Shared Homes as an Alternative to Nursing Home Care: Impact of VA’s Medical Foster Home Program on Hospitalization

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Special Issue: Veterans Aging: Research Article

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Cari R. Levy, MD, PhD1 Farrokh Alemi, PhD,* 2,3 Allison E. Williams, ND, PhD, RN4 Arthur R. Williams, PhD5 Janusz Wojtusiak, PhD2 Bryce Sutton, PhD5 Phan Giang, PhD2 Etienne Pracht, PhD6 and Lisa Argyros, MSW LCSW4

1Department of Internal Medicine, Palliative Care, Veterans Affairs Medical Center Eastern Colorado Health Care System, Denver. 2Department of Health Administration and Policy, George Mason University, Fairfax Virginia. 3Office of Chief of Staff, District of Columbia Veterans Affairs Medical Center, Washington DC. 4Bay Pines Veterans Administration Healthcare System, Florida. 5Center of Innovation on Disability and Rehabilitation Research, James A Haley Veterans Administration Medical Center, Tampa, Florida. 6Department of Health Administration and Policy, University of South Florida, Tampa.

*Address correspondence to Farrokh Alemi, PhD, Department of Health Administration and Policy, George Mason University, 4400 University Drive, MS:1J3, Northeast Module I, Fairfax, VA 22030-4444. E-mail: falemi@gmu.edu

Received December 1, 2014; Accepted May 27, 2015

Decision Editor: Rachel Pruchno, PhD

Abstract

Purpose of the Study: This study compares hospitalization rates for common conditions in the Veteran Affairs (VA) Medical Foster Home (MFH) program to VA nursing homes, known as Community Living Centers (CLCs).

Design and Methods: We used a nested, matched, case control design. We examined 817 MFH residents and matched each to 3 CLC residents selected from a pool of 325,031. CLC and MFH cases were matched on (a) baseline time period, (b) follow-up time period, (c) age, (d) gender, (e) race, (f) risk of mortality calculated from comorbidities, and (g) history of hospitalization for the selected condition during the baseline period. Odds ratio (OR) and related confidence interval (CI) were calculated to contrast MFH cases and matched CLC controls.

Results: Compared with matched CLC cases, MFH residents were less likely to be hospitalized for adverse care events, (OR = 0.13, 95% CI = 0.03–0.53), anxiety disorders (OR = 0.52, 95% CI = 0.33–0.80), mood disorders (OR = 0.57, 95% CI = 0.42–0.79), skin infections (OR = 0.22, 95% CI = 0.10–0.51), pressure ulcers (OR = 0.22, 95% CI = 0.09–0.50) and bacterial infections other than tuberculosis or septicemia (OR = 0.54, 95% CI = 0.31–0.92). MFH cases and matched CLC controls did not differ in rates of urinary tract infections, pneumonia, septicemia, suicide/self-injury, falls, other injury besides falls, history of injury, delirium/dementia/cognitive impairments, or adverse drug events. Hospitalization rates were not higher for any conditions studied in the MFH cohort compared with the CLC cohort.

Implications: MFH participants had the same or lower rates of hospitalizations for conditions examined compared with CLC controls suggesting that noninstitutional care by a nonfamilial caregiver does not increase hospitalization rates for common medical conditions.

Key Words: Caregiving-formal, Caregiving-informal, Nursing home care, Hospitalization, Matched case control evaluation

Nearly half of the 8.6 million Veterans enrolled in the Veterans Health Administration are over age 65 and those over age 85 are growing at the fastest rate (Congressional Budget Office, 2010; Shay, Hyduke, & Burris, 2013). Since 1972, the
Veterans Affairs Home Based Primary Care (HBPC) program has been composed of teams including physicians, social workers, psychologists, dietitians, rehabilitation therapists, pharmacists, and specialty nursing staff. The goal of HBPC is to increase access to medical care and rebalance long-term care services from institutional to noninstitutional team-based care (Beales & Edes, 2009; Shay et al., 2013). The rebalancing effort is in response to a preference for home-based care options by Veterans, and increasing costs to the Department of Veterans Affairs (VA), serving a rapidly growing population of aging Veterans. Because of HBPC availability, nursing home patients can take advantage of the Medical Foster Home (MFH) program to reside in the community outside other institutional alternatives such as nursing homes.

The MFH program provides a community-based living arrangement for adults who cannot live independently due to physical or mental disabilities. Veterans are paired with a community caregiver who can meet his or her specific level-of-care needs and who shares his/her home with the veteran. Caregivers typically have prior experience working in nursing homes, caring for loved ones or other significant caregiving experience. Potential MFH caregivers are interviewed by the MFH Coordinator who is a senior-level social worker and an occupational therapist from the HBPC team visits the home to assess suitability of the home as a MFH in terms of safety and any needed home modifications. The Veterans’ daily care is provided in the caregiver’s home 24 hr a day, 7 days a week. The Veterans receive all of their personal care and supervision from their caregiver, in a family-like, noninstitutional, shared setting. Unannounced visits are made to the MFHs monthly by the MFH coordinator as a means of assessing safety in the home. Veterans can remain in their MFH and receive all of their care until the end-of-life.

The VA provides primary care to the Veteran through the HBPC or Spinal Cord Injury (SCI) Home Care programs. Interdisciplinary staff from one of these programs make home visits to provide home assessment, caregiver education, and patient care. The HBPC interdisciplinary team includes RN case managers, Advanced Registered Nurse Practitioners (ARNPs), physical therapy and occupational therapy staff, social workers, a dietician, a psychologist, a pharmacist and a recreational therapist. The HBPC team ensures that the caregiver is well-trained to provide the required VA planned care to Veterans in their homes. Veterans pay out-of-pocket for room and board, whereas the Department of Veterans Affairs pays for and provides medical care coordinated by HBPC.

The VA MFH program began as a pilot in Little Rock, Arkansas in 2001 followed by two more programs: one in Tampa, Florida and another in San Juan, Puerto Rico. As a result of its success and potential as a preferred long-term care option for Veterans, the VA began actively developing the program in 2008. There are now over 100 VA MFH programs nationwide currently serving 856 Veterans (personal communication with Dr. Edes, Executive Director of Geriatrics and Extended Care Operations, Veterans Health Administration, December 2014). MFH is distinguished from traditional nursing homes and other community residential services by three features:

1. The home is owned or rented by the caregiver.
2. The caregiver lives in the home and provides personal care and supervision.
3. There are never more than three residents receiving care in the home at one time.

Little is known about the effect of enrollment in the MFH program on outcomes other than qualitative data describing factors that lead to successful MFH placement (Levy, Jones, Haverhals, & Nowels, 2014) and preliminary data describing costs in the MFH program (Rolland et al., 2014). More is known about the impact of HBPC.

A study examining HBPC showed that terminally ill patients randomized to HBPC experienced fewer hospitalizations than patients randomized to standard care. Similarly, a study examining frail elderly patients with complex conditions indicated that patients had fewer hospitalizations after HBPC enrollment than before HBPC enrollment (Chang, Jackson, Bullman, & Cobbs, 2009; Hughes et al., 2000). HBPC in the patient’s home has demonstrated higher satisfaction and lower costs; thus, it may be reasonable to assume that HBPC in combination with MFH may produce similar outcomes (Edes et al., 2014).

Although there is a growing literature describing outcomes in HBPC, there are no published descriptive data or outcomes data for Veterans in the MFH program. While there were 18,901 operating adult foster care homes with a capacity to serve 64,189 residents in 2008 in the United States (Mollica et al., 2009), available research pertaining to health outcomes in adult foster homes was either conducted 10–30 years ago (Anderson, Lakin, Hill, & Chen, 1992; Chen, Bruininks, Lakin, & Hayden, 1993; Kane, Kane, Illston, Nyman, & Finch, 1991; Lakin, Bruininks, Chen, Hill, & Anderson, 1993; Stark, Kane, Kane, & Finch, 1995) or is focused primarily on foster homes for the mentally ill (Anderson et al., 1992; Chen et al., 1993; Fotheringham, Abdo, Ouellette-Kuntz, & Wolgarth, 1993; Lakin et al., 1993; Piat, Ricard, Sabetti, & Beauvais, 2008a, 2008b; Reinard & Kane, 1999). The most comprehensive survey of residential care facilities for the dependent elderly estimated that 58% of the 29,282 facilities were small, home-like facilities comparable to MFHs and the authors noted, “The national scope and size of this long-term care option is substantial, meriting considerably more research attention than has been afforded it to date” (Mor, Sherwood, & Gutkin, 1984). Despite these recommendations in 1986, one of the only studies available describing outcomes among residents of adult MFHs was conducted in 1987 and consisted of 49 matched triads of geriatric patients compared in: nursing homes, geriatric foster homes, and private homes with supportive services. Compared with similarly disabled patients in nursing homes, patients in the two community settings made greater improvements in self-care skills and
mobility, expressed greater well-being, had similar morbidity and incurred lower costs (Braun & Rose, 1987).

In another study of adult foster care, researchers interviewed 400 adult foster care and 400 nursing home residents. The adult foster care residents reported more social activity compared with those in nursing homes, even after controlling for disability status (Kane et al., 1991). Adult foster care residents and their families were also more likely to value privacy and homelike settings, whereas nursing home residents were more likely to value rehabilitation and organized activity programs (Kane et al., 1991). In another study designed to determine characteristics that result in selection of adult foster care over nursing home placement and assess the price elasticity of demand for adult foster care, adult foster care was highly substitutable for nursing home care, select residents were willing to pay twice as much for nursing home care as for adult foster care. However, resident perceptions about utility of the two forms of care differed substantially (Nyman, Finch, Kane, Kane, & Illston, 1997).

Another study of 422 elderly residents of MFHs concluded that MFHs offer many advantages as long as residents are properly placed and adequate support services are provided (Bradshaw, Vonderhaar, Keeney, Tyler, & Harris, 1976).

Theoretically, however, there are many concerns about the MFH program given that it represents a relatively unregulated care setting, in which informal caregivers assume primary responsibility for care and medication administration. The literature on assisted living facilities raises concerns about effectiveness and safety of care (administration of medications and infection control) delivered by unlicensed persons (Charboneau, Shelton, Brickley, & Rich, 2011; Patel, White-Comstock, Woolard, & Perz, 2009; Woods, Guo, Kim, & Phillips, 2010). In MFH program, where even less regulatory oversight is available, concerns about care of residents may be more pronounced. Care outcomes are of particular concern because, unlike unskilled staff in assisted living facilities, MFH caregivers work 24 hr per day, 7 days per week. They can arrange for relief care providers but, in general, have no regularly scheduled breaks from their duties as caregivers. They are the primary, and often the sole, caregiver in the home.

This study compares the odds of hospitalization for residents in MFH to residents in Community Living Centers (CLCs). Variation in availability of data in home-based programs, such as MFHs, and nursing home programs, such as CLCs, makes the comparison of these two programs difficult, however; comparison of hospitalization rates for common conditions (e.g., errors in administration of medications or falls) can be used as surrogate for care outcomes within the two programs. The use of hospital data in assessing quality of nursing home or home-based programs is not new (Graverholt, Forsetlund, & Jamtvedt, 2014; Masotti, McColl, & Green, 2010). The Agency for Healthcare Research and Quality (AHRQ, 2014) has defined potential measures of safety based on hospitalization events (Duffy, Elixhauser, & Sommers, 1996). No similar effort has been undertaken for long term or home-based care programs, so the authors adapted the patient safety indicators of AHRQ to work with populations in nursing homes and home-based programs. For example, the AHRQ prescribes how to calculate “PSI 03 Pressure Ulcer Rate” by calculating percent of hospitalized patients with decubitus ulcer of hip, buttock, elbow, ankle, heel, upper back, lower back, and unspecified site. The authors’ changed the calculation of this rate by examining the percent of residents in our sample with hospitalization for the same definition of decubitus ulcer. Among the possible patient safety indicators, the authors’ decided to focus on pressure ulcers, infections, falls, medication errors, and medical care adverse event rates. These indicators have been identified by others as useful in evaluating quality of nursing home programs (Hartmann, Meterko, Zhao, Palmer, & Berlowitz, 2013; Masotti et al., 2010). Due to the high prevalence of psychiatric illness among Veterans, high rates of psychotropic use in CLCs (Harvey, Currie, Furman, & Mambourg, 2014; Gellad et al., 2012), and qualitative data suggesting that anxiety, depression, and self-injurious behaviors lessen after MFH enrollment, these rates also were included in this study (Levy et al., 2014). As before, we calculated these rates using the AHRQ definitions of these events.

Study Design and Methods

Study Design
This was a retrospective study using observational data to match MFH residents (cases) to CLC residents (controls). Data were retrieved from the VA Corporate Data Warehouse, VA Office of Geriatrics and Extended Care Operations, VA Health Data Repository, and the VA MFH Program through the VA Informatics and Computing Infrastructure (VINCI). VINCI is a secure, virtual platform that provides access to research software, software development tools, and VA national health data. The Institutional Review Boards at Bay Pines VA Healthcare System and the District of Columbia VA Medical Center, and the Department of Veterans Affairs Health Administration National Data Systems approved access to the data.

Administrative data were used to identify MFH residents from the 45 programs actively enrolling Veterans at initiation of this investigation by extracting social security numbers and corresponding medical records from VA electronic health records. MFH cases were enrolled in the program from May 11, 2001 to August 17, 2012. Data were available for 817 MFH residents in the United States. There were 325,031 CLC residents during the same timeframe who were sampled from programs nationwide and matched to MFH residents.

This study compared MFH cases matched to CLC controls on hospitalizations related to 14 categories: (a) adverse medical care, which in our population primarily included complications related to artificial implants, surgical procedures, and urinary catheters, (b) anxiety...
disorders, (c) mood disorders, (d) skin infections, (e) septicemia, (f) other bacterial infections (i.e., not tuberculosis, skin infections, or septicemia), (g) suicide/intentional self-injury, (h) pressure ulcers, (i) urinary tract infections, (j) falls, (k) other injuries, which in our population primarily included personal history of fall, hypoxemia, and history of injury not elsewhere classified, (l) adverse medication effects, which in our population included adverse effects of antipsychotics, and corticosteroids, (m) delirium, dementia, amnestic or other cognitive impairments, or (n) pneumonia. Residents’ hospitalizations were classified into these 14 categories using admission diagnoses codes and the Clinical Classification Software developed as part of the Healthcare Cost Utilization Project sponsored by the AHRQ.

Figure 1 illustrates the matching procedure for MFH and CLC residents. We excluded short stay CLC residents from analysis to more closely match the intent of the MFH program, which is to house Veterans for the remainder of their life. Short stay CLC patients were defined as patients who did not receive more than 90 days of CLC services. This exclusion reduced the CLC controls to 171,405 residents. For each MFH case, CLC residents were identified as controls, using the following matching criteria:

- **Same follow-up period:** The CLC and MFH cases were followed for the same 6-months post enrollment of the index MFH date of enrollment. A resident was assumed to have met this requirement if he/she had not died during this period and had at least one inpatient, outpatient, or pharmacy contact after this 6-month period.
- **Same baseline period:** The CLC and MFH cases were required to have the same 6-months of available medical history prior to the enrollment date of the index MFH case. A resident was assumed to have met the necessary length of history if they had at least one inpatient, outpatient or pharmacy contact prior to this period.
- **Same risk of mortality:** Probability of mortality was calculated at last hospitalization prior to index MFH date of enrollment. It was calculated using the Hospice Eligibility Prediction (HELP) index based on comorbidity and age of residents (Levy et al., 2015). The CLC controls were required to have a risk of mortality within 0.05 points of the MFH case.
- **Same age, gender and race:** The CLC and MFH residents’ birth dates were required to be within 1 year of each other. They were also required to have same gender and race.
- **Same history of outcomes:** During the 6-months prior to the date of enrollment of the index MFH case, CLC controls were matched on history of hospitalization for each of the 14 conditions in the study. For each outcome, separate analysis was done, and CLC controls were matched to MFH cases if they had same count of hospitalizations during the baseline period. For example, in the analysis for pressure ulcers, a MFH resident with one hospitalization for a pressure ulcer in the 6-months prior to enrollment was matched to a CLC resident with one hospitalization for a pressure ulcer in the 6-months prior to enrollment.

### Methods of Analysis

We used a matched case–control study to control for differences between MFH and CLC due to self-selection. There are other ways to analyze these data. For example, propensity scores could be used to match CLC residents to MFH cases. In matched case control studies, patients are matched on each factor separately (age, gender, prognosis, etc.) without calculating an overall propensity scores. It is not always possible to do a matched case–control study but when it is possible, as in our study, these studies are preferred to propensity matching because they are easier to interpret and do not allow compensation among the factors. For example, in a propensity scoring approach a young MFH patient with several comorbidities may be matched with an older CLC patient with fewer comorbidities. As long as the overall propensity scores are the same, the match is judged to be reasonable. In a matched case–control study, each factor is matched to itself. Younger MFH patients are matched to younger CLC patients. MFH residents with elevated risk due to comorbidities are matched with CLC patients with same risk. No compensation across the factors is allowed. Therefore, it is clear that MFH and CLC residents have the same characteristics on all matched criteria. Residents could contribute to more than one health outcome.
We calculated the relative risks associated with the MFH program using the odds ratio associated with adverse outcomes. Using the matched sample, the odds ratio for adverse outcomes was reported as:

\[
\text{OR} = \frac{n_{\text{mfh, outcome}}}{n_{\text{mfh, no outcome}}} \times \frac{n_{\text{cl, no outcome}}}{n_{\text{cl, outcome}}}
\]

Where \( n \) is number of cases.
The 95% confidence interval was calculated using the natural logarithm of the odds ratio. In particular, the test statistic, \( L \), was calculated as:

\[
L = \log \left( \frac{n_{\text{mfh, outcome}} n_{\text{cl, no outcome}}}{n_{\text{mfh, no outcome}} n_{\text{cl, outcome}}} \right)
\]

The distribution of the log odds ratio is approximately normal. Therefore, the approximate 95% confidence interval for the population log odds ratio was estimated as (Morris & Gardner, 1988):

\[
L \pm 1.96 \sqrt{\frac{1}{n_{\text{mfh, outcome}}} + \frac{1}{n_{\text{mfh, no outcome}}} + \frac{1}{n_{\text{cl, outcome}}} + \frac{1}{n_{\text{cl, no outcome}}}}
\]

This analysis required writing a software code for selection of the appropriate information from the medical record, matching of the CLC residents to MFH population, calculation of odds of adverse outcomes, and calculation of 95% confidence intervals. This program is available through the corresponding author.

**Results**

Participating VA Medical Centers reported admission of 817 MFH residents at the start of our study. We excluded 30 with no recorded social security number, 18 with incorrect social security number of less than 9 digits, 31 with no date of enrollment in MFH, 29 that had multiple dates of enrollment (we selected the first date of enrollment in MFH), and 193 with follow-up or a history of less than 180 days. These restrictions yielded 506 cases that were included in the analysis (Figure 1). We started with 325,031 CLC residents based on Resident Assessment Instrument Minimum Data Set reports. We found 172,158 long-term CLC residents with more than 90 days of CLC-related services. Of these, 124,166 CLC residents had the same baseline and follow-up observation periods as the MFH cases. Among the residents matched on baseline and follow-up time period, we found 102,597 who had same age and 80,138 CLC controls who had same gender and race as MFH cases. Finally, 36,870 CLC controls had risks of mortality within 0.05 point of MFH cases.

To analyze each study outcome, we separately matched on the history of hospitalization for each study condition. A CLC control and index MFH case were considered matched on the history of the outcome if they experienced the same number of hospitalizations for the condition of interest during the baseline period. On average, 478 MFH cases were matched on all criteria to 1,559 CLC controls.

Table 1 reports the resident characteristics before matching. After matching, reported in full in the Supplementary Appendix, there was no difference in patient characteristics. Percent Black, percent White, and percent male differed by less than 1 percent. The age of MFH and CLC matched cases differed by less than 3 years. Risk of mortality in the two groups differed by less than 1%. History of hospitalization in the two group differed by less than 0.05% and days between first and last encounter during the history differed by less than 30 days. There were no statistically significant differences between MFH cases and CLC controls on seven measured criteria. These data suggested that CLC controls and MFH cases had similar age, gender, race, risk of mortality, baseline period, follow-up period, and history of hospitalizations for the outcome during the baseline period.

Table 2 reports the number of hospitalizations for any cause among the MFH and matched CLC cases. CLC residents experienced more hospitalization during the same time period as the MFH patients.

Table 3 provides a more detailed analysis of hospitalization for specific causes. This table reports the odds ratio (OR) and 95% lower (LCL) and upper (UCL) confidence limits for hospitalizations among MFH and CLC residents. Compared with matched CLC cases, MFH residents were less likely to be hospitalized for adverse care events (OR = 0.13, 95% CI = 0.03–0.53), anxiety disorders (OR = 0.52, 95% CI = 0.33–0.80), mood disorders (OR = 0.57, 95% CI = 0.42–0.79), other bacterial infections (OR = 0.54, 95% CI = 0.31–0.92), skin infections (OR = 0.22, 95% CI = 0.10–0.51) and skin ulcers (OR = 0.22, 95% CI = 0.09–0.50). MFH cases and matched CLC controls did not differ in rates of suicide/self-injury, urinary tract infections, pneumonia, sepsemia,

<table>
<thead>
<tr>
<th>Table 1. Unadjusted Age, Mortality, Ethnicity, and Marital Status of Veterans Living in Medical Foster Homes and Community Living Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average year of birth</strong></td>
</tr>
<tr>
<td>Medical foster home</td>
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<tr>
<td>Community living centers</td>
</tr>
</tbody>
</table>
other and history of injury, delirium/dementia/cognitive impairments, falls, and adverse drug events. These data are also visually presented in Figure 2.

Discussion

Compared with CLC matched controls, MFH residents experienced fewer hospitalizations for mental health problems such as anxiety, and mood disorders. In addition, they experienced fewer hospitalizations related to pressure ulcers, skin infections and other bacterial infections. Incidents of adverse medical care resulting in hospitalization were also less prevalent among MFH than CLC residents. No differences between the groups were observed for adverse drug events, falls or other injuries. Infections due to pneumonia, sepsis, and urinary tract infections were similar in the two groups. Importantly, hospitalization was not significantly higher among MFH residents for any of the conditions measured.

Fewer hospitalizations for psychiatric diagnoses, pressure ulcers, adverse care events and some infections among MFH residents may reflect the stability provided by a consistent caregiver in a smaller environment. Although data on infection risk related to consistent assignment has not been reported, it is plausible that with fewer residents, the opportunity for exposure to infection lessens. Similar to our findings, the literature suggests that consistent assignment of aides to nursing home residents is associated with fewer quality of life deficiencies (Castle, 2011), fewer problematic behaviors (Patchner, 1989; Teresi et al., 1993), improved mood (Teresi et al., 1993) and a reduction in pressure ulcers (Campbell, 1985; Mangaco-Borja, 2011). Based on this literature, the Advancing Excellence campaign endorses consistent assignment of aides on 85% of their shifts (Bakerjian & Zisberg, 2013). By design of the program, consistent assignment occurs for residents in MFHs because they are in the same home with the same caregivers each day. Replication of this study with comparison to community-based nursing homes may yield even more differences given that CLC staffing tends to be more stable than private sector nursing home staffing (U.S. Department of Veterans Affairs, 2011). Although not all data related to consistent assignment are conclusive, mixed results on its effects on quality outcomes (Roberts, Nolte, & Bowers, 2013) have been attributed to inconsistent conceptualization, operationalization, and measurement of consistent assignment. The MFH setting may offer an opportunity to understand the effects of consistent caregiving on outcomes more definitively.

MFH qualitative data identified three key preference domains that are important to successful MFH placement: environment, caregiver–Veteran match, and perception and expectations regarding the ability for Veteran needs to be met (Levy et al., 2014). Caregivers, residents, and program coordinators expressed that matching across these domains...

Table 2. Percentage of Veterans Hospitalized and Number of Hospitalizations Following Admission to a Medical Foster Home

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4+</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFH</td>
<td>62.10</td>
<td>18.95</td>
<td>9.88</td>
<td>5.44</td>
<td>3.63</td>
</tr>
<tr>
<td>CLC</td>
<td>24.24</td>
<td>32.84</td>
<td>21.37</td>
<td>10.82</td>
<td>10.73</td>
</tr>
<tr>
<td>MFH</td>
<td>47.62</td>
<td>21.21</td>
<td>9.74</td>
<td>10.82</td>
<td>10.61</td>
</tr>
<tr>
<td>CLC</td>
<td>19.62</td>
<td>22.72</td>
<td>18.12</td>
<td>14.11</td>
<td>25.43</td>
</tr>
</tbody>
</table>

Note: CLC = Community Living Centers; MFH = Medical Foster Home.

Table 3. Odds of Hospitalization From Select Causes Among Veterans Living in Medical Foster Homes (MFHs) Compared With Community Living Centers (CLCs)

<table>
<thead>
<tr>
<th>Hospitalization due:</th>
<th>MFH No. of events (N)</th>
<th>CLC No. of events (N)</th>
<th>Odds ratio</th>
<th>LCL</th>
<th>UCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse care events*</td>
<td>2 (478)</td>
<td>44 (1,395)</td>
<td>0.13</td>
<td>0.03</td>
<td>0.53*</td>
</tr>
<tr>
<td>Anxiety disorders*</td>
<td>25 (475)</td>
<td>135 (1,391)</td>
<td>0.52</td>
<td>0.33</td>
<td>0.80*</td>
</tr>
<tr>
<td>Mood disorders*</td>
<td>53 (471)</td>
<td>249 (1,378)</td>
<td>0.57</td>
<td>0.42</td>
<td>0.79*</td>
</tr>
<tr>
<td>Other bacterial*</td>
<td>16 (474)</td>
<td>85 (1,389)</td>
<td>0.54</td>
<td>0.31</td>
<td>0.92*</td>
</tr>
<tr>
<td>Skin infection*</td>
<td>6 (477)</td>
<td>76 (1,398)</td>
<td>0.22</td>
<td>0.10</td>
<td>0.51*</td>
</tr>
<tr>
<td>Skin ulcer*</td>
<td>6 (473)</td>
<td>78 (1,385)</td>
<td>0.22</td>
<td>0.09</td>
<td>0.50*</td>
</tr>
<tr>
<td>Suicide/self-injury</td>
<td>8 (476)</td>
<td>44 (1,399)</td>
<td>0.53</td>
<td>0.25</td>
<td>1.13</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>24 (474)</td>
<td>81 (1,386)</td>
<td>0.86</td>
<td>0.54</td>
<td>1.37</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>18 (475)</td>
<td>48 (1,384)</td>
<td>1.10</td>
<td>0.63</td>
<td>1.90</td>
</tr>
<tr>
<td>Septicemia</td>
<td>6 (474)</td>
<td>23 (1,388)</td>
<td>0.76</td>
<td>0.31</td>
<td>1.88</td>
</tr>
<tr>
<td>Other and history of injury</td>
<td>20 (474)</td>
<td>60 (1,389)</td>
<td>0.98</td>
<td>0.58</td>
<td>1.64</td>
</tr>
<tr>
<td>Delirium/cognitive</td>
<td>45 (462)</td>
<td>167 (1,345)</td>
<td>0.76</td>
<td>0.54</td>
<td>1.08</td>
</tr>
<tr>
<td>Falls</td>
<td>15 (478)</td>
<td>52 (1,403)</td>
<td>0.84</td>
<td>0.47</td>
<td>1.51</td>
</tr>
<tr>
<td>Adverse drug events</td>
<td>9 (477)</td>
<td>36 (1,399)</td>
<td>0.73</td>
<td>0.35</td>
<td>1.52</td>
</tr>
</tbody>
</table>

Note: LCL = lower confidence limit; UCL, upper confidence limit.

*Statistically significant difference in odds of hospitalization.
optimizes the care setting and processes. With respect to psychiatric hospitalization, caregiver–Veteran match may be particularly important. This domain represented “respect and relationship,” with the MFH setting “feeling like home” and the relationships characterized by “mutual respect and family inclusion.” This familiar relationship may make MFH caregivers more attuned to changes in mental health and promote early care that prevents symptom escalation and avoidable psychiatric hospitalization (Becker, Andel, Boaz, & Howell, 2009; Cassie & Cassie, 2012). However, this association is far from well-described and data are needed to understand the interaction between preferences for a smaller care setting, consistent assignment, and mental health outcomes.

The Centers for Medicare & Medicaid Services, the National Quality Forum, AHRQ, and the Joint Commission all consider pressure ulcers an important marker of quality of care. Despite the high incidence of pressure ulcers in long-term care facilities (HealthGrades, 2009), the majority of evidence to support pressure ulcer prevention is of low or very low quality (Health Quality Ontario, 2009; Helberg, Mertens, Halfens, & Dassen, 2006). Other than moderate quality evidence to support the use of an alternative foam mattress to prevent pressure ulcers, there is low quality evidence to support risk assessment, redistribution devices, nutritional supplementation, repositioning, or incontinence management as effective means of preventing and treating pressure ulcers (Health Quality Ontario, 2009). Increasingly, efforts such as AHRQs pressure ulcer prevention program are specifically targeted at long-term care facilities are finding the most effective interventions are multipronged, multidisciplinary interventions involving education of frontline staff in all stages of program design and incorporating these strategies into routine care practices such that consistent performance is engendered. In this context, the fact that MFH residents experience fewer hospitalizations for pressure ulcers is a welcome finding. MFH caregivers may be able to implement the recommended strategies consistently due to frequent HBPC visits and the small number of residents in each MFH (Milne, Trigilia, Houle, Delong, & Rosenblum, 2009; Niederhauser et al., 2012).

Limitations

This study was limited to Veterans, a predominately male cohort with multiple comorbidities. These findings may not be generalizable to other populations. We relied on the VA medical record, which may not have been complete and Veterans may be hospitalized outside of the VA system, however, once a Veteran is within a CLC or MFH program, use of alternative health care providers is less likely as medical services are more readily available through the VA compared with other providers.

The large number of CLC residents relative to MFH residents allowed study subjects to be directly matched on seven characteristics (age, gender, race, prognosis at last hospitalization, history of the outcome, and time in the baseline and follow-up periods) but other criteria, for example, functional status, care preferences such as “do not hospitalize” orders, marital status, Veteran priority status, socioeconomic status, distance from the hospital, access to the program and factors that cause Veterans to choose one setting of care over another were not controlled. There are also a set of variables that are not easily measured and were not controlled for, such as the culture within the CLC or the character of the MFH caregiver. All of these factors are important and could change the results shown in this study. In addition, the CLC cohorts only included long-stay residents and outcomes may differ for those with shorter stays. In addition, it is possible MFH caregivers are not seeking to hospitalize Veterans when hospitalization is indicated.

Nursing home patients are typically examined by looking at their function. These data were not available for MFH residents in this study so we have not used cognitive assessments, data on behavioral problems or measures of physical function as cofactors. A recent report (Wojtusiak, Levy, Williams, & Alemi, in press) indicates that functional assessments are correlated with specific diagnoses and therefore our report of hospitalization for different diagnoses may be informative about possible functional problems. For example, hospitalizations for delirium may be associated with a higher prevalence of cognitive impairment.
Main Finding
Residence in the MFH Program does not appear to increase hospitalization for common medical conditions compared with traditional VA nursing home care. In many conditions, the outcomes were the same. In some conditions (anxiety or mood disorders, skin infections, pressure ulcers, and adverse care outcomes), MFH cases had fewer hospitalizations than CLC controls. If these findings are replicable and outcomes favorable, MFH may represent a safe alternative to nursing home care in which to study the contribution of qualities of caregivers and contributions to resident outcomes.

Policy Implications
Findings from this study have important research, practice, and policy implications. Some argue that quality of care and quality of life may be unrelated or even have a negative relationship with emphasis on one resulting in compromise of the other (Grabowski et al., 2014; Zimmerman, Shier, & Saliba, 2014). The majority of research to date has demonstrated that initiatives emphasizing quality of life have not been associated with a significant decline in quality of care; however, consistent, significant improvements in quality of care have also not been demonstrated (Grabowski et al., 2014; Shier, Khodyakov, Cohen, Zimmerman, & Saliba, 2014). Although The Green House model of care is not comparable to the MFH model, it does represent a small care environment for individuals who meet nursing home level of care. Consistent with our results, studies of the Green House model have shown that outcomes are not adversely affected by receipt of care in a less traditional care environment (Kane, Lum, Cutler, Degenholtz, & Yu, 2007). Nonetheless, the individual, organizational, and care process variables that contribute to better outcomes remain elusive. It is probable that variations in MFH program quality, structure and/or adequacy of resident–caregiver match affect care outcomes. Future research exploring specific factors that contribute to positive care outcomes may enable caregivers, patients and policymakers to identify and individualize optimal long-term care settings, and inform development of matching methods that facilitate care setting selection.

In particular, the high prevalence of mental health concerns in nursing home populations and general underutilization of behavioral health services presents an immediate opportunity for practice change (Becker et al., 2009; Cassie & Cassie, 2012; Gaboda, Lucas, Siegel, Kalay, & Crystal, 2011). The finding that the MFH setting decreased the likelihood of hospitalizations to treat anxiety and mood disorders suggests that care processes may be more effective for some mental health conditions, the environment is protective, and/or the familiarity and consistency of the caregiver–resident relationship heightens recognition of mental health concerns. Alternatively, hospitalizations for these disorders may be lower because these conditions are not diagnosed or not treated. Further analysis will be necessary to understand how medications for mental illness are being prescribed and managed along with the degree to which psychiatric and psychological support services are available. Potential practice changes may include training to increase awareness of and attention to mental health concerns, resident–staff relationship building, and initiatives to promote resident and employee empowerment to permit earlier interventions and prevent avoidable hospitalizations for anxiety and mood disorders.

Another key message this research sends to policymakers pertains to access. Only Veterans with financial means are eligible to participate in the MFH program. Policymakers may consider allocating funds to the program that would allow MFH access to Veterans who prefer and are appropriate for this setting independent of financial status. Additionally, findings from this study provide more support for alternative, less restrictive long-term care settings in the civilian community. This research suggests that MFHs are not placing Veterans at greater risk of hospitalization for common conditions. The MFH care setting offers an ideal setting to understand how smaller care settings with consistent caregivers impact outcomes.

Supplementary Material
Supplementary material can be found at: http://gerontologist.oxfordjournals.org.

Funding
This project was funded by appropriation #3620160 from VA Office of Geriatrics and Extended Care.

Acknowledgments
The project coordinator was James Blankenship. We acknowledge the valuable guidance we received from Thomas Edes, MD Director, Geriatrics and Extended Care Operations and the National Medical Foster Home coordinators, Dan Goedken and Aida Fonseca. The views expressed in this article do not represent the views of Veterans Administration or the U.S. Government. All authors are employed by a Veterans Affairs Medical Center.

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