

1. Title

Harpswell Aging at Home; a home modification and community resource program supporting older adults to age in place

2. Abstract

a. Provide adequate information to aid in searching and indexing

Aging in place; home modification; fall prevention

b. Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions

Most adults wish to remain in their current residence for as long as possible, yet aging in place becomes difficult as individuals' experience physical and cognitive changes. A home that is not suited to an individual's activities of daily living abilities can have significant health consequences. These challenges are especially apparent in Harpswell, Maine, where the median age is 56.9 years old. Harpswell Aging at Home (HAH) is a grassroots community organization that fosters low-cost or no-cost initiatives to help older adults thrive while aging at home. HAH's intervention provides home repair services and referrals to community supports. Summary statistics of program process measures and an initial and follow-up-assessment of healthcare utilization and self-reported outcomes were used to evaluate the impact of the intervention. Through March 2019, HAH completed 55 home modifications. The majority of program participants have resided in their home for twenty years or longer (69.2%, n=36) and live by themselves (55.1%, n=27). In the follow-up-assessment, the majority of respondents reported experiencing no falls (76.4%, n=13), no emergency department visits (81.3%, n=13), and no overnight stays in the hospital (100%, n=9) since the HAH intervention. About half (47.1%, n=8) of participants reported that their circle of support improved after the intervention. The average project cost \$1,711.02 and took 2.34 days. All respondents reported the home modifications improved their ability to be warmer (n=16) and drier (n=15), and the majority reported improved ability to be safer (88.2%, n=15). This program addresses a well-known gap among community-based older adults, allowing them to age in place. HAH works to keep Harpswell's older adults warmer, drier, and safer in their homes. Assessing the HAH program has inherent challenges, but increasing access to home modification and community support is a worthwhile goal.

Introduction: Maine

Problem Description

Most adults wish to remain in their current residence for as long as possible.¹ The Centers for Disease Control and Prevention (CDC) defines aging in place as "the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level."² Aging in place becomes more difficult as individuals begin to experience physical and cognitive changes. Most residential homes are not equipped to support these changes, making routine upkeep and maintenance difficult. As a result, many individuals or their caregivers make modifications to make their homes more hospitable to their changing abilities. In 2012, individuals in the United States spent \$125 million on home modifications.³ Most of the financial burden of home modification fell on homeowners and their informal caregivers.³

These challenges are especially apparent in Harpswell, Maine. The median age in Harpswell is 56.9 years old, making Harpswell one of the towns with the oldest residents in Maine. Like most adults, older Harpswell residents have the desire to age in place. As one resident describes, "This is the home I love. I

lived here with my husband before he died. I feel best planning to always be here, feel safe and independent.” A needs assessment of older adults in Harpswell found approximately two-thirds identified routine repair and maintenance as a concern. Despite planning to stay in their homes, a third of older adults in this town have an income too low to meet their necessary expenses. Harpswell Aging at Home (HAH) is a grassroots community organization that fosters low-cost or no-cost initiatives to help older adults thrive while aging at home.

Available Knowledge

Aging in place involves maintaining older adult’s physical and social environments, which enables them to preserve their dignity and independence in their home of choice.⁴ There are benefits to aging in place for the health system. For example, one study compared the costs of a community-based aging in place program to nursing home care.⁵ The community-based aging in place program used nurse care coordinators to create individualized care plans and coordinate the delivery of Medicaid home and community-based services (HCBS) and Medicare home health. They found that costs to Medicare and Medicaid were lower in the aging in place program by \$1,591.61 per month when compared to nursing home care.⁵

There are known barriers to aging in place. An individual’s home must meet their current needs while anticipating their future functional ability. Older adults that live at home may have difficulty performing basic and instrumental activities of daily living (ADL). These activities range from dressing and bathing to managing their medications.⁶ A house that is not suited to an individual’s ADL abilities can have significant health consequences. For example, in 2015, \$31.3 billion of direct medical costs in the United States resulted from non-fatal injuries due to falls.⁷ Studies also document the effect of inadequate or inefficient heating systems on health outcomes for older adults. Researchers found an association between energy inefficient housing and an increased risk of winter respiratory disease among older people.⁸ Older adults need their homes to keep them safe and warm if they want to successfully age in place.

Beyond the physical risks of aging in place, living at home without sufficient community and social supports may negatively impact health in other ways. HCBS are intended to help older adults remain safely in their homes for as long as possible.⁹ These supports include wellness programs, nutritional support, educational support, and general assistance with housing, finances, and home safety.⁹ These community supports are not only designed to relieve barriers to maintaining health but to promote socialization and overall well-being.¹⁰ Social networks can be necessary for both social support and practical support for older adults.¹¹ Rural older adults have a higher risk of isolation than their urban counterparts.¹² Isolation can occur when older adults cannot navigate the community’s physical environment.¹⁴ Chronic loneliness can be associated with a cycle of illness and health care utilization.¹³ Communities must consider the resources necessary to maintain older adult’s physical and social environment.

Previous studies have primarily investigated the effect of home modification on fall prevention. One study found that the presence of safety and accessibility features in the homes of elderly widowed individuals reduced the likelihood of a fall requiring medical treatment by 20%.¹⁵ A review of fall prevention interventions in community-dwelling older adults found home safety assessment driven modifications were resulting in fewer falls.¹⁶ Few studies have measured the impact of a community-based home modification intervention. One community-based intervention targeted frail older veterans living in rural counties.¹⁷ A nurse and a social worker conducted in-home standardized assessments, developed patient-specific care plans, and mobilized family, community, and Veterans Health

Administration resources. A limitation of this study was that their measurements were limited to process measures. They presented little information about the health outcomes of the intervention.

Few studies explore the effect of a community-based multi-component intervention designed to facilitate aging in place on health outcomes. A community-led organization in Maine, Harpswell Aging at Home (HAH), implemented a program that provides home modification and access to long-term service and supports to rural older adults and measured its impact on participants' health.

Rationale

Harpswell has one of the highest median resident ages in Maine, at 56.9 years. Older Harpswell residents see their current residence as their permanent home. One resident describes that their house is "nothing fancy but it is our forever home." Despite planning to stay in their homes, a third of older adults in this town have an income too low to meet their basic expenses. This financial pressure threatens their idea of a forever home: "I hope to pass it down to my children if I can continue to stay here financially." A needs assessment by HAH of older adults in Harpswell found that about two-thirds identified routine repair and maintenance as a concern. In addition to financing routine upkeep, residents will need to make modifications to their home as their physical capabilities change. Increasing access to home modification support, help with chores, and information about elder care and related services will help residents to remain in their home as they age. The needs assessment revealed that members of the community are eager to volunteer their time and help people in Harpswell age at home.

Specific Aims

The purpose of this report is to assess a community-based intervention that aims to enable beneficiaries to safely remain in their home by providing 1) home modification and 2) access to long term services and supports. Measures of success include reduced hospital utilization and patients reporting that they feel warmer, drier, and safer.

Methods

Context

Harpswell Aging at Home (HAH) is a community organization founded in 2015. Older Harpswell, Maine, residents created HAH to help other local older adults find the services they need to age in place. To achieve this mission, HAH partners with organizations like The Town of Harpswell and Habitat for Humanity 7 Rivers Maine to provide home repair services and referrals to long term services and supports. HAH aims to help older Harpswell residents stay warmer, drier, and safer as they age in place. HAH has had financial support from the town, citizens, community organizations and foundations, particularly AARP Maine and the Holbrook Community Foundation. Healthcentric Advisors, the Medicare Quality Innovation Network-Quality Improvement Organization (QIN-QIO) for New England, assisted with data collection strategies and analyses.

Intervention(s)

a. Description of the intervention(s) in sufficient detail that others could reproduce it

HAH's aging at home intervention provides home repair services and referrals to community supports. The two intervention components follow the same pipeline. First, a Harpswell resident contacts (or is referred to) a representative at Harpswell Town Offices to request home repair work. This town officer screens the resident for eligibility. To be eligible for the program, the individual must: be a resident of Harpswell; be 60 years or older; own their home or live in a home owned by a family member; have an annual household income under 80 percent of the Area Median income for Cumberland County; not

have their home up for sale; not intend to put their home up for sale for at least 2 years; and not rent their home more than 60 days per year. Once an individual is deemed eligible for the program, the town officer completes an intake form that includes a brief description of the home repair work and forwards it to HAH. A project coordinator at HAH receives the intake form and calls the participant to schedule a visit to their home. During this call, the project coordinator asks the questions on the HAH/Habitat Home Repairs Intake Call form.

During the initial visit, the project coordinator and the materials list developer conduct a thorough in-home assessment. The needs assessment explores how the participant uses their home and identifies physical improvements that would allow the participant to be safer, drier, and warmer in their home. The HAH team reviews each room and the exterior of the house. The project coordinator completes the HAH/Habitat Home Repairs Work Plan, which identifies repairs that were agreed upon by both the participant and other homeowners. Meanwhile, the materials list developer takes measurements and pictures to develop the materials list.

To improve a resident's safety, HAH installs wheelchair ramps, stairwell handrails, grab bars in bathrooms, outside lighting, and smoke and carbon monoxide detectors, among other tasks. Some examples of services to enhance a resident's warmth include installing insulation and storm windows, sealing cracks around entry doors, and repairing broken windows. Finally, to ensure residents stay dry, HAH installs gutters, replaces rotted trim around windows and doors, and repairs leaking sinks, faucets, and drains. The project scope, including materials, subcontracted labor, and trash disposal fees, cannot exceed \$1,500. If it does, the work plan will need to be modified. Any planned electrical or plumbing work are subcontracted to a licensed contractor from the HAH Contractor Referral List, as required by Code.

The project coordinator meets with the town's Code Enforcement Office to obtain any necessary work permits. A local hardware store delivers the materials needed for the job the day before scheduled work begins. Team members perform the work on the scheduled days. If new problems are identified while completing the repairs, the project coordinator consults with the site supervisor to determine if the repairs can be addressed using available materials or if there is room in the budget to buy additional materials. At the end of the job, the project coordinator confirms participant's satisfaction with the work, shows the participant how to use new items installed, gives the participant the HAH end-of-work handout, informs the participant of the HAH follow-up assessment, and informs the Town of Harpswell of project completion and readiness for inspection. Three months after completion of the home repairs, the HAH Health Professional schedules and conducts the follow-up visit with the participant using the HAH Three-Month Follow-up Assessment Form.

Concordant with the home repairs assessment, a nurse or social worker conducts a social determinants of health assessment. They then provide direct referrals to HAH services and recommendations to other community programs. The HAH services include a free transportation program, food assistance, and social opportunities for older adults to connect with friends and neighbors. The participants are provided with a sheet containing contact information for all recommended programs.

b. Specifics of the team involved in the work

The HAH team is interdisciplinary. There are project managers who coordinate the initiation and process of the application, needs assessment, and home repairs. There is a nurse or social worker who conducts the needs assessment and the three-month follow-up assessment. Additionally, volunteers with experience in construction or maintenance trades perform the home repairs. Healthcentric Advisors' Maine Office staff provide evaluation support.

Study of the Intervention(s)

a. Approach chosen for assessing the impact of the intervention(s)

Summary statistics of program process measures and an initial and follow-up assessment of healthcare utilization and self-reported outcomes were used to evaluate the impact of the intervention. Process measures were tracked by the HAH project managers. Outcome measures were captured from self-reported information shared during the intervention assessments.

b. Approach used to establish whether the observed outcomes were due to the intervention(s)

Only a randomized controlled trial can definitively link an intervention to an observed outcome. However, we surveyed the participants before and after the intervention, which gives us the best opportunity to assess changes in care utilization and self-reported outcomes that were due to the intervention itself. We are not aware of other interventions in the environment that specifically targeted these outcomes.

10. Measures

a. Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability

The following measures were tracked using data collected in the initial and follow-up assessments:

- Participant and home characteristics, including age, gender, household income, length of time in the home, and the number of people living in the home.
- Participant self-reported healthcare utilization, including hospital utilization, 911 utilization, and the number of falls.
- Participant self-reported outcomes, including self-reported use of referred services, changes in circle of support, and whether they felt warmer, drier, and safer.

In addition to participant characteristics and self-reported outcomes, HAH collected program characteristics, including the number of applications, number of assessments, repair type, time between application and project completion, number of referrals to community resources, project cost, and number of repairs completed.

b. Description of the approach to the ongoing assessment of contextual elements that contributed to the success, failure, efficiency, and cost

c. Methods employed for assessing completeness and accuracy of data

Data were sent to the QIN-QIO for assessment of completeness and accuracy; questions or requests were sent back to HAH to address.

Analysis

We used descriptive statistics of participant characteristics and program process measures, as well as an initial and follow-up assessment of care utilization and satisfaction to assess the impact of the intervention. The study period was September 2016 through March 2019. We did not assess for the effect of time as a variable.

Ethical Considerations

Ethical aspects of implementing and studying the intervention(s) and how they were addressed, including, but not limited to, formal ethics review and potential conflict(s) of interest

This intervention was a community quality improvement initiative. A formal ethics review was not sought for this protocol. However, potential risks were addressed by program staff. HAH assigned every

project a de-identified project code. Data analyzed by Healthcentric Advisors were de-identified for participant specific identifiers and stored on a password-protected computer kept in a secure location. Therefore, risks to participants were minimal.

Results

13. Results

a. Initial steps of the intervention(s) and their evolution over time (e.g., time-line diagram, flow chart, or table), including modifications made to the intervention during the project

Through March 2019, 55 home modifications were completed. We received initial-assessment data on 55 participants and 3-month follow-up data on 29 participants. A third of the participants were between the ages of 80 and 89 years old (33.3%, n=15), and two-thirds were women (66.7%, n = 30) (**Table 1**). The majority of program participants had resided in their home for twenty years or longer (69.2%, n=36), and half reported they lived by themselves (55.1%, n=27). Most participants considered their family in their circle of support (88.7%, n=47), followed by friends (49.1%, n=26) and neighbors (45.3%, n=24).

Prior to the intervention, 59.3% (n=32) of participants had no falls in the past 12 months. Nearly half of participants reported going to the emergency department or staying overnight in the hospital one or more times in the past 12 months (47.1% [n=24] and 55.7% [n=39], respectively) (**Table 2**).

After the -intervention, the majority of respondents report they have not had a fall since the HAH intervention (76.4%, n=13); 18.8% (n=3) of participants reported they visited the emergency department, and none reported they stayed overnight in the hospital since the HAH intervention. About half (47.1%, n=8) of participants reported that their circle of support improved after the intervention.

The average project cost \$1,711.02, ranging from \$273.39 to \$7,356.68, with a median cost of \$1,496.49. The average length of time spent on each home modification was 2.34 days and 139.45 work hours (**Table 3**).

All respondents reported the home modifications improved their ability to be warmer (n=16) and drier (n=15). The majority also reported it improved their ability to be safer (88.2%, n=15).

Discussion

14. Summary

We found that it is feasible to conduct a community-based intervention to provide older adults with home modifications and with access to long term services and supports. The intervention would benefit from a full outcomes evaluation, which was not possible with the data collected during the study period. Lessons learned from the initial implementation of the program have led to conversations about expanded data collection procedures. The eventual goal is to evaluate whether the intervention allows participants to stay in their homes longer than non-participants and whether the intervention affects health care utilization. Data collection is ongoing. The HAH team plans to continue updating documentation. At this time, some participants have had their home modification too recently to participate in the follow-up assessment.

A major strength of this project is that it responds directly to the result of an intensive needs assessment of the Harpswell community. The goal of the initial assessment was to understand what it is like to age in the community and identify supports people need as they age. Thus, this intervention was designed to truly meet the needs identified by the community itself.

15. Interpretation

Our ability to assess the impact of the program on health outcomes is limited at this time. A Cochrane review of interventions intended to reduce the incidence of falls in community dwelling older adults found that home safety assessment and modification were effective in reducing the rate and risk of falls.¹⁶ Our results similarly suggest that there were fewer falls among participants after the intervention. Yet, we cannot directly compare falls before and after the assessment because the initial - assessment and follow-up asked about the number of falls occurring during two time periods of different lengths. We hope to be able to present this information in subsequent publications.

However, our evaluation suggests the intervention is a realistic, feasible way to address barriers to aging in place. A home that is not suited to an individual's ADLs can have significant health consequences, including high medical costs resulting from non-fatal injuries due to falls.⁷ Other studies document the effect of inadequate or inefficient heating systems on health outcomes for older adults, including an association between energy inefficient housing and an increased risk of winter respiratory disease among older people.⁸ Older adults need their home to keep them safe and warm if they want to successfully age in place.

Despite limitations in the outcome measurement, we found that participants' perceptions of the intervention were extremely positive. Nearly all participants felt that the intervention improved their ability to be warmer, drier, and safer. One participant described that, "It was so helpful and all the things they did (repairs) worked out really well. I especially like the way I feel safer (bathroom and electrical plugs fixed-no extension cords)." Another participant noted, "The handrails you put on our stairway to our bedroom might seem like a little thing to you, but it's really big to us! Six months ago my wife fell from the top of those stairs... to the bottom because there was nothing there for her to hold onto when she lost her balance. She's still hurting from that fall. For a long time I've gone up and down those stairs on my hands and knees for fear of falling down them. This morning I went up and down stairs standing on my feet for the first time in ages, holding on to those wonderful rails. What a huge difference and what a feeling of security."

The average cost of the home modifications was \$1,711, which was higher than the initial limit of \$1,500. Meanwhile, the average hospital admission in Maine costs \$10,772, emergency department visit costs \$441, and observation stay costs \$2,079 according to a Healthcentric Advisors' analysis of Medicare Part A Claims data from 2014-2017. Thus, while the costs per participant exceeded the planning budget, one repair certainly offsets potential future medical expenditures. This cost avoidance is also supported by literature that found lower costs for Medicare and Medicaid in an aging in place program (by \$1,591.61 per month), compared to nursing home care.⁵

16. Limitations

The greatest limitation is missing data. Data were collected from multiple sources, including the repair teams and participants; some participants were missing entire assessments or repair team data. Incomplete assessments and repair team entries also created missing data. However, data are still being collected (including follow-up assessments) for a future outcomes or impact evaluation, to allow us to assess attribution of results to the program.

Additionally, this study was conducted in a small town in Maine, which may limit its generalizability to other communities. This community may have unique dynamics, community engagement, and funding sources that made this intervention possible.

17. Conclusions

This program addresses a well-known gap among community-based older adults, allowing them to age in place, in their own homes. Our goal to enable older adults to be warmer, drier, and safer is

unchanged. HAH continues to strive to keep Harpswell's older adult community warmer, drier, and safer in their homes, according to participants' wishes. Assessing the HAH program has inherent challenges, but increasing access to home modification and community supports is a worthwhile goal, so we will continue to move forward with this work. If we see success with the program in the future, we anticipate that the processes could be embedded in the town's approach to caring for its vulnerable citizens. The challenges and successes of this program may also influence consideration for other programs of this nature, in additional settings. But first, it is critical to effectively measure the impact of the program on reducing falls and hospital utilization for older adults to enable them to safely age in place.

Other Information

18. Funding

The analyses upon which this report is based were performed under IDIQ contract number HHSM-500-2014-QIN014I, Task Order Number HHSM-500-TMA01, funded by the Centers for Medicare & Medicaid Services, an agency of the U.S. Department of Health and Human Services. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsements by the U.S. Government. The authors assume full responsibility for the accuracy and completeness of the ideas presented.

HAH has had financial support from the Town, citizens, community organizations and foundations, particularly AARP Maine and the Holbrook Community Foundation.

Table 1: Participant characteristics, N=55

Characteristic	n (%)
Household Size (49 respondents)	
1	27 (55.1)
2	22 (44.9)
3+	0 (0)
Household Income (37 respondents)	
Below \$10,000	4 (10.8)
\$10,000-\$15,000	2 (5.4)
\$15,000-\$20,000	10 (27.0)
\$20,000-\$25,000	2 (5.4)
\$25,000-\$30,000	7 (18.9)
\$30,000-\$35,000	4 (10.8)
\$35,000+	8 (21.6)
Age (45 respondents)	
<60 years	4 (8.9)
60-69 years	11 (24.4)
70-79 years	12 (26.7)
80-89 years	15 (33.3)
90+ years	3 (6.7)
Sex (45 respondents)	
Female	30 (66.7)
Male	15 (33.3)
Time in Home (52 respondents)	
<5 years	0 (0)
5-9 years	3 (5.8)
10-19 years	13 (25.0)
20+ years	36 (69.2)
Circle of Support* (53 respondents)	
Family	47 (88.7)
Friends	26 (49.1)
Coworkers	1 (1.9)
Neighbors	24 (45.3)
Church Congregation	10 (18.9)
Hobby Groups	4 (7.5)

*Participants could select more than one option. Percentages represent percent of sample selecting that option.

Table 2: Initial and follow-up assessment outcomes

	Initial assessment* n (%)	Follow-up Assessment** n (%)
Falls		
None	32 (59.3)	13 (76.4)
Once	12 (22.2)	4 (23.5)
More than once	10 (18.5)	0 (0)
Respondents, N	54	17
Emergency Department Visit		
Yes	27 (52.9)	3 (18.8)

No Respondents, N	24 (47.1) 51	13 (81.3) 16
Number of Times Stayed Overnight in Hospital		
None	31 (56.4)	9 (100.0)
One to three	19 (34.5)	0 (0.0)
Four or more	5 (9.1)	0 (0.0)
Respondents, N	55	10

*Participants asked to answer based on the prior 12 months.

**Participants asked to answer based on the time since the prior visit.

Table 3: Process Measures*

Average Cost per Project	\$1,711.02
Average Number of Days per Project	2.34
Average Work Hours per Project	139.45

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