The Eden Alternative: Findings After 1 Year of Implementation

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Background. This study examines the effects of the Eden Alternative (EA), a systematic introduction of pets, plants, and children into a nursing home, on the quality of life of nursing home residents.

Methods. Two nursing homes run by the same organization participated. The study site began implementing the EA in November 1998. The control site continued traditional care. Patient-level data from the Minimum Data Set (MDS), Version 2.0, and aggregate data based on staff reports were used to compare the residents at the two sites in terms of cognition, survival, immune function, functional status, and cost of care after 1 year.

Results. After adjusting for baseline differences, follow-up MDS data indicated that the Eden site had significantly greater proportions of residents who had fallen within the past 30 days (p = .011) and residents who were experiencing nutritional problems (p < .001). Staff report data indicated that, during the study period, the Eden site had significantly higher rates of residents requiring skilled nursing and hypnotic prescriptions, and more staff terminations and new hires. The control site had significantly higher rates of residents requiring anxiolytic prescriptions.

Conclusions. The findings from this study indicate no beneficial effects of the EA in terms of cognition, functional status, survival, infection rate, or cost of care after 1 year. However, qualitative observations at the Eden site indicated that the change was positive for many staff as well as residents, suggesting that it may take longer than a year to demonstrate improvements attributable to the EA.

The Eden Alternative (EA) seeks to improve the quality of life of nursing home residents and create a home-like setting, using the systematic introduction of pets, plants, and children, accompanied by the engagement and empowerment of staff in effecting this change (1).

First introduced approximately 10 years ago in a nursing facility in New Berlin, New York, the EA is currently registered at 190 facilities. Anecdotal reports indicate that EA nursing homes benefit from lower use of psychotropic drugs, fewer infections, lower use of antibiotics, and a perceived improvement in quality of life of the residents (2,3). To date, our study is the first to use both Minimum Data Set (MDS) data and administrative reports to systematically evaluate the EA in a controlled trial.

Two nursing care facilities, run by the same organization but located in different communities, participated. The study site, a 126-bed, skilled nursing facility located in an urban area in a southern state, began implementing the EA after planning and preparing staff for more than a year, with the introduction of the first cat into the facility in November 1998. During the first year of implementation, in addition to plants, approximately eight dogs, 11 additional cats, 15 birds, and one rabbit were introduced at the Eden site. The second facility (control site), a 114-bed, skilled nursing facility located in a rural area in the same state as the Eden site, continued traditional care.

The purpose of this study was to test the hypothesis that the EA would have a beneficial effect on infection rates, functional status, and cost of care after 1 year. To control for secular trends and demographic differences between residents of the two nursing facilities, major outcome variables were measured using MDS data and administrative reports before and after the intervention.

Methods

We used medical records to identify permanent residents who were not terminally ill, who had resided at the site longer than 60 days, and whose MDS Version 2.0 data were available. We obtained baseline data from 115 initially eligible residents at the Eden site in November and December 1998, and follow-up data from 95 (83%) in December 1999 (19 residents died and one resident relocated). We obtained baseline data from 91 initially eligible residents at the control site and follow-up data from 79 (87%) (11 residents died and one resident left the facility).

Demographic and clinical characteristics of the residents at both sites were obtained from portions of the MDS. Aggregate information, including prescription use, infection-related laboratory tests, falls, and costs of care, was obtained from standard nursing home reports. A future report will summarize data from interviews with residents.

For dichotomous demographic variables at baseline, Fisher’s exact test was used to compare the Eden and control sites. For continuous variables, the two-sample t test was used. For number of diseases per resident, the Mann-Whitney-Wilcoxon test was used. Analysis of covariance
was used to compare the two sites on each outcome variable at the time of follow-up, after adjusting for baseline values and other variables that differed significantly between the two sites at baseline. The exact test for comparing two Poisson rates was used to compare the Eden and control sites in terms of per-resident rates calculated from aggregate data. The log-rank test was used to compare the survival curves at the Eden and control sites.

**RESULTS**

Baseline Characteristics

Resident baseline demographics are summarized in Table 1, and resident baseline clinical characteristics are summarized in Table 2. Staff caregivers at the two sites were similar in training and numbers. Providers at the Eden site included academic physicians, a nurse practitioner, and residents training in family medicine, as well as providers from the community. Providers at the control site were all community physicians.

**One-Year Effects of Eden Intervention**

**Survival.**—Of the subjects who were eligible for inclusion in the study, 33/115 (28.7%) at the Eden site and 23/91 (25.3%) at the control site eventually died (OR 1.19, 95% CI 0.61–2.34, p = .698). Figure 1 contains a comparison of the survival curves.

**Cognition, functional status, nutrition.**—After adjusting for baseline values, there was no significant difference between the two sites for MDS scales of cognition, activities of daily living (ADLs), oral problems, and nutritional approaches at time of follow-up (Table 3).

### Table 1. Baseline Demographics for Residents With Follow-Up Minimum Data Set (MDS) Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Subjects (N = 174)</th>
<th>Eden Site (n = 95)</th>
<th>Control Site (n = 79)</th>
<th>p Value (Eden vs Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age—Mean ± SE</td>
<td>85.1 ± 0.8</td>
<td>82.6 ± 1.4</td>
<td>88.0 ± 0.7</td>
<td>.001</td>
</tr>
<tr>
<td>Male</td>
<td>24/174 (14%)</td>
<td>16/95 (17%)</td>
<td>8/79 (10%)</td>
<td>.270</td>
</tr>
<tr>
<td>White race</td>
<td>153/174 (88%)</td>
<td>74/95 (78%)</td>
<td>79/79 (100%)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Widowed</td>
<td>116/173 (67%)</td>
<td>54/95 (57%)</td>
<td>62/79 (79%)</td>
<td>.001</td>
</tr>
<tr>
<td>High school graduate</td>
<td>87/169 (51%)</td>
<td>54/95 (57%)</td>
<td>33/74 (45%)</td>
<td>.164</td>
</tr>
</tbody>
</table>

Notes: Information on age, gender, and race was obtained from Section AA of the MDS, Version 2. Educational status was obtained from Section AB, and marital status was obtained from Section A. SE = standard error.

### Table 2. Baseline Clinical Characteristics for Residents With Follow-Up MDS Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Subjects (N = 174)</th>
<th>Eden Site (n = 95)</th>
<th>Control Site (n = 79)</th>
<th>p Value (Eden vs Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index—Mean ± SE</td>
<td>24.3 ± 0.7</td>
<td>24.8 ± 1.2</td>
<td>23.7 ± 0.6</td>
<td>.408</td>
</tr>
<tr>
<td>Weight (lbs)*—Mean ± SE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>157.1 ± 5.5</td>
<td>153.6 ± 5.4</td>
<td>164.0 ± 12.5</td>
<td>.466</td>
</tr>
<tr>
<td>(n = 24)</td>
<td>(n = 16)</td>
<td>(n = 8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>131.9 ± 2.7</td>
<td>131.0 ± 3.7</td>
<td>132.9 ± 3.8</td>
<td>.717</td>
</tr>
<tr>
<td>(n = 150)</td>
<td>(n = 79)</td>
<td>(n = 71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of diseases per resident†—Median (range)</td>
<td>6 (0–16)</td>
<td>5 (0–12)</td>
<td>6 (1–16)</td>
<td>.045</td>
</tr>
<tr>
<td>Fell within last 30 days§—No. (%)</td>
<td>42 (24%)</td>
<td>29 (31%)</td>
<td>13 (17%)</td>
<td>.034</td>
</tr>
<tr>
<td>Fell within past 31–180 days†—No. (%)</td>
<td>71 (41%)</td>
<td>37 (39%)</td>
<td>34 (43%)</td>
<td>.643</td>
</tr>
</tbody>
</table>

Notes: MDS = Minimum Data Set; SE = standard error; ADL = activities of daily living.

*Information on height and weight was obtained from Section K.2 of MDS, Version 2.0.

†Information on disease diagnoses was obtained from Section I.1 of MDS, Version 2.0.

‡Information on falls was obtained from Section J.4 of MDS, Version 2.0.

§Activities of Daily Living (ADLs) scale (4). Higher scores indicate greater functional impairment. Theoretical range 0–33.

¶MDS Cognition Scale (5). Higher scores indicate greater cognitive impairment. Theoretical range 0–9.

††Oral problems scale: Sum of items K1a, K1b, K1c (chewing problem, swallowing problem, mouth pain) on MDS, Version 2.0. Higher scores indicate more problems. Theoretical range 0–3.

‡‡Nutritional problems scale: Sum of items K4a, K4b, K4c (complaints about the taste of food, complaints of hunger, 25% or more of food left uneaten) on MDS, Version 2.0. Higher scores indicate more problems. Theoretical range 0–3.

§§Nutritional approaches scale: Sum of items K5a, K5b, K5c, K5d, K5e, K5f, K5g, K5h (feeding tube, mechanically altered diet, therapeutic diet, etc.) on MDS, Version 2.0. Higher scores indicate more approaches. Theoretical range 0–8.

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Both MDS data and staff reports indicated more falls at the Eden site than at the control site for a significant portion of the study period (Table 3, Figure 2). There were significantly more oral problems at the control site than at the Eden site at time of follow-up, after adjusting for baseline differences ($p < .001$). However, this difference became nonsignificant once baseline differences in ADLs between the two sites were taken into account (Table 3).

The residents at the Eden site experienced significantly more nutritional problems than the control site at time of follow-up after adjusting for baseline differences. Despite this difference, there were no significant differences in either body mass index (BMI) or weight at time of follow-up (Table 3).

**Infection rate.**—Aggregate data (not shown) indicated that the mean number of laboratory tests per resident that were positive for infection remained fairly constant at both sites during the study period with no significant differences.

**Cost of care.**—The Eden site had a consistently higher proportion of residents requiring skilled nursing, with stas-

**Table 3. Comparisons of Eden and Control Sites at Follow-Up—MDS Data**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Eden Site* ($n = 95$)</th>
<th>Control Site* ($n = 79$)</th>
<th>$p$ Value (Eden vs Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>23.2 ± 0.5</td>
<td>23.9 ± 0.5</td>
<td>.338</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>157.0 ± 3.1</td>
<td>160.5 ± 4.4</td>
<td>.526</td>
</tr>
<tr>
<td>(n = 16)</td>
<td>(n = 8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>129.9 ± 1.3</td>
<td>131.6 ± 1.3</td>
<td>.371</td>
</tr>
<tr>
<td>(n = 79)</td>
<td>(n = 71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fell within past 30 days—No. (%)</td>
<td>20 (21%)</td>
<td>5 (6%)</td>
<td>.011</td>
</tr>
<tr>
<td>Fell within past 31–180 days—No. (%)</td>
<td>30 (32%)</td>
<td>27 (34%)</td>
<td>.689</td>
</tr>
<tr>
<td>MDS scales†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADL</td>
<td>26.4 ± 0.6</td>
<td>26.2 ± 0.7</td>
<td>.871</td>
</tr>
<tr>
<td>Cognition</td>
<td>5.6 ± 0.1</td>
<td>5.4 ± 0.1</td>
<td>.350</td>
</tr>
<tr>
<td>Oral problems</td>
<td>0.4 ± 0.1†</td>
<td>0.6 ± 0.1†</td>
<td>.062</td>
</tr>
<tr>
<td>Nutritional problems</td>
<td>0.8 ± 0.1</td>
<td>0.5 ± 0.1</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Nutritional approaches</td>
<td>1.4 ± 0.1</td>
<td>1.4 ± 0.1</td>
<td>.902</td>
</tr>
</tbody>
</table>

*Mean ± SE at follow-up, adjusted for baseline, unless otherwise noted.
†A higher score on any MDS scale indicates poorer functioning or more problems.
‡Mean ± SE at follow-up, adjusted for baseline oral problems and baseline ADL.

Notes: BMI = body mass index; MDS = Minimum Data Set; ADL = activities of daily living; SE = standard error.
tical significance achieved for 5 months (Figure 3). The hospitalization rate was significantly higher at baseline at the control site than at the Eden site (22 per 100 residents vs 7 per 100 residents, \( p = .0031 \)), and the rate at the control site was consistently higher than at the Eden site for most of the remainder of the study period (data not shown). However, statistical significance was achieved only for July 1999 (12 per 100 residents vs 2 per 100 residents, \( p = .002 \)).

The rate of staff terminations was significantly greater at the Eden site than at the control site for all but 1 month during the period of implementation of the EA (December 1998–August 1999) (Figure 4). A similar pattern was seen for the rate of new hires (data not shown).

There were also significant differences between the two sites in mean numbers of anxiolytic (Figure 5) and hypnotic (Figure 6) prescriptions. With the exception of 1 month each, there were no significant differences between the two
sites in terms of either antidepressant and psychotropic prescriptions (data not shown).

**Discussion**

Our findings suggest no major effect of the Eden intervention after 1 year on survival, functional status, cognition, or nutritional status of residents as measured by MDS and no effect on infection rate or pharmaceutical use as measured by administrative reports. The findings also indicate that staff turnover may increase during the first year of Eden implementation.

The lack of a beneficial effect from the Eden intervention on measures of survival and infection rates may be explained by the higher proportion of Eden residents who required skilled nursing care, indicating a greater burden of illness. The lack of a significant difference in survival curves might be seen as a positive effect at the Eden site.

Hospitalization rates for residents at the Eden site were consistently lower than at the control site, despite the greater number of residents requiring skilled nursing. However, because the hospitalization rate was lower at the Eden site at baseline, this difference may not be attributable to the EA.

After controlling for baseline differences, there were no significant differences between the two sites at time of follow-up for outcomes based on MDS data, with the exception of falls within the past 30 days and nutritional problems. The higher frequency of nutritional problems at the Eden site may be related to both lower cognitive impairment scores, as manifest by greater ability to exhibit concerns with nutrition, and a greater percentage of residents requiring skilled nursing. The lack of change in BMI and weight during the Eden intervention also suggests that the differences between sites in nutritional problems at follow-up may be related to resident ability to express concerns.

The consistently lower rate of falls at the control site may be related to its greater degree of cognitive and functional impairment, resulting in residents who were less mobile and less likely to fall. The higher prescription rate for hypnotics at Eden and the higher anxiolytic prescription rate at the control site may reflect differences in prescribing preferences or in management philosophy among providers at the two sites.

The initial Eden intervention study reported a 50% decrease in infection rate (6). For the 1-year duration of the present study, there were no significant differences between sites in the number of laboratory tests positive for infection.

Staff turnover and leadership changes undoubtedly play a role in the implementation of the EA (7). Major administrative changes at both sites during the study period may have had a greater impact at the Eden site during the early critical implementation phase when loss of the nursing director and associated staff turnover occurred. The control site also lost its nursing director, but later in the study period and with less staff turnover. In addition, the administrator at the Eden site had to consult specialists to assist in dealing with fears of animals experienced by a substantial proportion of the staff. Because both nursing homes are run by the same organization with similar high standards of care, a “ceiling” effect may have made it difficult to demonstrate significant positive changes at the Eden site.

In addition, 1 year of the Eden intervention may have been too short a time interval to yield improvement in MDS and administrative data. Other studies (6,8), longer in duration and using administrative data only, have demonstrated more pronounced changes. Throughout the study period, involvement of residents with animals and plants increased. It may be that the intervention was actually only beginning to take effect when the study was completed. Alternatively, perhaps other measures would have been more sensitive in detecting change.

Use of MDS data is limited because of difficulties in controlling for variations in data collection, e.g., whether the direct caregiver or another nurse collects the data, and in training MDS data collectors (9). Scores on the MDS do not correlate with recognized assessment tools for mood, but MDS scores of functional status and cognitive impairment correlate well with other instruments, including the Physical Signs and Symptoms Scale, the Mini-Mental State Examination, and item 6 of the Psycho-geriatric Dependency Rating Scale (10). An advantage of the MDS is that it provides a periodic evaluation that can be used to track the resident’s status over time.

The differences that we found between the two sites in baseline characteristics of the residents may reflect differences in referral patterns to nursing home care between rural (i.e., the control site) and urban (i.e., the Eden site) areas. Urban families, in contrast to rural families, may be less able or willing to care for their elders and may refer them for nursing home care when they are less impaired cognitively or in activities of daily living.

Although quantitative data did not demonstrate significant effects of the EA after 1 year, several observations at the Eden site indicate that the change was positive for some. One staff member summed it up: “The atmosphere here changed the day the animals came into the facility.... It has certainly changed the attitudes of the workers as well as the residents.”

Staff members reported, “We had a bed-bound resident [who] very rarely interacted with anybody. We put the cat down on the bed, and she reached up and touched it and mumbled a few words. We hadn’t heard her talk before nor had we ever seen her interact like that,” and “When [one resident] came here she was depressed and crying. [We] had a cat brought up for her, and instantaneously she went from horribly depressed to happy and said, ‘This was like darkness and then peace.’ She has not had problems with depression since.”

In summary, after 1 year of implementation of the EA, MDS data and administrative reports did not show significant improvement in functional status, infection rate, or cost of care outcomes. However, anecdotes suggest that an extended period of implementation may yield significant positive changes. In addition, the fact that a higher proportion of the residents at the Eden site required skilled nursing may have diluted the expected effects. Future research on the benefits of the Eden intervention should control for burden of illness.

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Conflict of Interest

Dr. James O’Brien is medical director of the nursing home chosen as the site for introduction of the Eden intervention.

References


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