



Guide to Evidence on the Health Care Impacts of Interventions to Address the Social Determinants of Health

Introduction

This guide is intended to be used in conjunction with the Return on Investment (ROI) Calculator for Partnerships to Address the Social Determinants of Health, published by the Commonwealth Fund. It summarizes our assessment of the best available evidence of health care impact for interventions related to addressing health-related social needs for high-need adults. A recent systematic review found that few studies have rigorously evaluated how addressing social needs impacts health care utilization and costs.¹ While the studies that did measure impact on costs and utilization were primarily positive, this area of research is nascent, and the availability of high-quality studies is limited.

We developed this targeted summary to inform inputs needed by the calculator to determine the business case for sustainable financial arrangements between health care and community-based organizations serving high-need, high-cost patients. Holistically addressing the social and medical needs of such patients can improve their health outcomes and produce health care savings by reducing the use of expensive health care services such as emergency department visits and hospitalizations.

What's Included in the Guide

The guide includes relevant evidence from peer-reviewed and gray literature that reported on the costs of social service interventions and/or health care utilization outcomes for adult patients or clients. The evidence is presented in six tables by type of social service need including:

- Housing
- Nutrition
- Transportation
- Home Modification
- Care Management
- Counseling: legal, financial, and social supports

Given the formative state of field, the methodologic rigor of the evidence is variable. We selected data sources that we considered credible or promising (see Methods), with a bias toward including potentially useful information despite its limitations. We welcome feedback to improve the guide, which we plan to update as better evidence becomes available.

¹ Laura M. Gottlieb et al., “A Systematic Review of Interventions on Patients’ Social and Economic Needs,” *American Journal of Preventive Medicine*, 53, no. 5 (November 2017): 719–729.

How to Use the Guide

For a particular social need of interest, identify relevant studies that most closely match the aims, patient population, and context of your planned intervention. Consider carefully how well the evidence relates to your organizational or program context as well as its potential limitations. Use this evidence to inform reasonable input variables to be entered in the ROI calculator for target populations, the cost of social services, and their potential impact on the utilization of health care services. You may wish to model a range of values and use the calculator's sensitivity analysis function to test your assumptions. Given the limitations of the published data, the best data will be your own data.

Evidence Guide

HOUSING



There is strong evidence that providing people who are homeless, or at risk of becoming homeless, with supportive housing can significantly lower expensive forms of health care, thereby reducing costs. We found several studies that provided supportive housing — both with and without case management services — to homeless individuals with a medical need like a chronic condition or behavioral health problem. These studies consistently found that housing reduces ED visits, admissions, and inpatient days and results in large decreases in health care costs. Some studies also found significant increases in the receipt of preventive primary care services among those provided housing compared to their counterparts.

A few studies looking at the impact of providing housing to the elderly found — in addition to reductions in hospitalizations and ED visits — large decreases in skilled nursing facility and long-term-care days, which resulted in significant cost savings to Medicare and Medicaid.

Several of the studies found housing can generate an ROI. For example, one study estimated an ROI of \$2,249 per person per month, and another estimated for every \$1 spent, savings of \$1.57.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Basu et al., 2012	Homeless adults with chronic medical illnesses in Chicago	The housing and case management intervention was based on the Housing First model and offered three components: interim housing at a respite center after hospital discharge, stable housing after recovery from hospitalization, and case management based in study hospital, respite, and housing sites. Study participants were followed for 18 months.	Randomized control trial (n=201 intervention group, 206 usual care group) Strong evidence	Not given	Compared to usual care, the intervention group generated an average annual cost savings of \$6,307 per person. Chronically homeless participants in the intervention group generated the highest per person annual cost savings (\$9,809).
Sadowski et al., 2009	Homeless adults with chronic medical illnesses in Chicago	Study looked at the effectiveness of a case management and housing program. Intervention group was offered transitional housing after hospital discharge followed by placement in long-term housing. Case management was offered on-site at primary study sites, transitional housing, and stable housing sites. Usual care participants received standard discharge planning from hospital social workers.	Randomized control trial (n=201 intervention group, 206 usual care group) Strong evidence	Not given	For every 100 homeless adults offered the intervention, the expected benefits over the next year would be 49 fewer hospitalizations, 270 fewer hospital days, and 116 fewer ED visits. After adjusting for baseline covariates, intervention group, compared to usual care group, had relative reductions of 29% in hospitalizations, 29% in hospital days, and 24% in ED visits.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Gusmano et al., 2018	Elderly Medicare beneficiaries in Queens, New York	The study examined a community-based program called “Selfhelp” that supplied affordable housing with supportive social services. Intervention group had access to affordable housing with supportive social services which included Medicaid-funded home services, SNAP (for those eligible), psychological assessments, counseling, advocacy, health education, wellness, and access to list of local service providers (including transportation, physician, pharmacy).	Retrospective analysis with matched comparison group (n=1,248 in intervention group, 15,947 in comparison group) Moderate evidence	Not given	Total hospital discharge rate was 32% lower in intervention group compared to comparison group. Rate of hospital discharge for ambulatory care sensitive conditions was 30% lower among intervention group compared to controls. Mean length of hospital stay for intervention group was one day shorter than comparison group.
Larimer et al., 2009	Chronically homeless individuals with severe alcohol problems	The objective of this article is to evaluate association of a “Housing First” intervention for chronically homeless individuals with severe alcohol problems and high health care use and costs (including cost of jail bookings, days incarcerated, shelter and sobering center use, hospital-based medical services, publicly funded alcohol and drug detoxification and treatment, emergency medical services, and Medicaid-funded services). Individuals are placed in supportive housing with on-site case managers that engage residents on substance use.	Nonrandomized trial with comparison group (n=95 in intervention group, 39 waitlist controls) Moderate evidence	Housing and other services: \$13,440 per person per year	At 12 months, intervention group had reduced total costs on average by \$42,964 per person per year, an average net savings of \$29,564 per person per year.
American Hospital Association, 2017	Chronically homeless Individuals	University of Illinois Health and the Center for Housing and Health started a program that provided stable housing and supportive services to chronically homeless individuals. Participants, with the assistance of a case worker, first move into transitional housing followed by long-term independent housing.	Case study (n=25–27) Promising evidence	Not given	Early results suggest 42% drop in program participants’ health care costs, 35% reduction in ED visits, and increase in patients accessing clinics for routine care.
Bamberger & Dobbins, 2014	Homeless seniors in San Francisco	Study examining the long-term cost-effectiveness of placing homeless seniors in a Housing First program. Data from 1 year prior to move-in was compared with data from the 7 years subsequent to moving into a new supportive housing facility.	Pre/post study (n=51) Promising evidence	Cost of providing rent and support services for all 51 tenants from May 2006 to January 2014: \$8.5 million	Seniors placed in permanent supportive housing saw a \$1.46 million cost reduction in hospital-based health care compared with the year prior to placement. Researchers estimate independent housing resulted in 16,433 avoided days of care in an SNF, a savings for Medicaid and Medicare of approximately \$9.2 million in a 7-year period.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Center for Outcomes Research and Education, 2016	Medicaid beneficiaries in Oregon	Study used Medicaid claims and survey data to examine key health care outcomes for people who moved into one of three common affordable housing types: family housing, permanent supportive housing, or housing for seniors and people with disabilities.	Pre/post study (n=1,625) Promising evidence	Not given	Total health care expenditures were 12% less the year after moving in when compared to the year before, averaging a reduction of nearly \$50 PMPM. Overall, care for the 1,625 participants cost \$936,000 less after move-in than in the year before. After moving into affordable housing, residents used 20% more primary care and used the ED 18% less than in the year prior to moving in.
Hunter et al., 2017	Homeless residents of Los Angeles who experienced at least two inpatient hospitalizations and/or ED visits within the last year and who have extremely low incomes	Housing for Health, a division within the Los Angeles County Department of Health Services, provided supportive housing to Department of Health Services patients with complex medical and behavioral health issues who were experiencing homelessness. Evaluation compared service use and costs among recipients during the year prior to receiving housing compared to the year following receiving housing.	Pre/post study (n=890) Promising evidence	Not given	Health care utilization was reduced significantly, including ED visits (80%), inpatient stays (61%), and outpatient visits (47%). Participants had significant reductions in all Department of Health Services costs, including inpatient services (76%), emergency services (66%), and crisis stabilization (59%).
KPMG Government Institute, 2018	Dual-eligible beneficiaries in San Mateo, California	Health Plan of San Mateo launched the Community Care Settings Pilot to target housing support needs of members. Health plan invested in coordinating with two nonprofit organizations that specialize in affordable supportive housing and transitional case management as well as paying for a portion of housing services. Pilot targeted three 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.	Pre/post study (n=91) Promising evidence	Average per person per month cost of intervention by housing referral: 1) Assisted living = \$1,860–\$2,130, 2) Individual home support: \$0–\$400, 3) Affordable housing: \$0–\$400	Average overall cost of care PMPM dropped 43% (\$10,055 to \$5,721) following the intervention. Over \$6,000 PMPM was saved on LTC and SNF costs alone. A total of \$2.4 million in savings was accrued 6 months post-intervention. When accounting for \$1 million in start-up costs, total net savings was \$1.4 million. Estimated ROI was \$1.57 in savings for every \$1 invested.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Linkins et al., 2008	Frequent users of health care with complex, unmet needs	The Frequent Users of Health Services Initiative had a subprogram focused on addressing housing needs of homeless clients. One-third of frequent users who were homeless were connected to permanent housing and more than half were placed in shelters, board and care homes, or other placements.	Pre/post study (n=120 clients connected to permanent housing, 668 connected to shelters, board and care homes, or other placements) Promising evidence	Not given	Homeless clients who were connected to permanent housing showed greater reductions in ED use (34% vs. 12% reduction) and ED charges (32% vs. 2% reduction) compared to those who remained homeless or in less stable housing arrangements. Those connected to housing showed greater reductions in the number of inpatient days (27% decrease vs. 26% increase) and inpatient charges (27% decrease vs. 49% increase) compared to those not connected to housing.
Doran et al., 2013	Medicaid recipients	Article estimates the effects of New York's plan for supportive housing for high-need, high-cost Medicaid recipients.	Case study Expert opinion	Estimated cost per person per day for supportive housing: \$50–\$70	New York Medicaid pays on average \$217 per person per day for nursing-facility stays, much more than the estimated cost of providing supportive housing per person per day. Preventing even a few inpatient hospitalizations, at \$2,219 per person per day, could pay for many days of supportive housing.

NUTRITION



There is strong evidence that ensuring people have access to healthy food can significantly lower health care utilization and costs and result in an ROI. Home-delivered, medically tailored meals for those with chronic conditions or nutritional risk have been found to significantly lower inpatient utilizations, 30-day readmissions, and overall medical costs.

Home delivered meals that are not medically tailored also can have an impact. Two studies found that the Meals on Wheels program for Medicare beneficiaries resulted in reduced hospitalizations, ED visits, and overall health care costs. However, one study found that delivered, medically tailored meals resulted in a larger ROI than delivered, nontailored meals (\$220 per participant compared to \$10 per participant).

Finally, other nondelivered food support programs, such as the Supplemental Nutrition Assistance Program (SNAP) or 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	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Berkowitz et al., 2018	Medicare and Medicaid dual-eligibles at nutritional risk	Study examines whether home delivery of medically tailored meals or nontailored food reduces the use of selected health care services and medical spending among Commonwealth Care Alliance members. Those receiving medically tailored meals 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.	Nonrandomized trial with comparison group; Medically tailored meal group (n=133 in intervention group, 1,002 in comparison group) Nontailored food group (n=624 in intervention group, 1,318 in comparison group) Strong evidence	Average monthly program costs per participant for medically tailored meals: \$350 Average monthly program costs per participant for nontailored food: \$146	Medically tailored meals group compared to control saw 70% reduction in ED visits and 52% reduction in inpatient admissions. Nontailored food group compared to control saw 44% reduction in ED visits and 12% reduction in inpatient admissions. Medically tailored meals program and nontailored food program 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). Researchers estimate monthly net savings of \$220 per participant for medically tailored meals and \$10 per participant for the nontailored food program.
Hummel et al., 2018	Recently discharged heart failure patients age 55+	Study assesses Dietary Approaches to Stop Hypertension, a program that provides 4 weeks of home-delivered sodium-restricted meals to patients recently discharged from a heart failure hospitalization.	Randomized control trial (n=33 intervention group, 33 usual care) Strong evidence	Not given	Although not statistically significant, intervention group had lower 30-day heart failure readmissions compared to control group (11% vs. 27%). Recipients of home-delivered meals also had shorter lengths of stay during those readmissions compared to controls (17 days vs. 55 days).

Study	Target 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 CMS Hierarchical Condition Category)	Maine Medical Center partnered with the Southern Maine Agency on Aging to offer a Community-based Care Transition Program (CCTP) with and without the addition of a meal-delivery program titled Simply Delivered for ME (SDM). SDM offered specialized meals to patients after they were discharged from the hospital. Caregivers were also allowed to participate. Patients received up to a 7-day free meal supply delivered weekly to their homes over a 24-month period.	Time-series design (n=622) Strong evidence	The cost of providing 7 days of meals to the 622 patients totaled \$43,540. (~\$70 per person)	CCTP plus SDM was associated with a 38% decreased rate of 30-day readmissions compared to baseline. CCTP plus SDM participants had a readmission rate 16.3% lower than that for those who received CCTP alone. Assuming an average cost per readmission of \$16,320 per high-risk patient, the estimated ROI for adding SDM to the CCTP program was 387%, or a benefit-cost ratio of \$3.87 for every \$1.00 spent.
Thomas & Dosa, 2015	Seniors from Meals on Wheels waitlists at 8 Meals on Wheels programs	Participants were randomized to one of three groups: daily, traditional meal delivery (Meals on Wheels Program); once-weekly frozen meal delivery; or waiting list for meals (control). Intervention period was 15 weeks. Daily, traditional meal delivery of frozen meals included socialization and safety check at time of delivery.	Randomized control trial (n=214 received daily, traditional meal delivery, 202 received frozen meals once a week, and 210 remained on waiting list) Strong evidence	Not given	Recipients of home-delivered meals had greater improvements in anxiety, self-rated health, isolation, loneliness, and reduced rates of hospitalizations compared to those who did not receive meals on waitlist. Greatest improvements on all outcomes were seen among those who received daily meals.
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 the SNAP program 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.	Retrospective analysis with matched comparison group (n=1,889 intervention group, 2,558 matched comparison group) Moderate evidence	Not given	SNAP participation was associated with approximately \$1,400 lower health care costs per year per person.
Gurvey et al., 2013	Members of a Medicaid managed care organization in Philadelphia and Southern New Jersey with chronic diseases such as HIV/AIDS, renal disease, and cancer	Clients received 3 free, delivered, nutritionally balanced meals a day, from a nonprofit called Metropolitan Area Neighborhood Nutrition Alliance. Registered dietitians provided medical nutrition therapy to the clients which included nutrition counseling and meal planning. Outcomes were examined for 6 months before meal delivery and the first 6 months of receiving meals. Intervention group compared to matched comparison group.	Retrospective analysis with matched comparison group (n=65 in intervention group, 633 in comparison group) Moderate evidence	Not given	Intervention group, compared to matched comparison group, had significantly lower overall average monthly health care costs (\$28,268 vs. \$40,906). Intervention group, compared to matched comparison group, had significantly fewer mean monthly inpatient visits (0.2 vs. 0.4), shorter length of inpatient stays (10.7 days vs. 17.1 days), and lower mean monthly inpatient costs (\$132,441 vs. \$219,639).

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Project Angel Heart, 2018	Beneficiaries covered through Medicare, Medicaid, or dually enrolled in both, living with any of the following chronic illnesses: cancer, CHF, COPD, diabetes, end-stage renal disease, HIV/AIDS, or multiple sclerosis	Analysis of nonprofit Project Angel Heart meal delivery using medical claims data from the Colorado All-Payer Claims Database. Participants received 5 to 10 free, medically tailored, delivered meals per week. Intervention group compared to matched control group.	Retrospective analysis with matched comparison group (n=708 in intervention group) Moderate evidence	Estimated monthly average cost of providing 5 to 10 meals per client per week, including overhead: \$199.54	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), a significant decline. Total annual medical cost reduction for Project Angel Heart clients with CHF, COPD, and diabetes alone (~1,740 people) is estimated at \$4.2 million, not including costs of meals.
Samuel et al., 2018	Dually eligible beneficiaries age 65+	Study assessed whether SNAP participation was associated with health care utilization or cost among low-income older adults in Maryland. Meals were not delivered.	Retrospective analysis with comparison group (n=68,956) Moderate evidence	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. Study team estimates that expanding SNAP benefits to the 25,018 nonparticipants in 2012 could have been associated with total savings of \$19 million from averted hospital admissions and less costly stays.
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.	Pre/post study (n=2,243 patients who screened positive for food insecurity and were referred to food pharmacies) Promising evidence	Not given	1,100 patients of the 2,243 who were referred used their referrals and became clients of the food pharmacies. According to the operating health system, Medicaid patients referred experienced 3% decrease in ED visits, 53% reduction in readmissions, and 4% increase in primary care visits after screening.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Feinberg et al., 2018	Patients with diabetes, most of whom were insured by Geisinger Health Plan	Geisinger's Fresh Food Farmacy provides fresh, healthy food to patients who are identified as being food insecure and having HbA1c levels greater than 8. Patients are given a "prescription" or referral by their primary care physician to use at the Fresh Food Farmacy. Patients receive more than 20 hours of diabetes education with health coaches; food to prepare healthy and nutritious meals for their whole family, twice a day for five days; and attend a weekly diabetes self-management support group and online wellness module. Meals were not delivered.	Pre/post study (n=37) Promising evidence	Estimated operational cost of program: \$2,400 per patient per year Average cost of providing free healthy food: approximately \$6 per person per week	Claims data shows health care costs for pilot patients dropped by 80%, from an average of \$240,000 per member per year to \$48,000 per member per year.
More Than a Meal, 2017	Medicare fee-for-service beneficiaries	Study examined pre/post differences among Meals on Wheels recipients (daily meal delivery service, including a hot nutritious meal and a socialization and safety check) at 30, 90, and 180 days post-enrollment across 6 states between 2009 and 2014 using Medicare claims data. Outcomes for Meals on Wheels recipients were also compared to control group of Medicare beneficiaries who did not receive meals.	Pre/post study (n=14,000) Promising evidence	Not given	Meals on Wheels recipients had 39% reduction in hospitalizations, 28% reduction in ED visits, and 28% reduction in nursing home use 30 days post-enrollment. Declines in all three areas of utilization continued but lowered over time; at 180 days post-enrollment, reductions were 31% for hospitalizations, 13% for ED visits, and 25% for nursing home use. Average decrease in Medicare reimbursements per Meals on Wheels recipient 30 days post-enrollment was \$362 for hospitalizations, \$244 for skilled nursing facilities, and \$22 for ED. However, study found Meals on Wheels recipients had higher rates of utilization compared to control group of Medicare beneficiaries who did not receive Meals on Wheels.
Palar et al., 2017	People living with HIV and/or type 2 diabetes mellitus in San Francisco Bay area	Researchers evaluated a 6-month community-based food support intervention called Project Open Hand, which provided meals and snacks designed to comprise 100% of daily energy requirements and meet nutritional guidelines for a healthy diet. Meals were not delivered.	Pre/post study (n=52) Promising evidence	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% decline among participants in having at least one hospitalization in the previous three months, and a 9.6% decline in at least one ED visit. Participants experienced statistically significant decreases in low food security and depressive symptoms.

TRANSPORTATION



There is moderate evidence that providing non-emergency medical transportation (NEMT) to low-income people, those with certain chronic conditions, or dually eligible enrollees can increase the receipt of outpatient, preventive care; prevent expensive forms of care; and produce an ROI.

Three 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 other studies providing NEMT to those with chronic conditions found significant reductions in health care costs. Several programs calculated an ROI for specific populations and conditions. For example, one study found an ROI of \$3,423 per person per month for dialysis patients and \$792 for diabetes wound care patients.

However, the methodology and rigor of most of the studies on transportation were classified as moderate because of a lack of comparison groups and small sample sizes.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Chaiyachati et al., 2018	Medicaid beneficiaries	Patients of an internal medicine practice in West Philadelphia 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 similar, control practice in West Philadelphia which did not offer transportation.	Nonrandomized trial with comparison group (n=394 in intervention group, 392 in control group) Moderate evidence	Average cost per ride: \$8.10	Uptake of ridesharing was low among intervention group (19.8%) and no significant difference was found between show rates among intervention and control arm.
Chaiyachati et al., 2018	Medicaid beneficiaries	Patients of an internal medicine practice in West Philadelphia 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 similar, control practice in West Philadelphia which did not offer transportation.	Difference-in-difference study with comparison group (n=194 in intervention group, 312 in comparison group) Moderate evidence	Not given	At the rideshare practice, statistically significant improvement in show rate from 54% to 68%. At control practice, decline in show rate from 60% to 51%.
Hughes-Cromwick et al., 2005	Nationally representative sample of transportation disadvantaged people often representing low-income, older adults with chronic conditions	Sample identified using NHIS and MEPS datasets. Study estimates cost-effectiveness of providing NEMT for patients with 12 types of chronic conditions or preventive medical needs.	Cost-benefit analysis (n=3.6 million) Moderate evidence	Depending on medical condition and geography, NEMT costs ranged from \$13–\$46 per ride	Providing NEMT was estimated to save \$927 per patient with diabetes, \$333 per patient with asthma, and \$2,743 per patient with heart disease.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Adelburg et al., 2008	Medicaid beneficiaries	<p>Study estimated the ROI of providing NEMT to dialysis and wound care appointments for diabetes.</p> <p>Researchers processed 2014–2015 medical, pharmacy, and long-term-care claims for members enrolled during the 24-month period for each treatment.</p>	<p>Retrospective analysis without comparison group (n=N/A)</p> <p>Promising evidence</p>	<p>Average cost of one round-trip NEMT per patient is \$60.24 for dialysis patients and \$53.25 for wound care diabetes patients</p> <p>Average cost of providing NEMT per patient per month for dialysis patients is \$717.25 and \$291.96 for wound care diabetes patients</p>	<p>Providing NEMT for people with chronic conditions has a calculated positive ROI of over \$40 million per month per 30,000 Medicaid beneficiaries nationally, an amount totaling to \$480 million annually.</p> <p>Medicaid cost avoided because of NEMT per survey respondent per month is \$3,423 for dialysis patients and \$792 for wound care diabetes patients.</p> <p>ROI of NEMT per 10,000 dialysis patients per month is \$34,229,448.</p> <p>ROI of NEMT per 10,000 diabetic wound care patients per month is \$7,920,635.</p>
Alewine, 2017	Rural Medicare and Medicaid beneficiaries	<p>Missouri Health Foundation pilot program, “HealthTran,” 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.</p> <p>Intervention costs and results measured at 17 months into the program.</p>	<p>Pre/post study (n=N/A)</p> <p>Promising evidence</p>	<p>HealthTran provided 2,470 rides for patients at a cost of approximately \$66,000</p> <p>Average cost per ride: \$33</p>	<p>For every \$1 invested in transportation, the hospital earned \$7.68 in reimbursement.</p> <p>In total, program resulted in over \$730,000 in payments to the hospital and its clinics.</p>
Bove et al., 2018	Medicaid and dual-eligible beneficiaries as well as uninsured patients	<p>Study evaluated volume of van service and clinic attendance rate using records from private, outpatient physical therapy clinic offering free door-to-door van service to appointments.</p>	<p>Retrospective analysis without comparison group (n=N/A)</p> <p>Promising evidence</p>	<p>Each round-trip van ride cost: \$11.78</p> <p>Average monthly total van service cost: \$2,592</p>	<p>Use of the van service produced statistically significant increase over time, from a mean of 83 riders per month in 2010 to 205 riders per month in 2013.</p> <p>Overall clinic attendance rate saw statistically significant increase from 80.1% to 84.1% after implementation of the service.</p>
KPMG Government Institute, 2018	CareMore Medicare Advantage and dual-eligible beneficiaries	<p>3-month, self-funded rideshare pilot offering members in California the option to order NEMT through the Lyft rideshare platform.</p>	<p>Pre/post study (n=N/A)</p> <p>Promising evidence</p>	<p>Most recent per-ride cost of NEMT: \$21.3 per ride</p>	<p>33% average reduction of per-ride NEMT costs for CareMore (\$31.5 to \$21.3 per ride).</p>
Thomas et al., 2017	Medicaid beneficiaries, some of whom were also dually enrolled in Medicare	<p>Study evaluated the association between Medicaid-provided NEMT and diabetes care visits using demographic and claims data obtained from the Oklahoma Medicaid program.</p>	<p>Retrospective analysis without comparison group (n=8,411)</p> <p>Promising evidence</p>	<p>Not given</p>	<p>Providing NEMT resulted in statistically significant increase in outpatient visits for diabetes care.</p> <p>Number of diabetes care visits would increase by as estimated 0.6563 for every 2 uses of NEMT services.</p>

HOME MODIFICATIONS



The evidence on ROI for home modifications is limited, but promising. We only found one study that provided home modifications. In addition, the model — Community Aging in Place—Advancing Better Living for Elders (CAPABLE) — offered the modifications as one service among other interventions, making it difficult to tease apart the effect of home modifications alone. However, the research on CAPABLE does indicate investing in home modifications can provide a positive ROI. The researchers found that a modest investment of \$2,825 per person is associated with \$20,000 in medical savings per person, representing a 600% ROI.

Study	Target population	Intervention summary	Type of evidence	Intervention cost	Results on utilization and costs of care
Szanton et al., 2017	Dual-eligible beneficiaries age 65+ with reported difficulty with at least one activity of daily living	Community Aging in Place – Advancing Better Living for Elders (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 (occupational therapist, registered nurse, handyman) to help older adults attain self-identified functional goal(s). 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 from the handyman.	Nonrandomized trial with comparison group (n=204 in intervention group, 2,013 in comparison group) Strong evidence	Intervention cost: \$2,825 per participant	Average Medicaid spending per CAPABLE participant was \$867 less per month than matched comparison group, primarily because of reductions in inpatient care and long-term services and supports. 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.

CARE MANAGEMENT



Several rigorous studies have found that a variety of care management models — which link high-risk patients to needed medical and nonmedical community supports — reduce utilization of costly health care services, lower costs of care, and produce an ROI.

A few programs provided care management through multidisciplinary teams made up of social workers, case managers, nurses, or physicians and connected patients with community-based resources as needed. These demonstrated reduced ED visits, hospitalizations, home health episodes, and skilled nursing home admissions. One such program demonstrated millions in savings and a two-to-one ROI.

Several studies also evaluated the impact of community health workers (CHWs) that connected at-risk patients with social services. A subset of these studies showed CHWs contributed to a higher follow-up visit show rate, lower ED visits, reduced Medicaid spending, and an ROI as high as \$2.92 for every \$1 spent.

Finally, some studies evaluated the effectiveness of care management during and after transitions from the hospital to home and found decreased readmissions, hospitalizations, 30-day readmissions, and large savings. One of these studies estimated cost savings of \$17,562 per avoided inpatient admission.

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
MULTIDISCIPLINARY CARE TEAM INTERVENTIONS					
Berkowitz et al., 2018	Medicaid and Medicare beneficiaries at high risk of hospitalization	The Community Intervention of the Johns Hopkins Community Health Partnership (J-CHiP) provided enhanced care coordination in 8 primary care clinics in East Baltimore using multidisciplinary teams made up of physicians, care managers, health behavior specialists, community health workers, and neighborhood navigators. Among other interventions, 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.	Difference-in-difference analyses using propensity score-matched comparison groups (n=2,532 Medicaid and 2,154 Medicare beneficiaries) Strong evidence	Grant funded (\$19.9 million health care innovation award from the Center for Medicare and Medicaid Innovation)	Medicaid beneficiaries saw reductions per 1,000 enrollees of hospitalizations (33), ED visits (51), 30-day readmissions (36), and avoidable hospitalizations (7). Medicaid beneficiaries had statistically significant reductions in total cost of care compared to comparison group (average reduction of \$1,643 per beneficiary per quarter, not accounting for the cost of the intervention). There were no significant differences in results for Medicare beneficiaries. (Note: another study on a smaller sample of J-CHiP participants conducted by Murphy et al., 2018 found no significant differences in outcomes of interest for Medicaid or Medicare beneficiaries.
Boult et al., 2011 (Note: see Hostetter et al., 2016 for additional results)	Adults age 65+ with multiple chronic conditions at high risk of health care use	Guided Care model: trained nurses provide in-home needs assessment, care management, and education for patients and their caregivers in partnership with patients' primary care physicians. SDOH were addressed by facilitating access to community resources.	Randomized control trial (n=446 intervention group, 404 usual care group) Strong evidence	Not given	The intervention group had 30% fewer home health care episodes than a control group during the 32-month trial. Among a subgroup of patients insured by Kaiser Permanente, there were 47% and 52% fewer SNF admissions and SNF days, respectively.

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
Counsell et al., 2007 (Note: see Counsell et al., 2009 for additional results)	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.	Randomized control trial (n=474 intervention group, 477 usual care group) Strong evidence	Not given	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.
Counsell et al., 2009 (Note: see Counsell et al., 2007 for additional results)	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 (see Counsell et al., 2007 for a description of the model).	Cost analysis using data from a randomized control trial (n=474 intervention group, 477 usual care group) Strong evidence	\$1,432 per patient per year for high-risk patients	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).
Hostetter et al., 2016 (Note: see Boulton et al., 2011 for additional results)	Highest-risk 5% of patients attributed to an ACO	Guided Care model (see Boulton et al., 2011 for a description of the model). At this replication site, 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.	Case study: pre/post comparison (n=1,500) Promising evidence	\$2.5 million annually (about \$1,667 per patient per year assuming 1,500 patients served annually)	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 the baseline year, contributing to \$21.8 million in savings over 2 years, about half of which was earned by the ACO, yielding a 2:1 ROI.

SOCIAL WORKER-LED INTERVENTIONS

Rowe et al., 2016	Patients age 60+ referred by primary care providers because of unmet nonmedical needs; the majority were Medicare beneficiaries	The Ambulatory Integration of the Medical and Social (AIMS) model embeds Master's-prepared social workers 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 medical care plan adherence or physical condition.	Retrospective evaluation using nonequivalent comparison groups (n=640) Moderate evidence	Not given	A comparison of utilization to the entire RUMC 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 readmissions. The rate of 30-day readmissions and ED visits also was lower than regional and national averages, respectively.
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Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
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.	Pre/post comparison (n=5,753) Promising evidence	Not given	An evaluation of the Bridge Model at one site participating in the 2012–2014 Community-based Care Transitions Program found a 30.7% lower rate of 30-day readmissions, a 9.4% lower rate of 60-day readmissions, and a 13.9% lower rate of 90-day readmissions, as well as increased attendance of post-discharge physician appointments, in comparison to the baseline.
Xiang et al., 2018	Medicare beneficiaries hospitalized 5 or more times in the prior 12 months (the 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.	Pre/post comparison (n=586) Promising evidence	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), a 37% reduction in the number of ED visits (from 5.39 to 3.38 per patient), and 47% reduction in the 30-day readmission rate (from 25.5% to 13.4%).

COMMUNITY HEALTH WORKERS (CHWs), CARE NAVIGATORS, OR COACHES

Kangovi et al., 2014 (Note: see Morgan et al., 2016 for additional results)	Uninsured or publicly insured nonelderly adults living in high-poverty zip codes in Philadelphia and hospitalized or under observation status and expected to be discharged home	The Individualized Management for Patient-Centered Targets (IMPACT) program employed CHWs to support patients for 2 weeks following hospital discharge in setting and achieving goals, including connecting with long-term supports to address socioeconomic and behavioral barriers to their attainment.	Randomized control trial (n=446) Strong evidence	Not given	Postdischarge patients in the CHW group were equally likely to be readmitted but were less likely to have multiple readmissions (2.3% vs. 5.5%) as those in a control group. Among 63 patients who were readmitted, recurrent readmission was reduced from 40.0% to 15.2%.
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Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
Kangovi et al., 2018	Adult primary care patients living in high-poverty zip codes in Philadelphia and having 2 or more of 4 chronic diseases (diabetes, obesity, tobacco dependence, hypertension), at least one of which was in poor control	The Individualized Management for Patient-Centered Targets (IMPACT) program adapted for use in primary care settings (see Kangovi et al., 2014 for background on the model). CHWs engaged patients in primary care for 6 months after study enrollment.	Randomized control trial (n=592) Strong evidence	Not given	Primary care patients in the CHW group spent 65% fewer total days in the hospital at 9 months, because of fewer hospitalizations (1.4 vs. 1.6 admissions per patient) and shorter lengths of stay (5.8 vs. 9.2 days) among those who were admitted, and they were less likely to be readmitted within 30 days of discharge than patients in the control group (11.5% vs. 27.5% at 9 months).
Jack et al., 2016	Subset of studies of adults with at least 1 chronic disease such as asthma, diabetes, or high blood pressure; 8 of 19 selected studies targeted uninsured, low-income, and/or Medicaid patients	Systematic review of the impact of Community Health Worker (CHW) programs on health care use and costs. CHWs played the primary role in a health-related intervention relevant to primary care, had no professional training, were paid for their work, and were employed based on their knowledge of a community or population of interest. In 6 studies, the CHW role explicitly included connecting adults with social services such as food, housing, transportation, or insurance coverage, among other health interventions. Study periods ranged from 3 months to 3 years.	Reanalysis of 11 randomized control trials, 5 cohort studies, and 3 cost-effectiveness studies (note: 13 studies of children and 2 pre/post studies of adults were excluded from the reanalysis) Strong and moderate evidence	Program costs (reported in 11 studies of adults) ranged from \$392 to \$1,300 per participant per year	3 of 7 studies reported significant reductions in ED visits compared to control groups, ranging from a 23% lower risk of any ED visit 2 years after the start of an intervention to a 51% lower annual incidence rate. 3 of 6 studies reported significant reductions in hospital use compared to controls, ranging from a 39% lower risk of any hospitalization during a 23-month intervention to 75% fewer hospital admissions in the 6 months after compared to 6 months before an intervention. 4 of 5 studies reported an increase in ambulatory care compared to controls, ranging from a 39% greater completion of follow-up visits to a 146% increase in ambulatory visits.
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 II diabetes, HIV, hypertension, and substance use	Breakeven calculation for Community Health Worker (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.	Microsimulation using data from published literature and the AHRQ National ED and Inpatient files and MEPS Moderate evidence	\$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	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
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 long-term services and supports.	Retrospective propensity-score matched comparison (n=919) Moderate evidence	\$896,000 in operational expenses (about \$975 per participant)	The 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 \$2.92 per \$1 invested after accounting for operating expenses.
Morgan et al., 2016 (Note: see Kangovi et al., 2014 for additional results)	Uninsured or publicly insured nonelderly adults living in high-poverty zip codes in Philadelphia and hospitalized or under observation status and expected to be discharged home	The Individualized Management for Patient-Centered Targets (IMPACT) (see Kangovi et al., 2014 for background on the model).	Cost analysis Moderate evidence	\$65,000 to hire 2 part-time CHWs for one year, plus \$60,000 to run the randomized control trial	The health system realized an ROI of \$1.80 for every \$1 invested in the program, which rose to \$2 per \$1 invested as the program achieved efficiencies over time.
Center for Health Care Strategies, 2017	1) Medicare and dually eligible Medicare and Medicaid beneficiaries discharged from the hospital with CHF, COPD, AMI, pneumonia, and/or septicemia and, 2) Medicaid beneficiaries	CMMI 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.	Case study: pre/post comparison (n=25,656 Medicare and dually eligible beneficiaries, 945 Medicaid beneficiaries) Promising evidence	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	1) Medicare and dual-eligible patients: 51% reduction in hospital 30-day readmission rate (from 18.2% to 8.9%) over 12 months. 2) Medicaid pilot: average hospital 30-day readmission rate declined from 25% to 6% over 12 months. Costs: \$17 million in estimated savings from 1,804 avoided readmissions (approximately \$9,423 per readmission).

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
Center for Health Care Strategies, 2018	People at risk for unmet social needs, e.g., patients discharged from the hospital with complex health and social needs	<p>2-1-1 San Diego facilitates access to community resources through phone and web-based referrals and care coordination services provided by care navigators. A Community Information Exchange (CIE) enables bidirectional referrals between health care and social service providers and tracks patients' interactions across systems, agencies, and services.</p> <p>Sharp Grossmont Hospital partners with 2-1-1 San Diego and Feeding America in a Care Transition Intervention (CTI) that uses the CIE to help at-risk patients access a medical home and social services including housing, fresh food, transportation, and social supports.</p>	Case study; pre/post and nonequivalent controlled comparisons Promising evidence	Not given. Under grant funding 2-1-1 and CIE is free to users. Currently exploring a financing structure (such as a subscription model) that will ensure its sustainability	<p>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 services compared to those not enrolled.</p> <p>Sharp Grossmont Hospital estimates that its Care Transition Program saves roughly \$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 (measured using a risk rating scale) in at least 1 of 14 domains; these patients had a 9.6% readmission rate vs. 30% in a comparison group.</p>

COUNSELING



Legal aid can help patients tackle a range of social issues that impact health, including working with insurance companies for approval of services or improving housing environments. Several case studies showed that providing legal assistance and pro bono legal aid to complex or at-risk patients can reduce readmissions, ED visits, and hospitalizations and also cut costs. However, each of these studies lacked a comparison group and therefore are only promising evidence.

Several social worker–led models aim to address basic human needs of patients. These models tend to involve biopsychosocial assessments of high-risk patients for social needs, connecting patients to resources in the community to address them, and following up to ensure the issue was resolved. Social workers also offer counseling to support patients emotionally. Studies of these models found that social worker–led programs addressing social needs can reduce readmissions and ED visits. However, there is a lack of rigorous evidence on the cost impacts of these models.

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
LEGAL AND FINANCIAL COUNSELING					
Barnett et al., 2010	Uninsured inpatients (ages 0–64) admitted to the hospital during 3 months in 2006; age distribution was similar to the uninsured population nationally	Financial counseling to assist uninsured inpatients to obtain hospital charity care or insurance coverage (e.g., Medicaid, Medicare, Indian Health Service, state indigent care program), including coverage obtained during or after the acute-care hospitalization.	Case study: retrospective review of a systematic random sample of medical records (n=49) Promising evidence	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 49 patients. Among 16 patients responsible for some portion of their hospital bill, 3 (19%) made an out-of-pocket payment and 2 of these paid the full discounted amount charged them, which accounted for less than 15% of the total hospital cost.
KPMG Government Institute, 2018	Hospitalized, low-income New Yorkers with asthma	LegalHealth trains health care professionals to recognize legal issues that may negatively affect medical outcomes and offers on-site free legal clinics for patients at public hospitals in NYC. In this case, LegalHealth assisted asthma patients to send legal demand letters to landlords to clear their apartments of rodents, bugs, mold, and water and structural damage.	Case study: pre/post comparison Promising evidence	Average cost of \$225 per case	90% reduction in ED visits and admissions for affected asthma patients.

Study	Target population	Intervention summary	Type and level 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.	Case study: pre/post comparison (n=55) Promising evidence	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 clinical to improve rental housing environments by demanding that landlords fix leaks, exterminate pests, or provide a different apartment.	Case study: pre/post comparison (n=12) Promising evidence	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% (11) dropped 2 or more classes in asthma severity.
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, thereby 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.	Case study: retrospective records review (n=428 referred cases among 372 clients) Promising evidence	\$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 and/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).

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
SOCIAL SUPPORT COUNSELING*					
Constantino et al., 2005	Women (ages 28–43) who were victims of intimate partner violence; 71% were non-Hispanic white and 19% were African American	A social support intervention for women living in a domestic violence shelter: a trained nurse provided 90 minutes of individual counseling weekly for 8 weeks aimed at reducing psychological distress by enhancing a sense of belonging and self-esteem and meeting tangible needs. The latter included information about and time to access community resources such as financial assistance, transportation, food, clothing, and health care. The control group participated in nonstructured chat sessions and received standard services provided to all residents: meals, shelter, and transportation.	Randomized control trial (n=24) Strong evidence	Not given	Compared to the control group, the intervention group reported greater improvement in psychological distress symptoms (5% vs. 29% average change in rating scale) and a larger reduction in health care utilization (19% vs. 73% average change in reported use), which may have included visits to health clinics; health providers; and hospital emergency, inpatient, and outpatient departments.
American Hospital Association, 2013	Victims of intentional violent injury and their families	An intensive, hospital-based Violence Intervention Program (VIP) staffed by a multidisciplinary team offered assessment, counseling, and social support through an evidence-based change model that addressed safety issues; medical, mental and social adjustment; healthy coping skills; and connection to community-based services.	Case study: pre/post comparison Promising evidence	Not given	A 2000 study of the program found that VIP clients experienced an 83% decrease in repeat hospitalizations, a 67% decrease in violent crime, and an 82% employment rate at the time of follow-up (vs. a 20% rate for those not in the program).

Study	Target population	Intervention summary	Type and level of evidence	Intervention cost	Results on utilization and costs of care
Caruso, 2018	Medicare Advantage plan members who screen 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.	Case study; pre/post intervention (n=700) Promising evidence	Not given	Preliminary results show a 5% decrease in outpatient emergency room use and an 11% decrease in acute hospital admissions.
Rose et al., 2016	Primary care patients with uncontrolled complex chronic conditions, high inpatient service use (4 or more admissions in 24 months), and at least 12 months of engagement in the program	Social workers perform counseling and case management as members of a multidisciplinary team to help improve patients' self-efficacy, locus of control, and capacity for engagement. This includes evaluating patients for exposure to material disadvantage, violence, and trauma and referring patients to community resources to address social needs including safe/affordable housing, food security, and social isolation.	Case study; pre/post comparison (n=12) Promising evidence	Not given	Program participants had a 49% reduction in inpatient encounters (from 98 to 50) and a 5% reduction in ED visits (from 66 to 63) from 12 months before to 12 months after the intervention, which was associated with a cost reduction of approximately \$107,800 per year.

Notes: ACO = accountable care organization; AMI = acute myocardial infarction; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; ED = emergency department; HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome; LTC = long-term care; LTSS = long-term services and supports; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; PMPM = per member, per month; ROI = return on investment; SDOH = social determinants of health; SNAP = Supplemental Nutrition Assistance Program; SNF = skilled nursing facility.



Criteria and Methods Used to Develop the ROI Calculator 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.

Preliminary testing with users of this calculator suggests that the ROI Calculator is useful, but that evidence on effectiveness of specific social services and the estimated costs of providing those services should guide the input values. Specifically, effectiveness means the impact of providing social services on health care utilization and costs.

OBJECTIVE

In response to this user feedback, Commonwealth Fund staff collected, reviewed, and synthesized peer-reviewed and grey literature on the impact of investing in social services on health care costs and utilization among high-need, high-cost or complex patients. For this review, we focused on the following categories of interventions: transportation, nutrition, housing, home modifications, counseling, and care management.

Table 1 contains the definitions used for each social determinant in this review:

Table 1. Definitions of Social Determinants

Social Determinant	Definition
Housing	Support for short- or long-term housing needs and services; may include coordinated, case management services to housing-insecure individuals.
Nutrition	Services providing or facilitating access to nutritious foods in order to improve the health and quality of life of patients unable to afford or access these foods. This includes programs such as Meals on Wheels and medically tailored meals that support specific health care conditions.
Transportation	Benefits and interventions that provide transportation services, e.g., shuttles, taxis, ridesharing, for patients to non-emergency medical appointments such as primary care and dialysis.

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.
Care Management	Set of activities designed to assist patients and their support network in managing medical conditions and related psychosocial problems more effectively; may include screening for social needs and referral to social services.
Counseling	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	Custom interventions that target other social determinant of health such as social isolation can be incorporated into the calculator by selecting “Other.”

METHODS

1. **Developed search terms.** Search terms were identified for each social service/social determinant menu 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, ED visits, falls, outpatient visits).

The search terms varied depending on the social determinant/social service of focus:

- **Housing:** homes, housing, housing in place, housing for complex patients, housing for elderly patients, housing for seniors, housing older adults
- **Nutrition:** food, hunger, food insecurity, medically tailored meals, food prescriptions, nutrition interventions, food pantries
- **Transportation:** non-emergency medical transportation, non-medical transportation, transportation interventions, rideshare, uber, lyft, van services, car service
- **Home Modifications:** seniors and home modifications, grab bars, aging in place, interventions to prevent falls
- **Care Management:** cost analysis care management for senior, care management, social support interventions
- **Counseling:** social support interventions, medical-legal partnerships, financial counseling

2. **Identified and searched key databases and search engines.** Peer-reviewed articles were identified through search engines. The search engines used to identify the peer-reviewed literature primarily included: Google Scholar, PubMed, and the Social Interventions Research & Evaluation Network (SIREN) database. The SIREN database is a repository of literature on the social determinants of health with filters for key topics. We filtered articles in the database by selecting the specific SIREN terms relevant to the objective of the review, including food/hunger, employment, housing quality, housing stability, legal services, social support, transportation, Medicare-insured, complex patients, utilization, and cost. Grey literature was identified through a Google search, Google News, and SIREN as well.
3. **Gathered additional literature.** To capture relevant studies that were not identified in the online search, we also used a snowball approach, reviewing the references of included articles. We also sought advice and guidance 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 review.
4. **Developed inclusion and exclusion criteria.** We created several inclusion and exclusion criteria to meet our objective and ensure they included studies that were relevant to the ROI calculator.
 - Inclusion criteria:
 - Intervention: Study had to be of an intervention related to one of the six social determinants of focus (transportation, nutrition, home modifications, housing, counseling, and care management).
 - Population: Study targeted or included high-need, high-cost patients, medically complex individuals with social needs, people with multiple chronic conditions, dually eligible Medicare and Medicaid beneficiaries, the elderly, and/or Medicare beneficiaries.
 - Results: Study reporting findings for one or more of the following outcomes: return on investment (ROI) of social service intervention, health care costs, or health care utilization patterns (hospital admissions, hospital readmissions, hospital days, skilled nursing facility (SNF) admissions, or outpatient visits).
 - Exclusion criteria:
 - International: Due to resource limitations and concerns of comparability, we excluded studies that focused on international interventions or that were published in a language other than English.
 - Strength of Evidence: Excluded studies that did not meet the minimum criteria described in [The Playbook Evidence Criteria](#) and did not include key pieces of information or data, such as relevant pre-intervention data points.
 - Year: We excluded all studies published before 2000.
5. **Abstracted and prioritized relevant literature.** We reviewed abstracts for relevancy using the above inclusion and exclusion criteria. Included studies were summarized and relevant information was added to the table, including target population, intervention summary, type of study, strength of evidence, cost of intervention, and impacts on health care utilization and costs relevant to the inputs of the ROI Calculator.

Table 2 shows the breakdown of studies identified and included in final review.

Table 2. Literature Review: Number of Studies Included

Social Determinant of Health	# of Studies in Final Review
Housing	11
Nutrition	12
Transportation	8
Home Modifications	1
Care Management	16
Counseling	9

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 the final review. Studies not included in the final review did not meet all three characteristics for the inclusion criteria and/or had one or more characteristics falling under exclusion criteria. Studies were dropped primarily based on strength of evidence. Overall, the evidence and articles included in the guide provided more information on utilization impact and less information on service cost.

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