisciplinary team, including a physician, nurse, social worker, rehabilitation therapist (dietitian, psychologist, and pharmacist. In addition to these required disciplines, many programs include a midlevel provider (nurse practitioner, physician assistant) and other providers such as chaplains and recreational therapists	2.9 visits per month on average	VA	Individuals with complex, chronic disabling disease for whom routine clinic-based care is often not effective

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De Jonge, 2014	Lack of Medicare FFS Eligibility Residence in Nursing Home Died during the index month	HBPC	Matched Controls	Medicare Costs Mortality Hospital Admissions SNF Care ED Visits	Mean Age: 83.7 HBPC 82.0 Controls Sex: 76.7% Female – HBPC 76.7% Female Controls African American 90.2% HBPC 90.3% Controls Caucasian 7.1% HBPC 7.1% Controls Other 2.8% HBPC 2.6% Controls Selected major chronic conditions Alzheimer's disease or chronic mental illness	Screened: NR Eligible: 722 Enrolled: 722 Analyzed: 2983 HBPC: 722 Controls: 2161	NR	HBPC Controls Total Medicare Costs during mean followup \$44,455 vs. \$50,977 p=0.001 Difference in costs due to cases with high frailty index HBPC 9% fewer hospitalizations p=0.001 10% fewer ED visits p=0.001 27% fewer SNF days p=0.001 23% fewer specialist visits p=0.001 105% more generalist visits p<0.001 Mortality during followup period HBPC (40%) Controls (36%) hazard ratio=1.06, p=0.44	Good
Edes, 2014	Not episodic care	VA HBPC enrollees actual expenses	VA enrollees projected expenses	Projected Costs for VA and Medicare Hospital days Hospital admissions Skilled Nursing Days	Mean Age: 77.7 Sex: 96% Male Race: NR 69% Dependent in two or more ADLs Interviews were with 17 veterans, 14 caregivers and 64% of caregivers had medical problems	Screened: NA Enrolled: 9,425 Analyzed: 9,425 (HBPC only) and 6,951 (HBPC and Medicare) Loss to followup: NR 31 veterans and caregivers	No veterans or caregivers reported any perception of restriction of services from HBPC.	Change from 6 months before to 6 months during HBPC Medicare hospital days -7.8 (95% CI -8.4 to -7.1; Before 4,511 After 4,161) p<.0001 Medicare SNF days 0.6 (95% CI 0.4 to 0.7; Before 5,559 After 5,594) p=0.68 Total Medicare costs per patient -10.8 (95% CI -11.5 to -10.1; Before 4,025 After 3,590) p<0.001 VA hospital days -51.1 (95% CI -52.3 to -49.9; Before 8,877 After 4,339) p<0.001 Total VA costs per patient -28.1 (95% CI -29.2 to -27.1; Before 19,234 After 13,822 ) p<0.001 VA+Medicare hospital admissions per 100 patient-months -25.5 (95% CI -26.5 to -24.5; Before 15.7 After 11.7) p<0.001 VA+Medicare hospital days -36.5 (95% CI -37.6 to -35.4; Before 13,388 After 8,500) p<0.001	Good

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Hughes, 2000	RCT	To assess impact of Team Managed HBPC on functional status, health related quality of life, satisfaction with care and cost of care	United States 16 VA medical centers with HBPC	Patient's Home	VA	October 1994 to September 1998	Target care to high risk patients Designate primary care manager within team 24 hour contact Prior approval of hospital readmissions Transfer stable readmitted pts to step down beds HBPC Participation in discharge planning	NR	Primary Care Manager Physician	Sites used clinical judgment to provide visits based on patient condition and need	VA	2 or more ADLs impairments or prognosis of a terminal illness or were homebound with a primary diagnosis of congestive heart failure or COPD Lived within 35 mile catchment area

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Hughes, 2000	Patients with primary diagnosis of psychiatric illness, alcoholism, substance abuse, or spinal cord injury	Team Based HBPC for as long as needed until maximum patient benefit was achieved or until a different level of care was required	Customary VA and private sector care	Patient Functional Status Patient and caregiver satisfaction Caregiver burden Hospital readmissions Costs over 12 months	Mean Age HBPC 70.4 (10.3) Control 70.4 (10.3) Female HBPC 83.3 Control 83.6 White - HBPC 62.8 Control 64.2 Black - HBPC 29.7 Control 28.3 Other HBPC 7.5 Control 7.5 Terminally ill - HBPC 20.7 Control 20.1 Severely disabled - HBPC 75.1 Control 74.4 Congestive Heart Failure - HBPC 1.4 Control 1.6 Chronic obstructive pulmonary disease - HBPC 2.8 Control 3.9	Screened NR Eligible 2202 Enrolled 1966 Analyzed: 1704 at 1 month 1309 at 6 months 667 at 1 year Loss to follow up: 13.3% at 1 month 33.1% at 6 months 66.1% at 1 year	Died 340 of 981 in HBPC group 336 of 985 in control group	Results reported by treatment group and by terminal (n=188) vs. nonterminal patients (n=906) Functional Status: no significant difference QOL: terminal patients in HBPC group had better scores Nonterminal: no significant difference Patient satisfaction: terminal patients no significant difference Nonterminal patients: HBPC group significantly better 5- to 10-point increases in 5 of 6 dimensions Caregiver Most caregiver outcomes favor the treatment group HBPC group improved in HRQOL p<0.05 VA Hospital Readmissions Relative reduction in the proportion readmitted patients admitted in the first 6 months, not sustained at 12 months 7.9% (HBPC 49.2% Control 53.4%) p=0.07 Relative reduction in the number of readmissions of HBPC patients admitted in the first 6 months, not sustained at 12 months 11% (HBPC 0.8 Control 0.9) p=0.06 Relative reduction in mean number of HBPC the nonterminal, severely disabled subgroup readmissions at 6 months not sustained at 12 months 22% (HBPC 0.7 Control 0.9) p=0.03 Relative reduction in mean number of HBPC readmissions at 6 months in the terminal, CHF or COPD subgroups No differences in 6 or 12 months Overall Costs Total costs: 12.1% higher for HBPC (HBPC 31,401 Control 28,008) p=0.005	Fair

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Neergaard, 2009 and Neergaard, 2010	Retrospective Cohort	Examine association between home death and palliative care including GP home visits	Denmark	Patient's home	The National Healthcare System for Denmark	9 months in 2006 (March 1 to November 30)	GP Home visits Palliative Care	Community Nurses available 24 hours for visits or phone	GP Community Health Nurses Specialist Palliative visiting teams	NR	National HealthCare system, GP received special fee for involvement in palliative care	Adults in Aarhus county who died from cancer during the study period
Nichols, 2011	Prospective Pre-Post No comparison group	Effectiveness of dementia caregiver support	United States 24 VA facilities	Patient's home and telephone	VA	6 months	Education Support Skill training to address 5 caregiving risk factors: safety, social support, problem behaviors, depression and caregiver health	NR	Intervention was performed by non PCP member of HBPC team	Nine 1 hour individual home sessions three .5 hour individual home sessions Five 1 hour monthly support group sessions	VA	Caregivers providing 4 or more hours of assistance per day for at least 6 months and enduring at least 2 caregiving stress behaviors Patient inclusion - Alzheimer disease or related dementia and at least 1 ADL limitation or 2 or more instrumental activities of day living limitation

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Neergaard, 2009 and Neergaard, 2010	Noncancer deaths	Patients who received GP home visits	Patients who did not receive GP home visits	Home death	Mean age: 69.4 Sex: 45.6 Female Race: NR	Screened: NR Eligible: 599 Enrolled: 599 Analyzed: 333 (63.2%) for other GP characteristics	NR	Median number of GP home visits: 3 Prevalence Ratios (PRs) Home death, with 0 home visits as reference group any visits PR 4.3 (95% CI 1.2-14.9) 3 or more PR 6.9 (95% CI 2.0-23.4) 4 or more PR 6.1 (95% CI 1.8- 20.0) Involvement of community nurse	Fair
Nichols, 2011	Patients to ill (bed bound with severe dementia) 3 hospitalizations in past year Planned institutionalization	After Intervention	Before Intervention	Caregiver Improved Skills Increased Knowledge	Caregivers/ Intervention Recipients Age: 83.4 (6.2) Female .9 White 78.0	Screened: NR Eligible: NR Enrolled: 127 Analyzed: 105 at 6 months for burden 98 for survey Loss to followup: 29 (22.8%)	In lost to followup Veterans placed in nursing home n=4	Caregiver measure Improvement 95% CI (p-value)  Significant Burden: 2.88 (0.86) 1.17 to 4.59 (0.001) Effect size 0.33 Depression: 1.49 (0.55) 0.39 to 2.59 (0.009) Effect size 0.26 Depression impact: 0.29 (0.11) 0.07 to 0.51 (0.01) Effect size 0.26 Behaviors: 1.02 (0.49) 0.04 to 2.00 .04 Effect size 0.20 Caregiving frustrations: 0.26 (0.09) 0.09 to 0.44 (0.003) Effect size 0.30 Time on duty, h: 1.75 (0.92) -0.09 to 3.58 (0.06) Effect size 0.15  Not Significant General health: 0.13 (0.12) -0.11 to 0.37 (0.27) Effect size 0.11 Health behaviors: 0.20 (0.20) -0.19 to 0.59 (0.30) Effect size 0.10 Safety: 0.06 (0.13) -0.20 to 0.32 (0.65) Effect size 0.04 Social support: 0.11 (0.18) -0.25 to 0.46 (0.56) Effect size 0.06 Bother with behaviors: -0.18 (0.63) -1.43 to 1.08 (0.78) Effect size 0.03 Caregiving difficulties: 0.12 (0.18) -0.24 to 0.48 (0.51) Effect size 0.07 Time providing care, h: 0.96 (0.63) -0.29 to 2.20 (0.13) Effect size 0.15	Fair

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North, L., 2008	Pre/Post No comparison group	HBPC impact on Hospitalizations and ED visits	United States Denver Colorado	Patient's Home	VA	December 30, 2002 through December 31, 2003	Provide access to primary medical care Maximize independence and function Provide adequate ED and hospital stays Enhance safety and quality of life	NR	NP Dietitians Occupational Therapists Medical social services Pharmacists Home health services Home delivered meals Transportation Services	Home visit frequency is determined by the veteran's health and functional status at any given time, but patients are seen at least monthly	VA	HBPC at least 12 months Received care at Denver VA at least 12 months prior to HBPC enrollment
Ornstein, 2009	Prospective Pre/Post No comparison group	Impact of HBPC on caregiver burden and their unmet needs	United States Manhattan New York	Patient's Home	Mount Sinai Visiting Doctors Program	April 2001 to April 2002	Initial visit by PCP Followup PCP visits every 2 to 8 weeks depending on severity of illness Coordination of all aspect of care Initial Social Work assessment/ home visit, social work followup according to plan for patient	On call PCP or resident is available	PCP could be MD or NP	Every 2 to 8 weeks based on severity	Medicaid and some private insurance	Patient had to be new admission to HBPC program during period and alive at time of interview  Caregiver has to be the primary caregiver Able to complete interview in English or Spanish

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Author, Year Title	Exclusion Criteria	Intervention Group or Groups	Comparators/ Comparison Group or Time Period	Outcomes Measured	Study Participants: Baseline Demographics	Screened Eligible Enrolled Analyzed Loss to Followup	Adverse Events Including Withdrawals	Results	Quality Rating
North, L., 2008	NR	During HBPC	Before HBPC	Hospitalization ED visits Clinic no shows	Average age 80 Sex: (7% Female) White 59% Cardiovascular Disease Diabetes COPD Dementia Musculoskeletal	Screened: NR Eligible: NR Enrolled: 104 Analyzed: 104	NR	Hospitalizations - Pre 822 Post 135 - 84% decrease ED Visits - Pre 166 Post 86 - 48% decrease No Show - Pre 206 Post 112 - 26% decrease	Poor
Ornstein, 2009	If patient died before interview caregiver was not included  Caregiver exclusions Severe hearing limitations Participant in pilot or study for another patient or being investigated for abuse or neglect	Mount Sinai Visiting Doctors Program	Baseline to 9 month followup	Unmet Needs Scale Caregiver Burden Inventory Level of Care Index	Caregiver Mean age: 55 Sex: 78.6% Female White 32%	Screened: 212 Eligible: 127 Enrolled: 114 baseline Eligible at 9 months: 72 Analyzed: 56 Loss to followup: 16 (51%)	NR	Change in Percent Needing Assistance baseline to 9 months, (p-value) Financial: -12.5 Before 37.5 After 25 (0.071) Housing: -3.6 Before 39.29 After 35.71 (0.527) Employment: -3.6 Before 16.1 After 12.5 (0.414) Health insurance: -3.6 Before 17.9 After 14.3 (0.500) Transportation: -19.7 Before 26.8 After 7.14 (0.001) Home care: -12.5 Before 53.6 After 41.1 (0.162) Daily chores: -26.8 Before 41.1 After 14.3 (<0.001) Medical information: -10.7 Before 25 After 14.3 (0.083) Medical staff availability: -7.2 Before 16.1 After 8.9 (0.248) Emotional problems: -10.7 Before 35.7 After 25 (0.058) Family problems: -1.8 Before 16.1 After 14.3 (0.701) Spiritual or religious needs: -7.1 Before 10.7 After 3.6(0.056) Change in Caregiver Burden baseline to 9 months: Time burden: -0.89 Before 11.27 After 10.38 (0.053) Developmental burden: -0.43 Before 9.3 After 8.89 (0.285) Physical burden: -1.90 Before 7.86 After 5.96 (0.006) Social burden: -0.625 After 4.41 After 3.79 (0.127) Total burden: -3.84 Before 32.84 After 29 (0.017)	Poor

## Appendix E. Evidence Table

See Appendix B for the reference list for Appendix E.

Author, Year Title	Study Design	Study Purpose/ Research Question	Location	Setting	Organizational Characteristics (Of the organization providing HBPC)	Study Duration	Types of Service Provided	Services Provided on Evenings and Weekends	Provider Types and Roles	Duration of HBPC, Number of Visits, Frequency of visits	How HBPC is Funded	Inclusion Criteria
Ornstein, 2011	Prospective Pre/post No comparison group	Transition of Care Program	United States New York	Patient's Home	Mount Sinai Visiting Doctors Program	Before Period January 1, 2004 - May 30, 2006 After Period September 1 2006 - December 31, 2008	Focused physical examination Medication reconciliation Appropriateness of home care services Adequacy of patient caregiver education	Transition care not available on weekends; normal HBPC included 24 hour coverage	NP for transition PCP and other HBPC team stayed the same	Contact with hospital staff during admission Visit with patient during admission Initial visit within 3 weeks of discharge Once every 6- 8 weeks	NR	Patient in Mount Sinai Visiting Doctors Program Hospital Admission
Ornstein, 2013	Prospective Pre/post No comparison group	Transitional Care within HBPC	United States Manhattan New York	Patient's Home	Mount Sinai Visiting Doctors Program	September 2008 to February 2010	Ongoing chronic disease management Palliative care End of life care Treatments are at the discretion of each provider	Contact the on call physician	PCP Social Worker Nurses Specialists if needed	Initial visit and then every 2 to 12 weeks depending on the severity of the illness	NR	Living in Manhattan above 59th Street age > 18 Medicare Homebound Definition Report at least one symptom

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See Appendix B for the reference list for Appendix E.

Author, Year Title	Exclusion Criteria	Intervention Group or Groups	Comparators/ Comparison Group or Time Period	Outcomes Measured	Study Participants: Baseline Demographics	Screened Eligible Enrolled Analyzed Loss to Followup	Adverse Events Including Withdrawals	Results	Quality Rating
Ornstein, 2011	No Hospital Admission	During Enrollment in the program	Before enrollment in program	Hospital Admissions Length of Stay 30 Day Readmissions Case Mix Index Direct Costs	Mean Age: 81.1 (13.8) Sex: 72.7% Female White 178 (33.5) Black 157 (29.6) Latino 172 (32.4) Other 23 (4.3)	Screened: 1,464 Eligible: 532 Enrolled: 532 Analyzed: 530 (Note: this is patients, for some outcomes the unit is hospitalizations and a patient may have more than one)	NR	Length of Stay Before 6.5 days During 6.45 days $p=0.0930$ -day Rehospitalization Before 6.23 During 6.83 $p=0.05$ Net revenue, \$, median (IQR) 9,753 (7,945–14,684) 10,807 (8,174–15,832) $p<0.001$ Direct care costs, \$, median (IQR) 3,245 (1,977–5,834) 3,699 (2,389–6,703) $p<0.001$ Indirect cost, \$, median (IQR) 666.5 (399–1,199) 740 (466–1,355) $p<0.001$ Contribution to margin, \$, median (IQR) 5,658 (3,308–8,408) 5,940 (3,543–9,034) $p=0.34$ Revenue and Costs increased resulting in a nonsignificant impact	Fair
Ornstein, 2013	Death Being ambulatory Not requiring home based care Placement in nursing home	3 and 12 weeks after enrollment	Before enrollment in program	Pain Depression Loss of appetite Anxiety Tiredness	Majority of patients more than 80 (73%) Sex: 75% Female White: 54 (39%) Latino: 41 (29%) Black: 35 (25%) Asian: 3 (2%) Other: 2 (1%) Missing: 5 (4%) Dementia: 64 (46%) CHF: 18 (13%) COPD: 7 (5%) Depression: 43 (31%) Cancer: 19 (14%)	Screened: Eligible: 267 Enrolled: 140 Analyzed: 140 (Note: n vary by symptom) Loss to followup: 48%	NR	Reduction in Moderate to Severe Symptom Burden % symptom free Pain: 3 weeks 25% 12 weeks 27.08% Depression: 3 weeks 57.8% 12 weeks 50% Loss of Appetite: 3 weeks 20.69% 12 weeks 24.49% Anxiety: 3 weeks 58.62% 12 weeks 59.26% Tiredness: 3 weeks 45.10% 12 weeks 47.5%	Fair

## Appendix E. Evidence Table

See Appendix B for the reference list for Appendix E.

Author, Year, Title	Study Design	Study Purpose/ Research Question	Location	Setting	Organizational Characteristics (Of the organization providing HBPC)	Study Duration	Types of Service Provided	Services Provided on Evenings and Weekends	Provider Types and Roles	Duration of HBPC, Number of Visits, Frequency of visits	How HBPC is Funded	Inclusion Criteria
Rosenberg, 2012	Retrospective Pre/Post No comparison group	To evaluate the effect of medical Primary Integrated Interdisciplinary Elder Care at Home (PIECH) on acute hospital use and mortality in a frail elderly population	Victoria British Columbia Canada	Patient's home	Provincial Healthcare System	May 1, 2010 - April 30, 2010 (and year prior to enrollment)	Comprehensive Geriatric Assessment Clinical Case Management Primary medical care Joint injection Cryotherapy Skin Biopsies Long term planning Acute hospital and discharge planning	Family doctors from local clinics provided after-hours telephone coverage. Individuals were free to go to walk-in clinics. HBPC program did not provide coverage	Physician Nurse Physiotherapist	Physician saw patients every 2 to 3 months. Nurses saw them monthly Care in the home fluctuated depending on needs	Provincial Government and Private Practice Fee	Age 75 or older Difficulty getting to physician's office Complex medical or functional problems Living in geographic catchment area Transfer primary medical care
Wajnberg, 2010	Retrospective Chart Review Pre/post No comparison group	To evaluate the effect of an urban house calls program on healthcare utilization	United States New York	Patient's home	Health Plan	October 2004 to August 2006	Initial Assessment within 2 weeks of referral Blood draws as needed. Wound care by nursing services Some x-rays in the home Podiatry visits Patients travel to any specialty needs	NR	Primary Care Physician NP Social Worker Nursing services	After the initial assessment NP sees patient monthly and Primary Care Physician every 3 months Median days enrolled: 198 Range: 32 - 368 At least 30 days of followup in the program	Montefiore Medical Center Care Management Company a capitated insurance program	Medicare definition of homebound Able to leave home only with great difficulty and short duration

## Appendix E. Evidence Table

See Appendix B for the reference list for Appendix E.

Author, Year Title	Exclusion Criteria	Intervention Group or Groups	Comparators/ Comparison Group or Time Period	Outcomes Measured	Study Participants: Baseline Demographics	Screened Eligible Enrolled Analyzed Loss to Followup	Adverse Events Including Withdrawals	Results	Quality Rating
Rosenberg, 2012	Enrolled less than 1 year	Most recent 12 month period	Year prior to entering program	Acute hospital Admissions ED contacts Reason for leaving practice Site of death	Mean Age: 86.7 Sex: 71.7% Female Race: NR Frailty Scale Mean 5.4 (high is 7)	Screened: 306 Eligible: 248 Enrolled: 248 Analyzed: 198 Lost to followup: 20.2%	NR	Change pre to post Hospital admissions: -59.5 (Pre 84 Post 34) p<0.001 Hospital days: -61.7 (Pre 1,197 Post 459) p=0.004 ED visits: -9.8 (Pre 90 Post 82) p=0.66	Fair
Wajnberg, 2010	Unavailable charts or no record of HBPC	HBPC	Before enrollment in program	Hospital Admissions Skilled Nursing Facility Admissions	Mean Age: 79.0 (10.6) Female: 70% Male Black: 87 (49) White: 46 (26) Hispanic: 21 (12) Other: 25 (14) <u>Diagnoses, n (%)</u> Congestive heart failure: 46 (26) Diabetes mellitus: 78 (44) Dementia: 60 (34) Depression: 40 (22) Arthritis: 99 (55) Coronary artery disease 36 (20) Anticoagulation (warfarin) 24 (13) COPD or asthma 44 (25) History of stroke 40 (22) History of falls 25 (14)	Screened: NR Eligible: 210 Enrolled: 179 Analyzed: 179	NR	Patients with ≥1 hospitalizations Before Enrollment: 110 (61) After enrollment: 178 (38) p=<0.001 Patient with ≥ 1 Skilled Nursing Facility Admissions Before Enrollment: 63 (35) After Enrollment: 33 (18) p=0.001	Fair

**Please see Appendix B. Included Studies for full study references.**

ADL = Activities of daily living, CHF = congestive heart failure, CI = confidence interval, COPD = chronic obstructive pulmonary disease, ED = emergency department, FFS = fee for service, GP = general practitioner, HBPC = home-based primary care, IADL = Instrumental Activities of Daily Living, NP = Nurse Practitioner, NR = not reported, OR = odds ratio, PA = physician assistant, PCP = primary care provider, QOL = quality of life, RN = registered nurse, RCT = randomized controlled trial, SD = standard deviation, SNF = skilled nursing facility, TD = terminal declaration, VA = Veterans Affairs

## Appendix F. Quality Rating

**Table F-1. Randomized Controlled Trials Quality Rating**

<b>Author, Year</b>	<b>Was the randomization method adequate?</b>	<b>Was the allocation concealment adequate?</b>	<b>Were groups similar at baseline or did the analysis control for any important baseline differences?</b>	<b>Were outcome assessors blinded to the patient group? Or are primary outcome measures unlikely to be biased?</b>	<b>Did the study rule out or control for impact from unintended exposures or concurrent interventions that might bias results?</b>	<b>Are there no concerns about bias due to attrition? Where comparable groups maintained?</b>
Hughes, 2000	NR	Yes	Yes	Yes	No	No
Counsell, 2007	Yes	Yes	Yes	Yes	Yes	No

## Appendix F. Quality Rating

<b>Author, Year</b>	<b>Was fidelity to the intervention adequate?</b>	<b>Were valid and reliable measures of outcomes and confounders used and implemented consistently across all study participants/groups?</b>	<b>Was intention to treat analysis used? Was the method for handling missing data appropriate?</b>	<b>Were the potential outcomes prespecified and were all the prespecified outcomes reported?</b>	<b>Funding Source</b>	<b>External Validity</b>	<b>Quality Rating</b>
Hughes, 2000	No	Yes	Yes	Yes	Department of Veterans Affairs		Fair
Counsell, 2007	Yes	Yes	Yes	Yes	Grant: R01 AG20175 from the National Institute on Aging, National Institutes of Health		Good

**Please see Appendix B. Included Studies for full study references.**

## Appendix F. Quality Rating

**Table F-2. Observational Studies Quality Rating**

<b>Author, Year</b>	<b>Was the selection of comparison groups or time periods adequate? Were inclusion and exclusion criteria applied uniformly across groups or time periods?</b>	<b>Were groups similar at baseline or did the analysis control for any important baseline differences?</b>	<b>Were outcome assessors blinded to the patient group? Or are primary outcome measures unlikely to be biased?</b>	<b>Did the study rule out or control for impact from unintended exposures or concurrent interventions that might bias results?</b>	<b>Are there no concerns about bias due to attrition? Where comparable groups maintained?</b>	<b>Was fidelity to the intervention adequate?</b>
Aabom, 2006	Yes	Yes	Yes	No	NA (retrospective)	Yes
Anetzberger, 2006	Unclear	NA	No	No	No	Unclear
Beales, 2009	Yes	Yes	Yes	No	No	Unclear
Beck, 2009	Yes	No	Yes	No	No	Yes
Chang, 2009	Yes	Yes	Yes	No	Yes	Yes
Cooper, 2007	Yes	Yes	Yes	No	Yes	Unclear
De Jonge, 2014	Yes	Yes	Yes	Unclear	Yes	Yes
Edes, 2014	Yes	Yes	Yes	No	Yes	Unclear
Neergaard, 2009 Neergaard, 2010	Yes	Yes	Yes	No	No 63.2% response rate	Unclear
Nichols, 2011	Yes	NA	No	No	No	Yes
North, 2008	Yes	Yes	Yes	No	No	Unclear
Ornstein, 2009	Yes	NA	No	No	No	Yes
Ornstein, 2011	Yes	Yes	Yes	Unclear	Yes	Yes
Ornstein, 2013	Yes	NA	No	No	No	Yes
Rosenberg, 2012	Yes	NA	Yes	No	No	Yes
Wanjberg, 2010	Yes	NA	Yes	No	No	Yes

## Appendix F. Quality Rating

<b>Author, Year</b>	<b>Were valid and reliable measures of outcomes and confounders used and implemented consistently across all study participants/groups?</b>	<b>Was intention to treat analysis used? Was the method for handling missing data appropriate?</b>	<b>Were the potential outcomes prespecified and were all the prespecified outcomes reported?</b>	<b>Funding Source</b>	<b>External Validity</b>	<b>Quality Rating</b>
Aabom, 2006	Yes	Unclear	Yes	Health Insurance Foundation, Danish Research Foundation for General Practice, Danish College of General Practitioners' Research Scholarship	National system of care in Demark may not resemble other places	Fair
Anetzberger, 2006	Yes	No	Yes	Grants from the Abington, Bruening, Cleveland, Saint Luke's, and Sisters of Charities Foundations.		Poor
Beales, 2009	Unclear	Unclear	Unclear	Department of Veterans Affairs		Poor
Beck, 2009	Yes	No	Yes	National Institute on Aging awards K24-AG026770-01 and P30AG024967		Fair
Chang, 2009	Yes	Yes	Yes	Department of Veterans Affairs		Good
Cooper, 2007	Unclear	Unclear	Yes	VHA		Poor
De Jonge, 2014	Yes	Yes	Yes	Deerbrook Charitable Trust		Good
Edes, 2014	Yes	Yes	Yes	Geriatrics & Extended Care, Office of Clinical Operations & Management, Veterans Health Administration; Intel Corporation; and the Memphis VA Medical Center		Good
Neergaard, 2009 Neergaard, 2010	Yes	NA	Yes	Aarhus County Research fund for Clinical Development and Research in General Practice and Danish National Research Foundation for Primary care		Fair
Nichols, 2011	Yes	No	Yes	VA Patient Care Services		Fair
North, 2008	Yes	Unclear	No	Department of Veterans Affairs		Poor
Ornstein, 2009	Yes	NA	Yes	NR		Poor
Ornstein, 2011	Yes	Unclear	Yes	Fan Fox and Leslie R. Samuels Foundation		Fair
Ornstein, 2013	Yes	No	Yes	Y.C. Ho/Helen and Michael Chiang Foundation		Fair
Rosenberg, 2012	Yes	Unclear	Yes	Publically funded by the provincial government, BC and Victoria, Canada		Fair
Wanjberg, 2010	Yes	Unclear	Yes	No sponsor	Single site	Fair

**Please see Appendix B. Included Studies for full study references.**

## Appendix G. Strength of Evidence Table

Key Question Outcome	Number of Studies	Study Limitations (High, Medium, Low)	Directness (Direct, Indirect)	Consistency (Consistent, Inconsistent, Unknown)	Precision (Precise, Imprecise)	Reporting Bias (Suspected or undetected)	Strength of Evidence/ Grade (High, Moderate, Low, Insufficient)
<b>Key Question 1: Among adults with chronic conditions that are serious or disabling, what are the effects (positive and negative) of home-based primary care interventions on:</b>							
Health outcomes							
Function	3	High	Direct	Inconsistent	Imprecise	Undetected	Low
Symptoms	1	Medium	Direct	Unknown	Imprecise	Undetected	Insufficient
Mortality	2	Low	Direct	Inconsistent	Imprecise	Undetected	Low
Patient and caregiver experience							
Satisfaction	3	High	Direct	Consistent	Imprecise	Undetected	Low
SF-36/Quality of Life	2	Medium	Direct	Inconsistent	Imprecise	Undetected	Low
Caregiver Burden/Needs	2	High	Direct	Consistent	Imprecise	Undetected	Low
Utilization of services							
Hospitalization	10	Medium	Direct	Consistent	Precise	Undetected	Moderate
Hospital Bed Days	6	Medium	Direct	Consistent	Precise	Undetected	Moderate
Hospital Readmissions	3	High	Direct	Inconsistent	Imprecise	Undetected	Low
Emergency Department	6	Medium	Direct	Inconsistent	Precise	Undetected	Low
Nursing Home Admissions	1	Medium	Direct	Unknown	Precise	Undetected	Insufficient
Nursing Home Days	3	Medium	Direct	Inconsistent	Precise	Undetected	Insufficient
Specialty Visits	2	Medium	Direct	Consistent	Imprecise	Undetected	Low
Costs	6	Medium	Indirect	Inconsistent	Imprecise	Undetected	Insufficient
Negative unintended consequences/harms	1	High	Indirect	Unknown	Imprecise	Undetected	Insufficient
<b>Key Question 2: How do the effects of home-based primary care interventions differ across:</b>							
Patient characteristics: severity of illness or frailty	4	Low	Direct	Consistent	Precise	Suspected	Moderate
Organizational characteristics	0	–	–	–	–	–	Insufficient
<b>Key Question 3: Which characteristics of home-based primary care interventions are associated with effectiveness?</b>							
Caregiver support	1	Medium	Direct	Unknown	Precise	Undetected	Insufficient
Transitional care	1	Medium	Direct	Unknown	Precise	Undetected	Insufficient
Primary care home visits and palliative care at end of life	2	Medium	Indirect	Consistent	Imprecise	Undetected	Low
Others program components	0	–	–	–	–	–	Insufficient