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| CAPGI Bibliography  SDOH Strategies  May 2020 |
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# Housing

**Housing for Homeless**

**Upshot:**

A number of strategies can help address homelessness, some more cost-effective than others, and some such as tiny houses requiring multiple collaborations for funding as well as zoning issues.

**Basu, A., Kee, R., Buchanan, D., Sadowski, L. (2012). Comparative cost analysis of housing and case management program for chronically ill homeless adults compared to usual care. *Health Services Research, 47*(1), 523 – 543. Doi: 10.1111/j.1475-6773.2011.01350.x. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3393008/pdf/hesr0047-0523.pdf**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3393008/pdf/hesr0047-0523.pdf)**.**

*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. Participants followed for 18 months. Intervention group generated an average savings of $6,307 per person; Chronically homeless generated an average savings of $9,809 - but probably cost neutral when considering cost to implement.*

**Larimer, M., Malone, D., Garner, M., Atkins, D., Burlingham, B., Lonczak, H., Tanzer, K., Ginzler, J., Clifasefi, S., Hobson, W., & Marlatt, A. (2009). Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. *JAMA, 301*(13), 1349-1357. Doi: 10.1001/jama.2009.414. Retrieved from** [**https://jamanetwork.com/journals/jama/fullarticle/183666**](https://jamanetwork.com/journals/jama/fullarticle/183666)

*"Housing First" intervention for chronically homeless with severe alcohol problems and high health care use and costs (including costs of jail bookings, days incarcerated, shelter and sobering center use, hospital based medical services, publicly funded alcohol and drugs detoxification and treatment, emergency medical services, and Medicaid-funded services). Individuals were placed in supportive housing with on-site case managers that engage residents on substance use. Intervention group had reduced total costs on average by $42,964 per person per year. On average (after implementation costs) savings of $29,564 per person per year.*

**American Hospital Association. (2017). Housing and the role of hospitals. Retrieved from** [**https://www.aha.org/system/files/hpoe/Reports-HPOE/2017/housing-role-of-hospitals.pdf**](https://www.aha.org/system/files/hpoe/Reports-HPOE/2017/housing-role-of-hospitals.pdf)**.**

*Stable housing and supportive services to chronically homeless individuals, case workers were used to help move into transitional housing followed by long-term independent housing. Early results suggest 42% drop in participants health care costs, 35% reduction in ED visits, and an increase in patients accessing clinics for routine care.*

**Hunter, S., Harvey, M., Briscombe, B., & Cefalu, M. (2017). Evaluation of housing for health permanent supportive housing program.  *Rand Corporation*. Retrieved from** [**https://www.rand.org/pubs/research\_reports/RR1694.html**](https://www.rand.org/pubs/research_reports/RR1694.html)**.**

*Housing for Health, division within the LA County Dept of Health Services, provided supportive housing to homeless patients with complex medical and behavioral issues. Health care utilization reduced by 80% for ED visits; 61% for inpatient stays; and 47% for outpatient visits. Costs were reduced by 76% for inpatient services; 66% for emergency services and 59% for crisis stability services.*

**Hawk, M., & Davis, D. (2012). The effects of a harm reduction housing program on the viral loads of homeless individuals living with HIV/AIDs. *AIDS Care, 24*(5), 577-582. Doi: 10. 1080/09540121. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/22103666**](https://www.ncbi.nlm.nih.gov/pubmed/22103666)**.**

*Harm reduction housing model - the program implemented the use of 4-part time Resident Monitors to provide support services. Significant difference between un-detectable viral load measures at baseline and at follow-up. Cost effectiveness analysis was not completed; small sample size; cannot determine the specific impact of this program. This housing was already established for homeless people, this program targeted individuals that were least likely to be served in traditional housing models.*

**Chhabra, M., Spector, E., Demuynck, S., Wiest, D., Buckley, L., & Shea, J. (2020). Assessing the relationship between housing and health among medically complex, chronically homelss individuals experiencing frequent hospital use in the United States. *Health and Social Care, 28*, 91-99. Doi: 10.1111/hsc.12843. Retrieved from** [**https://onlinelibrary.wiley.com/doi/full/10.1111/hsc.12843**](https://onlinelibrary.wiley.com/doi/full/10.1111/hsc.12843)**.**

*Housing First Model. Housing facilitates stability and security, improving management of health conditions for formerly homeless individuals with significant medical needs. • Case managers play a critical role in connecting Housing First clients to services and help mitigate feelings of isolation. • Housing facilitates re‐connection with friends and family, but clients in scattered‐site programs can experience stigmatization and a lack of social integration.*

**Brothers, S., Lin, J., Schonberg, J., Drew, C., & Auerswald, C. (2020). Food insecurity among formerly homeless youth in supportive housing: A social-ecological analysis of a structural intervention. *Social Science & Medicine, 245.* Doi: 10.1016/j.socscimed.2019.112724. Retrieved from** [**https://www.sciencedirect.com/science/article/abs/pii/S0277953619307191**](https://www.sciencedirect.com/science/article/abs/pii/S0277953619307191)

*While housing removed some major sources of food insecurity, it actually added others. Youth not knowing about food resources, not knowing about kitchen us and food storage policies in the house, and limited cooking skills and equipment all impacted food insecurity.*

**Gusmano, M., Rodwin, V., & Weisz, D. (2018). Medicare beneficiaries living in housing with supportive services experienced lower hospital use than others. *Health Affairs, 37*(10). Doi: 10.1377/hlthaff.2018.0070. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.0070**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.0070)

*Affordable housing with supportive social services (Medicaid-funded home services, SNAP, psychological assessments, counseling, advocacy, health education, wellness, and access to list of local service providers (including transportation, physicians and pharmacy). Total hospital discharge rate was 32% lower for intervention group; Rate of hospital discharge for ambulatory care sensitive conditions was 30% lower for intervention group; and Mean length of stay was 1 day shorter for intervention group.*

**Jackson, A., Callea, B., Stampar, N., Sanders, A., De Los Rios, A., & Pierce, J. (2020). Exploring tiny homes as an affordable housing strategy to ameliorate homelessness: A case study of the Dwellings in Tallahassee, FL. *International Journal of Environmental Research and Public Health, 17*, 661. Doi: 10.3390/ijerph17020661. Retrieved from** [**https://www.mdpi.com/1660-4601/17/2/661**](https://www.mdpi.com/1660-4601/17/2/661)**.**

*A tiny home community for homeless in Tallahassee, FL. The development of this community (130 tiny homes and community center) and the issues that arose are chronicled in this manuscript. There are limitations to the level of affordability in this community; there are limitations by the local, state and federal policies that support non-profit affordable housing, which creates barriers. Funding from both private and public entities will make this financially sustainable in the long-term.*

**Tomita, A., & Herman, D. (2012). The impact of critical time intervention in reducing psychiatric rehospitalization after hospital discharge. *Psychiatr Serv., 63*(9), 935-937. Doi: 10.1176/appi.ps.201100468. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/22810163**](https://www.ncbi.nlm.nih.gov/pubmed/22810163)**.**

*Critical time intervention (CTI), time-limited case management model focused on building and strengthening community support systems during critical transition periods. Reduction in psychiatric re-hospitalizations.*

# Home Triggers of Asthma

**Multi-component, multi-trigger home visits and parent counseling for asthma**

**Upshot:** Targeting higher-severity cases yields a surer cost-savings, but programs are generally cost-effective.

**Lantz, P. M., Miller, G., Rhyan, C. N., Rosenbaum, S., Ku, L., & Lovan, S. (2018). “Pay for Success” Financing and Home-Based Multicomponent Childhood Asthma Interventions: Modeling Results from the Detroit Medicaid Population: Pay for Success Financing and Childhood Asthma. *The Milbank Quarterly*, *96*(2), 272–299.** [**https://doi.org/10.1111/1468-0009.12325**](https://doi.org/10.1111/1468-0009.12325)

*This paper introduces an estimation of cost savings in medical services rendered by an intervention in an urban Medicaid population, over the course of 7 years. The savings are apportioned according to a social impact bond model, where private investment funds the intervention and reaps cost-savings up to 110% of the intervention cost; thereafter, public systems reap any savings. Expected program outcomes were modeled upon data about Detroit’s Medicaid population of children with asthma. Reflecting the literature, targeting the intervention to more acute cases results in greater savings. Indeed, when all 7,619 asthmatic children in Detroit Medicaid were targeted, the program costs were not returned in averted medical savings over the 7-year period. Alternatively, targeting a high-severity asthma population with recent hospitalization would reap more savings ($4.1 million) relative to a smaller cost ($499,000 to intervene for 510 children, and thereafter $101,000 yearly). Under a shorter term like 3 years, this would still yield significant benefits: $865,000 in public savings, on top of 110% of the program cost returned to investors. The program modeled is unique because it uses a social impact bond financial structure. It also positions Medicaid managed care organizations (MCOs) as implementers, and MCOs would capture an uncalculated amount of the intervention effects in year one. Savings for the private investor and the public systems rely on quickly and accurately recalculating fixed payments to MCOs based on expected intervention effects. Other models were analyzed, briefly.*

**Nurmagambetov, T. A., Barnett, S. B. L., Jacob, V., Chattopadhyay, S. K., Hopkins, D. P., Crocker, D. D., Dumitru, G. G., & Kinyota, S. (2011). Economic Value of Home-Based, Multi-Trigger, Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity. *American Journal of Preventive Medicine*, *41*(2), S33–S47.** [**https://doi.org/10.1016/j.amepre.2011.05.011**](https://doi.org/10.1016/j.amepre.2011.05.011)

*A 2011 special issue of the American Journal of Preventive Medicine was devoted to “home-based environmental interventions” and included two systematic reviews relevant to Hartford’s proposal. One reviewed the program outcomes and the other investigated economic valuations of the programs. These reviews match the Hartford proposal neatly: they consider only “multi-trigger, multicomponent interventions” that include both counseling (often peer-based) and some environmental modification. Counseling was often conducted both during home visits and in groups of parents. In the economic-value review, 11 studies were in the US and 9 of these targeted youth and adolescents. Program cost ranged from $200 to $14900, largely reflecting the extent of environmental remediations paid for. Because of the range of program costs, ICERs ($ per symptom free day) and benefit-cost ratios ($ saved per $ spent) were quite variable across 6 studies reporting health and health-cost outcomes. The only other outcome that was monetized was productivity (of parents). A key determinant of home visit costs per visit was the profession of the visitor employed, and a key determinant of cost savings was how severe asthma cases had to be to generate eligibility. Higher severity requirements and lower-cost home modifications tended to yield cost-savings.*

*Home visit programs with hazard reduction can be cost saving even in a 1- or 2-year time frame, but not assuredly. Long-term cost-savings effects are understudied. One care delivery intervention, targeting higher severity asthma patients with frequent respiratory therapist visits and family education and hazard removal yielded net savings. Consistently, home-based interventions to address asthma triggers yielded reductions in health care utilization, in the literature up to 2008. By reducing hospital, ED, and office visits alike, the interventions can consistently yield medical savings. But whether program costs outweigh savings is inconsistently answered: 2 moderate and 1 light interventions yielded net program savings but 2 moderate and 1 light intervention yielded less savings than program costs. By addressing symptoms, they improve productivity and perhaps also quality of life and pulmonary function. It is unclear whether there are long-term benefits that could yield more unobserved avoided costs.*

**Ebell, M. H. (2019). A Multicomponent, Multi-Trigger Intervention to Enhance Asthma Control in High-Risk African American Children. *Preventing Chronic Disease*, *16*.** [**https://doi.org/10.5888/pcd16.180387**](https://doi.org/10.5888/pcd16.180387)

*This intervention involved 2 home visits by an environmental health worker, group self-management training (the “Wee Breathers” curriculum), and continuous case management. The group targeted was children who were dually enrolled in Medicaid and in Georgia’s case management program for children; they were ages 0-17, and their asthma was not well controlled or worse. (i.e., their asthma caused 1+ hospitalizations or 2+ emergency department visits in a half-year, weekly daytime and monthly nighttime symptoms, and a limitation of routine activity.) The sample was small (23), the follow-up period was 12 months, and the design employed pre-post comparison without a control. Trigger mitigation suggestions made during visits were not necessarily implemented (about half were), although Georgia’s case management program could pay for some recommended equipment, limiting financial barriers to treatment compliance. Asthma control, symptoms, and activity limitations were meaningfully improved by the intervention, as were outcomes like school absence and ED visits. Outcomes were based on self-report, limiting study strength.*

**Fernandes, J. C., Biskupiak, W. W., Brokaw, S. M., Carpenedo, D., Loveland, K. M., Tysk, S., & Vogl, S. (2019). Outcomes of the Montana Asthma Home Visiting Program: A home-based asthma education program. *Journal of Asthma*, *56*(1), 104–110.** [**https://doi.org/10.1080/02770903.2018.1426766**](https://doi.org/10.1080/02770903.2018.1426766)

*This intervention involved 4-6 home visits by a nurse during 12 months who delivered self-management training. The group targeted was children ages 0-17 with uncontrolled asthma (determined by a recent asthma ED visit or a low asthma control test score) in rural areas. The sample was large (338 children), the measured period was concurrent to intervention (12 months), and the study compared completion against partial completion of the intervention. Trigger mitigation equipment was provided during the visits if not implemented by the family in the first several months. The results therefore show the incremental benefits of completion, which were generally reduced symptoms, activity limitations, use of unscheduled care or pharmacotherapy, and school or work absence. Participants’ number of unscheduled or ED care visits in the prior half-year declined by 1.7 after 12 months, when the intervention completed. Outcomes were based on a mix of self-report, validated instruments, and nurse observation. A further concern is the lack of a comparison group: those who remain in the program at 12 months may be those seeing the most benefit.*

**Swann, J. L., Griffin, P. M., Keskinocak, P., Bieder, I., Yildirim, F. M., Nurmagambetov, T., Hsu, J., Seeff, L., & Singleton, C.-M. (2019). Return on investment of self-management education and home visits for children with asthma. *Journal of Asthma*, 1–10.** [**https://doi.org/10.1080/02770903.2019.1690660**](https://doi.org/10.1080/02770903.2019.1690660)

*This paper introduces a simulation of likely program costs and health care costs incurred if a state’s Medicaid-enrolled children with asthma were treated with self-management education outside of the home, or by home visits, or by neither. The authors cite 14 studies to estimate program costs and effects, 4 of which are systematic reviews. The simulation has a 3-year horizon, and takes a person as its unit of analysis. The simulation is then demonstrated using an extract of New York’s Medicaid administrative data from 2010-2011. In their simulations, one eligibility criterion – the severity of asthma cases is measured by recent acute-care visits – is relevant to the consistency of a cost-savings: targeting more severe cases increases the likelihood of net savings but reduces the number of treated persons, assuming a program could reach all eligible. The authors conclude that their simulation tool and demonstration underscore the program can be unilaterally executed by a Medicaid agency, and the agency on its own would probably yield net savings in just several years. The Python and Excel are reportedly available for planners, but not clearly downloadable in the article’s webpage or the authors’ webpages.*

**Sullivan, S. D., Weiss, K. B., Lynn, H., Mitchell, H., Kattan, M., Gergen, P. J., & Evans, R. (2002). The cost-effectiveness of an inner-city asthma intervention for children. *Journal of Allergy and Clinical Immunology*, *110*(4), 576–581.** [**https://doi.org/10.1067/mai.2002.128009**](https://doi.org/10.1067/mai.2002.128009)

*Home visits for asthma-management counseling, including environmental-trigger control training, investigating asthma triggers in the home, providing minor equipment to limit triggers (equipment like bed covers), and cockroach extermination if children tested as allergic to them. 8 visits and two group asthma counseling sessions for parents/guardians were rendered to families of 1033 children with severe recent asthma care use. The intervention occurred in 8 urban neighborhoods in 7 cities and targeted 5- to 11-year-old children with asthma. The program had unclear net effects on medical care, where counseling may induce care use, medication adherence, etc. that increase medical spending. The program cost $337 per child for 2 years. It had no significant difference in care use overall, and samples' intervention groups saw higher asthma-related care costs. Overall, the incremental cost-effectiveness ratio (ICER) was $9.20/symptom-free day. However, the care costs were lower for the intervention group among high-severity asthmatic children (not statistically significant). “It is only about 20% likely that implementation of the program, as carried out by the NCICAS investigators, would result in cost savings." This randomized control trial offered a large N and decent (2-year) follow up. Only medical visits/admissions were considered for the savings estimate, missing the medication and potential productivity effect of fewer missed school days, etc. Home visits for asthma can be coupled with system navigation services that connect participants with public programs and insurance options, reduce cultural barriers to ambulatory care, and improve self-management of asthma. Social workers can serve this role. Cost-Savings: Unlikely - 20% chance that a replicate program would yield net savings. While the program's costs were relatively low for the type of program, its savings were low (and not significantly nonzero).*

**Kattan, M., Stearns, S. C., Crain, E. F., Stout, J. W., Gergen, P. J., Evans, R., Visness, C. M., Gruchalla, R. S., Morgan, W. J., O’Connor, G. T., Mastin, J. P., & Mitchell, H. E. (2005). Cost-effectiveness of a home-based environmental intervention for inner-city children with asthma. *Journal of Allergy and Clinical Immunology*, *116*(5), 1058–1063.** [**https://doi.org/10.1016/j.jaci.2005.07.032**](https://doi.org/10.1016/j.jaci.2005.07.032)

*Home visits by environmental counselors, including moderate remediation of asthma triggers for disadvantaged urban children. Families of 937 low-SES children in urban neighborhoods in 7 cities aged 6-11 with moderate-to-severe asthma. (469 in intervention.) Increased symptom free days per year by 38 days. Program cost an average $1720 per family. $555 of direct medical costs averted. B-C ratio: 0.32. ICER: $31/SFD. 5-7 visits over 12 months. 12 months, after intervention. Productivity reported but not monetized. RCT with non-intervention control group matched retrospectively. Costs were decomposed in detail. Note in comparison with Sullivan et al. that the two studies with the largest samples had different structures and costs but yielded similar B-C ratios (0.32 for both) that indicate no net savings. This deflates the motivation that other studies but suggests that net savings may be reliably attained with a different program structure, esp. targeting worse cases/cases frequenting acute care. Cost-effectiveness: In this case, with high program costs, the cost-effectiveness was relatively low (especially if we accept that 1800 SFD = 1 QALY): this cost $31/SFD.*

**Oatman, L. (2007). *Reducing Environmental Triggers of Asthma in Homes of Minnesota Children*. Minnesota Department of Health.** [**http://www.asthmaawards.info/system/files/ResourseUploads/RETA%20report%20excerpts%20Sept%202007.doc**](http://www.asthmaawards.info/system/files/ResourseUploads/RETA%20report%20excerpts%20Sept%202007.doc)

*Moderate environmental remediation coupled with home visits -- 3 visits by respiratory therapist -- including environmental- plus self-management training. Families of 64 low-SES children ages 0-18 in the Twin Cities (MN). A second trial of delivering respiratory therapists' care in the home for more severe asthma cases yielded net savings, but only in a small population (n=64 here and n=18 above) and without a control.*

**Jowers, J. R., Schwartz, A. L., Tinkelman, D. G., Reed, K. E., Corsello, P. R., Mazzei, A. A., Bender, D. R., & Lochhead, R. A. (2000). Disease Management Program Improves Asthma Outcomes. *The American Journal of Managed Care*, *6*(5), 8.**

*Modest environmental remediation coupled with home visits -- 2 visits by a nurse -- that was widely targeted across age and asthma severity, coupled with self-management training. 317 households of all ages, socioeconomics, and any asthma severity in Western Pennsylvania. Medical costs averted and productivity gained. The study did not report symptom-free days. Average cost of $377 per participant. But program yielded $2,181 of medical cost averted, $772 of productivity loss saved. Benefit-to-cost ratio: 7.8. (i.e., the net savings by taking the gain in productivity and the medical costs averted, over program costs.) Observed participants at 6th and 12th months. Pre-post evaluation. Coupling modest environmental improvements with a self-management intervention can yield cost-savings in medical costs averted when targeting a wide group of asthmatic persons, but in a trial without a control. The benefits extend to non-urban settings. A nurse can perform this work.*

**Shelledy, D. C., McCormick, S. R., LeGrand, T. S., Cardenas, J., & Peters, J. I. (2005). The effect of a pediatric asthma management program provided by respiratory therapists on patient outcomes and cost. *Heart & Lung*, *34*(6), 423–428.** [**https://doi.org/10.1016/j.hrtlng.2005.05.004**](https://doi.org/10.1016/j.hrtlng.2005.05.004)

*For asthmatic children, 6 home visits with environmental remediation, or 6 visits that identified asthma triggers with only referral to asthma management resources. All remediation was intended to be low-cost. Home equipment provided with training, offering pest control, cleaning supplies, and linens. The intervention sample was families of 281 low-socioeconomic-status ("low-SES") children ages 2-16 in Philadelphia, almost all African-American, with at least one hospitalization or 2 ED visits for asthma in prior year. Rx use declined selectively: daily Albuterol use dropped almost in half for both groups. Daily controller medicine use remained high for all. Acute care use declined: Reduced hospitalizations per child 47% and 43% in the major and minor intervention groups, respectively versus their baseline month. Hospitalization reduced in both groups versus the control (p=0.02, 0.05). Reduced ER similarly by about half in both groups, versus control with higher ER use after 12 months. Those given home equipment and direct education had no better inpatient reduction versus just home visits and referral to group training. Intermediate outputs: home remediation had meaningfully better and sustained effects of removed triggers (rodents, carpet, cockroaches) and of protective actions (use of linens, e.g.). The program cost an average $675 per family. As a subset, the environmental remediation averaged $120 per family. 12 months were observed. Design: two-arm randomized trial with a nonintervention control group matched retrospectively by age, gender, and ethnicity. Outcomes: Self reports of symptomatic days, self-reported Rx use, and health-record-based inpatient care measure. Only inpatient care measured as an outcome – not costs.*

**Krieger, J. W., Takaro, T. K., Song, L., & Weaver, M. (2005). The Seattle-King County Healthy Homes Project: A Randomized, Controlled Trial of a Community Health Worker Intervention to Decrease Exposure to Indoor Asthma Triggers. *American Journal of Public Health*, *95*(4), 652–659.** [**https://doi.org/10.2105/AJPH.2004.042994**](https://doi.org/10.2105/AJPH.2004.042994)

*Seattle-King County Healthy Homes Project: Home visits by community health workers, including moderate remediation of asthma triggers for disadvantaged urban children. A second intervention (the control) was conducted with just one visit, offering allergen-reducing bedding and light environmental-risk education. Families of 274 low-SES children in Seattle area aged 4-12 with persistent, mild-to-severe asthma. Increased symptom free days per year by 21 days. (Note this is the incremental gain for multiple visits, the intense intervention group, versus a single-visit control group.) Program cost an average $1316 per family. (Unclear how costly was the control intervention.) $124-147 of direct medical costs averted. Benefit-cost ratio: 0.09-0.11. ICER: $56-$57/SFD. (Note this is the incremental cost-benefit for multiple visits, the intense intervention group.) 5-9 visits. 6 months observed. RCT with a low-treatment-intensity control group. Studied difference made by major intervention (5-9 visits) versus one visit with bedding encasement plus some education. This study involved trained laypersons to act as home visitors.*

**Bryant-Stephens, T., & Li, Y. (2008). Outcomes of a Home-Based Environmental Remediation for Urban Children with Asthma. *Journal of the National Medical Association*, *100*(3), 306–316.** [**https://doi.org/10.1016/S0027-9684(15)31243-8**](https://doi.org/10.1016/S0027-9684(15)31243-8)

*Families of 281 low-socioeconomic-status ("low-SES") children ages 2-16 in Philadelphia, almost all African-American, with at least one hospitalization or 2 ED visits for asthma in prior year. (Intervention) Rx use: daily Albuterol use dropped almost in half for both groups. Daily controller medicine use remained high for all. Acute care use: Reduced hospitalizations per child 47% and 43% in the major and minor intervention groups, respectively versus their baseline month. Hospitalization reduced in both groups versus the control (p=0.02, 0.05). Reduced ER similarly by about half in both groups, versus control with higher ER use after 12 months. Those given home equipment and direct education had no better inpatient reduction versus just home visits and referral to group training. Intermediate outputs: home remediation had meaningfully better and sustained effects of removed triggers (rodents, carpet, cockroaches) and of protective actions (use of linens, e.g.). Average $675 per family. Environmental remediation averaged $120 per family. 6 visits over 12 months. 12 months observed. Two-arm randomized trial with a nonintervention control group matched retrospectively by age, gender, and ethnicity. Self-reports of symptomatic days, self-reports of Rx use, and health-record-based inpatient care measure. Only inpatient care measured as an outcome – not costs.*

# Behavioral Health

**Financial Vouchers for Services and Supports for Behavioral Health Population**

**Croft, B., Battis, K., Isvan, N., & Mahoney, K. J. (2020). Service Utilization Before and After Self-Direction: A Quasi-experimental Difference-in-Differences Analysis of Utah’s Mental Health Access to Recovery Program. *Administration and Policy in Mental Health and Mental Health Services Research*, *47*(1), 36–46.** [**https://doi.org/10.1007/s10488-019-00969-4**](https://doi.org/10.1007/s10488-019-00969-4)

*Self-directed cash benefits were granted to 94 participants in Utah – vouchers for up to $2000, of which the average amount used per participant was $904. The most common services used were transportation, dentistry, housing, and wellness or fitness. Administrative data captured all behavioral health services paid for by Medicaid or the state and rendered to the intervention group or to a matched comparison group. The intervention group used significantly more behavioral health services, both rehabilitation and outpatient visits (63 hours and 22 hours more, respectively). Matching variables included demographic, household, Medicaid eligibility, serious mental illness status, mental health diagnoses and treatments, and days and hours of behavioral health and emergency service usage. A regression model was specified for each of four outcome variables: rehabilitation, outpatient, and residential treatment hours used, as well as emergency room use. The latter two variables were not influenced by program participation. While service use increased, the authors note that other recent research has found similar models of self-directed benefits “improved housing and employment outcomes [and] improvements in recovery and other psychosocial outcomes.” (See two entries below, Croft et al., 2018, and Cook et al., 2019.) The methods rely powerfully on merged public behavioral health services data, based on administrative records, to estimate the program effects on BH service utilization. These are generally available for a large group of other behavioral health users who can be matched with program participants as a quasi-experimental control.*

**Croft, B., Battis, K., Ostrow, L., & Salzer, M. S. (2019). Service costs and mental health self-direction: Findings from consumer recovery investment fund self-directed care. *Psychiatric Rehabilitation Journal*, *42*(4), 401–406.** [**https://doi.org/10.1037/prj0000374**](https://doi.org/10.1037/prj0000374)

*This study used Medicaid administrative data only in a managed care setting in Pennsylvania and found some reduced mental health care costs after receipt of self-directed benefits. Specifically, monthly clinical outpatient costs for mental health dropped $42 after the program (p <0.001 for a non-zero change); no other mental health service category – crisis and inpatient care, community support/coordination, outpatient and community-based services – saw reduced monthly costs. The monthly mean cost of the program was $182. Net costs did not change statistically significantly, but the sample saw an increased $84 monthly net cost post-intervention, factoring in cash benefit versus Medicaid costs. There was no control group; the design was an unadjusted pre-post.*

**Cook, J. A., Shore, S., Burke-Miller, J. K., Jonikas, J. A., Hamilton, M., Ruckdeschel, B., Norris, W., Markowitz, A. F., Ferrara, M., & Bhaumik, D. (2019). Mental Health Self-Directed Care Financing: Efficacy in Improving Outcomes and Controlling Costs for Adults With Serious Mental Illness*. Psychiatric Services, 70*(3), 191–201.** [**https://doi.org/10.1176/appi.ps.201800337**](https://doi.org/10.1176/appi.ps.201800337)

*With no significant change in total costs, self-directed cash benefits in Texas rendered improved care for behavioral health clients. This randomized control trial examined self-perceived recovery, psychosocial status, psychiatric symptoms, and behavioral rehabilitation between self-directed care (treatment, N = 114) and services-as-usual (control) groups. The control group was an intent-to-treat population. Over 2 years per-capita costs were not meaningfully different between the two groups, but the self-directed care group had improvements in the psychometric outcomes and self-esteem and work/education status relative to the control. The psychometric outcome data were collected by research staff through interviews, but utilization and cost data were accessed from a state health care claims data repository and the self-directed program administrative records.*

**Croft, B., İsvan, N., Parish, S. L., & Mahoney, K. J. (2018). Housing and Employment Outcomes for Mental Health Self-Direction Participants. *Psychiatric Services*, *69*(7), 819–825.** [**https://doi.org/10.1176/appi.ps.201700057**](https://doi.org/10.1176/appi.ps.201700057)

*The methods of this study on FloridaSDC largely match Croft et al., 2020, with the intervention group (n=271) matched to a comparison on demographic and diagnostic variables. The SDC recipients had about twice the odds of accessing and keeping housing, and 1.7-fold odds of working for pay in the past month.*

**Spaulding-Givens, J. C., & Lacasse, J. R. (2015). Self-directed care: Participants’ service utilization and outcomes. *Psychiatric Rehabilitation Journal*, *38*(1), 74–80.** [**https://doi.org/10.1037/prj0000103**](https://doi.org/10.1037/prj0000103)

For patients with severe and persistent mental illness, a self-directed care cash benefit was granted after development of a budgeted-out recovery plan by the patient and a recovery coach. There was no comparison group, but for the 136 sampled participants, employment was uncommon, and the cash was put toward living expenses. 80% of the expenditures went to nontraditional services, especially transportation, dentistry, housing, utilities, and food. “FloridaSDC participants choose to spend a substantial amount of their allotted budgets to meet their basic needs, including transportation, housing, and utilities.” The sampled participants may be a biased subset because they were the participants who consented to review of their financial records. The Functional Assessment Rating Scale (FARS) was employed at outset and 6-month follow-up, and severe mental health problems decreased over time, with the most precipitous decline in depression and issues with work.

# Crisis Response System with Hotline and Response Team

**Upshot:**

A response team can be formed or modeled after procedurally successful programs to intervene in behavioral health crises in (1) community mental health worker contexts, (2) law enforcement contacts, and (3) booking contexts. However, the outcomes for health use and justice use are sparsely or inadequately evaluated as of 2020. In the Texas setting, regional emergency networks have been integrated with these efforts. Challenges with methods to capture the effect of the program on system use and health outcomes are numerous and well-reported. Some studies have overcome these challenges by randomizing according to officer shifts, as well as use of good administrative data streams.

## Survey of Crisis Response Options

**Watson, A. C., Compton, M. T., & Pope, L. G. (2019). *Crisis Response Services for People with Mental Illnesses or Intellectual and Developmental Disabilities:* Vera Institute of Justice.** [**https://www.vera.org/downloads/publications/crisis-response-services-for-people-with-mental-illnesses-or-intellectual-and-developmental-disabilities.pdf**](https://www.vera.org/downloads/publications/crisis-response-services-for-people-with-mental-illnesses-or-intellectual-and-developmental-disabilities.pdf)

*This 2019 review discusses the evidence bases available about first-response strategies for persons with mental illness or intellectual/developmental disabilities. It underscores how intertwined law enforcement tend to be with models of community behavioral health crisis response. The role of law enforcement versus health professionals in each program is a crucial distinction addressed. Case management targets frequent utilizers by staffing a behavioral health worker with police to address their needs longitudinally. Co-responder teams address crises with a similar pairing of police with a BH professional. Crisis Intervention Teams are a police-led intervention to deescalate and handoff mental health crises. Ambulance or EMS teams may also be involved. Mobile crisis teams are grouped behavioral health professionals who respond to a scene of a crisis in the community, e.g a social worker, nurse, and peer specialist, and these offer an alternative to hospitalization by de-escalation at the scene of the crisis. Law enforcement can receive training, receive notifications of registered mental health cases for which they can call a service provider, or call in a specialist or advocate. These form a continuum of programs that can complement one another. Cost-effectiveness evidence was sparsely identified, mostly for CIT. Over a 12-month period in Memphis, each CIT diversion was associated with an increased cost of $6,576 (avoided jail costs were lesser than added hospitalization). A decade later, a Louisville, KY, implementation of CIT resulted in net savings of $1,024,897. The authors suggest that the context of program design determines the net system costs, but do not describe the design or scale of the Louisville implementation. A Georgia response model reduced system costs – and improved care and reduced arrests – when eligible 911 calls were referred to a state crisis hotline that would deescalate the crisis or else dispatch a team consisting of a counselor, social worker, and psychiatry trainee.*

## Street Triage and Mobile Crisis Teams

**Puntis, S., Perfect, D., Kirubarajan, A., Bolton, S., Davies, F., Hayes, A., Harriss, E., & Molodynski, A. (2018). A systematic review of co-responder models of police mental health ‘street’ triage. *BMC Psychiatry*, *18*(1), 256.** [**https://doi.org/10.1186/s12888-018-1836-2**](https://doi.org/10.1186/s12888-018-1836-2)

*Mental health triage/mobile crisis teams can be conducted either by staffing a mobile unit for dispatch to mental health crisis cases, or by staffing mental health nurses in police cars or ambulances to be dispatched. All studies reporting arrest outcomes found that arrest was reduced, suggesting successful de-escalation or diversion to treatment. Extant studies as of 2018 had disagreement about the programs’ effects on psychiatric hospitalizations. One study disaggregated involuntary from voluntary hospitalizations and found that its observed net increase in hospital use was due to higher voluntary use, despite lower involuntary use. From a cost-savings perspective, this leaves the cost effect unpredictable or ambivalent. Of three studies on net cost effectiveness, two suggested the triage lowered average cost per response; the other found a trivial change in cost. Costs shifted from justice system to health system, so cost-effectiveness could hinge on the size and direction of change in hospitalization use, and in cases where use increased, then it would hinge on the outcomes of the health care use. The current evidence remains weak, and much of the literature emerged in the three years leading up to 2018.*

*Mobile Crisis Outreach Teams are* [*standardized in Texas*](https://hhs.texas.gov/services/mental-health-substance-use/mental-health-crisis-services/mobile-crisis-outreach-teams)*, and they are well integrated with law enforcement, the health system, and social services in Bexar County in particular: see Table 18: Adult Crisis Services in Bexar County, in* [*https://www.texasstateofmind.org/wp-content/uploads/2016/11/2016-Bexar-County-Mental-Health-Report\_FNL.pdf*](https://www.texasstateofmind.org/wp-content/uploads/2016/11/2016-Bexar-County-Mental-Health-Report_FNL.pdf) *on page 25. The same report offers breakdowns of the 974 crisis response program/hotline users in 2015 according to age and use of other public-service systems. Notably, Bexar’s integrated approach has been both collaborative and orchestrated, notably by the Southwest Texas Crisis Collaborative with the Southwest Texas Regional Advisory Council.*

**Callender, M., Knight, L. J., Moloney, D., & Lugli, V. (2019). Mental health street triage: Comparing experiences of delivery across three sites. *Journal of Psychiatric and Mental Health Nursing*, *2020*(00).** [**https://doi.org/10.1111/jpm.12584**](https://doi.org/10.1111/jpm.12584)

*This qualitative study of police and health teams implementing street triage in 3 sites in the UK found that police focused on the program’s potential to reduce enforcement costs, while the health team saw it as a mode of care delivery. These dual focuses could be recognized early, by setting explicit goals in both domains to achieve mutually appreciated program effects.*

## Police-Based Crisis Intervention Team (CIT) model

**Rogers, M. S., McNiel, D. E., & Binder, R. L. (2019). Effectiveness of Police Crisis Intervention Training Programs. *Journal of the American Academy of Psychiatry and the Law Online*.** [**https://doi.org/10.29158/JAAPL.003863-19**](https://doi.org/10.29158/JAAPL.003863-19)

**Watson, A. C., & Compton, M. T. (2019). What Research on Crisis Intervention Teams Tells Us and What We Need to Ask. *Journal of the American Academy of Psychiatry and the Law Online*, *47*(4), 422–426.** [**https://doi.org/10.29158/JAAPL.003894-19**](https://doi.org/10.29158/JAAPL.003894-19)

**Compton, M. T., Bakeman, R., Broussard, B., Hankerson-Dyson, D., Husbands, L., Krishan, S., Stewart-Hutto, T., D’Orio, B. M., Oliva, J. R., Thompson, N. J., & Watson, A. C. (2014). The Police-Based Crisis Intervention Team (CIT) Model: II. Effects on Level of Force and Resolution, Referral, and Arrest. *Psychiatric Services*, *65*(4), 523–529.** [**https://doi.org/10.1176/appi.ps.201300108**](https://doi.org/10.1176/appi.ps.201300108)

*In a 2019 review, the University of Memphis estimated that 2,700 or 40% of police departments in the United States employed the CIT model. The model appears to reduce police burden from responding to mental illness crises by standardizing, delegating, and streamlining the response to such emergency calls. These processes are achieved by specially training some officers to respond and then to hand off their mental health cases to local mental health service providers. Concerns about this hand-off include the shift in burden or costs from the police to the service provider. The evidence has been somewhat limited about outcomes due to methodological issues: administrative data are not often or readily analyzable, and officers typically self-select into the program. One multi-site study (Compton et al.) found a favorable effect on level of force and arrest rates (versus diversion) in interactions due to CIT deployment. (This would suggest averted legal and justice-system costs for cases attributable to mental health as well as decreased police administrative burden associated with use of force.) The same study found improved referral and transport, suggesting the model improves access and use of care; the systematic review by Rogers indicates that the efficacy of CIT to make earlier diagnoses of mental illness is not established. (Though these could lower total cost of care, law enforcement, and judicial action.) A randomized control trial has never been conducted, but pre-post evaluations suggest that the officer training has valuable and lasting effects on officer know-how to deescalate and hand off crisis cases. CIT is an example of a police-based specialized police response, in which the police are both first responders and conduct the intervention for a mental health crisis. Other programs include mobile crisis units and street triage – these are mental-health-based specialized mental health responses.*

**Webb, F. M. (2016). Criminal Justice and the Mentally Ill: Strange Bedfellows. *Texas Tech Law Review*, *49*, 817.** [**https://heinonline.org/HOL/Page?handle=hein.journals/text49&id=857**](https://heinonline.org/HOL/Page?handle=hein.journals/text49&id=857)

*Note that this resource is provided by the author without a paywall within this PDF, as accessed May 11, 2020:* <https://www.fordham.edu/download/downloads/id/10094/the_future_of_neuroscience_and_law_-_cle_materials.pdf>

*This exhaustive review of programs connecting criminal justice and mental health shows the results, including some cost savings, of a suite of crisis intervention and acute behavioral health response programs in Houston, Texas, and offers state-level recommendations for interventions that integrate behavioral health responses with police. Houston police programs included: a crisis intervention training program and response team, a chronic consumer stabilization initiative, a homeless outreach team, oversight of boarding homes, and a crisis call diversion program. These were led by a mental health division in the police department.*

## NYC EPASU

**Cloud, D., Siegler, A., Martelle, M., Pope, L., & Parsons, J. (2017). *The Enhanced Pre-Arraignment Screening Unit: Improving Health Services, Medical Triage, and Diversion Opportunities in Manhattan Central Booking*. Vera Institute of Justice.** [**https://www.vera.org/downloads/publications/Enhanced-Pre-Arraignment-Screening-Unit-full-report.pdf**](https://www.vera.org/downloads/publications/Enhanced-Pre-Arraignment-Screening-Unit-full-report.pdf)

*The Expanded Pre-Arraignment Screening Unit increases judicial diversion and the diagnosis and delivery/coordination of care to persons experiencing or at risk of a physical or mental health crisis during post-arrest booking. New York City’s Manhattan Central Booking added into their booking process a review of medical and mental health records and a screening (including for behavioral health crises) by nurses at the time of booking as well as a diversion liaison, a licensed social worker who helps with justice and medical system navigation. Because EPASU integrates directly with hospital care, officer time (in case of a crisis occurring at the time of officer response) and emergency service use (in cases where crises occurred during booking) were reduced. The program also allows diversion and diagnosis, which changes the clinical and judicial course with likely cost savings. The program is complementary to other crisis responses, but increases reliability of reduced justice costs and improved health outcomes. It relies on quick access to Medicaid administrative records (approved for use by the booked/arrested person), past criminal records, and jail health care records to inform the nurse of health history simultaneous to their review of the person’s presenting condition. As an indication of the prevalence of behavioral illness in the screened population, 26% of the 10,695 screenings triggered a second behavioral health assessment. Half of patients released to the community and a quarter sent to jail were flagged as at-risk for mental or physical health – of all released to the community, 30% were flagged for a mental health risk (for community services).*

## Seattle LEAD

**Collins, S. E., Lonczak, H. S., & Clifasefi, S. L. (2017). Seattle’s Law Enforcement Assisted Diversion (LEAD): Program effects on recidivism outcomes. *Evaluation and Program Planning*, *64*, 49–56.** [**https://doi.org/10.1016/j.evalprogplan.2017.05.008**](https://doi.org/10.1016/j.evalprogplan.2017.05.008)

**Collins, S. E., Lonczak, H. S., & Clifasefi, S. L. (2019). Seattle’s law enforcement assisted diversion (LEAD): Program effects on criminal justice and legal system utilization and costs. *Journal of Experimental Criminology*, *15*(2), 201–211.** [**https://doi.org/10.1007/s11292-019-09352-7**](https://doi.org/10.1007/s11292-019-09352-7)

**Clifasefi, S. L., Lonczak, H. S., & Collins, S. E. (n.d.). *Seattle’s Law Enforcement Assisted Diversion (LEAD) Program: Within-Subjects Changes on Housing, Employment, and Income/Benefits Outcomes and Associations with Recidivism*. 17.**

*The Law Enforcement Assisted Diversion (LEAD) model in King County showed reduced legal costs and lower rates of imprisonment and bookings for harm-reduction in cases involving drug offenses (i.e. a sizable subset of behavioral health) and prostitution (less relevant). It is notable because of the shift-based randomization used in evaluating program effects, which can serve as a model to evaluate other crisis response interventions.*

# Medically Tailored Meals

**Upshot:** Several studies suggest providing medically tailored meals to at-risk patients significantly reduces ED visits; Readmissions and lengths of stay in the hospital.

**Berkowitz, S., Terranova, J., Hill, C., Ajai, T., Linsky, T., Tishler, L., & DeWalt, D. (2018). Meal delivery programs reduce the use of costly health care in dually eligible Medicare and Medicaid beneficiaries. *Health Affairs, 37*(4). Doi: 10.1377/hlthaff.2017.0999. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2017.0999**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2017.0999)**.**

*Program for the home delivery of medically tailored meals vs nontailored food (Meals on Wheels). 70% reduction in ED visits; and 52% reduction in inpatient admissions for medically tailored meals. For nontailored meals reduction of 44% in ED visits and 12% reduction in inpatient admissions. Medically tailored meals and nontailored meals were associated with significantly lower medical spending ($570 and $156) compared to control groups. Estimate of net savings for medically tailored $220 per participant and $10 per participant for nontailored meals. (62% ROI)*

**Berkowitz, S.,Terranova, J., Randall, L., Cranston, K., Waters, D., Hsu, J., (2019) Association Between Receipt of a Medically Tailored Meal Program and Health Care Use. *JAMA Intern Med.* 179(6):786-793. doi:10.1001/jamainternmed.2019.0198**

*Program for the home delivery of tailored meals tested over general population, adults over 18, with targets and controls taken from MA APCD. Those allowed into program were screened for clinical and social risk. Net program savings relative to cost of program = ROI = 115%. Straight health care savings vs. control group 16%.*

**Hummel, S., Karmally, W., Gillespie, B., Helmke, S., Teruya, S., Wells, J., Trumble, E., Jimenez, O., Marolt, C., Wessler, J., Cornellier, M., & Maurer, M. (2018). Home-delivered meals postdischarge from heart failure hospitalization. *Circulation: Heart Failure, 11*. Doi: 10.1161/CIRCHEARTFAILURE.117.004886. Retrieved from** [**https://www.ahajournals.org/doi/full/10.1161/CIRCHEARTFAILURE.117.004886**](https://www.ahajournals.org/doi/full/10.1161/CIRCHEARTFAILURE.117.004886)

*Dietary Approaches to Stop Hypertension program, provides 4 weeks of home-delivered sodium-restricted meals recently discharged from a heart failure. 11% reduction in 30 day readmission rates for HF patients; 17 days in hospital when a readmit did happen, compared to 55 days in control group.*

**Martin, S., Connelly, N., Parsons, C., & Blackstone, K. (2018). Simply delivered meals: A tale of collaboration.  *Am J Manag Care 24*(6), 301-304. Retrieved from** [**https://www.ajmc.com/journals/issue/2018/2018-vol24-n6/simply-delivered-meals-a-tale-of-collaboration**](https://www.ajmc.com/journals/issue/2018/2018-vol24-n6/simply-delivered-meals-a-tale-of-collaboration)**.**

*Community-based Care Transition Program with and without the addition of meal-delivery program - called Simply Delivered for ME. Offered specialized meals to patients after discharge (and included caregivers) 7-day free meal supply delivered to their home weekly for 24 months. Estimated ROI for adding this program was 387% or $3.87 for every $1 spent - estimated cost savings for reduced readmissions - $212,160.*

**Gurvey, J., Rand, K., Daugherty, S., Dinger, C., Schmeling, J., & Laverty, N. (2013). Examining health care costs among MANNA clients and a comparison group. *Journal of Primary Care & Community Health 4*(4) 311-317. Doi: 10.1177/2150131913490737. Retrieved from** [**https://journals.sagepub.com/doi/pdf/10.1177/2150131913490737**](https://journals.sagepub.com/doi/pdf/10.1177/2150131913490737)**.**

*Participants received 3 meals free, delivered, nutritionally balanced per day. Registered dieticians provided medical nutrition therapy, nutrition counseling and meal planning. Intervention group had significantly lower overall average monthly health care costs ($28,268 vs $40,906); had fewer mean monthly inpatient visits (.2 vs .4); and shorter length of inpatient stays (10.7 vs 17.1); and lower mean monthly inpatient costs ($132,441 vs $219,639).*

**Project Angel Heart. (2018). Small intervention, big impact: Cost savings related to medically tailored nutrition. Denver. Retrieved from** [**https://www.projectangelheart.org/assets/uploads/2018/06/PAH\_ImpactStudy\_OnePager\_FINAL.pdf**](https://www.projectangelheart.org/assets/uploads/2018/06/PAH_ImpactStudy_OnePager_FINAL.pdf)

*Project Angel Heart meal delivery in Colorado; participants received 5 - 10 free, medically tailored, delivered meals per week. Decrease in all-cause 30 day readmissions by 13%; Average of 24% reduction in medical costs; for CHF patients $736 PMPM less; for COPD patients $416 PMPM less; for Diabetes patients $453 PMPM less. Total annual medical cost reduction for patients with CHF, COPD and Diabetes only estimated at $4.2 million.*

**Meals on Wheels America. (2016). More than a meal: Medicare claims analysis. Retrieved from** [**https://www.mealsonwheelsamerica.org/learn-more/research/more-than-a-meal/medicare-claims-analyses**](https://www.mealsonwheelsamerica.org/learn-more/research/more-than-a-meal/medicare-claims-analyses)**.**

*Pre/Post differences among Meals on Wheels recipients. Daily meal delivery service which included hot nutritious meals and socialization and safety check. Analysis done at 30, 90 and 180 days post enrollment across 6 states from 2009-2014. Compared to a control group of Medicare beneficiaries who did not receive meals. 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 continued over time at a slower rate; at 180 days post enrollment reductions for hospitalizations were 31%; 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 hospitals; $244 for skilled nursing facilities; $22 for ED visits.*

**Palar, K. Napoles, T., Hufstedler, L., Seligman, H., Hecht, F., Madsen, K., Ryle, M., Pitchford, S., Frongillo, E., & Weiser, S. (2017). Comprehensive and medically appropriate food support is associated with improved HIV and diabetes health. *Journal of Urban Health 94*, 87-99. Doi: 10.1007/s11524-016-0129-7. Retrieved from** [**https://link.springer.com/article/10.1007/s11524-016-0129-7#citeas**](https://link.springer.com/article/10.1007/s11524-016-0129-7#citeas).

*Project Open Hand provided 6 months of meals and snacks to comprise 100% of daily energy requirements and meet nutritional guidelines for a healthy diet. Meals were not delivered. Not statistically significant; 9.9% decrease in participants having at least 1 hospitalization and a 9.6% decline in an ED visit. Statistically significant decrease in food insecurity and depressive symptoms.*

**Hayes, K., Hoagland, G., McDonough, D., Serafini, M., & Weiner, N. (2019). Next steps in chronic care: Expanding innovative Medicare benefits. *Bipartisan Policy Center*. Retrieved from** [**https://bipartisanpolicy.org/wp-content/uploads/2019/07/Next-Steps-in-Chronic-Care.pdf**](https://bipartisanpolicy.org/wp-content/uploads/2019/07/Next-Steps-in-Chronic-Care.pdf)

*According to the simulation, the aggregate cost of full participation among eligible beneficiaries for medically tailored meals for 7 days after discharge, would be $101,258,974 (which is $175.98 per person). The gross savings due to reduced readmission rates would be $158,606,687, resulting in a net savings of $57,347,713. Most of the net savings would come from the subgroup with several hospitalizations, while beneficiaries with a single inpatient stay would incur incremental costs from the meals program but have no readmissions to avert. All of the subgroups could potentially have additional savings due to averted emergency-department visits or even SNF stays under a national program with tailored supplemental benefits. In this illustration, the ratio of savings to cost for the hypothetical supplemental benefit was 1 to 57; hence, on average, every dollar spent on the meals program resulted in $1.57 in savings.*

**Seligman, H., Lyles, C., Marshall, M., Prendergast, K., Smith, M., Headings, A., Bradshaw, G., Rosenmoss, S., & Waxman, E. (2015). A pilot food bank intervention featuring diabetes-appropriate food improved glycemic control among clients in three states. *Health Aff, 34*(11), 1956-1963. Doi: 10.1377/hlthaff.2015.0641. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/26526255**](https://www.ncbi.nlm.nih.gov/pubmed/26526255)**.**

*Food for Families identifies food insecure families during clinic visits and connects them with food resources (SNAP, WIC and food pantries). Majority of clients preferred diabetic food box to regular food pantry options; improvement in glycemic control; fruit and vegetable intake; diabetes self-efficacy and medication adherence.*

# Isolation

**Upshot:**

Isolation is a prime determinant of health and costs, especially among the elderly. While the United Kingdom has prioritized and evaluated interventions in isolation and loneliness, the U.S. has not studied or intervened in the issue until recent years. Early, proprietary data suggests that insurers of Medicare Special Needs Plans populations are yielding savings from reduced acute care utilization, and beneficiaries avoid emergent health issues. The evidence base in the UK offers several evaluations of programs that intervene via physician-based referrals.

**Castellucci, M. (2017). Getting to the root of loneliness. *Modern Healthcare*, *47*(19), 28.**

**CareMore Health Highlights New Outcomes Data from Togetherness Program. (2018). *Professional Services Close - Up*. ProQuest Central.** [**https://search.proquest.com/docview/2166816191**](https://search.proquest.com/docview/2166816191)

**Jain, S. H. (2018). CareMore Health Tackles the Unmet Challenges of the Aging Population. Generations, 42(1), 14–18. http://search.proquest.com/docview/2086240370/abstract/F47E993E277944ACPQ/1**

*CareMore is coordinating care and services to more than 1,000 elderly plan members who reported feeling lonely in their care planning assessments. CareMore staff (of unknown profession) create an activity plan and follow up with phone calls or home visits. Clinicians also inquire about social activities during medical appointments. They create linkages with community organizations, including volunteer opportunities, and hold social and group fitness events at CareMore facilities. Early proprietary data suggests that the inpatient admission rate declined about 21 percent and the ER rate declined about 24 percentage points among the treated group against a benchmark intent-to-treat group. Exercise program participation was 57 percent higher among participants.*

**Mihalopoulos, C., Le, L. K.-D., Chatterton, M. L., Bucholc, J., Holt-Lunstad, J., Lim, M. H., & Engel, L. (2019). The economic costs of loneliness: A review of cost-of-illness and economic evaluation studies. *Social Psychiatry and Psychiatric Epidemiology*.** [**https://doi.org/10.1007/s00127-019-01733-7**](https://doi.org/10.1007/s00127-019-01733-7)

*This systematic review spanned program types of befriending, technology training, arts socialization, volunteering in schools, senior day center. The review included 12 studies that assessed economic effects or of financial cost-of-illness, many evaluating interventions. All focused on older adults. The program costs were highly variable, ranging around 10 to 1000 British pounds per person. Only one program was in the U.S.: a singing/choir program. Most reviewed programs had favorable cost-savings effects. ROIs were calculated for several interventions: ratios of 0.44:1.00 (from a befriending program), 1.20:1.00 (from a client-organized senior activity center), 1.26:1.00 (from referrals to social activities), and 8.27:1 (from a craft café). Several more interventions were cost-saving: peer support groups for dementia patients and group psychotherapy. The best ICER studies found high variation: a befriending intervention had an ICER of 2900 pounds per QALY. Studies comparing the intervention group cost/QALY to a non-intervention group almost all improved. Some used cost modeling and others used administrative data. Some were cost-of-illness estimates for a population, including of the Medicare population (see Flowers et al.). Others still were cost-effectiveness analysis, cost-utility analysis, ROI analyses, and social ROI analyses. Even low-cost programs can result in improvements to isolation and loneliness that would reduce spending.*

**Flowers, L., Houser, A., Noel-Miller, C., Shaw, J., Bhattacharya, J., Schoemaker, L., & Farid, M. (2017). *Medicare Spends More on Socially Isolated Older Adults*. AARP Public Policy Institute.** [**https://doi.org/10.26419/ppi.00016.001**](https://doi.org/10.26419/ppi.00016.001)

*Medicare spending on Parts A and B was $134.0 higher per bene per month (PBPM) (or $1,608 per year) for the objectively socially isolated than for the moderately socially connected group, adjusting for covariates. Post-acute care and inpatient use drove higher spending attributed to isolation. Inpatient spending was $81.0 higher, outpatient $5.8 higher, and SNF $74.5 higher PBPM. Usage – by incidence of claims – were not significantly different for inpatient or outpatient claims, but were 29% higher for SNF use in the isolated group (again, adjusting for covariates). Medicare spending is costlier for objectively isolated beneficiaries, driven by longer or more complex inpatient stays and post-acute care. This would suggest the objective loneliness affects medical spending in a medical crisis due to lack of transition supports. Transitional care management could perform the functions that isolated beneficiaries cannot otherwise perform without support. A temporary impairment, without family or friends to assist, may delay institutional discharge for isolated beneficiaries.*

**Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a Public Health Issue: The Impact of Loneliness on Health Care Utilization Among Older Adults. *American Journal of Public Health*, *105*(5), 1013–1019.** [**https://doi.org/10.2105/AJPH.2014.302427**](https://doi.org/10.2105/AJPH.2014.302427)

*Loneliness per se may drive increased utilization, as lonely elders appear to visit their physician more commonly. Analysis of community-dwelling elderly people found that loneliness (i.e. perceived social disconnection) was associated with higher use of physicians’ visits, although the association of loneliness with hospitalizations was found inconsistently depending on how loneliness was defined. The authors controlled for morbidity and health status in their analyses. The stronger effect on physician’s visits comported with secondary evidence that physicians believe patients commonly make doctor’s appointments due to loneliness rather than medical concern. The authors could not isolated unplanned from planned hospitalizations; moreover, they cited evidence that loneliness may increase unplanned hospitalizations through morbidity (herein treated as a confounder, not a mediator) but have an inconsistent relationship with planned hospitalizations. The authors suggest that evidence-based loneliness interventions (group therapy, namely) could hereby reduce health care use and costs. But they note that “No study to date has examined the impact of a loneliness intervention on health care costs in the United States,” which agrees with the review of Mihalopoulos et al. The authors summarize the literature as indicating “that loneliness may be more treatable than other determinants of functional decline among elders, such as chronic conditions.” They contrast coordinated counter-loneliness efforts in the UK with the lack of physician help for loneliness in the US, or of any studied interventions.*

**Humana Inc.; Humana and Meals on Wheels America Team up to Provide Food and Social Connections to Medicare Members. (2018, December 5). *Fitness & Wellness Business Week*, 2. ProQuest Central.** [**https://search.proquest.com/docview/2139440492**](https://search.proquest.com/docview/2139440492)

*Humana is sponsoring Meals on Wheels home-delivered meals with volunteer befriending visits (conversation and chore help), as a Medicare Advantage benefit for post-hospital transitional care. The benefit is available to 6,000 Humana Medicare Advantage plan members in three cities.*

**Thomas, K. S., Akobundu, U., & Dosa, D. (2016). More Than A Meal? A Randomized Control Trial Comparing the Effects of Home-Delivered Meals Programs on Participants’ Feelings of Loneliness. *The Journals of Gerontology: Series B*, *71*(6), 1049–1058.** [**https://doi.org/10.1093/geronb/gbv111**](https://doi.org/10.1093/geronb/gbv111)

*Existing home-delivered meals programs (e.g. Meals on Wheels) remediate loneliness in recipients. This trial examined the effects of 15 weeks of daily or weekly delivery of meals by volunteer visitors upon loneliness. Among waitlisted program enrollees, those who gained access to the program had reduced loneliness scores – 3.4 versus 4.2 on a 5-point scale ascending by loneliness. The trial was randomized by comparison to persons who remained on program waitlist, which the intervention groups were on but could shortcut. Confounding demographic, psychosocial risk, health, and socialization traits were controlled. Improved loneliness was 3 times more likely for the daily recipients than for the weekly recipients.*

# Care Coordination

**Upshot:** Strategies that coordinate the care of at-risk individuals may provide the most benefit and be the most cost effective.

**Counsell, S., Callahan, C., & Clark, D. (2007). Geriatric care management for low-income seniors: A randomized controlled trial. *JAMA, 298*(22), 2623-2633. Doi: 10.1001/jama.298.22.2623. Retrieved from** [**https://jamanetwork.com/journals/jama/fullarticle/209717**](https://jamanetwork.com/journals/jama/fullarticle/209717)**.**

*Geriatric Resources for Assessment and Care of Elders (GRACE); in-home and telephonic care management by a social worker and nurse practitioner in collaboration with an interdisciplinary primary care team at community clinics. Linked patients with community-based services and assisting with transportation. Compared to control group, high-risk patients had 35% and 44% reduction in rates of ED visits and hospital readmissions by second year. The intervention was cost-neutral among high-risk patients during the 2 year trial and yielded net savings of $1487 per patient on the post-intervention year ($5,088 vs $6,575).*

**Berkowitz, S., Parashuram, S., Rowan, K., Andon, L., Bass, E., Bellantoni, M., Brotman, D., Deutschendorf, A., Dunbar, L., Durso, S., Everett, A., Giuriceo, K., Hebert, L., Hickman, D., Hough, D., Howell, E., Huang, X., Lepley, D., Leung, C., Lu, Y., Lyketsos, C., Murphy, S., Novak, T., Purnell, L., Sylvester, C., Wu, A., Zollinger, R., Koenig, K., Ahn, R., Rothman, P., Brown, P. (2018). Associations of care coordination model with health care costs and utilization: The Johns Hopkins Community Partnership (J-CHiP). *JAMA Netw Open, 1*(7), e184273. Doi: 10.1001/jamanetworkopen.2018.4273. Retrieved from** [**https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2712183**](https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2712183)**.**

*Community Intervention of the Johns Hopkins Community Health Partnership (J-CHIP) provided enhanced care coordination in 8 primary care clinics using multidisciplinary teams made up of physicians, care managers, health behavior specialists, community health workers and neighborhood navigators. Team addressed social needs by connecting patients to community resources, providing transportation, securing affordable medications, and supplying preprogrammed cell phones to contact the health team. Medicaid patients saw a reaductions per 1,000 enrollees in hospitalizations (33); ED visits (51); 30-day readmissions (36); and avoidable hospitalizations (7). They had statistically significant reductions in total cost of care compared to control group - on average reduction of $1,643 per beneficiary per quarter, not accounting for the cost of the intervention. No significant results for Medicare enrollees.*

**Boult, C., Reider, L., Leff, B., Frick, K., Boyd, C., Wolff, J., Frey, K., Karm, L., Wegener, S., Mroz, T., & Scharfstein, D. (2011). The effect of guided care teams on the use of health services: Results from a cluster-randomized controlled trial. *Arch Intern Med, 171*(5), 460-466. Doi: 10.1001/archinternmed.2010.540. Retrieved from** [**https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/226766**](https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/226766)**.**

*Guided Care Model: used nurses to provide in-home needs assessment, care management, and education for patients and caregivers in coordination with primary care physicians. SDOH were addressed by facilitating access to community resources. Intervention group had 30% reduction in home health care episodes. Among a subgroup - there were 47% fewer SNF admissions and 52% fewer SNF days.*

**Hostetter, M., Klein, S., McCarthy, D., & Hayes, S. (2016). Guided care: A structured approach to providing comprehensive primary care for complex patients. *The Commonwealth Fund*. Retrieved from** [**https://www.commonwealthfund.org/sites/default/files/2018-06/1908\_Hostetter\_Guided\_Care\_case\_study.pdf**](https://www.commonwealthfund.org/sites/default/files/2018-06/1908_Hostetter_Guided_Care_case_study.pdf)**.**

*Guided Care Model: used nurses to provide in-home needs assessment, care management, and education for patients and caregivers in coordination with primary care physicians. SDOH were addressed by facilitating access to community resources. Rates of ED visits and hospital admissions were 7% and 22 % lower in the first year, and 6% and 14% lower in 2nd year compared to baseline. $21.8 million in savings over 2 years. (About half of which was earned by the ACO). $2.5 million annually - $1, 667 per patient per year assuming 1500 patients served annually.*

**Rowe, J., Rizzo, V., Shier Kricke, G., Krajci, K., Rodriguez-Morales, G., Newman, M., & Golden, R. (2016). The ambulatory integration of the medical and social (AIMS) model: A retrospective evaluation. *Soc Work Health Care, 55*(5), 347-361. Doi: 10.1080/00981389.2016.1164269. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/27111526**](https://www.ncbi.nlm.nih.gov/pubmed/27111526)**.**

*Ambulatory Integration of the Medical and Social (AIMS) model - Masters level social workers become part of the primary and specialty care teams. They use standardized protocols to assess needs and provide risk-focused care coordination to assist patients with biopsychosocial and functional issues impacting their medical care plan adherence or physical condition. Patients in AIMS group had 89% fewer ED visits; 49% fewer hospital admissions; and 57% fewer 30-day readmissions after 6 months.*

**Alvarez, R., Ginsburg, J., Grabowksi, J., Post, S., & Rosenberg, W. (2016). The social work role in reducing 30-day readmissions: The effectiveness of the bridge model of transitional care. *J Gerontol Soc Work, 59*(3), 222-227. Doi: 10.1080/01634372.2016.1195781. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/27276523**](https://www.ncbi.nlm.nih.gov/pubmed/27276523)**.**

*The Bridge Model - a social worker-led interdisciplinary transitional care intervention that addresses health and social needs through coordination, case management, and patient engagement for 30 days after hospital discharge. Masters trained social workers conduct a biopsychosocial assessment, provider behavioral therapy, and make linkages to follow-up care and community social services. Found at one-site a 30.7% reduction in 30-day admissions; 9.4% reduction in 60-day readmissions and increased post-discharge attendance with physicians.*

**Xiang, X., Zuverink, A., Rosenberg, W., & Mahmoudi, E. (2019). Social work-based transitional care intervention for super utilizers of medical care: A retrospective analysis of the bridge model for super utilizers. *Soc Work Health Care, 58*(1), 126-141. Doi: 10.1080/00981389.2018.1547345. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/30424717**](https://www.ncbi.nlm.nih.gov/pubmed/30424717)**.**

*The Bridge Model for Super Utilizers - adapted the Bridge Model by intensifying patient engagement with an average of 40 patient encounters over 6 months following an index admission. 59% reduction in hospital admissions compared to prior year; 37% reduction in ED visits; and 47% reduction in 30-day readmission rate - hospitals charges were reduced by $200,000 per patient.*

**Kangovi, S., Mitra, N., & Grande, D. (2014). Patient-centered community health worker intervention to improve posthospital outcomes: A randomized clinical trial. *JAMA Intern Med, 174*(4), 535-543. Doi: 10.1001/jamainternmed.2013.14327. Retrieved from** [**https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1828743**](https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1828743)**.**

*Individualized Management for Patient-Centered Targets (IMPACT) program utilizes community health workers to support patients for 2 weeks post discharge in setting and attaining goals including connecting with long-term supports to address socioeconomic and behavioral barriers to attainment. Patients were equally as likely to be readmitted but were less likely to have multiple readmissions (2.3% vs 5.5%). However overall, results demonstrate that a brief CHW intervention improved posthospital primary care access, discharge communication, patient activation, mental health, and recurrent readmissions for a population of high-risk hospitalized patients with varied conditions.*

**Kangovi, S., Mitra, N., Norton, L., Harte, R., Zhao, X., Carter, T., Grande, D., Long, J. (2018). Effect of community health worker support on clinical outcomes of low-income patients across primary care facilities. *JAMA Intern Med, 178*(12), 1635-1643. Doi: 10.1001/jamainternmed.2018.4630. Retrieved from** [**https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2707949**](https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2707949)**.**

*Individualized Management for Patient-Centered Targets (IMPACT) program adapted for use in primary care settings - community health workers engaged in with patients in primary care for 6 months. Spent 65% fewer total days in the hospital at 9 months - fewer hospitalizations; shorter lengths of stay; and less 30-day readmissions.*

**Kangovi, S., Mitra, N., Grande, D., Long, J. & Asch, D. (2020). Evidence-based community health worker program addresses unmet social needs and generates positive return on investment. *Health Affairs, 39*(2), 207-213. Doi: 10.1377/hlthaff.2019.00981. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00981**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00981)

*ROI analysis on a randomized controlled trial of IMPACT - individualized management for patient-centered targets, a standardized community health worker intervention that addresses unmet social needs for disadvantaged people. The community health workers were employed by the health system. Total cost to implement program was $567, 951 for one year. After one year there was a reduction in the intervention group in hospitalizations (23.3% vs 31.6%). The control group patients had higher acuity admissions than the intervention group, the intervention group had fewer outpatient visits. Overall the team of community health workers saved Medicaid $1,401,308, for an ROI of 1:$2.47.*

**Basu, S., Jack, H., Arabadjis, S. & Phillips, R. (2017). Benchmarks for reducing emergency department visits and hospitalizations through community health workers integrated into primary care: A cost-benefit analysis. *Med Care, 55*(2), 140-147. Doi: 10.1097/MLR.000000000000618. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/27547954**](https://www.ncbi.nlm.nih.gov/pubmed/27547954)**.**

*This was a breakeven calculation for Community Health Worker programs that enroll primary care patients with select chronic conditions. The analysis calculated CHW caseloads and the probability of ED visits and associated hospitalizations based on principal diagnoses and comorbid conditions. Depending on the diagnosis, achieving cost savings would require preventing 4 to 23 ED visits and associated hospitalizations per year among a panel of patients, representing a 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.*

**Partnership for Healthy Outcomes. (2017). Collaborating to reduce hospital readmissions for older adults with complex needs: Eastern Virginia care transition partnership. Retrieved from** [**https://www.chcs.org/media/EVCTP-Case-Study\_101217.pdf**](https://www.chcs.org/media/EVCTP-Case-Study_101217.pdf)

*CCMI Community-Based Care Transitions Program: Area Agencies on Aging (AAAs) partner with hospitals to provided dedicated coaches for discharged 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. Medicare and dual eligible patients had 51% reduction in 30 day readmission rate over 12 months (18.2% to 8.9%); Medicaid patients had a reduction in 30 day readmissions from 25% to 6% over 12 months; estimated at $17 million in savings from 1,804 avoided readmissions (approximately $9,423 per readmission).*

**Tsega, M., Lewis, C., McCarthy, D., Shah, T., & Coutts, K. (2019). Review of evidence for health-related social needs interventions. *The Commonwealth Fund.* Retrieved from** [**https://www.commonwealthfund.org/sites/default/files/2019-07/ROI-EVIDENCE-REVIEW-FINAL-VERSION.pdf**](https://www.commonwealthfund.org/sites/default/files/2019-07/ROI-EVIDENCE-REVIEW-FINAL-VERSION.pdf)**.**

*2-1-1 San Diego - facilitates access to community resources through phone and web-based referrals and care coordination services by providing care navigators. A Community Information Exchange enables bidirectional referrals between health care and social services providers and tracks patient's interactions across systems, services and agencies. The program helps access a medical home and social services including housing, fresh food, transportation and social supports. A 26% reduction in EMS use and an increase in stable housing among those tracked. Estimates suggested $17,562 per avoided inpatient admission and $1, 387 per avoided ED visit. 91% of patients had decreased vulnerability.*

**Gupta, R., Ghaly, M., Todoroff, C. & Wali, S. (2020). Creating value for communities: Los Angeles county’s invest in housing for health. *Healthcare, 8*. Doi: 10.1016/j.hjdsi.2019.100387. Retrieved from** [**https://www.sciencedirect.com/science/article/pii/S2213076419302490**](https://www.sciencedirect.com/science/article/pii/S2213076419302490)**.**

*Housing For Health program, which established partnerships with various housing facilities, broad community-based resources, community health services, and jail/prison transition programs. Funded by Los Angeles County's health system. Participants had fewer medical inpatient stays (77%); ED visits (68%); and lower use of acute mental healthcare (60% crisis stabilization services); Costs to LA DHS, reduced by 60% driven by reduced ED and hospital use. Participants had 20% lower public service utilization costs per year.*

**Coleman, E., Parry, C., Chalmers, S., & Min, S. (2006). The care transition intervention: Results of a randomized controlled trial. *Arch Inter Med, 166,* 1822-1828. Retrieved from** [**https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/410933**](https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/410933)**.**

*Care Transitions Intervention - randomized control trial, intervention patients received 1) tools to promote cross-site communicate; 2) encouragement to take a more active role in their care and to assert their preferences; 3) continuity across settings and guidance from a "transition coach". Intervention patients had lower re-admissions at 30 days and at 90 days than control group. Intervention patients had lower readmissions for the same condition that precipitated the index hospitalization at 90 days and at 180 days than the control group. The mean hospital costs were lower for intervention patients ($2,058 vs $2,546) at 180 days.*

**Mattke, S., Han, D., Wilks, A. & Sloss, E. (2015). Medicare home visit program associated with fewer hospital and nursing home admissions, increased office visits.  *Health Affairs, 34*(12), 2138-2146. Doi: 10.1377/hlthaff.2015.0583. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2015.0583**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2015.0583)**.**

*UnitedHealth Group's HouseCalls program - Comprehensive geriatric assessment by a clinician during a home visit with referrals to community providers and health plan resources to address uncovered issues. Compared to non-HouseCall Medicare Advantage plan members and fee-for-service beneficiaries, HouseCall participants had reductions in admissions to hospitals; lower risk of nursing home admission; number of office visits to specialists increased with this group.*

**Melnick, G., Green, L. & Rich, J. (2016). House calls: California program for homebound patients reduces monthly spending, delivers meaningful care. *Health Affairs, 35*(1), 28-35. Doi: 10.1377.hlthaff.2015.0253. Retrieved from** [**https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2015.0253**](https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2015.0253)

*HouseCalls California: an in-home program that provides, coordinates and manages care primarily for recently discharged high-risk, frail and psychosocially compromised patients to reduce preventable ED visits and hospital readmissions. All areas experienced a reduction in operating costs of the program per patient and showed substantial reduction in monthly per patient health care spending and hospital utilizations.*

**Woods, E., Bhaumik, U., Sommers, S., Ziniel, S., Kessler, A., Chan, E., Wilkinson, R., Sesma, M., Burack, A., Klements, E, Queenin, L., Dickerson, D., Nethersole, S. (2012). *Pediatrics, 129*(3), 465-472. Doi: 10.1542/peds.2010-3472. Retrieved from** <https://www.ncbi.nlm.nih.gov/pubmed/22351890>.

*Nurse case management and home visits with primary care and referral services, and nurse or nurse-supervised CHW home visits for asthma education, environmental assessment and remediation materials, and referral to IPM exterminator. At the 12 month mark there was a significant decrease in the asthma ED visits; any days of limitation of physical limitation; patient missed school; and parent missed work. There was significant reduction in hospital costs compared with the control group.*

**Karnick, P., Margellos-Anast, H., Seals, G., Whitman, S., Aljadeff, G., & Johnson, D. (2007). The pediatric asthma intervention: a comprehensive cost-effective approach to asthma management in a disadvantaged inner-city community. *J Asthma, 44*(1), 49-44. Doi: 10.1080/02770900601125391. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/17365203**](https://www.ncbi.nlm.nih.gov/pubmed/17365203)**.**

*Pediatric Asthma Intervention - a combination of asthma education, reinforced education and case management. The average decline in utilization of health resources was significant in all three groups; 69% for hospital days; 64% for ED visits and 58% for clinic visits. Cost savings were greatest among participants in the case manager group.*

**Bhaumik, U., Norris, K., Charron, G., Walker, S., Sommer, S., Chan, E, Dickerson, D., Nethersole, S., & Woods, E. (2013). A cost analysis for a community-based case management intervention program for pediatric asthma. *J Asthma, 50*(3), 310-317. Doi: 10.3109/02770903.2013.765447. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/23311526**](https://www.ncbi.nlm.nih.gov/pubmed/23311526)**.**

*Boston Children's Hospital Community Asthma Initiative. The program was associated with an adjusted ROI of 1.33 during the first 3 years of the program, when adding benefits due to reduced school and work days missed the social ROI increased to 1.85.*

**Morgan, A., Grande, D., Carter, T., Long, J., Kangovi, S. (2016). Penn center for community health workers: Step-by-step approach to sustain an evidence-based community health worker intervention at an academic medical center. *Am J Public Health, 106*(11), 1958-1960. Doi: 10.2105/AJPH.2016.303366. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5055768/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5055768/)**.**

*The Individualized Management for Patient-Centered Targets (IMPACT). The health system realized an ROI of $1.80:$1 and it rose to $2:$1 over time as the program achieved efficiencies. See Kangovi articles above for more details on program and more recent ROI.*

**Felix, H., Mays, G., Stewart, K., Cottoms, N., & Olsen, M. (2011). Medicaid savings resulted when community health workers matched those with needs to home and community care. *Health Affairs, 30*(7). Doi: 10.1377/hlthaff.2011.0150. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2011.0150**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2011.0150)**.**

*Arkansas Medicaid Community Connector Program - employed 6 Community Health Workers who identified eligible clients and connected them with home and community-based long-term services and supports. 23.8% lower average annual Medicaid spending (excluding prescription drugs) over 3 years vs comparison group, because of substitution of home-and community-based services for nursing home care. $2.92:$1 - Net savings of over 3 years $2.619 million.*

**Garg, A., Toy, S., Tripodis, Y., Silverstein, M., & Freeman, E. (2015). Addressing social determinants of health at well children care visits: A cluster rct. *Pediatrics, 135*(2), e296-e304. Doi: 10.1542/peds.2014-2888. Retrieved from** [**https://pediatrics.aappublications.org/content/135/2/e296**](https://pediatrics.aappublications.org/content/135/2/e296)**.**

*WE CARE program, which conducts social needs screening and referral tools at pediatric wellness checks. Positive change in number of social referrals; positive change in enrollment in community resources; positive change in childcare enrollment, employment, receipt of fuel assistance, and stable housing.*

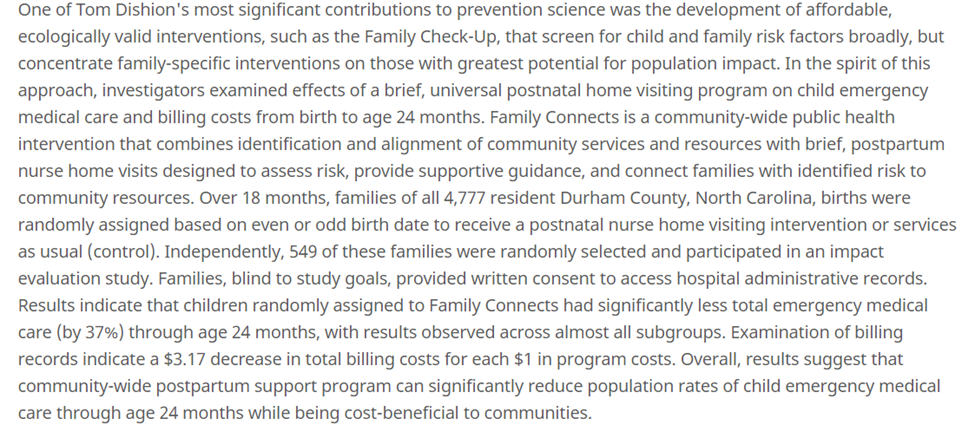
**Hassan, A., Scherer, E., Pikcilingis, A., Krull, E., McNickles, L., Marmon, G., Woods, E., & Fleegler, W. (2015). Improving social determinants of health: Effectiveness of a web-based intervention. *Am J Prev Med, 49*(6), 822-831. Doi: 10.1016/j.amepre.2015.04.023. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/26215831**](https://www.ncbi.nlm.nih.gov/pubmed/26215831)**.**

*HelpSteps (The online advocate), self-administered web-based health-related social domains screening and referral tool. Positive change in identifying social needs, income security, nutrition and fitness, and healthcare access. Almost half of youth contacted referral agency.*

**Gottlieb, L., Hessler, D., Long, D., Laves, E., Burns, A., Amaya, A., Sweeney, P., Schudel, C., & Adler, N. (2016). Effects of social needs screening and in-person service navigation on child health: A randomized clinical trial. *JAMA Pediatr, 170*(11), e162521. Doi: 10.1001/jamapediatrics.2016.2521. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/27599265**](https://www.ncbi.nlm.nih.gov/pubmed/27599265)**.**

*Volunteer patient navigators provide clinic-based social needs screening and connect families to resources. Positive identification of social needs; most frequently reported needs related to money for food and utilities, employment and housing. Positive change in parent reported child health.*

**­Goodman, W., Dodge, K., Bai, Y., O'Donnell, K., & Murphy, R. (2019). Randomized controlled trial of Family Connects: Effects on child emergency medical care from birth to 24 months. Development and Psychopathology, 31(5), 1863-1872. doi:10.1017/S0954579419000889. Retrieved from: https://www.cambridge.org/core/journals/development-and-psychopathology/article/randomized-controlled-trial-of-family-connects-effects-on-child-emergency-medical-care-from-birth-to-24-months/81F910539A78E411FDAF6791CE2FF224**



**Bronstein, L., Gould, P., Berkowitz, S., James, G., & Marks, K. (2015). Impact of a social work care coordination intervention on hospital readmission: A randomized controlled trial. *Soc Work, 60*(3), 248-255. Doi: 10.1093/sw/swv016. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/26173366**](https://www.ncbi.nlm.nih.gov/pubmed/26173366)**.**

*Social work-led care coordination designed to identify and alleviate barriers to patients remaining at home post-hospital discharge. Positive patient response to intervention; positive change in post-discharge risk for 30 day hospital readmission.*

**Smith, R., Dobbins, S., Evans, A., Balhotra, K., & Dicker, R. (2013). Hospital-based violence intervention: Risk reduction resources that are essential for success.  *J Trauma Acute Care Surg, 74*(4), 976-980. Doi: 10.1097/TA.0b013e31828586c9. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/23511134**](https://www.ncbi.nlm.nih.gov/pubmed/23511134)**.**

*The Wraparound project, hospital-based case management program targeting violently injured youth. Culturally competent case managers create risk reduction plan and shepherd clients through community resources. Positive identification of unmet needs; program success associated with meeting mental health and employment needs, as well as moderate and high intensive case management exposure in the first 3 months. Decline in recidivism for re-injuries.*

**Sege, R., Preer, G., Morton, S., Cabral, H., Morakinyo, O., Lee, V., Abreu, C., De Vos, E., & Kaplan-Sanoff, M. (2015). Medical-legal strategies to improve infant health care: A randomized trial. *Pediatrics, 136*(1), 97-106. Doi: 10.1542/peds.2014-2955.**

*DULCE - Developmental Understanding and Legal Collaboration for Everyone, a program engaging family specialists to conduct needs assessments and work directly with families to provide connections to resources. Positive increase in access to attainable concrete supports (food, public benefits, discounted telephone services); no difference in access to supports deemed unattainable (i.e. housing); Positive increase in preventive care for infants; Decreased ED visit by 6 months for infant.*

# Systematic Reviews

**Fraze, T., Beidler, L, Briggs, A., & Colla, C. (2019). ‘Eyes in the home’: ACOs use home visits to improve care management, identify needs, and reduce hospital use. *Health Affairs, 38*(6), 1021-1027. Doi: 10.1377/hlthaff.2019.00003. Retrieved from** [**https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00003**](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00003)

*Study examining the National Survey of Healthcare Organizations and Systems to determine whether ACO practices were more likely to use care transition home visits than non-ACOs. Along with qualitative interviews of ACO leaders. Practices in ACOs were more likely to use post discharge care transition home visits for their complex patients (25.7% vs 18.8%); these practices had more primary care physicians as well as specialist physicians; they were more likely to be part of an integrated delivery system and include a hospital; as well as be a part of episode-based payment and other risk-bearing contracts. Findings suggest that ACO's are responsible for the quality and cost of services to patients, even those that don't adhere to medical guidelines, so tracking those patients down and using home visits as a tool to engage patients and discover barriers is common. However, there was a disconnect between the survey responses for home visits from ACO's and interview responses from ACO leadership, suggestion a gap in the knowledge from leadership on how these programs are implemented.*

**Gottlieb, L., Wing, H., & Adler, N. (2017). A systematic review of interventions on patients’ social and economic needs. *AM J Prev Med, 53*(5), 719-729. Doi: 10.1016/j.amepre.2017.05.011. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pubmed/28688725**](https://www.ncbi.nlm.nih.gov/pubmed/28688725)

*A systematic review of the literature on interventions to address patients' social and economic needs. Review from 2000-2017, studies were based in the U.S.; addressed at least one social or economic determinant; were integrated into a medical care delivery system. More studies reporting findings associated with process (69%); or social or economic determinants of health (48%) outcomes than health (30%) or healthcare utilization or cost (27%) outcomes. Studies reporting health, utilization or cost outcomes reported mixed results.*

**Horwitz, L., Chang, C., Arcilla, H., & Knickman, J. (2020). Quantifying health systems’ investment in social determinants of health, by sector, 2017-19. *Health Affairs, 39*(2), 192-198. Doi: 10.1377/hlthaff.2019.01246. Retrieved from** [**https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2019.01246**](https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2019.01246)

*A systematic review of the dollars US health systems are directly investing in community programs to address social determinants of health. Identified 78 unique programs involving 57 health systems that collectively included 917 hospitals. The programs involved at least $2.5 billion of health system funds, of which $1.6 billion in 52 programs was specifically committed to housing-focused interventions; employment programs (28) was $1.1 billion; education program (14) was $476.4 million; food security programs (25) was $294.2 million; social and community context (13) was $253.1 million; and transportation (6) was $32 million.*

**Ruiz, S., Snyder, L., Rotondo, C., Cross-Barnet, C., Colligan, E. & Giuriceo, K. (2017). Innovative home visit models associated with reductions in costs, hospitalizations, and emergency department use. *Health Affairs, 36*(3), 425-432. Doi: 10.1377/hlthaff.2016.1305. Retrieved from** [**https://www.healthaffairs.org/doi/10.1377/hlthaff.2016.1305**](https://www.healthaffairs.org/doi/10.1377/hlthaff.2016.1305)**.**

*Review of five home health models to coordinate care for various patients:*

- *ABC Model (Aging Brain Care) - provides individualized and integrated care management through interdisciplinary care teams - monthly or quarterly home visits; Assesses patients' health status, monitors medications and adherence, delivers certain care protocols, offers environmental assessment, serves as liaison between the patient and other care team members. Over 3 year period – reduced hospitalizations.*

*-CAPABLE - (Community Aging in Place) Delivers a tailored combination of services to older adults who are dual Medicaid/Medicare beneficiaries; 10 home visits over a 5 month period; Assesses participants' functional difficulties, pain, depression and home environment; provides referrals to home and community-based services; and home modifications that allow seniors to age in place. Over 2 year period, reduced ED visits; reduced Medicare Expenditures.*

*-Stroke Mobile - Provides home-based follow up care once per month for a year after discharge from hospital for stroke, and targets stroke education for participants and their families caregivers. Offers educational modules to participants and family members/caregivers to address post-stroke care, prevention of additional strokes. Over 2 year period, reduced hospitalizations.*

*-DASH -(Doctors Assisting Seniors at Home) offers two-part episodic care coordination for Medicare and dual eligible who want to remain at home; Uses home-based assessment by nurses and follow up by nurse practitioners/physicians, preempts the need for emergency services; while conducting advanced care planning, medication reconciliation, receiving referrals for home and community-based services, and confirming connection to primary care physician. Over 3 year period – reduced hospitalizations; reduced ED visits; reduced Medicare expenditures.*

*-AIM - (Advanced Illness Management) Provides care coordination among hospital, home health care, physician's office, and telephone support for patients with late-stage illness. Weekly or biweekly home visits over 6-8 weeks. Enables patients to remain at home if they do not qualify for Medicare skilled home health care; visits provide engagement and education, advance care planning, medication reconciliation, assessment of patients' health status, navigation services, and referrals for durable medical equipment and home and community-based services. In last month of life, over a 3 year period – reduction in hospitalizations and Medicare expenditures.*

**Jack, H., Arabadjis, S., Sun, L., Sullivan, E. & Phillips, R. (2017). Impact of community health workers on use of healthcare services in the United States: A systematic review. *J Gen Intern Med, 32*(3), 325-344. Doi: 10.1007/s11606-016-3922-9. Retrieved from** [**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5331010/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5331010/)**.**

*Systematic review of Community Health Worker programs on healthcare issues and costs. Studies used Community Health Workers to connect adults with social services such as food, housing, transportation or insurance coverage, among other health interventions. 3 of 7 studies reported significant reductions in ED visits; 3 of 6 studies reported significant reductions in hospital use; 4 of 5 studies reported an increase in ambulatory care.*