

Cognition and Capacity to Consent for Elective Surgery

Running Title: Cognition, Capacity to Consent for Surgery

Kahli E. Zietlow, MD¹; Deborah M. Oyeyemi, MD²; Sarah E. Cook, PhD³; Margaret Hardy, MSN, AGPCNP-BC⁴; Shelley R. McDonald DO, PhD^{5,6,7}; Sandhya Lagoo-Deenadayalan MD, PhD⁴; Mitchell T. Heflin^{5,6,7}, MHS, MD; and Heather E. Whitson^{5,6,7}, MHS, MD

¹Department of Medicine, Division of Geriatric and Palliative Medicine, University of Michigan, Ann Arbor, MI, USA

²Department of Medicine, Yale School of Medicine, New Haven, CT, USA

³Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, Durham, NC, USA

⁴Department of Surgery, Duke University School of Medicine, Durham, NC, USA

⁵Department of Medicine, Division of Geriatrics, Duke University School of Medicine, Durham, NC, USA

⁶Center for the Study of Aging and Human Development, Duke University School of Medicine, Durham, NC, USA

⁷Durham Veterans Affairs Geriatrics Research Education and Clinical Center (GRECC), Durham, NC

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as doi: [10.1111/jgs.16786](https://doi.org/10.1111/jgs.16786)

Corresponding author: Kahli Zietlow, 1500 E Medical Center Dr, Ann Arbor, MI 48109. Email: Kaheliza@med.umich.edu. Twitter: @KahliGoBlue

Author Details

Kahli E. Zietlow, Assistant Professor, Division of Geriatric and Palliative Medicine, Department of Medicine, University of Michigan, 1500 E Medical Center Dr, Ann Arbor, MI 48109. Email: kaheliza@med.umich.edu

Deborah Oyeyemi, Resident, Department of Medicine, Yale School of Medicine, 20 York Street, YNHH Tompkins 226, New Haven, CT 06510. Email: deborah.oyeyemi@yale.edu

Sarah Cook, Assistant Professor in Psychiatry and Behavioral Sciences, Box 3333 DUMC, 932 Morreene Rd, Durham NC 27705. Email: sarah.cook@duke.edu

Margaret Hardy, Nurse Practitioner, Department of Surgery, 7684A Hafs Bldg, DN, Erwin Rd, Durham, NC 27710. Email: margaret.hardy@duke.edu

Shelley R. McDonald, Assistant Professor of Medicine, DUMC Box 3003, Durham, NC 27710. Email: shelley.mcdonald@duke.edu

Sandhya Lagoo-Deenadayalan, Professor of Surgery, DUMC Box 3110 Med Ctr, Durham, NC 27710. Email: sandhya.lagoodeenada@duke.edu

Mitchell T. Heflin, Professor of Medicine, 2513 Hosp South, Durham, NC 27710. Email: mitchell.heflin@duke.edu

Heather E. Whitson, Associate Professor of Medicine; Director, Center for the Study of Aging and Human Development, DUMC Box 3003, Durham, NC 27710. Email:

heather.whitson@duke.edu

Funding

This project was funded by a Maddox Award, provided from the Duke Center for Aging, Duke University Medical Center.

This work was accepted for presentation at the American College of Surgeons Clinical Congress, San Francisco, CA, 2019 and the American Geriatrics Society Annual Scientific Meeting in Long Beach, CA, 2020.

Word Count: 1018

Number of Figures: 1

Key Words: Consent, Capacity, Cognition, Elective Surgery

Introduction

Unrecognized cognitive disorders present ethical and logistical challenges when consenting older adults undergoing surgery. Twenty percent of adults aged ≥ 65 have mild cognitive impairment or dementia, and the prevalence may be higher in perioperative patients.¹⁻⁴ There is little literature on the epidemiology of preoperative incapacity, although diminished cognition correlates with impaired capacity for medical decision making.⁵⁻⁷ As the population ages, it is imperative to recognize and manage patients with incapacity to consent for their upcoming surgeries.

Studies suggest that physicians often overlook incapacity.⁸ In a cohort of 123 older adults presenting to a surgical ward, 111 (90.25%) had consented themselves for surgery, yet 33 (39.7%) had cognitive impairment, and 18 patients (16.2%) were unable to state the reason for admission to the hospital.⁹ Often, patients with profound impairment remain able to express a choice, without possessing an in depth understanding of the attendant risks and benefits.⁶ While performing formal capacity assessment on all patients in busy preoperative clinics is infeasible, a brief cognitive screening tool may allow for rapid identification of patients at highest risk of incapacity.

The current pilot study had three aims: 1) determine feasibility of cognition and capacity assessment in a perioperative clinic; 2) describe the prevalence of incapacity in older adults presenting for surgery; 3) examine the relationship between cognitive performance and capacity.

Methods

This was a cross-sectional analysis performed at a single center, embedded in the Perioperative Optimization of Senior Health (POSH) quality improvement program. The POSH program is a collaborative care model between surgeons, geriatricians, and anesthesiologists, which has been described in detail elsewhere.¹⁰ This study received an exemption from the Duke Institutional Review Board.

Patients ≥ 65 years old presenting for preoperative assessment with POSH in 2018-2019 were eligible for inclusion via convenience sampling. Exclusion criteria included: 1) Non-English speaking; 2) Hearing impairment that impeded communication; 3) POSH appointment occurring less than one week prior to scheduled surgery. Participating surgical services included general, breast, gynecologic, colorectal, hepatopancreaticobiliary, otolaryngology, cardiothoracic, orthopedics, and vascular.

Cognition was assessed with the Montreal Cognitive Assessment (MoCA) and the Health and Safety subtest of the Independent Living Scale (ILS).^{11,12} A subset of the MoCA items were used as an indicator of executive function, denoted as MoCA-EF.¹³ Patients with severe vision impairment were tested using the MoCA-BLIND.¹⁴ The ILS Health and Safety subtest primarily assesses judgement and executive function via awareness of potential hazards and hypothetical management of emergencies; it is scored 0-40 with higher scores indicating better performance.

Capacity to consent for surgery was assessed with the MacArthur Competence Assessment Tool for Treatment (MacCAT-T), a validated tool with excellent inter-rater reliability.¹⁵ The MacCAT-T evaluates patients' ability to 1) understand, 2) appreciate, 3) reason, and 4) express a choice, and generates scores for each of the 4 domains. There is no absolute cut-off determining incapacity, however, it provides a standardized approach for assessing capacity. A single assessor (KEZ) performed all capacity assessments and was blinded to cognitive testing scores. If a participant was found to lack capacity, the participant, next of kin, POSH providers, and surgeon were notified. Statistical analysis was performed using R Studio (RStudio Inc, Boston, MA).

Results

Fifty participants were enrolled in the study and 9 (18%) lacked capacity to consent for surgery. Median age was similar in the two groups (75 versus 76). Two patients who lacked capacity (22.2%) were female, compared to 27 (65.9%) of patients with capacity ($p=0.02$). Patients who lacked capacity had a mean of 8.3 years of formal education (SD 5.7), compared to 14.9 years (SD 3.1) for patients with capacity ($p=0.01$). **Figure 1** illustrates the ROC curves for MoCA, MoCA-EF, and ILS for predicting incapacity. The area under the curve (AUC) for each test, respectively, was 0.97, 0.88, and 0.79. At a cut point of ≤ 19 , the MoCA had 89% sensitivity and 93% specificity for predicting incapacity. At a cut point of ≤ 8 , the MoCA-EF had 88% sensitivity and 70% specificity for predicting incapacity.

Discussion

Deploying a brief cognitive screening test to older adults undergoing surgery may help identify those patients at highest risk of incapacity. All participants, including those with severe visual impairment, were able to complete the MoCA or MoCA-BLIND. At a cut point of 19, the MoCA had excellent sensitivity and specificity for predicting incapacity. The MoCA-EF also had excellent sensitivity and fair specificity. Screening with only the components of the MoCA-EF would potentially decrease the testing administration time. However, independently administering only the executive function components of the MoCA has not been validated, and is not possible for patients with severe visual impairment.

Performing pre-operative cognitive screening on adults over 65 aligns with recommendations for best practice by the American Geriatrics Society and American College of Surgeons.¹⁶ Patients scoring ≤ 19 on the MoCA merit further capacity evaluation. Identifying these high-risk patients allows surgeons to dedicate extra time to a complete capacity assessment, either with formalized tools appropriate for the clinical setting, or through informal interviews to assess each domain of capacity.¹⁵ If patients are found to lack capacity, obtaining consent from the appropriate next-of-kin or healthcare power of attorney is essential before proceeding with surgery.

Education was unbalanced between groups with and without capacity, however, the MacCAT-T emphasizes teach-back and allows the interviewer to repeat or rephrase information appropriate to the patient's level of understanding. Patients with incapacity were much more likely to be male, but given the small sample size, the significance of this finding is unclear. This was a small study, performed at a single academic institution, and the POSH clinic is a specialized referral clinic, all of which may limit generalizability.

In this pilot study, 18% of older adults presenting for elective surgery lacked capacity to consent for their upcoming procedure. Patients who scored ≤ 19 on the MoCA were at highest risk for incapacity. This was a small, single-center study, however, our data suggest the MoCA can be useful to identify older adults undergoing surgery who are at the highest risk of incapacity. Because the MoCA requires a fee for use, similar cognitive screening tools should also be examined for their ability to identify incapacity in older adults.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the efforts of the POSH clinical team, including Julie Little NP, Mary "Betsy" Hixon NP, Neema Sharda MD, Serena Wong DO, and Angeline Smith LPN for their assistance in facilitating this study.

Conflicts of Interest: The authors have no relevant conflicts of interest to disclose.

Kahli E. Zietlow participated in the study concept and design, acquisition of data, analysis and interpretation of data, and preparation of manuscript.

Deborah Oyeyemi participated in the acquisition of data, analysis and interpretation of data, and preparation of manuscript.

Sarah Cook participated in the study concept and design, analysis and interpretation of data, and preparation of manuscript.

Margaret Hardy participated in the acquisition of data and preparation of manuscript.

Shelley R. McDonald participated in the analysis and interpretation of data, and preparation of manuscript.

Sandhya Lagoo-Deenadayalan participated in the study concept and design and preparation of manuscript.

Mitchell T. Heflin participated in the study concept and design, analysis and interpretation of data, and preparation of manuscript.

Heather E. Whitson participated in the study concept and design, analysis and interpretation of data, and preparation of manuscript.

Sponsor's Role: N/A

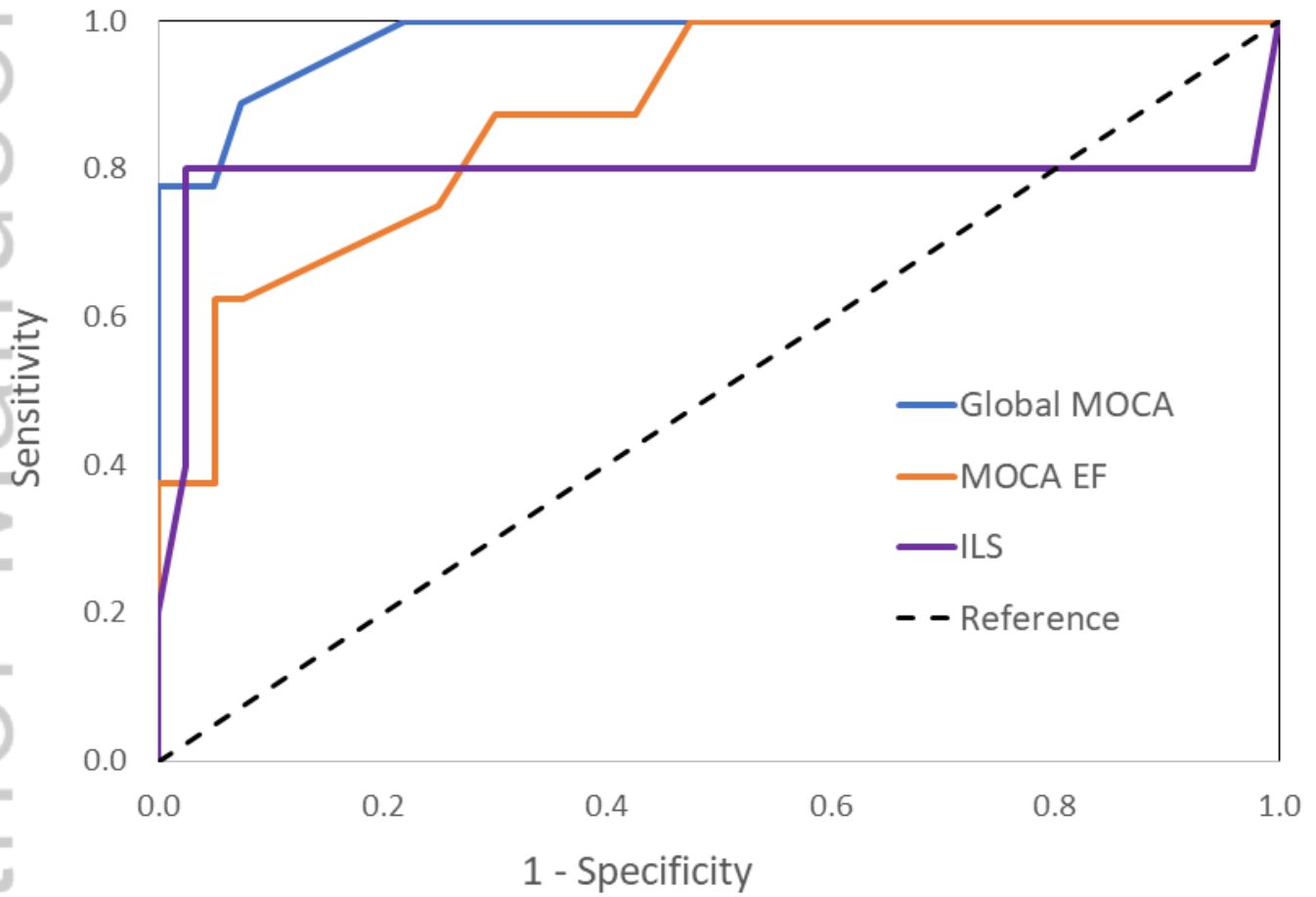
REFERENCES

1. Hebert LE, Weuve J, Scherr PA, Evans DA. Alzheimer disease in the United States (2010–2050) estimated using the 2010 census. *Neurology*. 2013;80(19):1778-1783.
2. Partridge JS, Dhesei JK, Cross JD, et al. The prevalence and impact of undiagnosed cognitive impairment in older vascular surgical patients. *Journal of vascular surgery*. 2014;60(4):1002-1011. e1003.
3. Petersen RC, Lopez O, Armstrong MJ, et al. Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*. 2018;90(3):126-135.
4. Zietlow K, McDonald SR, Sloane R, Browndyke J, Lagoo-Deenadayalan S, Heflin MT. Preoperative cognitive impairment as a predictor of postoperative outcomes in a collaborative care model. *Journal of the American Geriatrics Society*. 2018;66(3):584-589.
5. Karlawish J, Cary M, Moelter ST, et al. Cognitive impairment and PD patients' capacity to consent to research. *Neurology*. 2013;81(9):801-807.
6. Snineh MA, Camicioli R, Miyasaki JM. Decisional capacity for advanced care directives in Parkinson's disease with cognitive concerns. *Parkinsonism & related disorders*. 2017;39:77-79.
7. Gerstenecker A, Grimsley L, Otruba B, et al. Medical decision-making in progressive supranuclear palsy: A comparison to other neurodegenerative disorders. *Parkinsonism & related disorders*. 2019;61:77-81.
8. Sessums LL, Zembrzuska H, Jackson JL. Does this patient have medical decision-making capacity? *Jama*. 2011;306(4):420-427.
9. Terranova C, Cardin F, Pietra LD, Zen M, Bruttocao A, Militello C. Ethical and medico-legal implications of capacity of patients in geriatric surgery. *Medicine, Science and the Law*. 2013;53(3):166-171.
10. McDonald SR, Heflin MT, Whitson HE, et al. Association of integrated care coordination with postsurgical outcomes in high-risk older adults: The Perioperative Optimization of Senior Health (POSH) initiative. *JAMA surgery*. 2017.
11. Loeb P, Fe R. ILS: Independent living scales manual. The Psychological Corporation. In: Harcourt Race Jonanovich, Inc, San Antonio; 1996.
12. Nasreddine ZS, Phillips NA, Bédirian V, et al. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*. 2005;53(4):695-699.
13. Goldstein FC, Milloy A, Loring DW, Initiative AsDN. Incremental validity of Montreal Cognitive Assessment Index Scores in mild cognitive impairment and Alzheimer disease. *Dementia and geriatric cognitive disorders*. 2018;45(1):49-55.

14. Wittich W, Phillips N, Nasreddine ZS, Chertkow H. Sensitivity and specificity of the Montreal Cognitive Assessment modified for individuals who are visually impaired. *Journal of visual impairment & blindness*. 2010;104(6):360-368.
15. Appelbaum PS, Grisso T. Assessing patients' capacities to consent to treatment. *New England Journal of Medicine*. 1988;319(25):1635-1638.
16. Chow WB, Rosenthal RA, Merkow RP, Ko CY, Esnaola NF. Optimal preoperative assessment of the geriatric surgical patient: a best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. *Journal of the American College of Surgeons*. 2012;215(4):453-466.

LEGENDS

Figure 1. Receiver operator characteristic (ROC) curves of the Montreal Cognitive Assessment (MoCA), executive function component of the MoCA (MoCA-EF) and Health and Safety subtest of the Independent Living Scale (ILS), for predicting incapacity to consent for upcoming elective surgery. Area under the curve (AUC) is 0.97 for MoCA, 0.88 for MoCA-EF, and 0.79 for ILS.



JGS_16786_4.3.20_Figure2.tif

Color Charge Form Journal of the American Geriatrics Society

Upload this form to your submission OR return it to:

Emily Hammond / JAGS Editorial Office
jags@jeditorial.com

Dear Author:

If you have supplied color figures in your submission, the first color figure in print is free of cost. Any additional figures you wish to print in color will incur a fee of \$500 each. Please indicate how EACH of your figures should be handled in the table below.

INSTRUCTIONS:	Figure No.	Color in PRINT (waive fee)	Color in PRINT (charge \$500 per)*	Color ONLINE ONLY (no charge)	Black/White ONLINE and PRINT
<p>For EVERY figure in your paper, an X should be provided in the appropriate row.</p> <p>Place an 'X' in column 1 for a maximum of ONE figure.</p> <p>Place an 'X' in column 2 if you want to pay for additional color printing. The total in this column should be entered into the Quantity field below.</p>	1	X			
	2				
	3				
	4				
	5				
	TOTAL:	1			

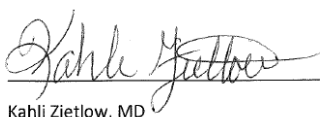
*If you indicate ANY figures in this column, the contact information below MUST be provided.

Please Complete & Please Print

Component(s) in Article	Charge(s)	Quantity	Estimated Charge(s) (in USD)
Color Figure Charge Standard	\$500 per figure	0	\$0.00
			\$0.00 = Total Estimated

Name: Kahli Zietlow
Manuscript No.: JAGS-1575-L-Jul-20
Manuscript Title: Cognition and Capacity to Consent for Elective Surgery
Address: University of Michigan, 1500 E Medical Center Dr, Ann Arbor, MI
Phone Number: (734) 936-2519
Fax Number: (734) 763-2064
Email Address: Kaheliza@med.umich.edu

Verify your agreement to pay by signing and dating below. Wiley will send an invoice to the email address you've provided:


Kahli Zietlow, MD

Date: 7/21/2020

This article is protected by copyright. All rights reserved.