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Impact of a Videoconference Educational Intervention on Physical Restraint and Antipsychotic Use in Nursing Homes: Results From the ECHO-AGE Pilot Study

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Abstract

Objectives—US nursing homes care for increasing numbers of residents with dementia and associated behavioral problems. They often lack access to specialized clinical expertise relevant to managing these problems. Project ECHO-AGE provides this expertise through videoconference sessions between frontline nursing home staff and clinical experts at an academic medical center. We hypothesized that ECHO-AGE would result in less use of physical and chemical restraints and other quality improvements in participating facilities.

Design—A 2:1 matched-cohort study comparing quality of care outcomes between ECHO-AGE facilities and matched controls for the period July 2012 to December 2013.

Setting—Eleven nursing homes in Massachusetts and Maine.

Participants—Nursing home staff and a hospital-based team of geriatrician, geropsychiatrist, and neurologist discussed anonymized residents with dementia.

Intervention—Biweekly online video case discussions and brief didactic sessions focused on the management of dementia and behavior disorders.

Measurements—The primary outcome variables were percentage of residents receiving antipsychotic medications and the percentage of residents who were physically restrained. Secondary outcomes included 9 other quality of care metrics from MDS 3.0.

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The authors declare no conflicts of interest.

Results—Residents in ECHO-AGE facilities were 75% less likely to be physically restrained compared with residents in control facilities over the 18-month intervention period (OR = 0.25, $P = .05$). Residents in ECHO-AGE facilities were 17% less likely to be prescribed antipsychotic medication compared with residents in control facilities (OR = 0.83, $P = .07$). Other outcomes were not significantly different.

Conclusion—Preliminary evidence suggests that participation in Project ECHO-AGE reduces rates of physical restraint use and may reduce rates of antipsychotic use among long-term nursing home residents.

Keywords

Dementia; nursing home; antipsychotics; physical restraints; videoconferencing

Behavioral problems are some of the most frequent neuropsychiatric symptoms (NPS) of dementia.¹ Although frequently seen in the nursing home setting, most nursing homes lack access to specialists, such as geriatric psychiatrists and behavioral neurologists with expertise in the management of these problems. This is in part because of a shortage of geriatricians and geropsychiatrists in the United States² as well as the lack of proximity of many community nursing homes to tertiary care institutions where such specialists frequently work. As a result, caregivers may resort to physical or chemical restraints to manage behavior disorders among nursing home residents. Although there is little evidence to support the use of antipsychotic medications in such situations,^{3–6} more than 1 in 5 nursing home residents are prescribed antipsychotic medications without a supporting diagnosis.⁷ Further, antipsychotic medication use in nursing homes has been associated with increased risk of adverse events such as hip fractures and hospitalizations.⁸ Although physical restraint use has declined significantly over recent years, they are still occasionally used to manage disruptive behaviors, despite their established risks. They significantly compromise safety, dignity, and autonomy, and there is a growing body of evidence that they actually increase overall risk of falls and fracture as well as mortality.^{8–12}

In 2012, clinicians at Beth Israel Deaconess Medical Center (BIDMC) in Boston launched Project ECHO-AGE, a biweekly, case-based video-consultation program aimed to extend relevant geriatric expertise in the care of patients with dementia to community-based nursing homes and thereby train frontline providers to become experts in dementia care. This model of care is based on the Extension for Community Healthcare Outcomes (ECHO) Project developed by Dr Sanjeev Aurora to successfully manage hepatitis C in rural New Mexico.^{13–15}

Our aim was to determine the impact of the ECHO-AGE intervention on the quality of care delivered to nursing home residents with dementia across participating facilities. In particular, we aimed to determine whether the intervention reduced physical and chemical restraint use.

Methods

An initial cohort of 16 nursing homes from Massachusetts and Maine was recruited to participate in ECHO-AGE. Of the initial facilities, 5 dropped out because of a lack of time or interest. Each of the facilities included in the final analysis presented at least 1 case and 1 follow-up case during the 18-month study period. Project ECHO-AGE uses secure, Health Insurance Portability and Accountability Act-compliant video-consultation technology to conduct a biweekly videoconference between teams of frontline nursing home staff and a team of clinical experts at BIDMC. Participants typically included a nurse and a certified nurse assistant, with an occasional nurse manager, activities director, or social worker. The clinical experts included a geriatrician facilitator, a geropsychiatrist who commented on psychoactive medications, a behavioral neurologist who interpreted cognitive tests and discussed the subtleties of treatment of dementia, and a part-time social worker who discussed behavioral modification plans. During each 120-minute biweekly session, participating nursing homes presented 3 to 4 challenging long-stay residents. A total of 115 cases were discussed during the study period. Didactic sessions were frequently included. Further details about the structure of the program, the issues discussed, and recommendations made, as well as a description of the qualitative findings from its first year, have been previously published.¹⁶ This research did not involve patient-level data and was deemed exempt by the BIDMC institutional review board.

Matching

Each of the 11 ECHO-AGE facilities was matched with 2 other similar facilities based on facility size (matched to within 32 beds, with 1 exception), for-profit status, region (using the New England City and Town Area designation [NECTA]), whether or not they were part of a larger nursing home chain, staff rating, and overall 5-star quality rating. Data from www.medicare.gov/NursingHomeCompare during the first 2 quarters of 2012 were used to identify staff and 5-star ratings.

Outcomes

Outcomes derived from the Minimum Data Set (MDS) 3.0 were obtained for each facility from www.medicare.gov/NursingHomeCompare. The MDS is a clinical assessment instrument that facilitates care management and payment schedules for nursing home residents, and is completed on all nursing home residents at the time of admission, quarterly thereafter, and with any acute change in condition.¹⁷ Outcomes were collected only for long-stay residents, defined as a resident with 100 days or more in the same facility without 10 consecutive days outside the facility. Our primary outcomes were the percentage of long-stay residents who were physically restrained (item P0100, E-H in MDS 3.0) and who received an antipsychotic medication over the past 7 days (N0400A in MDS 3.0). A total of 9 other quality measures were collected as secondary outcomes, including percentage of long-stay residents with increased need for help with activities of daily living (ADLs), residents with self-reported moderate to severe pain, high-risk residents with pressure ulcers, residents who lose too much weight (loss of 5% or more of body weight in 1 month or 10% or more over 6 months), low-risk residents (as defined in the MDS manual) who lose control of bowel or bladder, residents in whom a catheter was inserted and left in their bladder,

residents with a urinary tract infection, residents with depressive symptoms, and residents experiencing 1 or more falls with major injury.

Statistical Analysis

MDS data were downloaded for the 18-month period of the intervention and the preceding 4 quarters. Baseline quality measures were averaged across the 4 quarters preceding the intervention (Q2 2011 through Q1 2012). In addition to the MDS data, facility-level long-stay patient census data were obtained from the Center for Innovation in Quality at Brown University through a data use agreement. Means and SDs of the 11 quality measures of the nursing homes were calculated at baseline and at each of the 6 quarters of follow-up. Differences between intervention and control groups were tested using Student *t* test. We performed a logistic regression analysis to examine the relation between the intervention and each quality measure. We used generalized estimating equations to account for clustering within the matched sets and repeated measures over the 6 quarters. The quality measures (expressed as percentages within each facility) along with the patient census data were used to compute the number of residents with each outcome. Models were also adjusted for average baseline value of the quality measure. These same models were used to examine the changes in quality measures between baseline and the first quarter of the intervention, the period when the greatest changes were observed. Statistical analyses were performed using SAS version 9.4 (SAS Institute, Inc, Cary, NC).

Results

Baseline Characteristics

Of the 11 participating nursing homes, 8 were for-profit and 3 were nonprofit. The facilities in the intervention group had an average of 135 beds (62–355) versus 116 beds (46–186) in the control group. Baseline characteristics of the intervention and control groups were similar (Table 1).

At baseline, ECHO-AGE facilities reported that 26.0% of the residents had received an antipsychotic medication in the preceding month, versus 27.9% in the control group ($P = .53$). At baseline, 1.1% of long-stay residents in the intervention group had been physically restrained in the preceding month, versus 1.6% in the control group ($P = .28$). The only quality measure collected as a secondary outcome that showed a statistically significant difference between the intervention and control groups was percentage of high-risk residents with pressure ulcers. The intervention facilities had a higher percentage of these residents ($P = .03$).

In the adjusted logistic regression model, residents in ECHO-AGE facilities were 75% less likely to be physically restrained than residents in control facilities over the 18-month follow-up period (odds ratio [OR] = 0.25, $P = .05$). Additionally, residents in ECHO-AGE facilities were 17% less likely to be prescribed antipsychotic medication than residents in control facilities (OR = 0.83, $P = .07$). Of the secondary outcomes analyzed, residents in the ECHO-AGE facilities were 23% less likely to experience a urinary tract infection during the follow-up period (OR = 0.77, $P = .01$, Table 2).

For both of our primary outcomes, the greatest change occurred in the first quarter after the intervention began (2012 Quarter 3 [Q3]) (Figure 1). For physical restraints, the intervention group experienced a 67.3% decrease following initiation of the program (from an average of 1.1% to 0.4%), compared with an 11.5% increase in the control group (from an average of 1.6% to 1.8%) (OR = 0.58, $P = .07$). The decrease in the intervention group was maintained for the remaining 5 quarters. For antipsychotic use, the intervention group saw a 12.5% decrease in the quarter immediately following the start of the intervention (from an average of 26.0% to 22.7%), compared with a 4.2% increase in the control group (from an average of 27.9% to 29.1%) (OR = 0.95, $P = .24$). Antipsychotic use continued to gradually decline in the intervention group across the rest of the quarters. Based on the NH census data during the study, these percentages amounted to a reduction from 13 residents restrained at baseline to 4 residents restrained 3 months after the intervention began, compared with a change from 42 to 48 residents restrained in the control homes; and a reduction from 321 residents taking antipsychotics at baseline to 286 residents taking them 3 months after the intervention began, compared with a change from 668 to 677 taking antipsychotics in the control homes.

Discussion

In this prospective matched-cohort study, we evaluated a novel educational intervention that used videoconferencing technology to connect clinical experts at an academic medical center with frontline staff in community nursing homes to improve the care of residents with dementia and associated behavioral problems. We found preliminary evidence that this intervention was associated with a reduction in physical restraint use and a trend toward reduction in antipsychotic medication use among long-stay residents. Although national attention continues to reduce these potentially harmful treatments across the nursing home industry, the reduction experienced by the intervention group was in excess of that experienced by the matched controls. There is also no reason to believe that this “secular” trend affected the intervention group more than the control group. Given our modest sample size and the significant effect sizes observed, we believe this is a promising intervention worthy of further study.

There are several limitations to our study. First, its nonrandomized nature leaves open the potential for selection bias. Nursing homes that elected to participate in ECHO-AGE may be more strongly committed to quality improvement, better funded, or more generously staffed. Therefore, they may not be representative of a broader sample of facilities in Massachusetts, Maine, or other states. Second, as the facilities were aware we were studying the results, a Hawthorne effect is possible. Third, as a pilot study, the total number of facilities included was small and thus the study was underpowered to detect relatively small effect sizes. Fourth, given the low baseline rates of physical restraint use, it is possible that we are observing a floor effect rather than a meaningful reduction. Nevertheless, it is notable that physical restraint use did not increase while antipsychotic use decreased. Finally, we did not match on baseline rates of physical restraint and antipsychotic use. Given the other characteristics we matched on, it would have been relatively difficult to additionally match on baseline rates of the outcomes. Despite this, there were no differences in baseline rates between the intervention and control nursing homes and we did adjust all analyses for the baseline rates to account for any potential biases.

Our study used facility-wide data that was not limited to residents discussed in the ECHO-AGE conferences, which may have diluted the measured impact of the intervention. This was intentional, however, in that the goal of the intervention was to impact care across participating facilities. By using “long-stay” MDS data, we excluded residents recently readmitted from the hospital and all residents in assisted living, who were likely both positively impacted by the intervention. Also, our analysis may have underestimated the effect because changes in the dose or frequency of physical or chemical restraint use were not reflected. This is especially important given that research shows that significant factors in the overall mortality associated with antipsychotic medications are drug dosage, frequency, and duration.^{18,19}

Despite its limitations, the study has several strengths, including its prospective design, 2:1 matching of controls, and repeated-measures analysis over time.

Conclusion

In this pilot study of a videoconference educational intervention focused on behavioral problems in nursing home residents with dementia, we found preliminary evidence of a reduction in use of physical restraints and a trend toward reduction in use of antipsychotic medications. The decrease in use of antipsychotics in particular, has implications for potentially decreasing costly adverse events such as falls, hip fractures, and hospitalizations. Given the importance of both of these measures in terms of the health, safety, and dignity of long-term care residents, further research on the potential of the ECHO intervention to improve the management of other geriatric conditions and ultimately reduce health care costs is warranted.

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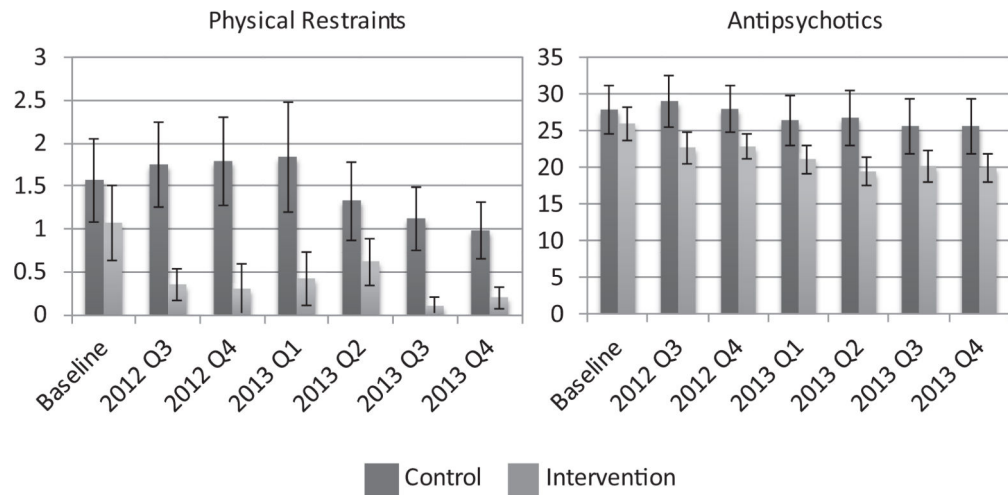


Fig. 1. Percentage of long-stay patients ordered for physical restraints and antipsychotics, by quarter, control versus intervention groups. Q, Quarter.

Table 1

Baseline Facility Characteristics

Measure	<u>Intervention</u>	<u>Control</u>
	n = 11	n = 22
Nursing home characteristics		
Size, beds	135 (80.82)	116(36.47)
Range of beds (n)	62–355	46–186
Profit status, for-profit, n (%)	8 (73%)	16 (73%)
Chain status, yes, n (%)	10 (91%)	20 (91%)
% Medicaid	64.9 (28.5)	62.8 (23.6)
Staffing rating, 5-point scale	4 (0.4)	4 (0.4)

Quality measures (percentage of long-term care residents within past month)

Measure	MDS No.	<u>Intervention</u>	<u>Control</u>	P
		n = 11	n = 22	
Need for help with ADLs has increased	401	18.16 (4.37)	14.87 (5.52)	.16
Self-report moderate to severe pain	402	9.16 (4.53)	8.97 (7.06)	.36
High-risk residents with pressure ulcers	403	6.66 (4.07)	4.98 (2.06)	.03
Lose too much weight	404	7.94 (2.08)	6.8 (2.75)	.15
Low-risk residents who lose control of bowel or bladder	405	47.3 (11.17)	47.32 (15.26)	.87
Catheter inserted and left in bladder	406	3.82 (2.01)	3.49 (2.75)	.69
With urinary tract infection	407	6.85 (2.78)	7.85 (3.35)	.55
With depressive symptoms	408	5.45 (6.42)	4.62 (4.25)	.93
Were physically restrained	409	1.07 (1.45)	1.57 (2.29)	.28
Experiencing 1 or more falls with major injury	410	3.6 (2.16)	3.68 (1.83)	.97
Received an antipsychotic medication	419	25.99 (7.67)	27.9 (15.52)	.53

MDS, Minimum Data Set; ADL, activities of daily living; SD, standard deviation.

Data are presented as mean (SD) unless otherwise stated.

Table 2

Logistic Regression of Primary and Secondary Outcome Quality Measures

Outcome	OR (95% Confidence Interval) for Intervention Effect	P
Need for help with ADLs has increased	0.95 (0.77–1.19)	.6684
Self-report moderate to severe pain	1.03 (0.72–1.48)	.8655
High-risk residents with pressure ulcers	0.80 (0.60–1.07)	.1322
Lose too much weight	1.20 (0.97–1.48)	.0943
Low-risk residents who lose control of bowel or bladder	1.00 (0.76–1.32)	.9986
Catheter inserted and left in bladder	0.89 (0.68–1.17)	.4091
With urinary tract infection	0.77 (0.64–0.94)	.0090
With depressive symptoms	1.09 (0.81–1.47)	.5830
Were physically restrained	0.25 (0.06–1.04)	.0574
Experiencing 1 or more falls with major injury	0.99 (0.78–1.27)	.9629
Received an antipsychotic medication	0.83 (0.68–1.02)	.0729

Model includes intervention + baseline.

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