Frontiers in Medi

OPEN ACCESS

EDITED BY

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*CORRESPONDENCE

RECEIVED 0 202
ACCEPTED 2 202
PUBLISHED 1 202

CITATION

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Front. Med. 11 1 10 .
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Results: / (% 1. %) (*p* 0.00). - (*p* 0.0). 1 - / (*p* 0.000). %

Discussion: / 1 -

KEYWORDS

mild cognitive impairment, geriatric assessment, self-administered cognitive screening, primary care provider, SAGE, early detection

paper form of SAGE, primarily due to familiarity with the paper SAGE. e second location served as the control o ce where all providers continued to conduct their visits, including any screening for cognitive impairment, based on their standard practices (which did not include the use of SAGE or eSAGE). Study data were collected and managed using REDCap electronic data capture tools hosted at e Ohio State University (26, 27).

e study consisted of three groups: the intervention group, control group 1, and control group 2. e intervention group consisted of patients seen by the intervention o ce who completed the SAGE during their appointment. Control group 1 consisted of patients seen by providers in the control o ce where SAGE was not utilized. Control group 2 consisted of patients seen by the intervention o ce who did not complete SAGE during their appointment due to time constraints, patient noncompliance, and provider oversight.

Chart reviews were conducted on patients with scheduled PCP appointments from October 2019–January 2020. e charts were reviewed before the patient visits to assess eligibility and in sequential order based on the appointment date/time until 100 eligible patients were enrolled in each group. None of the control group patients had any documentation of past completion of SAGE or eSAGE in their medical records. Two patients in the intervention group had prior SAGE use documented in their medical records. None of the intervention group patients had prior eSAGE use documented in their medical records.

For participants who met the inclusion/exclusion criteria, the charts were reviewed by two reviewers 60+ days later using a 60-day window from the initial visit. e reviewers conducted the chart reviews via a standardized method to allow for consistency. e

TABLE 1 **Demographic and clinical characteristics.**

	( ) (*n* 100)	1 (1) (*n* 100)	2 (2) (*n* 100)	1, 2 (3)	1 + 2 (2)
Age, mean yrs. (SD) Range	72.47 (5.64) 65–87	72.12 (6.25) 65–90	72.66 (5.98) 65–89	0.8193*	0.9105*
Sex, % female	58%	57%	67%	0.2892#	0.5321#
Ethnicity				0.0276#	0.1409#
White	83%	82%	74%		
Black	16%	10%	22%		
Other	1%	8%	4%		
Hypertension (%yes)	71%	73%	81%	0.2222#	0.2616#
Hyperlipidemia (%yes)	80%	73%	88%	0.0278#	1.0000#
Diabetes (%yes)	25%	31%	45%	0.0100#	0.0277#
Heart disease (%yes)	48%	39%	55%	0.0832#	0.9027#
Obesity (%yes)	52%	51%	63%	0.1656#	0.4603#
At least 2 comorbidities above (%yes)	85%	77%	90%	0.0445#	0.8676#
At least 3 comorbidities above (%yes)	**61%**				

When SAGE was utilized, the providers documented the detection of new cognitive conditions/concerns six times (9% versus 1.5%) as o en ($p = 0.003$); 95% CI for the RR was (1.66, 21.68) (Figure 1). e intervention group detection rate of new cognitive conditions/concerns was 3.96-fold for those with cognitively impaired SAGE scores (researcher graded SAGE score < 17) when compared to those with normal SAGE scores (researcher graded SAGE score of 17 or higher); 5 out of 24 versus 4 out of 76 ($p = 0.034$), and 95% CI for the RR was (1.15, 13.57) (Figure 2). e 34 individuals having either impaired SAGE scores or informant concerns of a signi cant change in the patient's cognitive functioning over the previous year were 15.5-fold as likely to have new cognitive conditions/concerns documented; 8 out of 34 versus 1 out of 66 ($p = 0.0007$), and 95% CI for the RR was (2.02, 119.10) (Figure 3).

Of the 53 out of the 100 patients in the intervention group with informant information documented, 17 had cognitively impaired SAGE scores and 36 had normal SAGE scores. In 35% of those with cognitively impaired SAGE scores and in 28% of those with normal SAGE scores, the informants had expressed concerns about signi cant cognitive change over the last year. While the former proportion is higher, there is no signi cant di erence between these two proportions ($p = 0.750$). Overall, 16 out of 53 informants (30%) expressed concerns about signi cant cognitive change over the last year.

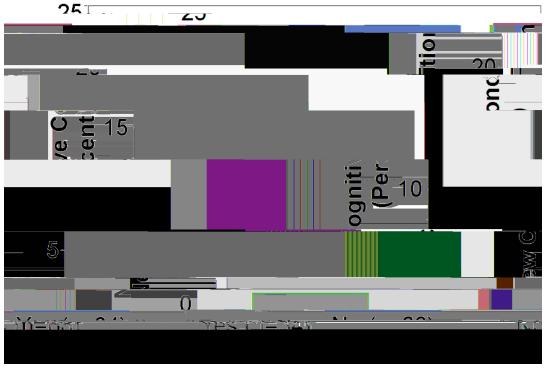

FIGURE 3

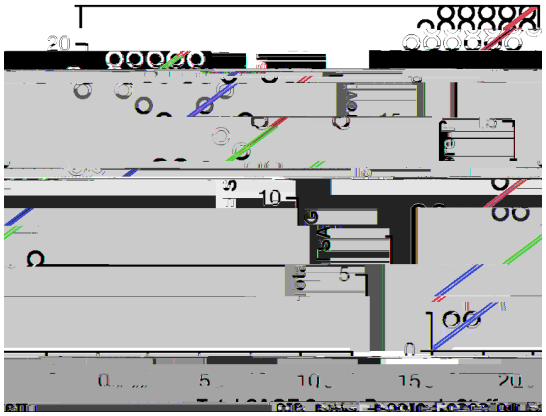

FIGURE 4

Charts were reviewed for a 60-day window a er the initial patient visit. During that time, 4% of patients in the intervention group, 1% in control group 1, and none in control group 2 had at least one PCP follow-up appointment scheduled for additional investigation of a cognitive impairment disorder ($p = 0.132$). When the two control groups were combined, the di erence between the intervention (4%) and the combined control group (0.5%) became statistically signi cant ($p = 0.044$). Seven percent of patients in the intervention group, 2% in control group 1, and none in control group 2 had at least one referral for further evaluation/management of potential cognitive impairment ($p = 0.012$). Further, the di erence between the intervention (7%) and the combined control group (1%) was highly signi cant ($p = 0.007$). Five percent of patients in the intervention group, 1% in control group 1, and none in control group 2 had more than one referral ordered. Referrals were sent for neuroimaging, laboratory evaluations, neurology/psychiatry consultation, legal assistance, home health, social work, nancial planning, and counseling. In addition, in some cases, the chart reviews revealed cognitive medication suggestions, home health discussions, discussions to consider stopping driving, and documentation of previous laboratory and neuroimaging results. No patients in any group were started on a pharmacological intervention to manage cognitive impairment.

Fourteen providers saw patients in the intervention o ce, and ten providers saw patients in the control o ce. Of the 14 providers in the intervention o ce, 11 utilized SAGE and were given the opportunity to complete the questionnaire (Supplementary Figure S1). Ten of those providers were physicians (5 female) and one was a Certi ed Nurse Practitioner (female) with four having 1–9 years, four having 10–19 years, and three having over 20 years of practice experience. Out of the eight providers who nished the questionnaire, 25% felt it took up too much time during routine visits, 75% thought that it was useful, 63% felt it in uenced their decision to further evaluate for cognitive impairment, and 63% thought that it led to more con dence regarding the presence or absence of cognitive impairment. Overall, 86% (6 out of 7) of providers indicated that they would recommend SAGE to be used during o ce visits, and that it can be better implemented if given outside exam rooms and at Annual Wellness Visits to prevent work ow disruption and allow for discussion time.

Eighty-three SAGEs were scored by the providers in the intervention o ce. e providers reviewed the other 17 SAGEs performed, but they did not have a score documented. e scoring discrepancies (the researcher scored SAGE minus the provider scored SAGE) ranged from −7 points to +3 points. Sixty-six percent of the total score discrepancies were within ±2 points. e mean di erence of −1.45 was signi cantly di erent from 0 ($p < 0.0001$), with a 95% CI (−1.10, −1.79). Overall, the providers scored the SAGE incorrectly 78% of the time. Figure 4 plots the PCP SAGE scores against the researcher's score. It suggests that providers' scores are likely to be higher. e Spearman correlation between these scores was 0.843. e most signi cant discrepancies between the provider and researcher subscores occurred with the problem-solving question (40%) and the 3-D gure question (29%).

Disease-modifying therapies for MCI due to Alzheimer's disease and for mild AD dementia are now FDA-approved. However, identifying cognitive impairment is o en delayed so long that these treatments are less e ective and may be outside the window of approved use. Expert panels have continued to stress the need for validated, brief, case- nding cognitive assessment tools, especially self-administered tests that allow for unsupervised administration and accurately identify those with MCI (30). It is critical to focus on those individuals still in the MCI stage because a treatment that prevents MCI due to AD or other neurodegenerative diseases from progressing to dementia would signi cantly impact quality of life, caregiver burden, and cost of care. Diagnosing AD during the MCI stage could save the nation as much as $7 trillion in medical and long-term care expenditures for those alive in 2018 that will develop AD (31). Having easy access to low/no-cost validated cognitive assessments that can be taken completely unsupervised in any setting will allow for earlier identi cation of cognitive impairment.

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