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Improving Adherence to Dementia Guidelines through Education and Opinion Leaders

A Randomized, Controlled Trial

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Background: Educational methods that encourage physicians to adopt practice guidelines are needed.

Objective: To evaluate an educational strategy to increase neurologists' adherence to specialty society-endorsed practice recommendations.

Design: Randomized, controlled trial.

Setting: Six urban regions in New York State.

Participants: 417 neurologists.

Intervention: The educational strategy promoted six recommendations for evaluation and management of dementia. It included a mailed American Academy of Neurology continuing medical education course, practice-based tools, an interactive evidence-based American Academy of Neurology-sponsored seminar led by local opinion leaders, and follow-up mailings.

Measurements: Neurologists' adherence to guidelines was measured by using detailed clinical scenarios mailed to a baseline group 3 months before the intervention and to intervention and control groups 6 months after the intervention. In one region, patients' medical records were reviewed to determine concordance between neurologists' scenario responses and their actual care.

Results: Compared with neurologists in the baseline and control groups, neurologists in the intervention group were more adherent to three of the six recommendations: neuroimaging for patients with dementia only when certain criteria are present (odds ratio, 4.1 [95% CI, 1.9 to 8.9]), referral of all patients with dementia and their families to the Alzheimer's Association (odds ratio, 2.8 [CI, 1.7 to 4.8]), and encouragement of all patients and their families to enroll in the Alzheimer's Association Safe Return Program (odds ratio, 10.8 [CI, 3.5 to 33.2]). For the other three recommendations, adherence did not differ between the intervention and the nonintervention groups. Agreement between scenario responses and actual care ranged from 27% to 99% for the six recommendations and was 95% or more for three of the recommendations.

Conclusion: A multifaceted educational program can improve physician adoption of practice guidelines.

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Many medical specialty societies devote substantial resources to the development and dissemination of practice guidelines. Studies suggest that passive dissemination (such as publication or mailing of guidelines) is ineffective in increasing adoption of recommendations into clinical practice (1–5). Educational efforts to increase physicians' adoption of guidelines are more likely to be effective when they are local, are multifaceted, and incorporate strategies that use a “social influence” model of change (1, 2, 4, 6–9). In particular, opinion leaders—respected authorities within a medical community—have been shown to influence the adoption of guidelines (1, 7, 10, 11). However, despite the widespread development and endorsement of guidelines by specialty societies, little research has been done on the effectiveness of guideline implementation efforts (3–5, 12).

We conducted a randomized, controlled trial to evaluate a multifaceted, evidence-based educational program to enhance the adoption of practice recommendations for the care of patients with dementia that were endorsed by the American Academy of Neurology (AAN) and local opinion leaders. We hypothesized that more neurologists who received the educational intervention would adhere more to the guideline recommendations than would neurologists who did not receive this intervention.

See editorial comment on pp 304-306.

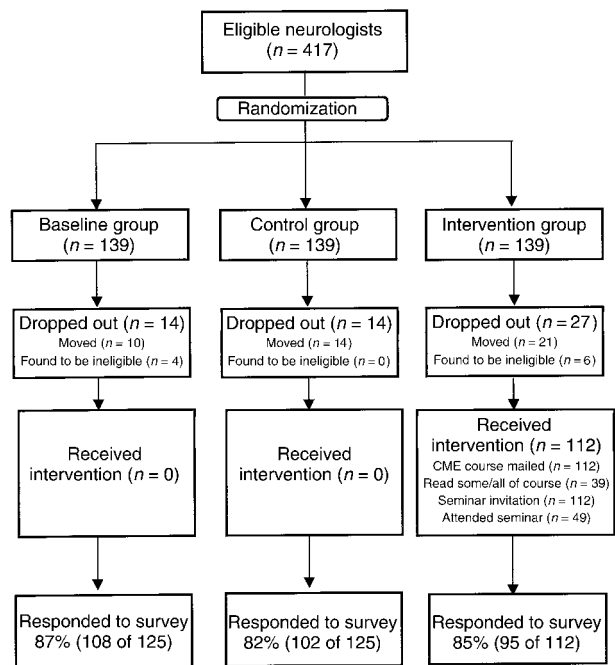


Figure 1. Participant flow and follow-up. A random-number generator was used to assign 417 eligible neurologists to one of three groups of 139 neurologists each. The randomization scheme was concealed from all study personnel except the computer programmer and the project coordinator. A trend was seen for more neurologists to “drop out” of the study after randomization (that is, move) from the intervention group ($n = 27$) compared with the baseline ($n = 14$) and control ($n = 14$) groups ($P = 0.1$). Neurologists in the baseline and control groups were notified of the study when they received the survey; neurologists in the intervention group were informed at the start of the intervention. Among neurologists in the intervention group who responded to the survey and answered the question about reading the course, 42% (39 of 93) reported thoroughly reading some or all of the mailed continuing medical education (CME) dementia care course. The baseline group received the survey by mail 3 months before the start of the intervention, whereas the control and intervention groups received the survey approximately 6 months after the start of the intervention. More than 80% of participants in all three groups responded to the survey.

Methods

Our methods have been described in detail elsewhere (13) and are summarized here. The University of Rochester institutional review board approved the study.

Study Sample

We identified neurologists from six major urban regions in New York State (Albany, Buffalo, the Upper East Side of Manhattan, Queens, Rochester, and Syracuse) by using both the AAN membership database ($n = 407$) and, for neurologists not in the AAN database, the New York State physician master file ($n = 10$) (13). Neurologists were eligible to participate if they were board eligible or board certified in neurology or currently in a neurology residency or fellowship. We excluded neurologists whose primary specialty was child neurology, neu-

ropathology, ophthalmology, nuclear medicine, or pediatrics and those who provided no patient care.

Study Group Assignment

We randomly assigned neurologists to the baseline group, control group, or intervention group (Figure 1). Only neurologists in the intervention group received the educational intervention. We assessed the primary study outcomes in the baseline group 3 months before the intervention and in the control and intervention groups 6 months after the intervention. Neurologists in the same practice could be randomly assigned to different study groups. Comparison of baseline and control group results enabled assessment of possible temporal effects and potential information transfer between control and intervention groups (14).

Selection of Practice Recommendations

We reviewed all available clinical practice guidelines on dementia care that were developed and endorsed by the AAN (15, 16), as well as other published dementia guidelines (17–26). We selected six recommendations because they were developed or endorsed by a specialty society and because the literature suggested performance gaps and practice variations for the clinical care issues outlined in the recommendations (27–30). These recommendations included two about the indications for neuroimaging and electroencephalography in patients with dementia, from a previously published, AAN-developed “practice parameter” on dementia (15); one on the use of apolipoprotein E genotype testing, from a position paper that had been officially endorsed by the AAN and other specialty society organizations (16); and one on detection and treatment of depression, from guidelines developed by a national panel of experts (19, 20). In addition, we developed two recommendations specifically for the project on referring patients and their families to the Alzheimer’s Association and to the Alzheimer’s Association Safe Return Program, a national program designed to reduce the potential of adverse consequences of wandering. An AAN Advisory Panel—composed of four dementia experts nominated by the AAN, neurology opinion leaders from each study region, and persons from the local Alzheimer’s associations representing the study regions—endorsed all six recommendations (see the Appendix for the wording of each guideline).

Opinion Leader Selection

To identify local opinion leaders, we mailed a survey (31) to a random sample of half of all eligible persons in each region except Albany and Syracuse, where all eligible persons received the survey. This survey was completed before neurologists were

randomly assigned to study groups, and it guided the identification and recruitment of 12 opinion leaders: 1 in Albany; 2 each in Buffalo, Manhattan, Rochester, and Syracuse; and 3 in Queens (13).

Educational Intervention

The intervention was an evidence-based educational program consisting of a mailed AAN continuing medical education (CME) course (32), a resource manual with tools to help implement guidelines, an invitation to an AAN-sponsored evidence-based seminar, and five reminder mailings. The AAN, the local opinion leaders, and other advisory panel members endorsed the program. The individual components of the program were administered in the fall of 1997 to the intervention group only.

The mailed CME course was designed so that readers could quickly review each recommendation and then analyze the rationale and evidence supporting it in more depth (32). The course begins with an executive summary highlighting all six practice recommendations, along with a short rationale formatted as a bulleted list. The course continues with four similarly formatted sections. Each section presents one or two recommendations in outline format, along with the endorsing organizations, followed by the rationale and supporting data, a clinical algorithm and a clinical case vignette illustrating and reinforcing each recommendation, and an in-depth discussion that elaborates on the recommendations. We included a list of physician resources and patient education and information handouts in two appendices.

The resource manual consisted of a three-ring binder containing tools designed to help neurologists incorporate these recommendations into their practice, including the Cornell Scale for Depression in Dementia (33), a fact sheet for patients and caregivers about their local branch of the Alzheimer's Association (with the Association's telephone number), and a Safe Return Program application (13). All tools were also included in the CME course.

We invited all neurologists in the intervention group to attend an AAN-sponsored local seminar on dementia care. The seminars occurred on a weeknight, included dinner, and lasted 3 hours. The local opinion leaders, a representative from the local Alzheimer's Association, and a study investigator served as faculty. The seminars followed a standard format. The study investigator presented each practice recommendation, along with the rationale and supporting evidence. After formal presentation of each recommendation, the opinion leaders endorsed the recommendation and led a 10- to 15-minute interactive discussion with attendees about practical issues of incorporating the recommendation in

routine clinical practice. The Alzheimer's Association representative also actively participated in the discussion. Tools that applied to the recommendations were presented and were distributed to each attendee.

Six weeks after the seminar, we sent five mailings (each approximately 2 to 3 weeks apart) with cover letters signed by the opinion leaders to all intervention neurologists. The first four mailings highlighted one or two recommendations. The final mailing included a copy of the executive summary of all six recommendations, a business card for the local branch of the Alzheimer's Association, and a Safe Return Program application.

The AAN was the primary sponsoring body for the practice recommendations and evidence-based seminars. We also used the AAN's continuing education program, CONTINUUM (34), as the primary vehicle to disseminate the recommendations in the CME course. In addition, AAN leadership signed introductory letters that accompanied study mailings.

Outcome Measures

We assessed adherence to the six practice recommendations by evaluating neurologists' written responses to three clinical scenarios, each depicting a typical patient with dementia presenting for an initial evaluation. After each scenario, participants were asked to provide information on the same four items: 1) Write in the most likely diagnosis; 2) from a list of 12 common diagnostic tests, indicate which you would order; 3) write in any additional diagnostic tests you would order; and 4) write in any treatment or management recommendations you would make. The scenarios and questions were developed by study investigators, reviewed by dementia experts on the Advisory Panel, and pilot tested with seven neurologists.

Scenarios 1 and 3 depicted patients who presented with features typical of Alzheimer's disease and who did not meet any of the recommended criteria for ordering either a neuroimaging study or electroencephalography. Scenario 2 depicted a patient with established Alzheimer's disease who had symptoms consistent with a diagnosis of major depression. Three physician investigators who were masked to the neurologists' group assignments reviewed all written responses to each scenario and determined whether each response adhered to each practice recommendation. Neurologists who did not order a neuroimaging study (magnetic resonance imaging or computed tomography) were considered adherent to the neuroimaging recommendation. We analyzed responses to scenarios 1 and 3 separately because the patient in scenario 1 had no previous neuroimaging studies, whereas in scenario 3, the patient had a "normal" noncontrast computed to-

mographic scan of the head obtained 6 months earlier. Neurologists who did not order electroencephalography for scenarios 1 and 3 were considered adherent to the electroencephalography recommendation. We considered neurologists adherent to the depression recommendation if, for scenario 2, they wrote in any of the following: a diagnosis of depression, referral to a mental health specialist, perform a screening test for depression, or initiate antidepressant therapy.

All three scenarios were designed so that each patient would benefit from referral to the Alzheimer's Association and the Safe Return Program but none should receive an apolipoprotein E genotype test. Neurologists who did not write in that they would order an apolipoprotein E genotype test for any of the three scenarios were considered adherent to the apolipoprotein E practice recommendation. Neurologists who wrote in that they would refer at least one of the three scenario patients to the Alzheimer's Association were considered adherent to that recommendation; adherence was similarly defined for the Safe Return Program recommendation. In addition, the survey asked neurologists to report the intensity of their reading of the mailed CME course on a 4-point scale from "did not read" to "read all sections thoroughly."

Survey Administration

The patient scenarios and all subsequent questions were assembled into an eight-page survey (available from authors upon request). All participants received a \$20 cash payment, which was attached to the survey, and a reminder postcard 1 week after the survey. Nonrespondents received up to three follow-up survey mailings and a telephone call.

Validation of Scenario Responses

To assess whether neurologists' responses to clinical scenarios reflect their clinical practice, we recruited all neurologists in one study region. Using these neurologists' billing records, we identified all new patients seen for dementia during the study period (13). Using a standardized form, one neurologist-investigator abstracted information from the medical record that was needed to assess adherence to each practice recommendation. We considered the physician's scenario response to agree with actual care when either of two conditions occurred: 1) The medical record reflected care that did not adhere to the recommendation and the physician's scenario response also did not adhere, or 2) the medical record reflected care that adhered to the recommendation and the physician's response also adhered. We calculated agreement for each practice recommendation by patient and by physician.

Agreement by patient was calculated as the percentage of patients whose care as documented in the medical record agreed with the neurologists' scenario responses. Agreement by physician was determined by a two-step process. First, we calculated the proportion of each physician's patients whose care as documented in the medical record agreed with that physician's scenario response. We then averaged, across all physicians, each physician's proportion of agreement.

Statistical Analysis

We collected demographic, training, and practice characteristics for each neurologist from the AAN membership database and from the mailed survey. We compared known characteristics of each of the three groups of study neurologists by using the chi-square test, the Fisher exact test, analysis of variance, or two-tailed *t*-tests.

We combined responses of the baseline and control groups for analysis if the proportion of responses in each group that adhered to each recommendation did not differ significantly ($P > 0.05$). Using an intention-to-treat approach for each recommendation, we compared the proportion of neurologists in the intervention group who were adherent with the proportion of neurologists in the combined baseline/control group who were adherent (chi-square or Fisher exact test).

We also calculated the unadjusted and adjusted odds ratios for adherence to each practice recommendation in the intervention group relative to the comparison (combined baseline/control) group. Because the intervention may have varied slightly by region (for example, the opinion leaders differed in each region), we used logistic regression to adjust for region in each model, with the six regions entered as a group of dummy variables. We also included residency or fellowship status and hours spent seeing patients per week because of their potential relation to the effectiveness of the intervention. For the neuroimaging and electroencephalography recommendation, we also adjusted for self-reported practice focus in neuroimaging or in electroencephalography or epilepsy, respectively. All of these variables were selected a priori for inclusion in these models (35).

To assess the relation between intensity of exposure to the intervention and degree of adherence, we used the chi-square test or the Fisher exact test to compare adherence in three subgroups of neurologists in the intervention group: 1) those who neither read the dementia care course nor attended the seminar, 2) those who either read some or all of the course or attended the seminar, and 3) those who both attended the workshop and read some or all of the course.

Table 1. Characteristics of Eligible Participants*

Characteristic†	Baseline Group	Control Group	Intervention Group
Demographic			
Age, y (n = 278)	46 ± 10	46 ± 9	47 ± 11
Women, % (n = 346)	15	22	15
Education and training			
Currently in residency or fellowship, % (n = 357)	22	21	17
International medical graduate, % (n = 336)	31	36	26
U.S. board-certified in neurology, % (n = 267)‡	89	87	90
Practice			
Years in practice, n (n = 297)§	11 ± 11	13 ± 11	14 ± 11
Hours in patient care per week, n (n = 297)§	37 ± 20	35 ± 19	35 ± 19
Office patients per week, n (n = 288)§	28 ± 22	28 ± 22	32 ± 28
Hospital patients per week, n (n = 286)§	13 ± 14	14 ± 15	14 ± 13
New patients with a diagnosis of dementia in the past 3 months, n (n = 292)§	7 ± 8	9 ± 14	8 ± 13
Follow-up patients with a diagnosis of dementia in the past 3 months, n (n = 284)§	12 ± 14	16 ± 23	15 ± 25
Reported aging, dementia, or behavioral neurology as a focus of practice, % (n = 340)	27	27	25
Reported neuroimaging as a focus of practice, % (n = 340)	9	9	5
Reported electroencephalography or epilepsy as a focus of practice, % (n = 340)	26	38	33
Academic appointment, % (n = 321)¶			
None	36	30	32
Part-time	28	37	31
Full-time	37	32	38
Practice setting, %‡			
Solo practice (n = 247)	26	36	28
Neurology group practice (n = 247)	20	23	23
Multispecialty group practice (n = 247)	5	6	8
Medical school or university (n = 247)	44	31	39
Other (n = 247)**	17	13	19
Managed care penetration, % (n = 236)‡			
<25%	26	22	28
26%–50%	31	42	33
>50%	43	36	39
Patients with insurance, %‡			
Type of insurance			
Fee-for-service (non-Medicare) (n = 215)	16 ± 16	15 ± 17	20 ± 21
Discounted fee-for-service (n = 215)	24 ± 21	25 ± 20	21 ± 21
Medicare (n = 215)	28 ± 17	33 ± 20	27 ± 19
Capitation (n = 215)	5 ± 18	5 ± 18	8 ± 20
Medicaid (n = 215)	11 ± 18	7 ± 15	10 ± 15
Other (n = 215)	16 ± 22	16 ± 16	15 ± 20

* Unless otherwise noted, data are presented as the mean ± SD. Data on characteristics were obtained from the 1997 American Academy of Neurology membership survey, unless otherwise noted. $P > 0.1$ for all comparisons of each characteristic between groups by the chi-square test (the Fisher exact test when the minimum expected cell size was <5), two-tailed t -tests, or analysis of variance.

† Numbers in parentheses represent the sample size.

‡ Excludes residents and fellows, who were not asked this question.

§ Data were obtained from the mailed scenario survey sent to all study participants.

|| Neurologists were provided with a list of 22 areas of neurology practice and were asked, "In your practice, do you focus or concentrate on any of the following areas?" Residents and fellows were not asked to complete this question.

¶ Data were obtained from the 1993 American Academy of Neurology membership survey.

** Includes the following settings: hospital, health maintenance organization, military, government, pharmaceutical company, insurance company, or independent consultant.

On the basis of information from a previous study (27), we hypothesized that approximately 90% of neurologists would order a neuroimaging study in patients for whom the recommendation indicated that it is not necessary. Assuming a 70% survey response rate and using a two-tailed test at the 5% significance level, a total sample of 375 participants (of whom one third were randomly assigned to the intervention group and two thirds were randomly assigned to the combined baseline and control group) would provide approximately 85% power to detect a 15–percentage point difference (90% compared with 75%) in the proportion of neurologists ordering a neuroimaging study between the two groups.

Role of the Funding Source

This project was funded by a grant to the American Academy of Neurology from the New York State Department of Health as part of its Clinical Guidelines and Medical Technology Assessment Grant Program. The funding source did not have a role in the design, conduct, or reporting of the study.

Results

Participant Characteristics

More than 80% of each group responded to the survey (Figure 1). Among all eligible neurologists,

Table 2. Adherence to Guideline Recommendations According to Responses to Clinical Scenarios*

Guideline Recommendation	Adherence Measure	Baseline Group	Control Group	Combined Baseline/Control Group	Intervention Group	Unadjusted Odds Ratio (95% CI)†	Adjusted Odds Ratio (95% CI)‡
Order neuroimaging only if clinical criteria are present	No neuroimaging ordered for scenario 1	5.6 (6/107)	5.9 (6/101)	5.8 (12/208)	20.2 (19/94)§	4.1 (1.9–8.9)	4.3 (1.9–9.8)
	No neuroimaging ordered for scenario 3	47.6 (50/105)	42.3 (41/97)	45.0 (91/202)	60.7 (51/84)	1.9 (1.1–3.2)	1.9 (1.1–3.2)
Order electroencephalography only if clinical criteria are present	No electroencephalography order for scenarios 1 and 3	64.4 (67/104)	67.0 (65/97)	65.7 (132/201)	72.3 (60/83)	1.4 (0.8–2.4)	1.6 (0.8–2.9)
Screen for and treat depression	Screened, diagnosed, or treated depression for scenario 2	80.6 (87/108)	84.3 (86/102)	82.4 (173/210)	86.2 (81/94)	1.3 (0.7–2.6)	1.3 (0.6–2.6)
Do not order apolipoprotein E genotype testing to predict or diagnose Alzheimer disease	No apolipoprotein E test ordered for any of the three scenarios	87.9 (94/107)	95.0 (96/101)	91.3 (190/208)	94.6 (87/92)	0.9 (0.3–3.2)¶	0.7 (0.2–2.7)¶
Refer all patients and their families to the Alzheimer's Association	At least 1 of 3 scenario patients referred to Alzheimer's Association	20.4 (21/103)	23.2 (22/95)	21.7 (43/198)	44.1 (41/93)§	2.8 (1.7–4.8)	2.7 (1.5–4.7)
Encourage all patients and their families to enroll in the Safe Return Program	At least 1 of 3 scenario patients referred to the Safe Return Program	1.0 (1/103)	3.2 (3/95)	2.0 (4/198)	18.3 (17/93)§	10.8 (3.5–33.2)	9.7 (3.1–30.5)

* Because of missing values, the number of participants in each group ranged from 103 to 108 for the baseline group, 95 to 102 for the control group, and 83 to 94 for the intervention group.

† Odds ratio were calculated comparing the intervention group with the combined baseline/control group, except for the apolipoprotein E genotype testing recommendation.

‡ We included residency or fellowship status, hours spent in patient care per week, and region in all models. For the neuroimaging adherence models, we also included whether the neurologist reported having a practice focus in neuroimaging; for the electroencephalography adherence model we included whether the neurologist reported a practice focus in electroencephalography or epilepsy. Few or none of the adjustment variables were predictive of adherence in any model (β -coefficients for each model are available from the authors on request).

§ $P \leq 0.001$ for intervention group compared with combined baseline/control group (chi-square test).

|| $P = 0.02$ for intervention group compared with combined baseline/control group (chi-square test).

¶ We report the odds ratio comparing the intervention group with the control group only because the baseline group differed from the control group (87.9% and 95.0%; $P = 0.05$). The results remained nonsignificant when we compared the intervention group with the combined baseline/control group (unadjusted odds ratio, 1.6 [95% CI, 0.6 to 4.6]; adjusted odds ratio, 1.5 [CI, 0.5 to 4.3]).

the baseline, control, and intervention groups did not differ for any demographic, training, or practice characteristic (all $P > 0.1$) (Table 1).

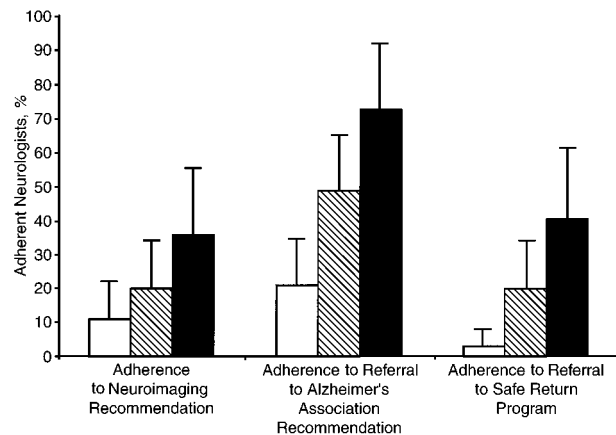


Figure 2. Association between intensity of exposure to intervention material and adherence to guidelines in the intervention group. Results are shown for the three practice recommendations that had a significant effect on adherence. White bars represent neurologists who neither read the course nor attended the seminar; striped bars represent neurologists who read some or all of the course or attended the seminar; and black bars represent neurologists who both read some or all of the course and attended the seminar. Higher adherence and more intense exposure to the intervention for two recommendations were significantly associated ($P < 0.001$ for referral to the Alzheimer's Association and for referral to Safe Return Program), and a trend was seen for an association with use of neuroimaging ($P = 0.1$). The total sample size ranged from 91 to 92 for each analysis and was less than 95 because of missing values. Error bars represent upper bound of 95% CIs.

Adherence to Guideline Recommendations

Compared with the combined baseline/control group, neurologists in the intervention group were significantly more likely to adhere to three practice recommendations: use of neuroimaging, referral to the Alzheimer's Association, and referral to the Safe Return Program (Table 2). For the other three recommendations, adherence did not differ between groups. For two of these recommendations (apolipoprotein E genotype testing and diagnosis and treatment of depression), adherence was high ($>80\%$) in all three groups. Unadjusted and adjusted odds ratios for each recommendation did not meaningfully differ. Compared with the combined baseline/control group, the intervention group had higher adherence with one of three recommendations designed to reduce overuse (significant for use of neuroimaging [$P < 0.01$] but not for use of electroencephalography [$P > 0.2$] and apolipoprotein E genotype testing [$P > 0.2$]) and two of three recommendations designed to increase use (significant for referral to the Alzheimer's Association [$P \leq 0.01$] and encouragement to enroll in the Safe Return Program [$P \leq 0.01$] but not for diagnosis and treatment of depression [$P > 0.2$]). Within the intervention group, more intense physician exposure to the intervention was associated with higher adherence (Figure 2).

Agreement of Survey Responses with Clinical Practice

Forty-six percent (22 of 48) of all study neurologists in one region saw at least one new patient with dementia during the study period; there was a total of 181 such patients. The range of patients seen per neurologist was 1 to 40; the mean was 8.2 and the median was 4. Agreement in adherence between the neurologist's medical record and response to the scenarios ranged from 95% to 99% for ordering electroencephalography, testing for apolipoprotein E genotype, and referral to the Safe Return Program (Table 3). Agreement was moderate for referral to the Alzheimer's Association and for diagnosis and treatment of depression (47% and 77%, respectively). Agreement for use of neuroimaging was low (27% to 49%).

Discussion

We found that a specialty society-sponsored educational intervention involving local opinion leaders was effective in improving decision making for three of six practice recommendations: use of neuroimaging, referral to the local branch of the Alzheimer's Association, and referral to the national Safe Return Program. However, for these three practice recommendations, there was still room for improvement; adherence in the intervention group ranged from 18% for referral to the Safe Return Program to 60% for use of neuroimaging. For the three recommendations for which the intervention group and the baseline/control group did not differ (use of electroencephalography, apolipoprotein E genotype testing, and diagnosis and treatment of depression), adherence was already high (>80%) for two

of these recommendations in the baseline and control groups. Thus, there may have been a "ceiling" effect, making it difficult to further improve care. No pattern suggested differential effectiveness of the intervention on recommendations designed to reduce overuse compared with those likely to increase use.

Passive efforts to disseminate guidelines, such as mailing copies of guidelines to physicians and educational programs, have generally been ineffective in changing physicians' practices unless they are coupled with other methods, such as the use of reminders or financial incentives (1, 4, 6). We examined whether modifications of common educational methods (for example, a mailed CME program and seminars), coupled with endorsement by a specialty society and opinion leaders, could improve neurologist's adoption of practice recommendations. Our intervention may have been successful in part because the formats for the CME course and evidence-based seminars were consistent with physicians' reports that they want guidelines to be presented in a concise format along with the supporting evidence (36). Qualitative interviews with eight intervention group participants after the study suggested that the endorsement of the AAN, participation in the dinner seminar, and the quality of the evidence supporting each recommendation were the most common reasons for changing their practice in response to the educational intervention. This finding is consistent with theories on how new information is adopted by physicians (9) and with physicians' reports that the development and endorsement of guidelines by opinion leaders or specialty societies is the most important factor influencing their decision to adopt recommendations (36).

Opinion leaders have been shown to be central figures in the dissemination and adoption of new

Table 3. Agreement of Neurologists' Responses to Clinical Scenarios with Medical Record Data*

Scenario Responses	Agreement by Patient†		Agreement by Physician‡	
	Patients with Medical Record Data	Agreement with Scenario Responses	Neurologists with Survey and Medical Record Data	Mean Agreement
	n	%	n	%
Use of neuroimaging test§				
Scenario 1 (no previous neuroimaging)	15	27	8	33
Scenario 3 (recent neuroimaging)	21	48	7	49
Use of electroencephalography§	64	97	13	99
Diagnosis and treatment of depression	76	58	16	47
Ordering apolipoprotein E genotype testing	72	99	14	99
Referral to Alzheimer's Association	75	68	16	77
Referral to Safe Return Program	76	96	16	95

* Determined for one study region only.

† Agreement by patient was calculated as the percentage of patients whose record of care was in agreement with the neurologist's scenario response.

‡ Agreement by physician was determined in a two-step process. First, we calculated the proportion of each physician's patients whose record of care was in agreement with the physician's scenario response. We then averaged, across all physicians, each physician's proportion of agreement.

§ Because the scenarios that evaluated ordering neuroimaging and electroencephalography presented cases in which neither neuroimaging nor electroencephalography was indicated, we selected only patient medical records in which a neuroimaging study was not indicated by the guidelines or only those cases in which electroencephalography was not indicated. In addition, to compare neuroimaging ordering with responses to scenario 1, we selected only medical records for patients who did not present to the neurologist with a previous neuroimaging study. For comparison of neuroimaging responses with scenario 3 responses, we selected only medical records for patients who presented with a neuroimaging study approximately 6 months before the visit.

information and technology within communities (9). The effectiveness of incorporating opinion leaders into educational interventions to change physicians' practices has been supported by two widely reported trials (7, 11). However, a recent systematic review of trials using opinion leaders suggests that they may not always be effective agents of change (10). In our study, the impact of the opinion leaders on decision making may have been increased because the participants associated the opinion leaders with the AAN. Future trials that use opinion leaders as part of a multifaceted intervention should continue to examine the contribution that opinion leaders have on changing physicians' practices.

Previous studies (1, 5) have found that physician participants in CME programs may already perform better than nonparticipants or be more receptive to the CME message. However, we minimized the potential for selection bias by randomly assigning participants to three groups and by performing an intention-to-treat analysis. The higher adherence associated with greater exposure to the intervention among intervention neurologists may in part result from selection bias, but the "dose-response" relation that we observed argues for at least some intervention effect.

Only one fourth of neurologists in the intervention group both attended the seminar and reported reading some or all of the mailed CME course thoroughly. Educational interventions to change physician practice should focus on methods to enhance exposure to components of the intervention. Brief, focused material needs to remain substantive and contain the information that physicians claim they want in guidelines (36).

A potential barrier to adherence to the neuroimaging recommendation may be neurologists' perception that they are at increased medicolegal risk for missing a potentially reversible cause of dementia by not ordering a neuroimaging study in every patient. Despite the AAN's guideline on this topic, the decision to routinely use neuroimaging in the evaluation of dementia is debated in the neurology community (37-40). The low overall adherence to this recommendation may also reflect lack of consensus among neurologists.

We did not expect to find that preintervention adherence to use of electroencephalography and diagnosis and treatment of depression was already high. Data in the literature suggested that adherence to these recommendations was lower than the adherence that we observed (27, 30). Practice patterns may have changed since these studies were conducted. In addition, for the depression recommendations, diagnosing depression may have been enhanced by the information contained in the written scenario, information that might not be ob-

tained by a physician. Nonetheless, the discrepancy between the literature and our findings underscores the value of conducting timely and targeted needs assessments for CME and quality improvement activities, which would focus on areas in which practice seems to deviate from recommended standards of care (1, 6). This is particularly important, considering the resources devoted to CME programs and to guideline development, dissemination, and implementation efforts.

Our study has some limitations. The main outcome measures were assessed by neurologists' responses to clinical scenarios, a method that may not reflect actual clinical practice, depending on the setting and type of practice being assessed by written scenarios (6, 41, 42). There are many potential reasons for this, including the possibility that physicians have a higher tolerance for diagnostic uncertainty in hypothetical cases than in actual cases (43, 44). However, in our study, agreement between survey responses and actual care processes recorded by medical record review was moderate to high between scenario responses and five of six processes of care. Concordance for the use of neuroimaging was lower, possibly because of patient or family requests for neuroimaging or because of less concern with malpractice suits on the part of neurologists when they respond to scenarios compared with seeing actual patients.

Another potential limitation is that our results may not be generalizable to other physician specialties or to neurologists outside of New York State. However, the characteristics of our sample did not seem to differ from those of a national sample of neurologists (45).

It was proposed that guideline dissemination and implementation strategies be integrated within the CME programs of specialty societies (2, 11). Our study suggests that medical specialty societies can play an important role in disseminating and implementing guidelines, particularly for those with active CME and guideline programs already in place. This type of integration calls for a close working relationship among specialty societies, clinical experts, guideline developers, representatives of voluntary health agencies, and health service researchers. Further research on the effect of such efforts on quality of care and the different components of interventions to change physicians' practice is needed.

Appendix: The Six Practice Recommendations Provided to the Intervention Group

(Each recommendation was presented on a separate page in an outline format, in bold and framed with a

border. Three to four bullets with evidence supporting each recommendation also appeared on each page below the recommendation.)

1. Use of neuroimaging.

“After performing a careful history and physical examination, the neurologist should consider whether or not to obtain a neuroimaging (MRI or CT scan) study in a patient diagnosed with dementia. Based on the AAN Practice Parameter, neuroimaging is usually indicated if any of the following criteria are present: duration of cognitive complaints <6 months, symptom onset before age 60 years, focal signs, focal symptoms, or papilledema, diagnosis by history of new onset seizures, or gait abnormalities (e.g. ataxic or apraxic gait). Neuroimaging need not be routinely obtained in every patient with dementia.” Based on reference 15. Other organizations that support similar recommendations are the American College of Physicians (23), the Canadian Consensus Conference (25), the Department of Veterans Affairs (26), and New York State Department of Health (21).

2. Use of electroencephalography.

“Electroencephalography is not recommended as part of the routine evaluation in individuals with dementia unless the following criteria are present: (a) clinical history suggestive of seizure(s), including patients with fluctuating levels of consciousness (i.e. “sleepy demented”) or transient brief episodes of behavior change, OR (b) Creutzfeldt Jakob Disease (CJD) is suspected, that is: rapid decline in cognitive function over 3 months or less, or ataxia, chorea, or myoclonus early in the course of dementia, AND any extrapyramidal or cerebellar features that are not attributable to some other diagnosis.” Based on reference 15.

3. Detection and treatment of depression.

“(A) All patients diagnosed with dementia should be screened for depression initially and thereafter at least every 6 months using either: (a) questions to assess mood during the clinical history, or (b) a validated screening questionnaire for depression such as the *Cornell Scale for Depression in Dementia*. (B) Depression should be treated either when diagnosed or when highly suspected in patients with dementia.” Based on references 19 to 21.

4. Testing for apolipoprotein E genotype.

“Apolipoprotein E genotype testing should not be ordered in routine office practice to diagnose Alzheimer’s disease in individuals with dementia (or possible dementia). Apolipoprotein E genotype testing should not be ordered as a screening test to predict Alzheimer’s disease in asymptomatic individuals. At present, apolipoprotein E genotype testing is only appropriate in the research setting, where data on its diagnostic utility can continue to be collected and analyzed, and where formal genetic counseling should be provided.” Based on reference 16. Endorsed by the American Academy of Neurology, American College of Medical Genetics, American Society of Human Genetics, American Psychiatric Association, and the NIH-DOE Working Group on Ethical, Legal & Social Implications of the Human Genome Research Project.

5. Referral to the Alzheimer’s Association.

(This recommendation also contained a description of the Alzheimer’s Association and the Alzheimer’s Disease Education and Referral Center.)

“At the time of diagnosis, patients with dementia (and their caregivers) should be referred by their physician to organizations that can provide educational information and resources, such as *Alzheimer’s Disease and Related Disorders Association* (Alzheimer’s Association) 1-800-272-3900.

6. Encouragement to enroll in the Safe Return Program.

(This recommendation also contained a description of the Safe Return Program.)

“Patients with an established diagnosis of dementia should be encouraged to enroll in the Alzheimer’s Association’s Safe Return Program because of the potential for wandering and injury.”

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References

- Davis DA, Thomson MA, Oxman AD, Haynes B. Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA*. 1995;274:700-5.
- Davis DA, Taylor-Vaisey A. Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *CMAJ*. 1997;157:408-16.
- Grimshaw JM, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. *Lancet*. 1993;342:1317-22.
- Greco PJ, Eisenberg JM. Changing physicians' practices. *N Engl J Med*. 1993;329:1271-3.
- Davis DA, Thomson MA, Oxman AD, Haynes B. Evidence for the effectiveness of CME. A review of 50 randomized controlled trials. *JAMA*. 1992;268:1111-7.
- Davis D. Physician education, evidence and the coming of age of CME. *J Gen Intern Med*. 1996;11:705-6.
- Lomas J, Enkin M, Anderson GM, Hannah WJ, Vayda E, Singer J. Opinion leaders vs audit and feedback to implement practice guidelines. Delivery after previous cesarean section. *JAMA*. 1991;265:2202-7.
- Mittman BS, Toness X, Jacobson PD. Implementing clinical practice guidelines: social influence strategies and practitioner behavior change. *QRB Qual Rev Bull*. 1992;18:413-22.
- Rogers EM. Diffusion of Innovations. New York: Free Pr; 1983.
- Thomson MA, Oxman AD, Haynes RB, Davis DA, Freemantle N, Harvey EL. Local opinion leaders to improve health professional practice and health care outcomes. The Cochrane Library. Oxford: Update Software. In: Issue 1, 1999.
- Soumerai SB, McLaughlin TJ, Gurwitz JH, Guadagnoli E, Hauptman PJ, Borbas C, et al. Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. *JAMA*. 1998;279:1358-63.
- Gifford DR, Mittman BS, Fink A, Lanto AB, Lee ML, Vickrey BG. Can a specialty society educate its members to think differently about clinical decisions? Results of a randomized trial. *J Gen Intern Med*. 1996;11:664-72.
- Holloway RG, Gifford DR, Frankel MR, Vickrey BG. A randomized trial to implement practice recommendations. Design and methods of the Dementia Care Study. *Control Clin Trials*. 1999;20:369-85.
- Balas EA, Austin SM, Ewigman BG, Brown GD, Mitchell JA. Methods of randomized controlled clinical trials in health services research. *Med Care*. 1995;33:687-97.
- Practice parameter for diagnosis and evaluation of dementia (summary statement). Report on the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology*. 1994;44:2203-6.
- Statement on use of apolipoprotein E testing for Alzheimer disease. American College of Medical Genetics/American Society of Human Genetics Working Group on ApoE and Alzheimer Disease. *JAMA*. 1995;274:1627-9.
- Costa PT Jr, Williams TF, Somerfield M, Albert MS, Nutters NM, Folstein MF, et al. Recognition and Initial Assessment of Alzheimer's Disease and Related Dementias. Clinical Practice Guideline no. 19. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research; 1996. AHCPR publication no. 97-0702.
- Small GW, Rabins PV, Barry PP, Buckholtz NS, DeKosky ST, Ferris SH, et al. Diagnosis and treatment of Alzheimer disease and related disorders. Consensus statement of the American Association for Geriatric Psychiatry, the Alzheimer's Association, and the American Geriatrics Society. *JAMA*. 1997;278:1363-71.
- Depression in Primary Care. Volume 1. Detection and Diagnosis. Clinical Practice Guideline no. 5. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research; 1993. AHCPR publication no. 93-0550.
- Rush AJ, Golden We, Hall GW, Herrera M, Houston A, Kathol RG, et al. Depression in Primary Care. Volume 2. Treatment of Major Depression. Clinical Practice Guideline no. 5. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research; 1993. AHCPR publication no. 93-0551.
- Guidelines for the Diagnosis of Alzheimer's Disease and Other Dementias. Health Facilities Series. Albany, NY: Department of Health, State of New York; 1990.
- Dementia Identification and Assessment: Guidelines for Primary Care Practitioners. Washington, DC: U.S. Department of Veterans Affairs: Oakbrook, IL: University Health System Consortium; 1997.
- Magnetic resonance imaging of the brain and spine: a revised statement. American College of Physicians. *Ann Intern Med*. 1994;120:872-5.
- Consensus conference. Differential diagnosis of dementing diseases. *JAMA*. 1987;258:3411-6.
- Assessing dementia: the Canadian consensus. Organizing Committee, Canadian Consensus Conference on the Assessment of Dementia. *CMAJ*. 1991;144:851-3.
- Dementia: Guidelines for Diagnosis and Treatment. 2d ed. Washington, DC: Office of Geriatrics and Extended Care, Department of Veterans Affairs. Veterans Health Services and Research Administration; 1989.
- Vickrey BG, Gifford DR, Belin TR, Martin PJ, Smith D, Delrahim S, et al. Practice styles of UK compared to US neurologists. *Neurology*. 1998;50:1661-8.
- Mohide EA, Pringle DM, Streiner DL, Gilbert JR, Muir G, Tew M. A randomized trial of family caregiver support in the home management of dementia. *J Am Geriatr Soc*. 1990;38:446-54.
- Brodsky H, Hadzi-Pavlovic D. Psychosocial effects on carers of living with persons with dementia. *Aust N Z J Psychiatry*. 1990;24:351-61.
- Wells KB, Hays RD, Burnam MA, Rogers W, Greenfield S, Ware JE Jr. Detection of depressive disorder for patients receiving prepaid or fee-for-service care. Results from the Medical Outcomes Study. *JAMA*. 1989;262:3298-302.
- Hiss RG, Macdonald R, Davis WK. Identification of physician educational influencers (EIs) in small community hospitals. Proceedings of the Seventeenth Annual Conference on Research in Medical Education. 1978:283-8.
- Kosik KS, Gifford DG, Greenberg SM, Morris JC, Sabry JH, Vickrey BG. Dementia Care. CONTINUUM. v 2, no 3. Baltimore: Williams & Wilkins; 1996.
- Alexopoulos GS, Abrams RC, Young RC, Shamoian CA. Cornell Scale for Depression in Dementia. *Biol Psychiatry*. 1988;23:271-84.
- Munsat TL, Mancall EL, DesLauriers MP. The AAN launches a new education program: CONTINUUM lifelong learning in neurology. *Neurology*. 1994;44:771-2.
- Harrell FE, Lee KL, Mark DB. Multivariate prognostic models: issues in developing models, evaluating assumptions and adequacy, and measuring and reducing errors. *Stat Med*. 1996;15:361-87.
- Hayward RS, Wilson MC, Tunis SR, Guyatt GH, Moore K, Bass EB. Practice guidelines. What are internists looking for? *J Gen Intern Med*. 1996;11:176-8.
- Katzman R. Should a major imaging procedure (CT or MRI) be required in the workup of dementia? An affirmative view. *J Fam Pract*. 1990;31:401-5.
- Clarfield AM, Larson EB. Should a major imaging procedure (CT or MRI) be required in the workup of dementia? An opposing view. *J Fam Pract*. 1990;31:406-10.
- Lanska DJ. Recommendations of the American Academy of Neurology for Evaluation of Dementia [Letter]. *Mayo Clin Proc*. 1996;71:821.
- Corey-Bloom J, Thal LJ, Galasko D, Folstein M, Drachman D, Raskind M, et al. Diagnosis and evaluation of dementia. *Neurology*. 1995;45:211-8.
- Jones TV, Gerrity MS, Earp J. Written case simulations: do they predict physician's behavior? *J Clin Epidemiol*. 1990;40:805-15.
- Peobody J, Luck J, Dresselhaus T, Lee M, Glassman P. Are clinical vignettes better than chart abstraction (or standardized patients) to measure quality? [Abstract] Association of Health Services Research Annual Meeting Abstract Book. 1998;15:202.
- Putterman C, Ben-Chetrit E. Clinical problem-solving. Testing, testing, testing. . . . *N Engl J Med*. 1995;333:1208-11.
- Kreger CG, Murden RA. Clinical problem-solving: hypereosinophilic syndrome [Letter]. *N Engl J Med*. 1996;334:538-9.
- Holloway RG, Vickrey BG, Keran CM, Letter E, Iverson D, Larson W, et al. U.S. Neurologists 1996-1997. St. Paul: American Academy of Neurology; 1998.