HEALTH BEGINS

ROI Calculator for Partnerships to Address Social Needs:

GUIDE TO EVIDENCE FOR HEALTH-RELATED SOCIAL NEEDS INTERVENTIONS: 2023 ENHANCED EDITION

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Introduction

This evidence guide is intended for users of the Return on Investment (ROI) Calculator for Partnerships to Address the Social Needs. It summarizes an assessment of the evidence available for the calculator to establish a business case for sustainable financial arrangements between health care and community-based organizations serving adults with complex health and social needs. Holistically addressing social and medical needs can improve health outcomes and may produce health care savings as well, by reducing use of expensive health care services such as emergency department visits, hospitalizations, and nursing home stays.

What's Included in the Guide

The guide includes relevant evidence from peer-reviewed and gray literature that reported on the costs of health-related social need interventions and/or their impact on health care utilization and cost of care for adults with complex health and social needs (see Methods).

The 2022 update of the guide added 41 studies (indicated by asterisks in citations) to 41 studies retained from a first report, published in 2019. Although this area of research remains in an early stage of development, the number and rigor of studies is increasing.

The evidence is presented in seven tables organized by type of intervention, including interventions that help people access social services. Some tables are further subdivided into sections reflecting common characteristics of how interventions were delivered, as indicated below:

- **Housing**: permanent supportive and transitional housing and medical respite care programs
- **Home Modifications**: delivered as part of multi-component interventions to prevent falls among the elderly and mitigate environmental triggers for asthma
- **Nutrition**: home-delivered meals, food prescriptions, and nutrition assistance programs
- **Transportation**: nonemergency medical transportation
- **Care Management**: programs that may address multiple social needs through multidisciplinary care teams, social worker–led interventions, coaching by community health workers and care

- **Counseling**: legal aid and financial assistance
- **Social Isolation and Loneliness**: this is a new section with only a few studies, some of which also address other social needs such as nutrition.

Within each table or section, the studies are organized by strength of evidence, defined as follows:

- Strong: randomized controlled trials
- Moderate: nonrandomized trials and observational studies with comparison groups
- Promising: before-and-after (pre/post) and descriptive studies without comparison groups.

For each evidence level, studies are sorted alphabetically by the first study author's last name. Results described in the guide were statistically significant, unless otherwise indicated. Given the formative state of the field, the methodological rigor of the evidence is variable. Studies were selected with a bias toward including newer, controlled studies and findings that are useful as inputs for the calculator. The 2022 update also clarified, combined, and dropped some results included in the 2019 report (see Methods).

What's New in this Edition

This enhanced edition of the guide features new Appendix tables that summarize the cost of social service interventions and their potential impact on health care utilization. Intervention costs from the guide were supplemented with recent evidence from the field and inflated to 2023 dollars (Appendix Table 2). Median values from these tables are used to pre-populate inputs for the Quick ROI Calculator.

How to Use the Guide

For each social need, first identify relevant studies that most closely match the aims, target population, and context of your planned intervention. To get more information on a study, click on the citation to view the online abstract and full text of the article (when available). Consider how well the evidence relates to your organizational or program context as well as its potential strengths and limitations. You may wish to model a range of input values from the guide to test your assumptions.

Abbreviations Used in the Guide

ACO	accountable care organization
ADL	activity of daily living
AIDS	acquired immunodeficiency syndrome AMI acute myocardial infarction (heart attack)
CBO	community-based organization
CHF	congestive heart failure
CHW	community health worker
COPD	chronic obstructive pulmonary disease
DME	durable medical equipment
ED	emergency department EMS emergency medical services
ESRD	end-stage renal disease
FQHC	federally qualified health center

HEALTH BEGINS

HIV human immunodeficiency virus
LTC long-term care
LTSS long-term services and supports
MEPS Medical Expenditure Panel Survey
MS multiple sclerosis
NHIS National Health Interview Survey
OT occupational therapist/therapy
PMPM per member per month
PPPY per person per year
PSH permanent supportive housing
RCT randomized controlled trial
RN registered nurse
ROI return on investment
SDOH social determinants of health
SNAP Supplemental Nutrition Assistance Program
SNF skilled nursing facility
SSI social security income
SUD substance use disorder
TANF Temporary Assistance to Needy Families
VA Veterans Administration

HEALTH BEGINS

Evidence Guide

HOUSING

People experiencing homelessness often live with chronic illnesses that may be complicated by mental health or substance use disorders as well as unmet social needs (NAEH 2021). Many have repeated and prolonged hospital stays, make frequent ED visits, incur high health care costs, and experience poor health outcomes (NASEM 2018). This review found promising to strong evidence that providing people with a medical need who are homeless — or at risk of becoming homeless — with permanent supportive or transitional housing, or with medical respite care after a hospital stay, can significantly reduce expensive forms of health care, thereby reducing costs.

Among a subset of 8 profiled studies that compared PSH or transitional housing to a control group:

- ED visit rates were 14% to 54% lower (median 29%) in 6 studies.
- Hospital admission rates were 15% to 42% lower in 5 studies but not significantly different in one study (median 30% reduction).
- Hospital days were 29% to 43% lower in 2 studies.
- Hospital length of stay was 14% shorter in 1 study.
- Total health care costs were lower in 2 studies ($145 PMPM to $1,940 PMPM) but not significantly different in 5 studies.

Some studies also found significant increases in receipt of outpatient, primary care, or mental health visits, as well as increased pharmacy costs among those in supportive housing, indicating that PSH improved access to care.

Health care savings alone may not fully pay for PSH programs. A systematic review of 17 controlled studies of PSH in the U.S. (including some that predated our review) reported median health care savings of $937 PMPM versus median intervention costs of $1,373 PMPM (Jacob et al. 2022). However, there was a net societal benefit of $1.80 for every $1 invested in PSH when considering savings from both health care and criminal justice system involvement. Few studies have specifically examined the effect of PSH on long-term care. One promising study reported a large decrease in use of SNF and LTC facilities among dually eligible Medicare and Medicaid beneficiaries enrolled in a pilot PSH program, resulting in net program savings of $4,334 PMPM (KPMG Government Institute 2018).

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
PERMANENT SUPPORTIVE HOUSING (PSH)					
Sadowski et al. 2009; Basu et al. 2012	Homeless adults with chronic medical illnesses in Chicago	The Housing First PSH model offered three components: 1) interim housing at a respite center after hospital discharge, 2) stable housing after recovery from hospitalization, and 3) case management in study hospitals, respite care, and housing sites. Usual-care participants received standard discharge planning from hospital social workers. Participants had 18 more contacts with a case manager than those in usual care, on average.	Strong. RCT (n=201 in intervention group, 206 in usual care group). Study participants were followed for 18 months. Differences in overall costs were not statistically significant.	Average annual incremental cost of $3,154 for housing and respite care and $183 for case management.	Compared to usual care, PSH participants had the following outcomes: Relative reductions of 29% in hospitalizations, 29% in hospital days, and 24% in ED visits after adjusting for baseline covariates. $8,593 (26%) lower health care costs PPPY for hospitalizations, ED visits, outpatient visits, residential substance abuse treatment, and nursing home days. Net program savings of $6,307 (17%) PPPY in total medical, legal, housing, and case management costs; and of $9,809 PPPY among chronically homeless PSH participants.
***Brennan et al. 2020**	Chronically homeless Medicaid beneficiaries in Massachusetts	Two statewide Housing First PSH initiatives that serve chronically homeless individuals: Healthy for Good and the Social Innovation Financing Pay for Success program. Housing First participants were enrolled in the Community Support Program for People Experiencing Chronic Homelessness, a Medicaid-funded program that provides community-based support services for chronically homeless individuals.	Moderate. Observational study of intervention group (n=690) from 2 years before until 1 year after enrollment in Housing First, and a matched comparison group (n=690) not enrolled in Housing First (data from Appendix B).	Not given	Relative to the comparison group during the year after enrollment, Housing First enrollees on average had 33% fewer ED visits (3.0 vs. 4.5 per person); 31% fewer hospital admissions (1.8 vs. 2.6); 43% fewer inpatient days (7.7 vs. 13.4); 20% more mental health care visits (11.2 vs. 9.3 per person); and 27% fewer other visits (15.3 vs. 20.9). Difference of $5,267 PPPY (17%) in total health care costs between participants and comparison group ($25,614 vs. $30,881 PPPY) was not statistically significant.
***DeLia et al. 2021**	Adult Medicaid beneficiaries (age 18 and older) in 19 of 21 New Jersey counties	PSH programs, which primarily serve special needs and chronically homeless and disabled populations. PSH residents were typically offered case management, assistance finding and maintaining housing, referrals to mental and physical health care, and referrals to social services.	Moderate. Observational study with difference-in-differences comparisons during the 6 months before and 6 months after enrollment in PSH (n=1,442) relative to a matched comparison group (n= 6,064).	Not given	Relative to the comparison group, PSH enrollees had a significant 14% decrease in ED visits, a marginally significant 15% decrease in hospital admissions, and no significant difference in primary care visits. No significant reduction in total Medicaid spending, largely due to increased pharmaceutical spending.

*Indicates studies added to the guide in this update.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Gusmano, Rodwin, and Weisz 2018	Elderly Medicare beneficiaries in Queens, New York	Community-based PSH program called "Selfhelp" that supplied affordable housing with supportive social services including Medicaid-funded home services, SNAP (for those eligible), psychological assessments, counseling, advocacy, health education, wellness, and access to a list of local service providers (e.g., transportation, physician, pharmacy).	Moderate. Observational study (n=1,248 in intervention group, 15,947 in matched comparison group).	Not given	Total hospital discharge rate was 32% lower for PSH vs. comparison group. Rate of hospital discharge for ambulatory care– sensitive conditions was 30% lower for PSH compared to controls (43% lower after controlling for demographic factors). Mean length of hospital stay for PSH group (6.38 days) was one day shorter than comparison group (a difference of 13.5%).
***Hollander et al. 2021**	Adult Medicaid beneficiaries (age 21 and older) with disabilities experiencing chronic homelessness in select Pennsylvania counties	PSH model which integrates non-time-limited rental assistance with supportive services to promote housing stability and recovery from physical and mental health conditions. Supportive services may include case management, substance use disorder treatment, life skills training, job hunting assistance, relocation assistance, and tenancy-sustaining services.	Moderate. Observational study analyzing difference in differences between beneficiaries in PSH for 180 days or more (n=1,226) and a matched cohort experiencing housing instability who did not receive PSH (n=970).	Total service costs not given. Spending on case management services increased by $20.40 PMPM ($245 PPPY) for PSH relative to the control group.	After 3 years, the PSH cohort had the following outcomes relative to changes in the comparison group: Medicaid spending decreased by $145 PMPM (14%); ED visits decreased by 4.7 visits per 100 person-months (19%); hospitalizations decreased by 1.6 admissions per 100 person-months (44%); and use of residential SUD treatment decreased by 27.3 days per 100 person-months (79%).
***Hunter et al. 2021**	Adults (age 18 and older) experiencing homelessness, who were high-need and enrolled in a large Southern California Medicaid and Medicare health plan	PSH program combines a long-term housing subsidy with intensive case management services and medical and nonmedical supports. Participants received recuperative care including shelter, meals, and transportation during a transition period while awaiting permanent housing placement.	Moderate. Observational study using regression analysis with propensity score weighting comparing program participants (n=162) 12 months before and 12 months after enrollment to a cohort of health plan members not enrolled in PSH (n=356).	$30,540 PPPY ($2,545 PMPM), including costs for those who exited the program before housing placement.	PSH participants used more primary and home health care after program enrollment relative to the comparison group but had fewer high-cost events and decreased use of inpatient and emergency care. Reductions in health care costs did not differ significantly between PSH and comparison group ($21,418 vs. $25,273). The PSH program did not save money overall.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
***Srebnik, Connor, and Sylla 2013**	Chronically homeless adults ages 18 and older with medical illnesses and high prior acute-care use or sobering sleep-off center visits	Begin at Home (BAH), a Housing First PSH pilot in Seattle, offered integrated onsite medical, psychiatric, and chemical dependency services. Participants received help applying for income and food assistance benefits and developing self-sufficiency capabilities. Participants and control group both received either medical respite or services that linked them to primary care, dental care, and behavioral health care.	Moderate. Prospective cohort study of BAH participants (n=29) 1 year before and 1 year after enrollment, compared to a similarly recruited control group (n=31).	$18,600 PPPY ($1,550 PMPM).	After controlling for baseline differences, average ED use was 54% lower for BAH participants than the control group (2.07 vs. 4.48 visits), while sobering center use was 86% lower (1.24 vs. 8.8 visits). Total service costs including health care and jail costs were reduced by $36,579 PPPY ($3,048 PMPM) for BAH participants versus controls. Excluding jail costs, the difference in health care costs was $35,275 ($2,940 PMPM).
KPMG Government Institute 2018	Dually eligible Medicare and Medicaid beneficiaries in San Mateo, California	Community Care Settings, a PSH pilot program offered by Health Plan of San Mateo in partnership with two CBOs that specialize in affordable supportive housing and transitional case management. Three targeted groups: 1) LTC residents that could return to the community with LTSS, 2) individuals in acute-care or short-term rehab settings being recommended for LTC, and 3) those in the community at imminent risk of LTC placement.	Promising. Pre/post study (n=91) measuring changes from 6 months before to 6 months after intervention. Statistical significance was not reported.	$2,750 PMPM including residential care facilities, care plan oversight, case management, housing retention, and LTSS. Intervention cost varied by type of housing referral.	Average health care savings of $7,083 PMPM, including $6,207 in the costs of SNF and LTC. Net program savings of $4,334 PMPM after accounting for the cost of the intervention, yielding ROI of 157%. Total net program savings was $1.4 million after accounting for $1 million in start-up costs.
***Weaver, Covey, and Wilburn 2018**	Low-income adults (ages 20 to 62) who were homeless and high users of crisis services in Jacksonville (Duval County), Florida	The Solution that Saves program at Village on Wiley offered PSH with comprehensive supportive services including case management, peer support, substance use recovery services, Medicaid and Medicare enrollment, health care enrollment, transportation, and employment services.	Promising. Pre/post study of participants (n=68) 2 years before and 2 years after moving into PSH.	$10,058 PPPY ($838 PMPM) including housing subsidy of $8,271 PPPY ($689 PMPM) and supportive services costs of $1,788 PPPY ($149 PMPM).	Decreased costs of 43% for ED visits, 59% for inpatient stays, 64% for outpatient visits, 66% for inpatient mental health crisis services, and 37% for primary care at FQHCs. Substance use recovery services costs increased by 134%. Total cost of services (including medical, mental health, emergency transport, county jail, and housing) decreased by 30% or $16,541 PPPY ($1,378 PMPM), though the difference was not significant.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
TRANSITIONAL HOUSING					
*Gordon et al. 2021	Adult members of a Medicaid health plan who experienced homelessness in or near Indianapolis	Blue Triangle Safe Haven Program offered temporary housing in single-occupancy units without limits on duration of stay. Onsite staff provided support services (e.g., patient education, medication management, care coordination) to help participants improve their health, as well as connections to social services (e.g., employment support, assistance applying for benefits, long-term housing).	Moderate. Observational study analyzing difference in differences in trends for participants (n=81) up to 25 months before and up to 16 months after entry, and for a comparison group (n=100) on a waiting list for the program.	Not given	Relative to changes in the comparison group, the intervention group experienced decreases in ED visits of 0.2 PMPM (39%); an increase in primary care visits of 0.14 PMPM (86%); and no significant difference in inpatient admissions. A difference of $912 PMPM (28%) in total medical costs between the intervention and comparison group was not statistically significant.
*Knapp et al. 2021	Older and disabled homeless veterans who were judged to be too ill to recover from physical illness or injury on the street, but not ill enough to be in a hospital	Veterans Affairs Palo Alto Health Care System's Geriatric Homeless Program offers emergency transitional housing for recovery from postacute medical care in partnership with a local homeless emergency housing provider. Participants stayed for 74 days on average in a residential care facility for the elderly and received intensive monitoring of self-care, communication strategies, and social engagement.	Promising. Pre/post study analyzing cost and utilization for participants (n=20) 6 months before admission to 6 months after discharge from the program. Statistical significance was not reported.	Not given	Most participants transitioned to stable housing after discharge from the program. The program resulted in a 53% decrease in the average number of ED visits; a 48% decrease in the average number of inpatient admissions; a 13% decrease in inpatient length of stay; and a 46% decrease in the average combined cost of inpatient care and ED visits.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
MEDICAL RESPITE CARE					
***Buchanan et al. 2006**	Homeless adults discharged from a large public hospital in Chicago	Interfaith House medical respite care program serves people experiencing homelessness in Chicago who have an identified acute illness, the ability to perform ADLs with minimal assistance, and the ability to function in a drug- and alcohol-free group setting. The program offers interim housing, food, acute health care (not skilled nursing), substance abuse counseling, case management, and referrals to permanent housing.	Moderate. Observational study of patients referred to medical respite care and accepted (n=161) or denied admission because beds were not available (n=64), using regression analysis to control for baseline differences between groups.	$706 per person based on a 42-day average stay at $79 per day	Relative to the usual care group, the respite care group had 49% fewer hospital admissions and spent 4.7 (58%) fewer days in the hospital on average during 1 year of follow-up. There were no significant differences between groups in the average number of visits to the ED or outpatient clinic.
***Kertesz et al. 2009**	Homeless adults discharged from a large, academic medical center in Boston	Boston Health Care for the Homeless Program medical respite care program serves people experiencing homelessness in Boston who need short-term care for an acute medical problem and are able to perform ADLs and function in a group setting. It offers interim housing, daily medical care, 24-hour nursing care, psychiatric consultation, case management, onsite dental care, and medication administration.	Moderate. Observational study of those discharged to respite care (n=136) and "own care" (n=433) adjusting for differences in patient characteristics using propensity scores.	$7,929 per person for an average stay of 31.3 days ($253 per day)	Those using medical respite care had 46% lower odds of being readmitted to the hospital within 90 days compared to those discharged to their "own care," which may have included a shelter or the street. (Note: This intervention had some characteristics of care in a SNF.)
***Biederman et al. 2019**	Adult patients age 18 and older experiencing homelessness and discharged from an acute-care hospital in Durham, N.C.	Project Access of Durham County led a medical respite care program that offered a safe place to recover for people with medical needs who were able to perform ADLs and would be discharged to home if they had one. The program provided nursing case management to facilitate access to care and coordination of services, including assistance applying for housing and income support.	Promising. Pre/post study (n=29) without comparison group.	Not given. Average length of stay in medical respite care was 34 days.	During the year after a medical respite care stay, participants had 37% fewer hospital admissions, 70% fewer inpatient days when admitted, a similar number of ED visits, 193% more outpatient provider visits, and 49% lower health care charges than during the year before the medical respite care stay.

HOME MODIFICATIONS

Home modifications are a key feature of multi-component interventions to prevent falls among older adults and to reduce environmental triggers of respiratory diseases such as asthma and COPD. Studies of such interventions do not isolate the impact of home modifications, but consider their contribution as part of an integrated package of health care and social services.

Falls are the most frequent cause of injury among older adults, contributing to 3 million ED visits, 950,000 hospitalizations, 32,000 deaths, and $50 billion in medical costs each year in the United States (Moreland, Kakara, and Henry 2020). The Community Aging in Place — Advancing Better Living for Elders (CAPABLE) model offers home safety modifications (e.g., installation of grab bars) as part of a participant-directed, interprofessional home visit program intended to help older adults live safely at home. Research on CAPABLE indicates that an investment of $2,825 per person is associated with up to $20,000 in medical savings per person to the Medicare and Medicaid programs. From the perspective of a Medicare Advantage plan, investing in the CAPABLE model could yield an ROI of up to 291% (Rinaldo et al. 2020).

Asthma disproportionately affects low-income households and people of color (Pate et al. 2021). Among the 25 million Americans with asthma, medical costs are $3,266 higher per year on average (in 2015 dollars) than for people without asthma (AAFA 2018). Asthma symptoms are exacerbated by environmental factors such as mold and pests in the home. A systematic review found net savings from programs that assess and mitigate such factors when coupled with education for children and families (Nurmagambetov et al. 2011). However, only a handful of studies have assessed the impact of such interventions for adults (the focus of this guide). One such program produced an ROI of 103% to 258% from reduced health care use among both children and adults with asthma (Gomez et al. 2017).

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
COMMUNITY AGING IN PLACE — ADVANCING BETTER LIVING FOR ELDERS (CAPABLE)					
***Breysse et al. 2020;** **Breysse et al. 2022**	High-need, low-income adults age 65 and older who spoke English and were not cognitively impaired; hospitalized more than four times in the past year; living in a nursing home; or receiving cancer treatment, select therapies, or in-home nursing services	Aging Gracefully in Place, a replication of the CAPABLE model in four sites: Burlington, Vt.; Greensboro, N.C.; San Diego, Calif.; and Wilkes-Barre, Penn. An interprofessional team (RN, OT, and home repair (HR) professional) received training to help clients identify functional goals and develop an integrated plan to address them, which could include home safety modifications, DME, and assistive equipment to prevent falls.	Strong. RCT (n=153) comparing those who received services in the first year to those on a waitlist to receive services in the following year. Medical costs were imputed from regional benchmarks derived from MEPS and inflated to 2018 dollars.	Median of $2,352 per client, not including care coordination and supervision. Median component costs were: OT: $900 RN: $320 HR: $525 DME: $179	Teams made 9 home visits on average during a 5-month intervention period. One-year medical event expenditures for unplanned hospitalizations and ED visits were 18% lower for the intervention than the control group ($2,434 vs. $2,968). However, medical event costs decreased more in the control group (by $1,734, or 37%) than in the intervention group (by $764, or 24%). Consistent with the results of other studies of the CAPABLE model, the intervention improved clients' physical function and mental health outcomes, while making homes safer for participants.

*Indicates studies added to the guide in this update.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
***Ruiz et al. 2017;** **Rinaldo et al. 2020**	Adults age 65 and older who were dually enrolled in Medicare and Medicaid, lived in a home in Baltimore County, needed assistance with activities of daily living, and did not have a cognitive impairment	CAPABLE model implemented under the Center for Medicare and Medicaid Innovation's Health Care Innovation Award. (See Szanton et al. 2018, for a description of CAPABLE.)	Moderate. Observational study analyzing difference in differences between intervention group (n=171) and a propensity score- matched comparison group drawn from the same ZIP codes.	See Szanton et al. 2018.	Average Medicare expenditures decreased by $2,765 per quarter per person ($922 PMPM) for the intervention group relative to the comparison group. On an annual basis, there was a 61% reduction from baseline Medicare expenditures in the intervention group, in addition to reductions in Medicaid spending. Rinaldo et al. (2020) extrapolated these results to eligible high-need older adults in Medicare Advantage plans, calculating net savings of $8,239 PPPY (assuming an intervention cost of $2,825 per person) and cumulative savings of $7.3 million for a plan with 5,000 members.
Szanton et al. 2018	Dual-eligible beneficiaries age 65+ who reported difficulty with at least one activity of daily living	CAPABLE is a 5-month program to reduce the health effects of impaired physical function in low-income older adults by addressing individual capacity and the home environment. CAPABLE uses an interprofessional team (OT, RN, handyperson) to help older adults attain self-identified functional goals. Over 5 months, CAPABLE participants received up to 6 sessions with the OT; up to 4 with the RN; and up to $1,300 of home repair, modification, and assistive devices.	Moderate. Nonrandomized trial (n=204 in intervention group, 2,013 in comparison group).	$2,825 per participant	Average Medicaid spending per CAPABLE participant was $867 less per month than the matched comparison group, primarily because of reductions in inpatient care and LTSS. Researchers estimate CAPABLE could save Medicaid an average of $10,000 per participant per year, saving Medicaid significantly more than it costs. This is in addition to the more than $10,000 per year in Medicare savings for CAPABLE participants, in inpatient and outpatient care.
***Spoelstra et al. 2019**	Adult Medicaid beneficiaries (age 50 and older) receiving home- and community-based waiver services in four sites in Michigan	Modified CAPABLE model to allow flexibility in the number and type of home visits and to extend the intervention to 32 weeks. Social workers were added to the interprofessional team to address social and emotional needs, augmenting the role of RNs (who acted as team leaders and addressed medical needs), OTs (who helped participants improve physical functioning), and handyperson (who made home modifications).	Promising. Pre/post study of a convenience sample (n=240 intervention) with benchmarking to a demographically matched cohort (n=1,350) that received usual care before the intervention.	$1,989 per case for additional home visits plus $108 per case for care coordination. Training costs were $209 per clinician and $688 per year for facilitation. Home modifications were paid for by Medicaid (personal communication with the author).	The average number of hospitalizations decreased 46% after the intervention. The intervention had no significant effect on the average number of ED visits. The percentage of beneficiaries experiencing at least one fall decreased from 34.8% before to 20.8% after the intervention.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
REMEDIATION OF HOME ENVIRONMENT FOR ASTHMA					
***Krieger, Song, and Philby 2015**	Low-income adults (ages 18–65) with poorly controlled asthma in King County, Washington	Community health workers made 5 home visits over 12 months to provide asthma education, environmental trigger assessment and intervention (e.g., pest management and air purification), care coordination, and referrals to social services.	Strong. RCT (n=177 in intervention and 189 in control group).	Not given	No significant difference in urgent health care use (ED visits, hospitalizations, and urgent clinic visits) despite improved asthma control and quality of life for those in the intervention group versus the control group.
***Gomez et al. 2017;** **Reddy, Gomez, and Dixon 2017**	Adults and children with active asthma or asthma events in the previous year living in New York State communities with a higher burden of housing-related illness and risk factors	New York State Healthy Neighborhoods Program provided asthma self-management education, including home environmental assessments for health and safety hazards and low-cost interventions (guidance, products, and referrals to services) to address asthma triggers. Conditions are reassessed 3 to 6 months after the initial home visit.	Promising. Pre/post study with no comparison group (n=550 children and 731 adults with active asthma; 791 households with 448 children and 551 adults with asthma events in the previous year).	$302 per in-home asthma visit	At follow-up assessment, significant reduction in number of home hazards (from 2.8 to 1.5 per home), physician visits, ED or urgent care visits, and hospital stays. Among those with asthma events: per person medical savings of $1,083 and net benefit of $781 per home visit, yielding a benefit of $3.58 for every dollar invested (258% ROI). Among those with active asthma: per person medical savings of $613 and net benefit of $311 per home visit, yielding a benefit of $2.03 for every dollar invested (103% ROI).
***Ramsay et al. 2018;** **Schwindt et al. 2015**	Adults with poorly controlled asthma living in subsidized housing in westside Chicago	Helping Chicago's Westside Adults Breathe and Thrive intervention: CHWs made 6 home visits over 12 months to provide asthma education, assess the home environment, collaborate with landlords to remediate asthma triggers, and assist clients with smoking cessation, comorbidities, health system navigation, and referral to social services.	Promising. Pre/post study with no comparison group (n=202). Statistical significance was not reported.	Not given	Preliminary results among 40 adults who completed 6 months of follow-up: 60% reduction in daytime asthma symptoms, 66% reduction in hospitalizations due to asthma, and 56% reduction in asthma-related ED visits.
***Turcotte et al. 2019**	Low-income adults (age 62 and older) with asthma at risk of home-related respiratory impacts residing in subsidized housing in Lowell, Massachusetts. One-third also had COPD.	Multifaceted home environmental intervention delivered by community health workers including health and environmental assessment, education on asthma and environmental triggers, and referral to landlords for home repairs (e.g., ventilation, plumbing leaks, and cracks and holes that allow entry for pests).	Promising. Pre/post study with no comparison group (n=90 households with 93 adults).	$225 per participant for home visits and cleaning supplies but not including the cost of home remediation.	At 1 year follow-up, there was a significant reduction in visible mold associated with a significant decrease of 50% in asthma-related doctor visits (from 0.69 to 0.34 per person). There were nonsignificant decreases of 37.5% in ER visits (from 0.56 to 0.35 per person) and 43.8% in asthma-related hospitalizations (from 0.38 to 0.21 per person).

NUTRITION

Food insecurity, defined as restricted access to adequate food due to a lack of money or other resources, negatively affects health and well-being (Gundersen and Ziliak 2015). Household food insecurity is associated with higher health care utilization and $160 billion in U.S. health care spending (FRAC 2017). People with medical conditions and socioeconomic vulnerability face challenges to maintaining a healthy diet, which can contribute to disease complications and impede recovery (Silverman et al. 2015).

This review found promising to moderate evidence that interventions to increase access to healthy food can significantly lower health care utilization and costs and result in a positive ROI. Seven studies of home-delivered meals for those with chronic conditions, nutritional risk, or high needs found significantly reduced rates of hospital and SNF utilization. Specifically:

- ED visits were 28% to 70% lower in 3 comparisons but 50% higher in one study (median 36% reduction).
- Inpatient hospital admissions were 12% to 52% lower (median 49%) in 5 comparisons.
- Hospital 30-day readmissions were 13% to 16% lower in 2 comparisons.
- Hospital average length of stay was 37% shorter in 1 comparison.
- SNF admissions were 28% to 72% lower in 2 comparisons.
- Overall medical costs were 3% to 24% lower (median 16%) in 4 comparisons ($156 to $753 PMPM).

While the cost of providing medically tailored meals (MTM) was higher than for nontailored meals (median of $350 vs. $224 PMPM), programs that nutritionally tailored meals to clients' medical needs (e.g., low-sodium diet) generally showed greater impact on health care utilization. A study (Berkowitz et al. 2018a) that compared home delivery of MTM and nontailored meals found that MTM resulted in larger reductions in health care utilization and costs.

Finally, other nondelivered food support programs, such as SNAP and food pharmacies, have been shown to significantly reduce health care utilization for those with chronic conditions, low incomes, or food insecurity. Several studies have found these programs can lower overall health care costs, particularly through reduced hospitalizations and ED visits.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
HOME-DELIVERED MEALS					
Berkowitz et al. 2018a	Dually eligible Medicare and Medicaid beneficiaries at nutritional risk	Community Servings in Boston provided home delivery of MTM or nontailored food to members of Commonwealth Care Alliance health plan. Those receiving MTM had 5 days' worth of lunches, dinners, and snacks delivered each week. Those receiving nontailored food (i.e., not tailored to their medical needs) received 5 days' worth of prepared lunches and dinners delivered daily through a program similar to Meals on Wheels.	Moderate. Nonrandomized trial with comparison groups: MTM group (n=133 in intervention group, 1,002 in comparison group) Nontailored food group (n=624 in intervention group, 1,318 in comparison group).	Average monthly program costs per participant were $350 for MTM and $146 for nontailored food	Compared to controls, MTM group had 70% reduction in ED visits and 52% reduction in inpatient admissions, while nontailored food group had 44% reduction in ED visits and 12% reduction in inpatient admissions. Both MTM and nontailored meal delivery were associated with significantly lower medical spending compared to those not receiving any meal support (average monthly difference of $570 and $156 per participant, respectively). There was an estimated monthly net savings of $220 per participant for MTM and $10 per participant for the nontailored food program.
***Berkowitz et al. 2019**	Adults age 18 and older referred by a clinician due to a medical condition that required medically tailored meals to prevent clinical deterioration and who faced "substantial" social barriers to following an appropriate diet.	Community Servings in Boston. Eligible participants received 10 ready-to-consume MTMs per week over 4 weeks, delivered to their homes. Meals were prepared under the supervision of a registered dietitian nutritionist.	Moderate. Observational study comparing an intervention group (n=499) to a matched control group of nonrecipients (n=521) using an intention-to-treat approach and instrumental variables to control for confounding.	$350 PMPM including food, dietary tailoring, and delivery	Relative to the control group, MTM recipients had a 49% lower rate of hospital admissions; 72% lower rate of SNF admissions; and 16% lower health care costs, equal to a reduction of $753 PMPM.
Gurvey et al. 2013	Nutritionally at-risk members of a Medicaid health plan in Philadelphia and Southern New Jersey with life-threatening chronic diseases such as HIV/AIDS, renal disease, and cancer	Clients received 3 free, home-delivered, nutritionally balanced meals a day from the nonprofit Metropolitan Area Neighborhood Nutrition Alliance. Registered dietitians provided medical nutrition therapy to clients, which included nutrition counseling and meal planning.	Moderate. Observational study (n=65 in intervention group, 633 in a similar comparison group).	Not given	Relative to the comparison group, intervention group had 50% fewer average monthly inpatient stays (0.2 vs. 0.4), 37% shorter average length of inpatient stays (10.7 days vs. 17.1 days), and 50% higher average number of ED visits (0.6 vs. 0.3) during the six months after the intervention.

*Indicates studies added to the guide in this update.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Martin et al. 2018	Medicare beneficiaries designated as at high risk of readmission (score of 1.6 or more on Hierarchical Condition Category)	Maine Medical Center partnered with Southern Maine Agency on Aging to offer a Community-based Care Transition Program (CCTP) with and without the addition of a home-delivered meal program titled Simply Delivered for ME (SDM). SDM clients received up to 7 meals weekly over a 24-month period after hospital discharge. Caregivers were also allowed to participate.	Moderate. Time-series design with comparison group (n=622).	The cost of providing 7 days of meals to 622 patients totaled $43,540 (~$70 per person).	CCTP plus SDM participants had a 38% decreased rate of 30-day readmissions compared to baseline and a 16.3% lower readmission rate compared to those who received CCTP alone. Assuming an average cost per readmission of $16,320 per high-risk patient, the estimated benefit for adding SDM to the CCTP program was $3.87 for every $1 spent (287% ROI).
Project Angel Heart 2018	Adults covered by Medicare or Medicaid, or dually enrolled in both, with any of the following chronic illnesses: cancer, CHF, COPD, diabetes, ESRD, HIV/AIDS, or MS	Project Angel Heart participants received 5 to 10 free, medically tailored, home-delivered meals per week.	Moderate. Observational study using 12 months of claims data for an intervention group (n=708) and propensity score-matched comparison group.	$200 PMPM to provide 5 to 10 meals per client per week, including overhead	All-cause, 30-day readmissions across diseases dropped 13% during intervention. On average, 24% reduction in total medical costs for those with CHF ($736 less PMPM), COPD ($416 less PMPM), and diabetes ($453 less PMPM). Medical costs increased for those with HIV/AIDS and MS. Data were insufficient to analyze other conditions.
***Martinez 2021**	Adult Medicaid beneficiaries with chronic conditions, recently discharged from a hospital and at high risk of readmission.	Post-Discharge Meal Delivery Program offered by Central California Alliance for Health Medi-Cal plan. Over 12 weeks, eligible participants received 14 medically tailored meals per week delivered to their homes by CBOs. Participants were assigned case managers and offered access to a nutritionist to support healthy habits.	Promising. Pre/post study without comparison group (n=495). Statistical significance was not reported.	Not given. Funded through Medi-Cal Capacity Grant Program.	Health care costs decreased by $676 PMPM from before to after the intervention.
Meals on Wheels America 2017	Medicare fee-for-service beneficiaries in 6 states	Meals on Wheels (MOW) daily meal delivery service, including a hot nutritious meal and a socialization and safety check between 2009 and 2014. Outcomes for MOW recipients were also compared to a control group of Medicare beneficiaries who did not receive meals.	Promising. Pre/post study with and without comparison group (n=14,000). Statistical significance was not reported.	Not given	At 30 days after enrollment, MOW recipients had reductions of 39% in hospitalizations, 28% in ED visits, and 28% in SNF use. At 180 days after enrollment, reductions were 31% for hospitalizations, 13% for ED visits, and 25% for SNF use. However, MOW recipients had higher rates of utilization than the control group.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
FOOD PHARMACIES and OTHER FOOD SUPPORT PROGRAMS					
American Hospital Association 2017	Medicaid beneficiaries with food insecurity and chronic illness at ProMedica Health System in Ohio	Physicians screen for food insecurity and refer patients who screen positive to 1 of 2 food pharmacies. Patients receive a 2- to 3-day supply of food and can revisit the pharmacy once a month for up to 6 months. Meals were not delivered.	Promising. Pre/post study (n=2,243) without comparison group. Statistical significance was not reported.	Not given	1,100 patients of the 2,243 who were referred used their referrals and became clients of the food pharmacies. Medicaid patients referred experienced 3% decrease in ED visits, 53% reduction in readmissions, and 4% increase in primary care visits after screening.
Feinberg et al. 2018; National Academy of Medicine 2019	Patients with diabetes who are identified as being food insecure and having HbA1c levels greater than 8, most of whom were insured by Geisinger Health Plan	Geisinger's Fresh Food Farmacy. Patients are given a "prescription" or referral to the program by their primary care physician. Patients receive more than 20 hours of diabetes education with health coaches; receive food to prepare healthy and nutritious meals for their whole family, twice a day for 5 days; and attend a weekly diabetes self-management support group and online wellness module. Meals were not delivered.	Promising. Pre/post study (n=37) without comparison group. Statistical significance was not reported.	$2,400 PPPY. Average cost of providing free healthy food: approximately $6 per person per week	Health care costs for participating patients dropped by 80%, from an average of $240,000 PPPY to $48,000 PPPY. ED visits declined by 27% and hospitalizations declined by 74%.
Palar et al. 2017	People living with HIV and/or type 2 diabetes mellitus in San Francisco Bay area	Project Open Hand, a 6-month community-based food support intervention, provided meals and snacks designed to make up 100% of daily energy requirements and meet nutritional guidelines for a healthy diet. Meals were not delivered.	Promising. Pre/post study (n=52) without comparison group.	Cost of food and packaging per person: $6.58 a day, or $1,184 for the 6-month intervention	Although not statistically significant, there was a 9.9 percentage point (63%) decline among participants in having at least one hospitalization in the previous 3 months (from 15.7% to 5.8%), and a 9.6 percentage point (36%) decline in at least one ED visit (from 26.9% to 17.3%). Participants experienced significant decreases in low food security and depressive symptoms.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP)					
Berkowitz et al. 2017	Noninstitutionalized adults with incomes below 200% of the federal poverty level	Study assesses whether there is an association between participation in SNAP and reduced health care expenditures over a 2-year period using data from the 2011 NHIS linked to 2012–2013 MEPS data. Researchers compare outcomes for those who self-identified as participating in SNAP to those who did not. Meals were not delivered.	Moderate. Observational study (n=1,889 intervention group, 2,558 matched comparison group).	Not given	SNAP participation was associated with approximately $1,400 lower health care costs PPPY.
Samuel et al. 2018	Dually eligible Medicare and Medicaid beneficiaries age 65+ in Maryland	Study assessed whether SNAP participation was associated with health care utilization or cost among low-income older adults in Maryland. Meals were not delivered.	Moderate. Observational study with comparison group (n=68,956).	Average monthly supplemental income per person from SNAP: $129	SNAP participants were 1.5% less likely to incur an inpatient hospital expense. Among those hospitalized, SNAP participants had 5.8% lower expenses than nonparticipants. Expanding SNAP benefits to the 25,018 nonparticipants in 2012 could have saved an estimated $19 million from averted hospital admissions and less costly stays.

TRANSPORTATION

Millions of Americans delay seeking medical care or miss scheduled appointments because of difficulty in arranging transportation, which puts them at risk for poor health outcomes (Hughes-Cromwick et al. 2005). This review found promising to moderate evidence that providing nonemergency medical transportation (NEMT) to low-income people, those with chronic conditions, or dually eligible Medicare and Medicaid enrollees increases access to care. However, whether NEMT can prevent expensive forms of care and thereby reduce health care costs and produce an ROI remains uncertain (Shekelle et al. 2022).

Several studies found that providing NEMT for Medicaid beneficiaries and some dually eligible beneficiaries increased the receipt of outpatient care, including primary care and physical therapy. Two studies estimated that providing NEMT to patients with chronic conditions would reduce health care utilization and costs through improved disease management for specific populations, such as patients receiving dialysis and diabetes wound care. However, some studies of real-world NEMT programs have found no actual reduction in missed appointments or in health care utilization and costs.

The reported cost of NEMT ranged from $8 to $46 per ride, with a median cost of $25 across 8 studies reflecting different time periods and modalities. One study of a modern ridesharing service reported that this modality reduced intervention costs (KPMG Government Institute 2018). The lack of robust evidence on the impact of NEMT means that decision-makers should use caution in applying estimates of impact from such programs. A recent systematic review of the literature "suggests that transportation assistance is more likely to be effective when offered with other interventions to reduce social and economic barriers to health" (Solomon et al. 2020).

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Chaiyachati et al. 2018a	Medicaid beneficiaries living in West Philadelphia	Patients of an internal medicine practice in West Philadelphia were offered prescheduled, free Lyft rides to primary care appointments.	Strong. Quasi-randomized trial comparing show rates for 2.5 months at intervention practice (n=394) and a similar control practice (n=392).	$14 average cost per patient who consented to use ridesharing (range $0 to $40.17)	Uptake of ridesharing was low among intervention group (20%), and no significant difference was found between show rates among intervention and control groups.
***Berkowitz et al. 2022**	Members of a Medicare ACO in North Carolina who had clinical or social barriers to care	NEMT during weekday working hours to and from ambulatory settings, outpatient settings, and pharmacies. Participants requested transportation with designated coordinators by phone, email, and electronic portal.	Moderate. Nonrandomized trial (n=173 in intervention group, 11,660 in comparison group).	$517 mean cost PPPY	NEMT improved access to care: Participants had 9.2 more outpatient visits PPPY and $4,420 higher outpatient spending than the comparison group. However, there was no difference in rates of inpatient utilization or ED visits. The program did not generate health care cost savings.

*Indicates studies added to the guide in this update.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Chaiyachati et al. 2018b	Medicaid beneficiaries who were patients of an internal medicine practice in West Philadelphia	Patients were offered prescheduled, free Lyft rides to primary care appointments. Show rates for 2.5-month period at intervention practice were compared to show rates of a similar, control practice in West Philadelphia that did not offer transportation.	Moderate. Observational study with difference-in-difference analysis (n=194 in intervention group, 312 in comparison group).	$8.10 average cost per ride $13.71 average cost per visit	At the rideshare practice, significant improvement in show rate from 54% to 68%. At control practice, decline in show rate from 60% to 51%. In adjusted analysis, odds of showing up for an appointment before and after implementation of the intervention increased by a factor of 2.57 more in the rideshare practice than the control practice.
Hughes-Cromwick et al. 2005	Nationally representative sample of transportation-disadvantaged people, often low-income, older adults with chronic conditions	Study estimates cost-effectiveness of providing NEMT for transportation-disadvantaged patients with 12 types of chronic conditions or preventive medical needs, assuming that better access to care would lead to improved disease management and reduced health care utilization and costs.	Moderate. Cost-benefit analysis (n=3.6 million) using MEPS data.	$13–$46 per ride depending on medical condition and geography	Providing NEMT was estimated to save $927 in health care costs per patient with diabetes, $333 per patient with asthma, and $2,743 per patient with heart disease. NEMT was considered cost-effective (providing one additional quality-adjusted life year at a cost of less than $50,000) for patients with COPD, hypertension, depression, and ESRD.
Adelberg et al. 2018	Medicaid beneficiaries	Study estimated ROI of providing NEMT to dialysis and wound care appointments for diabetes. Medicaid patients were asked how many medical appointments they would likely miss without NEMT. The impact of this hypothesized reduction in access to care was estimated from an analysis of 2014– 2015 medical, pharmacy, and long- term-care claims for members enrolled during the 24-month period for each treatment.	Promising. Retrospective analysis (n=N/A) without comparison group. Statistical significance was not reported.	Average round-trip cost: $60.24 per dialysis patient and $53.25 per wound care diabetes patient. Average monthly cost: $717.25 per dialysis patient and $291.96 per wound care diabetes patient.	Estimated Medicaid cost avoided because of NEMT is $3,423 PMPM for patients receiving dialysis and $792 PMPM for patients with diabetes receiving wound care. Estimated ROI of NEMT per 10,000 dialysis patients per month is $34,229,448. ROI of NEMT per 10,000 diabetic wound care patients per month is $7,920,635.
Alewine, 2017; **Rural Health Information Hub 2018**	Rural Medicare and Medicaid beneficiaries	HealthTran program hired a mobility coordinator, trained staff in clinics and hospitals to screen patients for their transportation needs, and developed cost-effective solutions for those in need of transportation.	Promising. Pre/post analysis (n=N/A) without comparison group. Statistical significance was not reported.	$3 per local trip and $81 to $150 per trip for specialty care. Average cost per ride ranged from $33 to $45.92.	A participating hospital earned $7.68 in reimbursement for every $1 invested in transportation by HealthTran. One participating provider reported a 20% reduction in missed appointments through patient referrals to HealthTran.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Bove, Gough, and Hausmann 2019	Medicaid and dual-eligible beneficiaries as well as uninsured patients of a private, outpatient physical therapy clinic	Free door-to-door van service to appointments at a private, outpatient physical therapy clinic.	Promising. Retrospective analysis (n=N/A) without comparison group.	Each round-trip van ride cost: $11.78 Average monthly total van service cost: $2,592	Use of the van service significantly increased over time, from a mean of 83 riders per month in 2010 to 205 riders per month in 2013. Overall clinic attendance rate significantly increased from 80.1% to 84.1% after implementation of the service.
***Flynn, Perk, and Sipiora 2021**	Adult patients (ages 18 and older) with two or more chronic conditions who frequently missed health care appointments	Atlanta Regional Commission Rides for Wellness (funded by the Federal Transit Administration) provided transit training, free transit passes, and reduced-fare enrollment assistance for patients to make preventive health care visits and other trips to 4 area health care providers during a 6-month demonstration.	Promising. Pre/post study (n=167) without comparison group.	$11.59 per trip based on total project budget of $422,035 for 36,386 trips	68% of participants reported improved medical appointment keeping. Participants reported 3.4 more healthy days per month on average, which translated to an increase of 0.331 in average quality-adjusted life years (QALY) and $98.17 in incremental cost per QALY gained compared to a missed appointment cost of $154.
KPMG Government Institute 2018	CareMore Medicare Advantage and dually eligible beneficiaries	3-month, self-funded rideshare pilot offering members in California the option to order NEMT through the Lyft rideshare platform.	Promising. Pre/post study (n=N/A) without comparison group.	$21.30 per ride	33% average reduction in per-ride NEMT costs (from $31.50 to $21.30 per ride).
Thomas, Wedel, and Christopher 2018	Oklahoma Medicaid beneficiaries with diabetes, some of whom were also dually enrolled in Medicare	Medicaid-provided NEMT for diabetes care visits.	Promising. Retrospective analysis (n=8,411) without comparison group.	Not given	Providing NEMT resulted in a significant increase in outpatient visits for diabetes care. Number of diabetes care visits would increase by an estimated 0.6563 for every 2 uses of NEMT services.

CARE MANAGEMENT

Care management programs often provide a focal point for screening and addressing multiple social needs. A range of studies have found that a variety of care management models — which link high-risk patients to needed medical and nonmedical community supports — can reduce use of costly health care services and lower costs of care (see table below). These results reflect the combined effects of integrating medical and social service interventions.

Some programs provide care management through **multidisciplinary teams** that may include social workers, nurses, physicians, and others who coordinate care for patients with complex needs and connect them with community resources. **Social worker–led models** aim to address basic human needs by assessing patients for social needs, connecting them to resources in the community, and following up to ensure the issue was resolved. Social workers also offer counseling to address behavioral health needs. Health care organizations are increasingly employing **community health workers** (CHWs), **navigators**, or **coaches** who connect at-risk patients with social services and meet other needs.

Reductions in Health Care Utilization and Costs Reported in Select Studies of Care Management

Type of program	Type of evidence	Reduction in ED visits	Reduction in hospital admissions	Reduction in hospital readmissions	Reduction in hospital days	Reduction in skilled nursing admissions/days	Reduction in health care costs PMPM	Intervention cost PMPM
Multidisciplinary teams	S(6), M(2), P(1)	0% to 35% (4)	18% to 44% (4)	NS (3)	59% (1)	47%/52% (1)	$124 to $644 (4)	$119 to $417 (3)
Social worker–led models	M(2), P(2)	37% to 89% (2)	39% to 59% (3)	31% to 57% (3)	N/A	N/A	N/A	N/A
CHWs/Navigators/Coaches	S(5), M(3), P(1)	7% to 23% (2)	6% to 57% (4)	17% to 76% (3)	8% to 34% (2)	N/A	$480 to $773 (2)	$81 to $341 (4)

Note: Numbers of studies are indicated in parentheses. Type of evidence: S=Strong; M=Moderate; P=Promising. NS=No Significant Reduction.

A few studies reported no significant improvement for some programs or outcomes in comparison to control groups. For example, 2 recent controlled studies of rigorous **transitional care programs** found that hospital readmissions decreased by a similar magnitude among those who did and did not receive the intervention.

Integrated housing and health programs focus on providing supportive services to people living in affordable or congregate housing so that they can maintain their health and well-being. The Support and Services at Home (SASH) program in Vermont reduced federal Medicare spending on health care by $1,100 per participant in some locations, and state Medicaid spending on nursing homes by $400 per participant. These programs can be less expensive to operate than other care management models: The cost of the SASH program was $63 to $69 PMPM.

Finally, research is beginning to emerge on the impact of **screening and referral networks** for people with social needs. While many people can benefit from such initiatives, cost savings are more likely to accrue when serving those with greater needs.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
MULTIDISCIPLINARY CARE TEAM INTERVENTIONS					
Boult et al. 2011; **Hostetter, Klein, and McCarthy 2016**	(1) Adults age 65+ with multiple chronic conditions at high risk of health care use (2) Highest-risk 5% of patients attributed to a Medicare ACO	(1) Guided Care model: trained nurses provide in-home needs assessment, care management, and education for patients and caregivers in partnership with primary care physicians. SDOH were addressed by facilitating access to community resources. (2) At a replication site in a suburban Medicare ACO, 15 Guided Care nurses were supported by an interdisciplinary care team that included 3 pharmacists, 4 social workers, and 3 health coaches. SDOH were addressed by facilitating access to community resources.	(1) Strong. RCT (n=446 in intervention, 404 in usual care group) (2) Promising. Pre/post study (n=1,500) without comparison group. Statistical significance was not assessed.	(1) Not given (2) $2.5 million annually (about $1,667 per patient per year assuming 1,500 patients served annually)	(1) Intervention group had 30% fewer home health care episodes than control group during 32-month trial. Among subgroup of patients insured by Kaiser Permanente, there were 47% and 52% fewer SNF admissions and SNF days, respectively. (2) Rates of ED visits and hospital admissions were 7% and 22% lower in the 1st year, and 6% and 14% lower in the 2nd year, respectively, compared to baseline, contributing to $21.8 million in Medicare savings over 2 years, about half of which was earned by the ACO, yielding ROI of approximately 100% to the ACO.
Counsell et al. 2007; **Counsell et al. 2009**	Adults age 65+ with income under 200% FPL; most had multiple chronic conditions; 23% were at higher risk of hospital admission	Geriatric Resources for Assessment and Care of Elders (GRACE) model: in- home and telephonic care management by a social worker and nurse practitioner in collaboration with an interdisciplinary primary care team at community clinics. SDOH were addressed by linking patients with community-based services and by assisting them with transportation arrangements.	Strong. RCT (n=474 intervention group, 477 usual care group). (Also see McCarthy, Waugh, and Nong 2021 for results from four replication sites.)	$1,432 per patient per year for high-risk patients	Compared to the control group, high-risk patients had 35% and 44% reductions in rates of ED visits and hospital admissions, respectively, in the second year of the intervention. The intervention was cost-neutral among high-risk patients during the 2-year trial and yielded net savings of $1,487 per patient on average in the post-intervention year ($5,088 vs. $6,575 per patient).
***Finkelstein et al. 2020**	Frequently hospitalized adult patients with medically and socially complex conditions primarily insured by Medicare and/or Medicaid in Camden, New Jersey	Camden Coalition of Healthcare Providers Core Model: a team of nurses, social workers, and CHWs conducted post-discharge home visits, scheduled and accompanied patients to initial medical visits, coordinated follow-up care and medication management, measured vital signs, coached patients in self-care, and helped patients apply for behavioral health and social services (e.g., SNAP, housing support).	Strong. RCT (n=800).	$5,000 per enrolled patient, of which about 80% was staff salary and the remainder was for meetings, office supplies, travel, and indirect costs	Participants received an average of 7.6 home visits and 8.8 telephone calls and were accompanied on 2.5 physician visits during a median 3-month intervention. The 180-day hospital readmission rate declined by 38 percentage points from 6 months before to 6 months after the intervention. However, there was no significant difference in 180-day hospital readmission rates in the comparison between the intervention and control groups (62.3% vs. 61.7%).

*Indicates studies added to the guide in this update.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
***Henschen et al. 2022**	Frequently readmitted patients at a large, urban academic hospital	The Complex High Admission Management Program (CHAMP) deployed an interdisciplinary team including social workers, physicians, and pharmacists who used comprehensive care planning and inpatient, outpatient, and community visits to address medical and social needs, improve continuity of care, and reduce hospital readmissions.	Strong. Pragmatic RCT (n=101) with intention-to-treat analysis comparing the CHAMP intervention and a concurrent control group.	Not given	Reduction in rates of hospital readmissions for both intervention and control groups. After 180 days of enrollment, 30-day readmission rate was 63% higher among patients enrolled in CHAMP than those in the control group (incidence rate of 1.3 vs. 0.8). The authors noted this result was possibly due to a short intervention period and consolidation of care for CHAMP patients at a single hospital.
***Powers et al. 2020**	Adult high-need, high-cost Medicaid patients of a CareMore clinic in Memphis, Tenn.	Complex care management program carried out by a multidisciplinary team: a CHW who called patients weekly and accompanied them on medical visits, a social worker who provided behavioral health counseling and coordinated referrals to social services, and a primary care physician. The team assessed medical, behavioral, and social risk factors, developed a care plan, and identified drivers of poor outcomes and avoidable spending.	Strong. RCT (n=253) with intention-to-treat analysis comparing regression-adjusted rates of spending and utilization between patients receiving the complex care program (n=71) and usual care (n=127) over the 12 months following randomization.	Not given	Compared with patients receiving usual care, patients receiving complex care management had 37% lower total medical expenditures ($13,091 vs. $20,823) PPPY, 44% fewer hospital admissions (0.41 vs. 0.73 per patient), 59% fewer hospital bed days (2.41 vs. 5.87 per patient), and 25% fewer specialist visits (4.08 vs. 5.43 per patient). There were no significant differences in ambulatory care center visits or ED visits between groups.
Berkowitz et al. 2018b	Medicaid and Medicare beneficiaries at high risk of hospitalization who were patients of eight primary care clinics in East Baltimore	The Community Intervention of the Johns Hopkins Community Health Partnership (J-CHiP) provided enhanced care coordination by multidisciplinary teams made up of physicians, care managers, health behavior specialists, CHWs, and neighborhood navigators. Teams addressed social needs by connecting patients to community resources, providing transportation assistance, securing affordable medications, and supplying preprogrammed cell phones to contact the health care team.	Moderate. Observational study with difference-in-difference analyses using propensity score-matched comparison groups (n=2,532 Medicaid and 2,154 Medicare beneficiaries).	Grant-funded ($19.9 million health care innovation award from the Center for Medicare and Medicaid Innovation)	Medicaid beneficiaries had reductions in rates of hospitalizations (33 per 1,000 enrollees), ED visits (51 per 1,000), 30-day readmissions (36 per 1,000), avoidable hospitalizations (7 per 1,000), and total cost of care relative to comparison group ($1,643 per beneficiary per quarter, not accounting for the cost of the intervention). No significant reductions in utilization or costs for Medicare beneficiaries. Note: Another study on a smaller sample of J-CHiP participants (Murphy et al. 2018c) found no significant improvements in outcomes of interest for Medicaid or Medicare beneficiaries.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
*Gingold et al. 2021	Adult patients 18 years and older with complex medical and social needs, discharged home from an academic medical center and community hospital in Baltimore, MD	A mobile integrated health community paramedicine (MIH-CP) transitional care program used a multidisciplinary team of physicians, community paramedics, nurse practitioners, nurses, pharmacists, social workers, and CHWs to support individuals in their homes for 30 days after hospital discharge. CHWs coordinate and execute activities to address or mitigate social and environmental needs.	Moderate. Observational study comparing patients from 30 days before to 60 days after enrollment in MIH-CP (n=464) relative to a propensity-matched control group (n=5,530).	Not given	In a pre/post analysis, the hospitalization rate for MIH-CP patients was 72% lower 30 days after than 30 days before program enrollment. In contrast, the controlled comparison found no significant difference in rates of 30-day hospital readmissions, excess days in acute care within 30 days of hospital discharge, ED visits, or total health care charges within 30 and 60 days of discharge.
*Moreno et al. 2021	Older adults living at home in southern California with complex social and medical needs, as determined by their physician or medical group based on frequent hospitalizations or ED visits and failure to improve under usual case management	SCAN Health Plan Connecting Provider to Home deployed teams consisting of a social worker and a CHW who conducted an in-home assessment and were integrated into community medical groups through interdisciplinary meetings. Teams first addressed patients' nonmedical needs to reduce barriers to self-care and then addressed medical needs and disease-specific support, including medication-related issues and coordination among providers.	Moderate. Observational study (n=420) with matched comparator group (n=700).	Not given	During the 12 months post-intervention, participants in the Connecting Provider to Home program had a 33% lower risk of ED visits and an 18% lower risk of hospitalization relative to the comparator group.
SOCIAL WORKER–LED INTERVENTIONS					
*Akiya et al. 2021	Older adults in greater Rochester, New York, who were overusing ED or hospital care or struggling with a nonclinical issue that affected their health	Lifespan of Greater Rochester Community Care Connections (CCC) provides intensive case management by social work care managers in physician offices. The care managers refer patients to up to 40 services, e.g., chronic disease education, financial counseling, home meal deliveries, home care, housekeeping, home modifications, and transportation, as well as health care coordination by licensed practical nurses, including assistance with accessing health care services and adhering to treatment.	Moderate. Cohort study of 1,316 CCC participants and a propensity score-matched control group.	Not given	In the 90 days after program enrollment, participants had 40% fewer hospitalizations compared with the 90 days before enrollment, and 39% fewer hospitalizations than the matched control group. CCC program enrollment was not associated with fewer ED visits when compared with the control group.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Rowe et al. 2016	Patients of an academic medical center age 60 and older referred by primary care providers because of unmet nonmedical needs; most were Medicare beneficiaries	The Ambulatory Integration of the Medical and Social (AIMS) model embeds social workers with master's degrees into primary and specialty care teams. AIMS social workers use a standardized protocol to assess needs and provide risk-focused care coordination to assist people with biopsychosocial and functional issues impacting their care plan adherence or physical condition.	Moderate. Observational study with nonequivalent comparison groups (n=640).	Not given	A comparison of utilization to the entire medical center population found that, 6 months after enrollment, patients in the AIMS group had 89% fewer ED visits, 49% fewer hospital admissions, and 57% fewer 30-day hospital readmissions. The rate of 30-day readmissions and ED visits also was lower than regional and national averages, respectively.
Alvarez et al. 2016	Medicare beneficiaries with multiple chronic conditions transitioning from hospital to home- and community-based settings	The Bridge Model is a social worker–led, interdisciplinary transitional care intervention that addresses health and social needs through care coordination, case management, and patient engagement for 30 days after a hospital discharge. Master's-trained social workers conduct a biopsychosocial assessment, provide behavioral therapy, and make linkages to follow-up care and community social services.	Promising. Pre/post study (n=5,753) without comparison group. Statistical significance was not reported.	Not given	An evaluation of the Bridge Model at six Chicago-area sites participating in the 2012–2014 Community-based Care Transitions Program found: 30.7% lower rate of 30-day readmissions, 9.4% lower rate of 60-day readmissions, 13.9% lower rate of 90-day readmissions, and Increased attendance of post-discharge physician appointments, in comparison to the baseline.
Xiang et al. 2019	Medicare beneficiaries hospitalized five or more times in the prior 12 months (average patient was age 65 and had 9 chronic conditions)	The Bridge Model for Super Utilizers adapted the Bridge Model (see Alvarez et al. 2016) by intensifying patient engagement with an average of 40 patient contacts over 6 months following an index admission at a large teaching hospital in Chicago.	Promising. Pre/post study (n=586) without comparison group.	Not given	A comparison of utilization 12 months before and 12 months after the intervention found a 59% reduction in the number of hospital admissions (from 5.75 to 2.38 per patient), 37% reduction in the number of ED visits (from 5.39 to 3.38 per patient), 47% reduction in the 30-day readmission rate (from 25.5% to 13.4%), and 60% decline in average hospital charges per person (from $335,339 to $135,672).

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
COMMUNITY HEALTH WORKERS (CHWs), NAVIGATORS, OR COACHES					
***Kelley et al. 2020**	Medicaid-insured adults (ages 18 to 62) who were frequent ED users at a large, urban, academic hospital	An ED-initiated Patient Navigation program (ED-PN) was delivered by a CBO in partnership with the hospital. A trained patient navigator (PN), assisted by a nurse and supervised by a multidisciplinary team, supported patients for a year by scheduling and attending physician visits, making weekly calls, encouraging adherence to treatment, and identifying social needs (e.g., transportation, housing problems, food insecurity, insurance coverage) and community resources to address them.	Strong. Prospective, RCT (n=100) with difference-in-difference analysis of utilization for 12-month pre-enrollment and 12-month post-enrollment periods.	$4,091 PPPY ($341 PMPM) based on $200,500 in annual program costs (including staff salaries, supplies, administrative support, and team supervision) for 49 patients served	Compared to control group, ED-PN participants had 1.37 (23%) fewer ED visits per patient and 0.97 (55%) fewer hospitalizations per patient. There was a nonsignificant reduction of $10,201 (41%) in hospital costs per patient and of $5,765 (29%) in Medicaid costs among ED-PN participants compared to controls.
***Kangovi et al. 2020**	Adult patients of two urban, academic primary care clinics who were insured by Medicaid or uninsured, resided in high-poverty neighborhoods in Philadelphia, and were diagnosed with two chronic conditions	IMPaCT model, in which specially trained CHWs integrated in primary care practices provide tailored social support to high-risk patients to address unmet social needs. CHWs had weekly contact with participants to help them create and execute action plans, led weekly support groups to promote social networks, and helped participants apply for social services and identify long-term supports.	Strong. Regression analysis of outcomes data collected for RCT (n=302) of patients enrolled for 6 months in the IMPaCT intervention and a control group (Kangovi et al. 2017).	$1,721 PPPY ($143 PMPM) based on annual program expenses of $567,951 for a team (6 CHWs, manager, director, program coordinator) serving 330 patients per year including salary, office space, equipment, transportation, and overhead	Assuming all patients were insured by Medicaid, and after adjusting for differences in patient acuity, the program yielded an estimated reduction of $1.4 million (36%) in Medicaid costs for inpatient admissions and outpatient visits relative to the control group. This represented an ROI of 247%. In a sensitivity analysis, the ROI ranged from 184% to 309%. (Note: The analysis did not consider use of or costs for ED visits, SNF stays, or prescription drugs.)
Morgan et al. 2016	Uninsured or publicly insured nonelderly adults living in high-poverty ZIP codes in Philadelphia and hospitalized or under observation and expected to be discharged home	IMPaCT model (see Vasan et al. 2020 for background on the model).	Strong. Cost analysis of data from an RCT (n=446) of patients enrolled for 2 weeks in the IMPaCT intervention and a control group (Kangovi et al. 2014).	$65,000 to hire 2 part-time CHWs for one year, plus $60,000 to run the RCT	The health system realized a benefit of $1.80 for every $1 invested in the program (80% ROI), which rose to $2 per $1 invested (100% ROI) as the program achieved efficiencies over time.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
***Vasan et al. 2020;** **Kangovi et al. 2014;** **Kangovi et al. 2017;** **Kangovi et al. 2018**	Middle-age adults (average 51 years) in high-poverty neighborhoods of Philadelphia who were admitted to the hospital for medical conditions or were patients of primary care clinics with 2 or more chronic conditions (diabetes, obesity, tobacco dependence, or hypertension)	Individualized Management for Patient-Centered Targets (IMPaCT) model, an intervention in which specially trained and supervised CHWs provide tailored social support to address unmet social needs (e.g., housing instability, food insecurity, limited social support), health behavior coaching, connection with resources, and health system navigation. The primary objective of CHWs was to support patients in meeting their own goals rather than to keep them out of the hospital.	Strong. Pooled data from three RCTs. **RCT #1** (n=446) tested 2 weeks of IMPaCT among hospitalized general medical patients. **RCT #2** (n=302) tested 6 months of IMPaCT among outpatients at 2 academic primary care clinics. **RCT #3** (n=592) tested 6 months of IMPaCT among outpatients at academic, VA, and FQHC clinics.	Approximately $1,499 PPPY ($125 PMPM) on average across all 3 trials	**Across all 3 RCTs**, the total number of days spent in the hospital per patient was 34% lower among IMPaCT participants than among patients in control groups (1.26 vs. 1.91 days). This reduction was driven by 21% fewer hospitalizations per patient (0.27 vs. 0.34 admissions) and 15% shorter average length of stay (4.72 vs. 5.57 days). Readmission outcomes not reported in the pooled analysis: **In RCT #3** (Kangovi et al. 2018), IMPaCT participants had 17% lower risk of being readmitted to the hospital within 30 days of discharge than patients in the control group.
Basu et al. 2017	Patients with a primary care visit and at least 1 ED visit in the prior year for a chronic condition including asthma, CHF, type 2 diabetes, HIV, hypertension, and substance use	Breakeven calculation for CHW programs that enroll primary care patients with select chronic conditions. The analysis calculated CHW caseloads based on published literature (45 to 90 patients, depending on condition) and the probability of ED visits and associated hospitalizations among panels of enrolled patients based on principal diagnoses, including visits for comorbid conditions.	Moderate. Microsimulation using data from published literature and the Agency for Healthcare Research and Quality (AHRQ) National ED and Inpatient files and MEPS.	$47,800 per year per CHW (2015 U.S. dollars) including salary, overhead, initial training, and annual continuing education	Depending on enrollment diagnosis, achieving cost savings would require preventing 4 to 23 ED visits and associated hospitalizations per year among a panel of patients, representing a reduction of 3% to 21% in total ED visits. For example: A CHW with a caseload of 70 asthma patients would need to prevent about 14 ED visits (15% of the total), of which 23% would be expected to result in a hospitalization. A CHW with a caseload of 70 heart failure patients would need to prevent about 4 ED visits (3% of the total), of which over 90% would be expected to result in hospitalization.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
***Duru et al. 2020**	High-need, high-cost Medicaid health plan members ages 21 and older with diabetes, enrolled in 15 states through Medicaid expansion, TANF, SSI, or both Medicare and Medicaid	Optum Coordinated Care Organizations (CCOs) provided telephonic care coordination of medical, behavioral, and social supports to address access barriers and SDOH. CCOs typically designated a CHW to enroll eligible members, administer a needs assessment, and connect the member with needed services such as behavioral health, primary care, Meals on Wheels, or food pantries.	Moderate. Interrupted time series analyzing difference in differences between intervention group (n=154,324 person-months) and a comparison group of members not offered the intervention (n=40,510 person-months).	Not given	Twelve months after CCO enrollment, SSI beneficiaries in the intervention group had a 6.6% greater decrease in risk of ED visits than the comparison group, and Medicaid expansion beneficiaries had a 5.8% greater decrease in risk of hospitalization than the comparison group. There were no significant differences in utilization among other enrollment groups.
Felix et al. 2011	Medicaid beneficiaries with physical disabilities and potential unmet need for long-term care	Arkansas Medicaid Community Connector Program employed 6 CHWs who identified eligible clients and connected them with home and community-based LTSS.	Moderate. Observational study (n=919 in intervention group and 944 in propensity score-matched comparison group).	$896,000 in operational expenses over 3 years (about $325 PPPY)	Intervention group had 23.8% lower average annual Medicaid spending (excluding prescription drugs) over 3 years vs. a comparison group because of a substitution of home- and community-based services for nursing home care, yielding a ROI of 292% after accounting for operating expenses.
***Thompson et al. 2018**	Adult patients of an urban nonprofit health system in Memphis, TN, who had 11 or more hospital stays originating in the ED during a 1-year period	Methodist Le Bonheur Healthcare Familiar Faces program employed community navigators to meet medical and social needs of frequent ED users. Navigators supported patients for up to 1 year to help eliminate barriers to health, coordinate care, tailor information to their needs, motivate them to make healthy choices, and link them to community resources.	Moderate. Observational study comparing difference in differences between intervention (n=159) and control group (n=280) of similar patients living in contiguous ZIP codes.	Not given	Utilization and cost outcomes for intervention and control groups declined significantly from 1 year before to 1 year after the intervention. Relative to the control group, patients working with community navigators had an additional 13% reduction in hospital encounters, 8% reduction in total hospital days, and 9% increase in days between encounters.
Kozick 2017	(1) Medicare and dually eligible Medicare and Medicaid beneficiaries discharged from the hospital with CHF, COPD, AMI, pneumonia, and/or septicemia; (2) Medicaid beneficiaries	Eastern Virginia Care Transitions Partnership's Community-Based Care Transitions Program: Area Agencies on Aging (AAAs) partner with hospitals to provide dedicated coaches for discharged hospital patients to support a Care Transitions Intervention including in-home assessments and linkages to social services such as transportation to medical appointments, home-delivered meals, and home repairs to facilitate independent living.	Promising. Pre/post study (n=25,656 Medicare and dually eligible beneficiaries, 945 Medicaid beneficiaries) without comparison group. Statistical significance was not reported.	Not given. AAAs were paid once per eligible discharge in a 180-day period. Most funding now comes from health plans under a fee-for-service contract.	Medicare and dually eligible patients: 51% reduction in hospital 30-day readmission rate (from 18.2% to 8.9%) over 12 months. Medicaid pilot: average hospital 30-day readmission rate declined 76% (from 25% to 6%) over 12 months. Costs: $17 million in estimated savings from 1,804 avoided readmissions (approximately $9,423 per readmission).

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
INTEGRATED HOUSING AND HEALTH INTERVENTIONS					
***Kandilov et al. 2019**	Lower-income older adults and individuals with disabilities who lived in affordable housing properties in Vermont, were covered by Medicare, and had high health care costs	The Support and Services at Home (SASH) program provides care coordination and community-based support services to panels of 70 to 100 residents of affordable housing properties. SASH teams include a coordinator and wellness nurse who perform comprehensive assessments, create "healthy living" plans, provide coaching, and partner with local service providers to meet wellness and social support needs; ensure appropriate medication use; and promote successful care transitions.	Moderate. Observational study analyzing difference in differences between SASH participants (n=2,973) enrolled during 6.5 years and a comparison group (n=2,614) of Medicare or Medicaid beneficiaries during concurrent time periods.	$760 to $830 PPPY ($63 to $69 PMPM). The annual cost of a SASH panel serving 100 participants was between $76,100 and $83,300, funded from Medicaid, federal and state agencies, and private foundations.	There was no significant reduction in growth of total Medicare or Medicaid spending among all SASH participants relative to the comparison group. Medicare spending growth was $1,100 lower per beneficiary per year among SASH participants served by the state's designated regional housing organization (DRHO), and was $1,400 lower per beneficiary per year among those living in urban areas served by this DRHO. Among dually eligible participants, growth in Medicaid expenditures for institutional long-term care was about $400 lower per year per beneficiary living in congregate housing or in rural areas.
***Nadash et al. 2021**	Lower-income older adults living in affordable senior housing buildings in greater Boston, MA	Hebrew SeniorLife's Right Care, Right Place, Right Time (R3) program placed wellness teams consisting of a nurse and social worker in senior housing buildings. Teams identified and monitored those at risk for falls and hospitalizations and those with mental health and medication management needs; facilitated communication with health plans and health care providers and connections with health-related services; assisted with care transitions; and developed information-sharing relationships with EMS providers with patient permission.	Moderate. Observational study of EMS calls 15 months before and 18 months after intervention in 7 buildings (n=353 residents) compared to a control group of 5 buildings (n=208), and rates of ED visits 18 months before and 18 months after the intervention compared to a control group of 25 buildings (n=9,212).	Not given	EMS calls resulting in ambulance transfers to an ED decreased by 18% in intervention buildings, with greater declines in buildings with fewer supportive services at baseline. In contrast, a decrease in transfers at control sites was not significant. The rate of ED visits remained almost unchanged among residents of intervention buildings while increasing by 15% among residents of control buildings. The difference was significant after controlling for the proportion of residents over age 75.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
SCREENING & REFERRAL PROGRAMS					
***Wu et al. 2019**	Adult high-risk Medicare and Medicaid patients (ages 18 years and older) of an academic medical center in Baltimore, Md.	Baltimore CBO Neighborhood Network is a multi-component intervention to reduce health care utilization and increase referral of patients between an academic health center and local CBOs that address SDOH. Components included an online tool to help refer clients to community resources, meet-and-greet sessions between CBO staff and health care staff, and research assistants.	Strong. Cluster RCT analyzing difference in differences 6 months before and 18 months after intervention for 22 CBOs and 5,255 patients allocated to study arms based on proximity to CBOs.	Not given	Intervention had no significant effect on health care utilization (ED visits and days spent in the hospital) compared to control groups. There was a 3% increase in referrals by inpatient staff to intervention CBOs and a 7% increase in referrals by outpatient staff to intervention CBOs between baseline and follow-up.
***Schickedanz et al. 2019**	Adult patients ages 18 years and older of a large, integrated health system in California, who were predicted to be in the highest 1% for total utilization in the next 12 months	Health Leads Telephonic Social Needs Screening and Navigation program at Kaiser Permanente of Southern California. Under supervision, program associates called eligible patients to screen for social needs and performed intake assessments for those who screened positive and expressed interest in help. Associates followed up with patients at least every 2 weeks. Those in need were referred to community resources.	Moderate. Prospective cohort study using difference-in-differences analysis between intervention group (n=7,107) and propensity-weighted control group (n=27,118) for 14 months after the program began.	Not given	Total utilization decreased 2.2% in intervention group compared to control group. There were larger decreases in total utilization for low–socioeconomic-status subgroups receiving the intervention compared with control groups by: • 7.0% in the low-income-area group • 11.5% in the low-education-area group • 12.1% in the Medicaid-insured group In-network inpatient admissions declined by 16% in the low-income group. Out-of-network outpatient visits declined by 36% in the low-education group and by 38% in the Medicaid-insured group.
Spencer and Hashim 2018	People at risk for unmet social needs, e.g., patients discharged from the hospital with complex health and social needs	2-1-1 San Diego facilitates access to community resources through phone and Web-based referrals and care coordination by care navigators. A Community Information Exchange (CIE) enables bidirectional referrals between health care and social service providers and tracks patients' interactions. Sharp Grossmont Hospital partnered with 2-1-1 San Diego and Feeding America in a Care Transition Intervention (CTI) that used CIE to help at-risk patients access a medical home and social services including housing, fresh food, transportation, and social supports.	Promising. Pre/post and nonequivalent comparisons (n=233 and 71). Statistical significance was not reported.	Not given. Free to users under grant funding. Exploring a financing structure (such as a subscription model) for sustainability.	Among 233 CIE-enrolled clients with a history of EMS use, there was a 26% reduction in EMS trips and an increase in stable housing among those who were tracked using CIE compared to those not enrolled. Sharp Grossmont Hospital estimated CTI saved $17,562 per avoided inpatient admission and $1,387 per avoided ED visit. Among 71 CTI patients referred to 2-1-1 during 2016–2017, 91% had decreased vulnerability in at least 1 of 14 domains; their readmission rate was 9.6% vs. 30% for a comparison group (68% difference).

FINANCIAL & LEGAL COUNSELING

Legal aid and financial counseling can help patients tackle a range of nonmedical issues that impact health, including working with insurance companies for approval of services and advocating with landlords to improve housing environments. Counseling services are often included in care management programs, but are highlighted as standalone interventions in this section. Several case studies showed that providing such assistance to complex or at-risk patients can reduce ED visits, hospitalizations, and costs of care. Intervention costs ranged from approximately $200 to $400 per case. In one study, a hospital realized 149% ROI on program costs through recovered payments for services. However, all the studies in this section lacked a comparison group and therefore offer only promising evidence.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
FINANCIAL COUNSELING					
Barnett, Maughan, and Pearce 2010	Uninsured inpatients (ages 0–64) admitted during 3 months in 2006; age distribution was similar to the uninsured population nationally	Financial counseling to help uninsured inpatients obtain hospital charity care or insurance coverage (e.g., Medicaid, Medicare, Indian Health Service, state indigent care program), including coverage obtained during or after an acute-care hospitalization.	Promising. Retrospective review of a systematic random sample of medical records (n=49). Statistical significance was not reported.	Not given	Among 49 uninsured patients, 76% were contacted by a financial counselor before discharge, 43% qualified for free or discounted care, and 55% obtained insurance coverage (including automobile medical policies) that collectively paid for $17,660 of $25,775 in average hospital costs per patient, representing 69% of the total potential uncompensated care costs for these patients.
LEGAL COUNSELING					
***Regenstein, Trott, and Williamson 2017**	Low-income, uninsured, and/or underserved patients in need of medical–legal services.	Survey of 232 organizations providing medical–legal partnership (MLP) services to address social needs including income assistance, insurance, housing, utilities, education, employment, legal status, and personal and family stability. Two of five sites (38%) served patients that made high use of health care.	Promising. Program survey data (n=N/A). Statistical significance was not reported.	Not given.	MLP programs handled an average of 285 cases in the previous year. Of those that collected financial benefit information, the median dollar amount of total financial benefits received by all patient-clients served by each MLP in the past year was $81,595. The annual median dollar amount recovered by health care organizations as a result of MLP services was $119,013 per MLP program.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Martin et al. 2015	"Super-utilizer" patients identified based on high-cost ED and inpatient use	A medical–legal partnership pilot project that embedded lawyers within an interprofessional care team to train staff and offer resources for addressing legal issues (e.g., medical certification requirements to help seriously ill patients prevent utility shutoffs) and provide civil legal aid services to patients when needed at a community health care system.	Promising. Pre/post study (n=55) without comparison group. Statistical significance was not reported.	Not given	Of the 55 pilot patients, 95% had two or more civil legal problems impacting their health care use. The pilot data suggest a decrease in both 30-day and 7-day readmission rates among identified patients. Both inpatient and ED use dropped more than 50%, and overall costs (as defined by charges) fell by 45%.
O'Sullivan et al. 2012	Adult patients with poorly controlled asthma and self-reported home allergen exposure (e.g., mold, dust, cockroaches, rodents)	Patients received legal assistance at a New York City medical clinic to improve rental housing environments by demanding that landlords fix leaks, exterminate pests, or provide a different apartment.	Promising. Pre/post study (n=12) without comparison group. Data covered 9 to 12 months pre-intervention and 6 to 12 months post-intervention.	Not given	ED visits and hospital admissions declined 91% (from 22 ED visits and 11 admissions to 2 ED visits and 1 admission). All patients had reductions in dose and/or number of medications post-intervention, and 92% dropped 2 or more classes in asthma severity.
***Schneider et al. 2016;** **KPMG Government Institute 2018**	Low-income patients with serious health problems served by hospitals in New York City and Long Island, New York.	LegalHealth trains health care professionals to recognize legal issues that may negatively affect medical outcomes and offers onsite free legal clinics for patients at participating hospitals. 1) Clients received assistance with income support, immigration, housing, insurance coverage, family issues, debt management, employment, education access, wills, and advance planning. 2) In this case, asthma patients received assistance to send legal demand letters to landlords to clear their apartments of rodents, bugs, mold, and water and structural damage.	Promising. 1) Cost-benefit analysis of 6,429 cases handled during one year. 2) Pre/post case study (n=N/A) without comparison group. Statistical significance was not reported.	1) Annual operating costs of $2,413,000 divided by 6,429 cases equals $375 per case. 2) Average cost of $225 per case.	1) Clients received $2.2 million in direct financial benefits, and hospitals received $4.8 million in financial benefit (imputed health insurance reimbursements and efficiency gains from shorter length of stay). Hospitals gained $4.83 for every $1 contributed to LegalHealth services. Overall, LegalHealth produced $2 in hospital financial benefit for every $1 invested by both hospitals and philanthropic sources. 2) Among asthma patients, 90% reduction in ED visits and admissions.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Teufel et al. 2012	Underserved patients living in rural southern Illinois	A Health and Law Collaborative Partnership between a hospital and a legal aid organization created a health care legal navigator system that referred patients to pro bono legal aid, facilitating legal solutions to health-related problems including Social Security and Medicaid benefits, power-of-attorney rights, property or housing dispute resolution, wills, medication benefits, employment benefits, divorce, and child support.	Promising. Retrospective records review (n=428 referred cases among 372 clients) without comparison group. Statistical significance was not reported.	$321 per client and $270 per case based on an investment of $115,438 by the hospital partner	Of 372 closed cases, 42.7% resulted in clients receiving legal advice or referrals to legal assistance. Local health care providers collected $296,704 in adjusted Medicaid reimbursement ($10,597 on average for 28 clients that obtained benefits), yielding a 149% return on the hospital's investment in the program. Clients had $1,177,844 of billed health care services covered by Medicaid ($42,066 on average for 28 clients).
***Tsai et al. 2017**	Homeless and low-income veterans with behavioral health needs at four sites in Connecticut and New York	Collaborations between legal professionals and health care providers that help patients address civil legal problems that can affect health and well-being (e.g., benefits, housing, family issues, and consumer issues).	Promising. Prospective observational study (n=950) without comparison group.	$50–75 an hour; $270–$405 per legal issue resolved	The average total cost for each resolved issue was $270 to $405, as compared to average annual direct costs of $10,000 to $60,000 to provide care to a person who is chronically homeless, has a severe mental illness, or both.

SOCIAL ISOLATION AND LONELINESS

A comprehensive review of the literature found that social isolation (infrequency or lack of social contact) and loneliness (feeling unhappy with social relationships and lack of connections) are associated with a variety of adverse health outcomes, including cardiovascular disease, mental illness, and premature mortality (NASEM 2020). Social isolation and feelings of loneliness are related but distinct concepts.

The Medicare program spent $1,644 more annually on socially isolated beneficiaries (objectively measured) than on those reporting more connections to friends and family, amounting to an estimated $6.7 billion in additional Medicare spending annually. Increased spending was concentrated in inpatient and SNF care. Despite receiving more health care, socially isolated beneficiaries had 31% greater risk of death. In contrast, subjective feelings of loneliness predicted *reduced* annual Medicare spending of $768 on inpatient and outpatient care, but did not predict SNF use or mortality (Flowers et al. 2017; Shaw et al. 2017).

The exacerbation of social isolation during the COVID-19 pandemic has heightened interest in addressing social isolation and loneliness among payers, providers, and policymakers. A review of international programs to prevent or address loneliness and social isolation found that several were cost-effective or cost-saving in relation to health care (Mihalopoulos et al. 2020). However, there is currently a lack of rigorous evidence evaluating the impact of such interventions on avoidable health care costs and utilization in the U.S.

Three studies examined impacts on social isolation in the U.S. All found benefits, although only one had a strong design. A study of home-delivered meals found that the program reduced feelings of isolation among those who lived alone (Thomas and Dosa 2015), suggesting that it can be helpful to address social isolation as part of programs to meet other social needs.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Thomas and Dosa 2015; **Thomas, Akobundu, and Dosa 2016;** **Thomas et al. 2018**	High-need seniors (ages 60–102) on waiting lists for services from Meals on Wheels programs at 8 sites in 6 states.	Participants were randomized to one of three groups: 1) daily meal delivery (traditional Meals on Wheels program), 2) once-weekly frozen meal delivery, or 3) waiting list for meals (control group). Intervention period was 15 weeks.	Strong. RCT (n=214 received daily meal delivery; 202 received frozen meals once a week; and 210 remained on waiting list).	Not given	Recipients of home-delivered meals (groups 1 and 2) had a nonsignificant 30% lower rate of hospitalization compared to those who did not receive meals (14% vs. 20%). They also had significantly less worry about continuing to live at home, as well as significantly greater improvements in avoiding falls (among those who had fallen in the past) and feelings of loneliness (among those who lived alone) compared to controls. Those receiving daily meals (who had daily contact with delivery staff) had greater improvement on some outcomes than those receiving weekly meals.

Study	Population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Caruso 2018	Medicare Advantage plan members who screened positive for loneliness on an initial health assessment	The CareMore Togetherness Program targets loneliness as a health condition. Participants receive interventions that include weekly phone calls from the plan's Togetherness Connectors and other employees who assess concerns and offer guidance and a listening ear. Social workers make home visits to help members develop coping skills and connect to community-based organizations and other programs offered by the plan. For example, a Nifty After Fifty gym serves as a social connecting point for a physical exercise program tailored to older adults with chronic illnesses.	Promising. Pre/post study (n=700) without comparison group. Statistical significance was not reported.	Not given	Preliminary results show a 5% decrease in outpatient emergency room use and an 11% decrease in acute hospital admissions.
***Galiatsatos et al. 2022**	Patients of an urban, academic hospital (ages 60 and older) who had a hospitalization in the past 12 months and a diagnosis of diabetes, high blood pressure, heart failure, or COPD	Together in Care initiative was a partnership with a Meals on Wheels (MOW) program that provided interventions during the 3 months after the patient's transition to home. Interventions included food delivery, home safety inspection, social engagement, medical supply allocation, and minor home safety repairs. During meal delivery, a MOW volunteer engaged in 10 minutes of social engagement through scripted daily questions about medication adherence, medical appointments, mood, appetite, and well-being. A MOW care manager notified the patient's primary health team of any worrisome responses.	Promising. Pre/post study (n=84) without comparison group.	Not given	Total hospital expenditures while the cohort was enrolled in the transition program were $435,258, 70% lower than the $1,445,637 in costs incurred by these patients during the three months prior to program enrollment.

*Indicates studies added to the guide in this update.

APPENDIX Table 1. Summary of Healthcare Utilization Impacts of Health-Related Social Needs Interventions

TYPE OF INTERVENTION	Strength of Evidence	ALL EVIDENCE												MODERATE AND STRONG EVIDENCE ONLY											
		ED Visits		Hospital Admits		30-day Readmits		Hospital ALOS		SNF Admits		Outpt Visits		ED Visits		Hospital Admits		30-day Readmits		Hospital ALOS		SNF Admits		Outpt Visits	
		N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn	N	Mdn
HOUSING																									
Supportive housing	S:1 / M:5	5	-24%	5	-31%			1	-14%			2	-13%	5	-24%	5	-31%			1	-14%			2	-13%
Transitional housing	M:1 / P:1	2	-46%	2	-24%			1	-13%			1	86%	1	-39%	1	0%							1	86%
Medical respite / recuperative care	M:2 / P:1	2	0%	2	-43%	1	-46%					2	97%	1	0%	1	-49%	1	-46%					1	0%
NUTRITION																									
Medically tailored home-delivered meals	S:1 / M:3	2	-10%	3	-50%	1	-13%	1	-37%	1	-72%			2	-10%	3	-50%	1	-13%	1	-37%	1	-72%		
Non-tailored home-delivered meals	S:1 / M:1 / P:1	2	-36%	2	-26%	1	-16%			1	-28%			1	-44%	1	-12%	1	-16%						
COUNSELING																									
Legal Assistance	P:3	3	-90%	3	-90%																				
CARE MANAGEMENT																									
Multidisciplinary teams	S:5 / M:2 / P:1	4	-20%	4	-33%	3	0%			1	-47%	1	-25%	3	-33%	3	-44%	3	0%			1	-47%	1	-25%
Social worker-led interventions	M:2 / P:2	2	-63%	3	-49%	3	-47%							1	-89%	2	-44%	1	-57%						
Community health workers or navigators	S:3 / M:2 / P:2	2	-15%	4	-17%	3	-51%	1	-15%					2	-15%	4	-17%	1	-17%	1	-15%				

Source: Guide to Evidence for Health-Related Social Needs Interventions: 2023 Enhanced Edition, HealthBegins, 2023.
Abbreviations: ALOS = Average Length of Stay; Mdn = Median; N = Number of Studies; SNF = Skilled Nursing Facility. Strength of evidence: S = Strong; M = Moderate; P = Promising.
Notes: These data should not be used to compare the effectiveness of interventions. Nonsignificant differences in study outcomes were included as 0% change. Data in the "All Evidence" category were used to pre-populate inputs for Quick ROI Calculator.

APPENDIX Table 2. Summary of Social Service Intervention Costs

Type of Social Need Intervention	Unit	Number of Studies	Evidence (Unadjusted Nominal Dollars)			Evidence (Adjusted for Inflation to June 2023)		
			Minimum	**MEDIAN**	Maximum	Minimum	**MEDIAN**	Maximum
HOUSING								
Supportive housing (composite) from research studies	PMPM	5	$278	**$1,550**	$2,750	$438	**$2,298**	$3,451
Supportive housing (services only) from field evidence*	PMPM	1	N/A	N/A	N/A	N/A	**$830**	N/A
Medical respite / recuperative care	Overnight	5	$79	**$207**	$253	$161	**$213**	$515
HOME MODIFICATIONS								
CAPABLE	Bundle	3	$1,989	**$2,352**	$2,825	$2,319	**$2,619**	$3,585
Asthma	Bundle	2	$225	**$264**	$302	$272	**$346**	$420
NUTRITION (PMPM COST)								
Medically tailored home-delivered meals*	PMPM	3	$200	**$350**	$350	$280	**$452**	$457
Non-tailored home-delivered meals*	PMPM	2	$146	**$225**	$303	$191	**$297**	$403
NUTRITION (UNIT COST)								
Medically tailored home-delivered meals*	Meal	6	$6	**$9**	$10	$8	**$10**	$12
Non-tailored home-delivered meals*	Meal	4	$3	**$8**	$10	$4	**$8**	$13
TRANSPORTATION								
Non-emergency medical transportation	Ride	8	$8	**$25**	$116	$11	**$31**	$151
COUNSELING								
Legal assistance*	Case	4	$207	**$273**	$405	$279	**$430**	$659
CARE MANAGEMENT								
Multidisciplinary teams*	PMPM	4	$119	**$278**	$501	$176	**$345**	$501
Community health workers or navigators	PMPM	4	$81	**$134**	$341	$129	**$148**	$422

Source: Guide to Evidence for Health-Related Social Needs Interventions: 2023 Enhanced Edition, HealthBegins, 2023. *Additional field evidence was included from the Corporation for Supportive Housing, North Carolina Healthy Opportunities Pilot Fee Schedule (in medical respite, nutrition, and care management), and Kaiser Permanente (in legal aid).
Note: Inflation adjustments were made to reflect June 2023 dollars at the individual study level using Chained CPI for All Urban Consumers, U.S. city average (C-CPI-U) for Housing, Food, Transportation, or Medical Care, and the Producer Price Index for Legal Services. Highlighted values are used to pre-populate intervention costs in the Quick ROI Calculator.
Abbreviations: N = number of studies; PMPM = per member per month. Composite means the combined cost of housing and supportive services. Bundle means the home modifications are provided as part of a multi-faceted intervention.

Methods and Criteria Used to Develop the Evidence Guide

BACKGROUND

While health care organizations (HCOs) and community-based organizations (CBOs) have widely recognized that social determinants of health and social factors such as access to healthy foods, housing, and transportation have an impact on health outcomes and costs, many lack the planning tools or framework to translate this knowledge and evidence into sustainable partnerships.

The Return on Investment (ROI) Calculator is an online tool designed to assist HCOs and CBOs seeking to create partnerships to address the social needs of their patients or members. Such organizations can use this tool to estimate service needs, target populations, and financial arrangements based on estimated health care cost savings. Users of the calculator indicated that they need evidence on the impacts of social services on health care utilization and costs and the estimated costs of providing those services to guide the input values.

OBJECTIVE

In response to this user feedback, researchers at the Commonwealth Fund collected, reviewed, and synthesized peer-reviewed and gray literature on the impacts of various social service interventions on health care costs and utilization among adults with complex health and social needs. This guide focuses on the categories of interventions featured in the ROI Calculator, as defined in Table 1.

Table 1. Definitions of Social Need Interventions

Social Need Intervention	Definition
Housing	Support for short- or long-term housing needs and services; may include coordinated case management services for housing-insecure individuals.
Home Modifications	Repairs and home improvements, e.g., installation of grab bars and pull handles, to support aging or disabled adults by preventing accidents and enabling them to continue to live independently at home; mitigating environmental triggers of asthma such as by fixing leaks that can cause mold and sealing cracks to prevent entry by pests.
Nutrition	Services providing or facilitating access to nutritious foods in order to improve the diet quality of patients unable to afford or access these foods, e.g., programs such as Meals on Wheels and medically tailored meals that support specific health care conditions.
Nonemergency Medical Transportation	Benefits and interventions that provide transportation services (e.g., shuttles, taxis, ridesharing) to nonemergency medical appointments, e.g., primary care and dialysis.
Care Management	Sets of activities designed to assist patients and their caregivers or support networks in managing medical conditions and related psychosocial needs more effectively. To be included in the guide, an intervention was required to include screening for social needs and/or making referrals to social services.

Counseling: Legal and Financial	Interventions that connect patients with or provide professional services to address the social determinants of health, such as legal advice/assistance to ameliorate substandard rental housing or financial assistance to obtain coverage or benefits.
Other: Social Isolation and Loneliness	Interventions to address social isolation (infrequency or lack of social contact) and/or loneliness (feeling unhappy with social relationships and lack of connections). These interventions can be incorporated into the calculator by selecting "Other" on the social needs menu.

METHODS

1. **Developed search terms.** The first edition of the guide identified search terms for each social need intervention listed on the ROI Calculator (Table 1). The search strategy was developed by using the exact and related terms listed on the social service menu combined using AND with the following terms: health care utilization, utilization impact, cost savings, and other utilization metrics listed on the ROI Calculator (admissions, ED visits, SNF admissions, falls, outpatient visits). The search terms varied depending on the social need intervention of focus:
    - **Housing:** homes, housing, housing in place, housing for complex patients, housing for elderly patients, housing for seniors, housing older adults, permanent supportive housing, medical respite, recuperative care
    - **Home Modifications:** seniors and home modifications, grab bars, aging in place, interventions to prevent falls, asthma and home environmental interventions (adults)
    - **Nutrition:** food, hunger, food insecurity, medically tailored meals, food prescriptions, nutrition interventions, food pantries
    - **Transportation:** nonemergency medical transportation, nonmedical transportation, transportation interventions, rideshare, Uber, Lyft, van services, car service
    - **Care Management:** cost analysis care management for seniors, care management, social support interventions, social needs/social risks and screening/referral/navigation
    - **Counseling:** medical–legal partnerships, financial counseling
    - **Social Isolation and Loneliness:** We added this category for this update and conducted a new search using these terms.

2. **Identified and searched key databases and search engines.** Articles and studies were identified through search engines and curated databases. These primarily included Google Scholar, PubMed, and the Evidence & Resource Library, maintained by the Social Interventions Research & Evaluation Network (SIREN). The latter is a repository of literature on health-care-based interventions to address social risks with filters for key topics. Search terms were selected relevant to the objective of the guide, including food/hunger, employment, housing quality, housing stability, legal services, social support, transportation, Medicare-insured, complex patients, utilization, and cost.

    The 2022 update also relied on the Evidence Map on Social Needs Interventions to Improve Health Outcomes, published by the Patient-Centered Outcomes Research Institute (PCORI). This is a collection of 157 studies identified through a systematic scoping review of research on social needs interventions. Studies were extracted from the database relevant to this guide — those that reported on health care utilization and cost for adults with complex health and social needs.

3. **Gathered additional literature.** A snowball approach was used to capture other relevant studies from systematic reviews and the references of included articles. Advice and guidance were obtained from subject matter experts within the Commonwealth Fund and external colleagues working in the area of social services and health care. These subject matter experts shared articles and literature that were then included in the guide.

4. **Developed inclusion and exclusion criteria.** Several inclusion and exclusion criteria were developed to ensure the guide included studies that were relevant to the ROI Calculator.

   - Inclusion criteria:
     - — Intervention: Study had to be of an intervention related to one of the social need interventions described in Table 1.
     - — Population: Study targeted adults with complex health and social needs, such as those with multiple chronic conditions and/or functional limitations, the frail elderly, and those who made (or were at risk of making) frequent use of health care services and/or who incurred (or were at risk of incurring) high health care costs.
     - — Results: Study reported findings for one or more of the following outcomes: return on investment or benefit-to-cost ratio, health care costs or spending, or health care utilization patterns (ED visits, hospital admissions, hospital readmissions, hospital length of stay, hospital days, SNF admissions, SNF length of stay, or outpatient visits).
     - — Year: For the 2022 update, we focused on studies published since our first review (January 2019–March 2022) or that were not included in the first report.
   - Exclusion criteria:
     - — International: studies that focused on international interventions or that were published in a language other than English.
     - — Evidence: studies that did not include key pieces of information in a format that could be used in the calculator.
     - — Year: all studies published before 2000.

5. **Abstracted and prioritized relevant literature.** Abstracts were reviewed for relevancy using the above criteria. The following information was included in the tables: target population, intervention summary, type and strength of evidence (defined below), cost of intervention, and impacts on health care utilization and total cost of care relevant to the inputs of the ROI Calculator. ROI and benefit-to-cost ratios were identified when this information was reported in the literature. The latter is calculated as benefit ÷ cost, while ROI is calculated as (benefit − cost) ÷ cost.

   For this update, definitions of strength of evidence were simplified and re-applied to existing studies as indicated below. The effect of this revision is that 4 studies classified “strong” in the first edition are labeled “moderate” in this update.

   - Strong: randomized controlled trials
   - Moderate: nonrandomized trials and observational studies with comparison groups
   - Promising: before-and-after (pre/post) and descriptive studies without comparison groups.

   Unless otherwise indicated, results described in the guide were statistically significant when significance was measured. (Statistical significance was not reported for 19 studies, primarily those published in the gray literature.)

6. **Summarized the evidence for each social need domain.** Findings were compiled in Excel tables and statistical functions were used to characterize the range of results and median values. Relative changes in utilization or total cost of care were calculated for studies that did not report them. For controlled studies, relative change was calculated by subtracting the intervention group value from the control group value and dividing the difference by the control group value. For difference-in-differences analyses that did not report relative change, a percentage change was calculated following the same methodology for calculating a difference in difference.

Commonwealth Fund staff and external colleagues reviewed the completed summary table and provided feedback. Table 2 summarizes the number of studies that are included in this update. Studies were dropped primarily based on relevance to the calculator and on strength of evidence when a stronger study offered more reliable results. Overall, the evidence included in the guide provided more information on health care utilization impact and less information on social service cost (not included in almost half of the studies).

Table 2. Literature Review: Number of Studies Included

Social Need Intervention	Total Number of Studies	Number of New Studies*	Number of Strong Studies	Number of Moderate Studies	Number of Promising Studies
Housing	14	11	1	9	4
Home Modifications	8	7	2	2	4
Nutrition	12	2	0	7	5
Transportation	10	2	1	3	6
Care Management	27	15	10	12	5
Counseling	8	3	0	0	8
Social Isolation and Loneliness	3	1	1	0	2
TOTALS	**82**	**41**	**15**	**33**	**34**

*New studies are indicated by an asterisk before the citation. This category does not count studies that update or elaborate on research included in the first edition of the Guide.

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