

plications. However, the benefit does not currently require completion of advanced care planning during these sessions. One potential solution to facilitate improved quality of life near death for patients who are receiving long-term dialysis would be to add advanced care planning as a requirement to the kidney disease education benefit. Alternatively, end-of-life discussions and advanced care planning could be reimbursed separately, similar to predialysis educational counseling, or it could be required as part of monthly dialysis management fees. Facilitating discussions about treatment goals and preferences early and throughout the course of long-term dialysis may substantially improve quality of life for patients and their loved ones. Also, by facilitating these discussions at the beginning of dialysis, we can help to ensure that patients do not receive unwanted, expensive, and invasive care at the end of life.

Uptal D. Patel, MD  
Kevin A. Schulman, MD

**Author Affiliations:** Duke Clinical Research Institute and Department of Medicine, Duke University School of Medicine, Durham, North Carolina.

**Correspondence:** Dr Schulman, Duke Clinical Research Institute, PO Box 17969, Durham, NC 27715 (kevin.schulman@duke.edu).

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## RESEARCH LETTERS

### Comparing Physician-Reported Cancer Management Plans With Medicare Services Received

The National Oncologic PET Registry (NOPR) was developed to provide evidence on the effectiveness of positron emission tomography (PET) in the detection, diagnosis, and clinical manage-

ment of certain cancers, and has been used to inform Medicare coverage policy for PET.<sup>1-3</sup> The NOPR collects data regarding the intended management strategy reported by physicians before and after PET, with a change in intended management suggesting "added clinical value" from the PET scan.<sup>4</sup> The NOPR does not collect data on the management plan actually implemented. To determine whether physician-reported management plans in NOPR reflect actual services received, we compared the physician-reported NOPR management plan with services provided according to Medicare claims data. As the first study, to our knowledge, using linked NOPR and Medicare data, this comparison provides information on whether physician-reported data in NOPR reflect the care that is ultimately provided to patients.

**Methods.** We conducted a retrospective cohort study using linked cancer registry, NOPR, and Medicare data for Medicare patients in North Carolina and California who received NOPR-documented PET scans from May 2006 through December 2008. Patients with a new primary diagnosis of pancreatic adenocarcinoma or renal cell carcinoma from 2003 through 2007 were identified. Of the 683 eligible PET scans for these cancer cases, we excluded 194 (28.4%) because of nonconsent, non-continuous Medicare fee-for-service coverage, or death within 30 days of PET scan.

From the post-PET NOPR survey we identified the referring physician's planned management following the PET scan. Using Medicare claims data, we identified management services received in the 30 days following the PET scan based on all diagnosis and procedure codes found in claims. For the NOPR vs Medicare comparison, we categorized management strategies as observation, additional imaging, biopsy, or treatment (eg, surgery, chemotherapy, and/or radiation). In the Medicare data, observation was defined as having no subsequent claims for cancer-related imaging, biopsy, or treatment in the follow-up period.

We assessed the agreement between post-PET NOPR physician-reported intended management and post-PET Medicare services using Cohen  $\kappa$  and calculated the proportion of NOPR post-PET intended management strategies provided based on Medicare data. Since the NOPR allows the referring physician to select 1 intended management strategy (observation, additional imaging, biopsy, or treatment) yet multiple treatments, we also created a variable indicating any treatment.

**Results.** We identified 489 PET scans for 325 patients. Agreement of post-PET management strategies in NOPR and Medicare services received ranged from poor ( $\kappa=0.06$ ) for additional imaging to fair ( $\kappa=0.49$ ) for surgery (**Table**). In 21.3% of scans, NOPR physicians indicated planned subsequent treatments that were not found in Medicare claims. Conversely, 11.3% of scans had Medicare claims for treatments after the PET that were not indicated in NOPR as the intended management strategy.

The proportion of NOPR-reported management plans that could be matched to a corresponding Medi-

**Table. Agreement Between Post-Positron Emission Tomography (PET) National Oncologic PET Registry (NOPR) Management Strategies and Medicare Services Received in 489 Scans**

Management Strategy	Data Source				$\kappa$
	NOPR + Medicare	NOPR Only	Medicare Only	Neither NOPR nor Medicare	
Observation <sup>a</sup>	112 (22.9)	42 (8.6)	101 (20.7)	234 (47.9)	0.39
Additional imaging	11 (2.3)	19 (3.9)	102 (20.9)	357 (73.0)	0.06
Tissue biopsy	21 (4.9)	20 (4.1)	25 (5.1)	423 (86.5)	0.43
Treatment					
Any	160 (32.7)	104 (21.3)	55 (11.3)	170 (34.8)	0.36
Surgical	25 (5.1)	26 (5.3)	17 (3.5)	421 (86.1)	0.49
Chemotherapy	103 (21.1)	103 (21.1)	57 (11.7)	226 (46.2)	0.31
Radiation	20 (4.1)	24 (4.9)	26 (5.3)	419 (85.7)	0.39

<sup>a</sup>Observation in Medicare is defined as the absence of claims indicating receipt of additional imaging, tissue biopsy, surgical, chemotherapy, or radiation treatment.

care claim ranged from 36.7% (additional imaging) to 72.7% (observation) depending on the management category. For NOPR-reported management strategies that included an intended treatment, 49.0% of surgery, 50.0% of chemotherapy, and 45.5% of radiation therapy were also found in Medicare claims. The results of sensitivity analyses changing the window in which Medicare claims were included (30-60 days after PET, or inclusion of 15 days prior to PET) showed no significant effect on the agreement.

**Comment.** Prior studies examining changes in the physician-reported intended management plans on the pre-PET vs post-PET NOPR forms demonstrated that a significant percentage of intended management plans change after the PET scan.<sup>5-7</sup> However, to our knowledge, physician reports in NOPR have not been previously validated. In this pilot study, we found only modest agreement between the post-PET management plan indicated by physicians in NOPR and health care services captured in Medicare claims. This finding has important implications for Medicare's Coverage with Evidence Development policies<sup>8</sup> and others who examine NOPR data to understand PET scan effectiveness for cancer care.

Oncologic care is increasingly multidisciplinary, and treatment plans are often determined or revised after a patient has consulted with several physicians, yet only 1 physician completes the NOPR forms. As such, one must consider that the physician ordering the PET scan may not know the exact management plan before or after the scan. Furthermore, the NOPR physician-reported management strategies are recommendations, not reports of actions taken. As the clinician and patient discuss care options, they may reach a joint decision regarding future care, informed by the patient's individual situation and preferences, that differs from that reported to NOPR.

By examining the relationship between intended and actual management, we demonstrate that post-PET physician-reported management plans in NOPR are frequently not implemented. These results suggest that the impact of PET scans cannot be assessed using the NOPR alone and that supplementation of NOPR with Medi-

care data is needed to fully assess the clinical impact of PET scans in cancer care.

Louise M. Henderson, MSPH, PhD  
 Katherine Reeder-Hayes, MD  
 Sharon Peacock Hinton, MPA  
 William R. Carpenter, PhD  
 Ronald C. Chen, MD, MPH

**Author Affiliations:** Division of Hematology and Oncology (Dr Reeder-Hayes), Departments of Radiology (Dr Henderson), Medicine (Dr Reeder-Hayes), Health Policy and Management (Dr Carpenter), and Radiation Oncology (Dr Chen), and Cecil G. Sheps Center for Health Services Research (Drs Reeder-Hayes, Carpenter, and Chen), and Lineberger Comprehensive Cancer Center (Drs Carpenter and Chen), University of North Carolina, Chapel Hill; and The Carolinas Center for Medical Excellence, Cary, North Carolina (Ms Hinton).

**Correspondence:** Dr Henderson, Department of Radiology, University of North Carolina, CB 7515, Chapel Hill, NC 27599 (louise\_henderson@med.unc.edu).

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## Resistance Training Promotes Cognitive and Functional Brain Plasticity in Seniors With Probable Mild Cognitive Impairment

Cognitive decline is a pressing health care issue. Worldwide, 1 new case of dementia is detected every 7 seconds.<sup>1</sup> Mild cognitive impairment—a well-recognized risk factor for dementia<sup>2</sup>—represents a critical window of opportunity for intervening and altering the trajectory of cognitive decline in seniors.

Exercise is a promising strategy for combating cognitive decline. Both aerobic training (AT) and resistance training (RT) enhance cognitive performance and functional plasticity in healthy, community-dwelling seniors<sup>3-5</sup> and those with mild cognitive impairment.<sup>6</sup> However, to our knowledge, no intervention study has compared the efficacy of both types of exercise on cognitive function and functional brain plasticity in seniors with mild cognitive impairment. Understanding this is crucial to using exercise as a strategy for altering the trajectory of cognitive decline in seniors with mild cognitive impairment.

We conducted a proof-of-concept, single-blinded, randomized controlled trial primarily designed to provide preliminary evidence of efficacy of both RT and AT to improve executive cognitive functions—robust predictors of conversion from mild cognitive impairment to Alzheimer disease<sup>7</sup>—in senior women with probable mild cognitive impairment. Secondarily, we aimed to exam-

ine the effect of both types of exercise on associative memory performance, everyday problem solving ability, regional patterns of functional brain plasticity, and physical function.

**Methods.** The EXCEL (EXercise for Cognition and Everyday Living) study was a 6-month randomized trial. Eighty-six community-dwelling women 70 to 80 years old were randomly allocated to twice-weekly RT (28 women), twice-weekly AT (30 women), or twice-weekly balance and tone (BAT) training (control group) (28 women). Participants were classified as having probable mild cognitive impairment if they had a score lower than 26 out of 30 on the Montreal Cognitive Assessment<sup>8</sup> and had subjective memory complaints.

The primary outcome measure was Stroop Test<sup>9</sup> performance, an executive cognitive test of selective attention/conflict resolution. Secondary measures of executive cognitive functions included set shifting (Trail Making Tests) and working memory (Verbal Digits Tests). Broader effects of exercise training on cognitive function were examined by assessing associative memory (memorizing face-scene pairs) and everyday problem solving ability (Everyday Problems Test). Regional patterns of functional brain plasticity were assessed using functional magnetic resonance imaging (fMRI) during the associative memory task. Finally, we assessed general balance and mobility (Short Physical Performance Battery) and general cardiovascular capacity (Six-Minute Walk Test).

The 60-minute classes were led by certified fitness instructors. For RT, both a Keiser Pressurized Air system and free weights were used.<sup>3</sup> Participants performed 2 sets of 6 to 8 repetitions, and loading was increased when sets were completed with proper form. The AT program was an outdoor walking program. The training stimulus started at 40% of a participant's age-specific target heart rate (ie, heart rate reserve [HRR]) and progressed to 70% to 80% of the HRR. The BAT program consisted of stretching, range of motion, balance exercises, and relaxation techniques.<sup>3</sup> This group served to control for confounding variables. Participants were questioned about the presence of any adverse effects and were monitored by instructors.

**Results.** Of the 86 participants, 77 completed the 26-week trial (26 in the RT group, 24 in the AT group, 27 in the BAT group). Twenty-two participants were included in our fMRI analysis (7 in the RT group, 7 in the AT group, and 8 in the BAT group).

The **Table** shows the baseline characteristics of our sample and change in scores from baseline to trial completion for the primary and secondary outcome measures, excluding fMRI. Compared with the BAT group, the RT group significantly improved performance on the Stroop Test ( $P=.04$ ) and the associative memory task ( $P=.03$ ). Compared with the BAT group, RT also led to functional changes in 3 regions of the cortex—the right lingual ( $P=.03$ ) and occipital-fusiform ( $P=.02$ ) gyri and the right frontal pole ( $P=.03$ )—during the encoding and recall of associations. In addition, there was a significant positive correlation between change in hemodynamic activity in the right lingual gyrus and change in behav-