THE GERONTOLOGICAL SOCIETY OF AMERICA®

Journals of Gerontology: Medical Sciences
cite as: *J Gerontol A Biol Sci Med Sci*, 2016, Vol. 71, No. 2, 279–280
doi:10.1093/gerona/glv200
Advance Access publication November 2, 2015

OXFORD

Letter to the Editor

Diminished Cognitive Function Among Chronic Obstructive Pulmonary Disease Patients During Periods of Acute Illness Exacerbation

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Decision Editor: Stephen Kritchevsky, PhD

Dear Editor,
Adults with chronic obstructive pulmonary disease (COPD) are known to experience more rapid declines in cognitive function over time than adults without the disease (1). It is not known, however, how their cognitive functioning changes in the context of acute COPD exacerbations, when they may be exposed to conditions that often disrupt cognitive processes, like hypoxemia, high dose steroids, and altered sleep-wake cycles. In this study, we evaluated change in cognitive function during and after COPD-related hospitalizations.

Methods

Data were from a prospective longitudinal cohort study of adults, aged 55 years or older with COPD in New York City and Chicago (n = 403) (2). The institutional review boards at each site approved the study and participants provided written informed consent. Patients were excluded if they had dementia or a neuropsychiatric condition that affects cognition. This analysis focused on the 65 (16.1%) participants who were hospitalized for a COPD exacerbation during the study. Cognitive assessments were performed by trained research assistants. Assessments performed in the hospital were conducted with the permission of the attending hospitalist and only when patients were comfortable and in no distress, typically near the end of their hospital stay. We compared cognitive performance during hospitalization with performance during a period of disease stability, either preceding or following the hospitalization. Post-hospitalization assessments were performed at the next regularly scheduled in-person interview, which could occur 1–12 months following the hospital discharge. We evaluated general cognition with the Mini-Mental State Examination (MMSE), processing speed (Trail Making Test A), executive functioning (Trail Making Test B), immediate and delayed recall (New York University Paragraph Recall test), and word fluency (Animal Naming test). We used generalized estimating equation models to evaluate changes in test scores, incorporating the correlation structure of the data arising from repeated measures within individuals, and controlling for age, education, comorbidities (diabetes, hypertension, depression), and whether hospitalization occurred prior to or after the scheduled evaluation.

Results

Of the 65 patients in our evaluation, 17 (4.2%) were recruited during a hospital admission for COPD exacerbation. Overall, the mean (*SD*) age was 66.8 (8.3) years, 69% were female, 15% were white, 54% black, and 28% were Hispanic. The mean score on the MMSE during periods of COPD stability was 23.2 (4.0) (Table 1), and 47% scored 1 *SD* below the age and education-adjusted norm. Statistically significant declines (mean change [*SD*]) in function were observed between periods of COPD stability and hospitalization for general cognition (MMSE: −1.6 (2.4) units; adjusted p = .001), immediate recall (−1.0 [3.0] units; adjusted p = .01), and delayed recall (−1.5 [2.9] units; adjusted p = .0003). In contrast, there were nonsignificant declines in processing speed (Trails A: −4.1 [34.3] units; adjusted p = .08), executive functioning (Trails B: −11.4 [87.3] units; adjusted p = .10), and word fluency (animal naming: −1.3 [4.1] units; adjusted p = .21).

Discussion

This evaluation is limited by a small sample size and inclusion of individuals who were recruited during hospitalization rather than a homogenous sample of individuals with baseline evaluation and

Table 1. Differences in Cognitive Function Scores Between Periods of COPD Stability and Exacerbation

Measure	During Period of COPD Stability *Mean (SD)*	During COPD Hospitalization *Mean (SD)*	Difference	*p*	Adjusted *p*
MMSE	23.7 (3.7)	22.2 (4.1)	1.6 (2.4)	.001	.001
Trail Making Test A	72.9 (40.8)	78.2 (43.1)		.14	.10
Trail Making Test B	209.0 (110.6)	229.9 (88.6)		.11	.08
NYU Paragraph Immediate Recall	5.3 (3.2)	4.2 (3.0)		.004	.01
NYU Paragraph Delayed Recall	5.1 (3.8)	3.7 (3.3)		.0001	.0003
Word Fluency	13.8 (5.4)	13.1 (5.7)		.15	.21

Notes: COPD = chronic obstructive pulmonary disease; MMSE = Mini-Mental State Exam; NYU = New York University.

subsequent COPD hospitalization. Those recruited during hospitalization tended to have poorer cognitive performance during scheduled interviews, though the magnitude of the changes in cognitive function between stable and acute periods was similar to that for patients whose hospitalization occurred subsequent to a scheduled interview.

Acute COPD exacerbations requiring hospitalization are associated with significant declines in cognitive function, specifically in memory. A diminished ability to recall information provided during hospitalizations may put patients at risk for poor adherence to post-hospitalization self-care and follow-up instructions, and might contribute to the high rate of hospital readmissions observed among adults with COPD (3). This observation highlights the importance of, and indeed validates, hospital discharge strategies like Coleman's Care Transitions Model, that emphasize clear communication about discharge instructions, inclusion of low health literacy-appropriate printed instructions, and rapid follow-up with a health care provider (4).

Funding

This work was supported by a grant from the National Heart, Lung, and Blood Institute (grant number R01HL105385).

Acknowledgments

Financial/nonfinancial disclosures: J.W. is a member of the research board of EHE International, has received consulting honorarium from Quintiles, BMS, and Merck, and research grants from Aventis and Quorum. All other authors report no potential conflicts of interest.

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