THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Data Driven Development of the UAB Exploratory ADRC

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Overview

- Background on the UAB Exploratory ADRC
- Operationalizing our data for process improvement
- Next steps and thinking to the future

The UAB Exploratory ADRC

- Thematic focus on Deep South disparities in Alzheimer's disease
- US region with the largest population identifying as Black or African American (B/AA)
- Risk factors associated with AD (diabetes, cerebrovascular disease, obesity) are also highly prevalent in the area

The UAB Exploratory ADRC

- Pilot phase in 2018; funded as P20 Exploratory Center on 9/22
- Two pre-specified Cores:
  - Clinical
  - CODI Community Outreach
- Goal is to demonstrate capacity as a future P30-funded Center
  - Outreach, recruitment, enrollment
  - UDS, biomarkers, genetics
  - PET/MRI neuroimaging, neuropathology

Handling the NACC / UAB Data

- Goal has been to build a longitudinal clinical cohort as dictated by NACC but specific to UAB's goals
- Clinical data (UDS) collected on initial paper forms but emphasis on electronic data capture whenever possible
- Neuroimaging and neuropathology processed by specific Cores before being sent back to the Data Core
- Utilization of REDCap for data entry, processing using R, long-term storage in formal relational database, other resources as dictated by need

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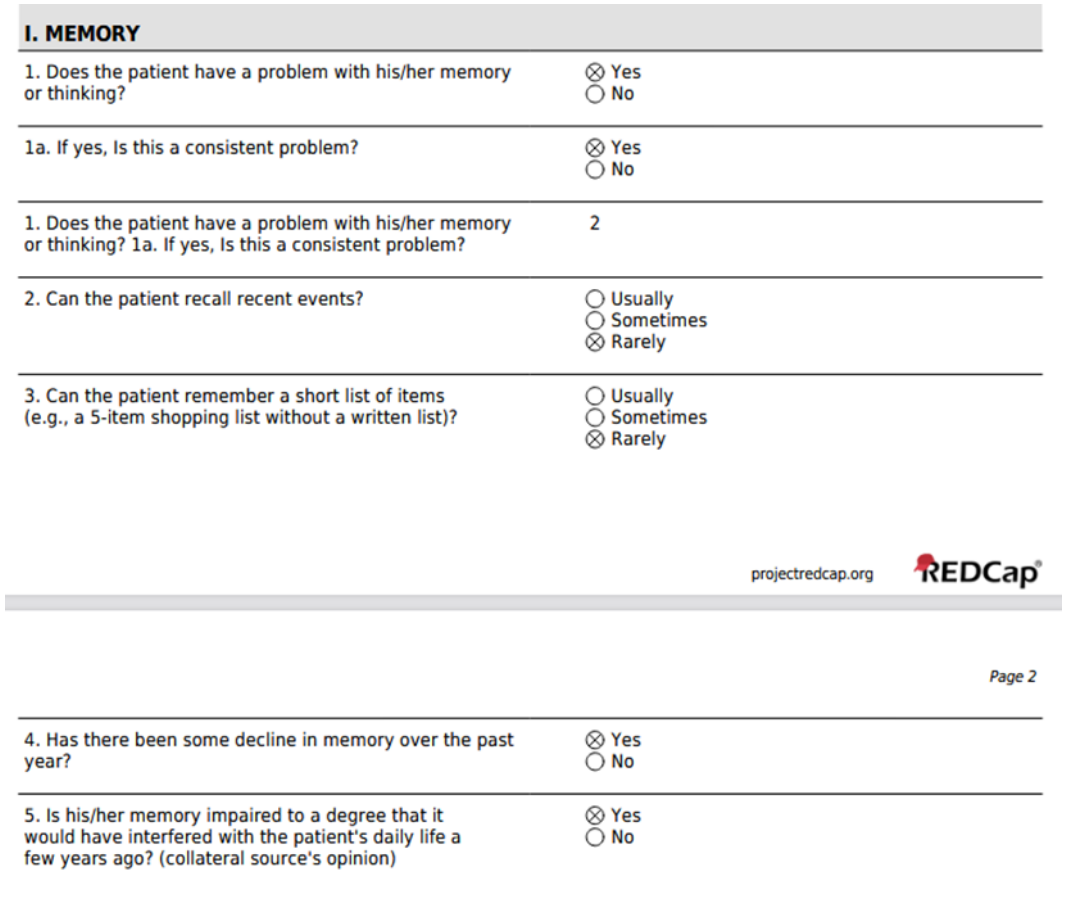
Operationalizing Data for Process Improvement

Making Our ADRC Data "Work"

- Seeking to manage the conflict between data collection and improving the process
- Two large goals with respect to data utilization
  1. Refine study activities for clinicians and raters
  2. Leverage data to improve Center operations
- Many applications tailored to UAB
  - The UAB ADRC Dashboard
  - Additional reports and tools based on staff need
  - Improvements to EDC via REDCap
- All towards building up a collaborative Center

Support for Review and Consensus

- Facilitating presentation of data for review / consensus



I. MEMORY

1. Does the patient have a problem with his/her memory or thinking?	⊗ Yes ○ No
1a. If yes, Is this a consistent problem?	⊗ Yes ○ No
1. Does the patient have a problem with his/her memory or thinking? 1a. If yes, Is this a consistent problem?	2
2. Can the patient recall recent events?	○ Usually ○ Sometimes ⊗ Rarely
3. Can the patient remember a short list of items (e.g., a 5-item shopping list without a written list)?	○ Usually ○ Sometimes ⊗ Rarely

projectredcap.org REDCap

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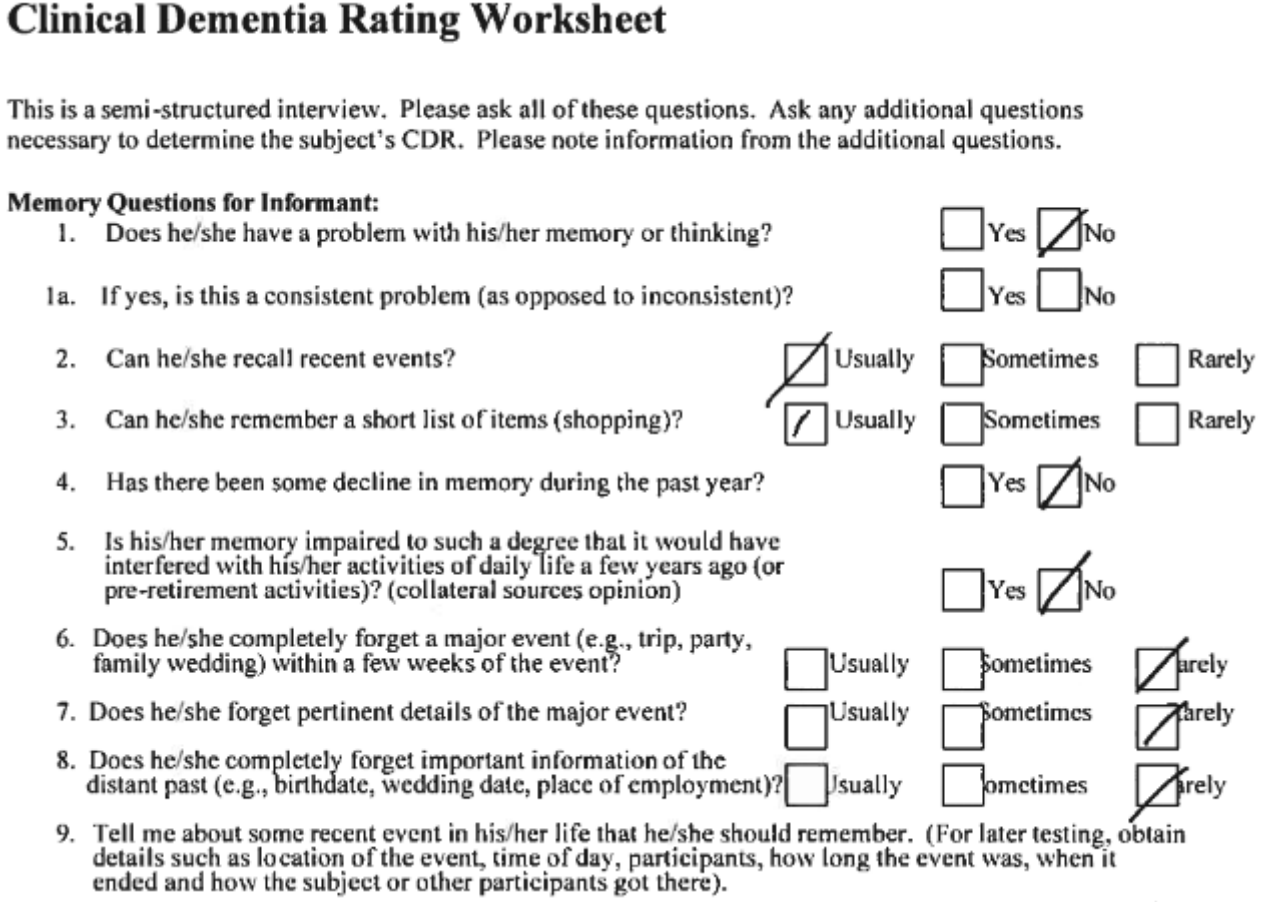
4. Has there been some decline in memory over the past year?	⊗ Yes ○ No
5. Is his/her memory impaired to a degree that it would have interfered with the patient's daily life a few years ago? (collateral source's opinion)	⊗ Yes ○ No



Clinical Dementia Rating Worksheet

This is a semi-structured interview. Please ask all of these questions. Ask any additional questions necessary to determine the subject's CDR. Please note information from the additional questions.

Memory Questions for Informant:

1. Does he/she have a problem with his/her memory or thinking? ☐ Yes ☒ No
1a. If yes, is this a consistent problem (as opposed to inconsistent)? ☐ Yes ☐ No
2. Can he/she recall recent events? ☒ Usually ☐ Sometimes ☐ Rarely
3. Can he/she remember a short list of items (shopping)? ☑ Usually ☐ Sometimes ☐ Rarely
4. Has there been some decline in memory during the past year? ☐ Yes ☒ No
5. Is his/her memory impaired to such a degree that it would have interfered with his/her activities of daily life a few years ago (or pre-retirement activities)? (collateral sources opinion) ☐ Yes ☒ No
6. Does he/she completely forget a major event (e.g., trip, party, family wedding) within a few weeks of the event? ☐ Usually ☐ Sometimes ☒ Rarely
7. Does he/she forget pertinent details of the major event? ☐ Usually ☐ Sometimes ☒ Rarely
8. Does he/she completely forget important information of the distant past (e.g., birthdate, wedding date, place of employment)? ☐ Usually ☐ Sometimes ☒ Rarely
9. Tell me about some recent event in his/her life that he/she should remember. (For later testing, obtain details such as location of the event, time of day, participants, how long the event was, when it ended and how the subject or other participants got there).

Support for Review and Consensus

- More direct and intuitive than paper or raw REDCap

CDR - Collateral 1: ADC (IV) - Examiner:

Memory

No abberant responses from collateral in Memory domain

Orientation

Question	Response
1. How often does he/she know of the exact: Date of the Month?	Usually
2. How often does he/she know of the exact: Month?	Usually
3. How often does he/she know of the exact: Year?	Usually
4. How often does he/she know of the exact: Day of the Week?	Usually
5. Does he/she have difficulty with time relationships?	**Sometimes**
6. Can he/she find his/her way about familiar streets?	Usually
7. How often does he/she know how to get from one place to another outside his/her neighborhood?	Usually
8. How often can he/she find his/her way about indoors?	Usually

Form B6 - GDS: ADC (IV) - Examiner:

Question	Response
1. Are you basically satisfied with your life?	0 Yes
2. Have you dropped many of your activities and interests?	0 No
3. Do you feel that your life is empty?	0 No
4. Do you often get bored?	0 No
5. Are you in good spirits most of the time?	0 Yes
6. Are you afraid that something bad is going to happen to you?	0 No
7. Do you feel happy most of the time?	0 Yes
8. Do you often feel helpless?	0 No
9. Do you prefer to stay at home, rather than going out and doing new things?	0 No
10. Do you feel you have more problems with memory than most?	0 No
11. Do you think it is wonderful to be alive now?	0 Yes
12. Do you feel pretty worthless the way you are now?	0 No
13. Do you feel full of energy?	**1 No**
14. Do you feel that your situation is hopeless?	0 No
15. Do you think that most people are better off than you are?	0 No
16. Sum all checked answers for a Total GDS Score	**1**

Support for Review and Consensus

- Presentation of neuropsych z-scores and percentiles

Memory

	Raw Value	Z Score	Percentile
MOCA Global Assessment	28	0.68	75.2
Craft Story 21 Recall	**Raw Value**	**Z Score**	**Percentile**
Immediate (Verbatim)	27	0.75	77.3
Immediate (Paraphrase)	17	0.18	57.1
Delayed (Verbatim)	24	0.74	77
Delayed (Paraphrase)	16	0.2	57.9
Benson Complex Figure	**Raw Value**	**Z Score**	**Percentile**
Figure Copy	17	1.06	85.5
Figure Recall	6	-1.72	4.3

Language

	Raw Value	Z Score	Percentile
MINT Multilingual	29	-0.3	38.2
Phonemics Test	**Raw Value**	**Z Score**	**Percentile**
F-Words	3	-2.68	0.4
L-Words	7	-1.73	4.2
F and L-Words	10	-2.36	0.9
Categorical Naming	**Raw Value**	**Z Score**	**Percentile**
Animals	20	-0.26	39.7
Vegetables	15	-0.24	40.5

Attention

Number Span Test	Raw Value	Z Score	Percentile
Forward (Total Score)	11	1.28	90
Forward (Longest Span)	8	1.12	86.9
Backward (Total Score)	12	2.28	98.9
Backward (Longest Span)	8	2.33	99

Trails Making Test	Raw Value	Z Score	Percentile
Test A Frwd (sec)	25	0.53	70.2
Test B Bkwd (sec)	69	0.36	64.1
Test A Adjusted	0.96	0.18	57.1
Test B Adjusted	0.35	-0.2	42.1

UAB Global Evaluations

ABCs	GDS	FAS	NPI Q	NPI Q Severity
30 / 30	0 / 15	2 / 30	2 / 12	2 / 6

Clinical Dementia Rating

CDR Sum	CDR Global Score	Memory	Orientation	Judgement	Community	Home and Hobbies	Personal Care
0.5	**0 No Impairment**	0	0	0.5	0	0	0

ADAS-Cog (Total - 7 / 80)

Word List	Commands	Construction	Word Delay	Naming	Ideation
2 / 10	0 / 5	0 / 5	4 / 10	0 / 5	0 / 5
Orientation	**Recognition**	**Instructions**	**Comprehension**	**Word Find**	**Spoken Lang**
0 / 8	1 / 12	0 / 5	0 / 5	0 / 5	0 / 5

WRAT - Reading

Raw Score	T Score	Scale Score	Percentile	Grade Equivalent
55 / 57	61	117	87%	Post-HS

Visual Recall

VRI Immediate	VRII Delayed	VRII Recognition
22 / 43	12 / 43	6 / 7
9%	25%	>75%

Support for Review and Consensus

- These reports are combined into subject-specific slide sets for diagnostic review and clinical consensus conference
- Clinician evaluations are distributed using REDCap surveys with participant specific hook file packets
- Generated, uploaded and distributed using R scripts and API's

Process Improvements to Operations

- Initial improvements to EDC in REDCap emphasized longitudinal project structure to better serve data collection and inform staff-patient interactions

Initial Visit

16. (FV 5.) What is the subject's level of independence?

- (●) 1 Able to live independently
- ( ) 2 Requires some assistance with complex activities
- ( ) 3 Requires some assistance with basic activities
- ( ) 4 Completely dependent
- ( ) 9 Unknown

17. (FV 6.) What is the subject's primary type of residence?

- (●) 1 Single - or multi-family private residence (apartment, condo, house)
- ( ) 2 Retirement community or independent group living
- ( ) 3 Assisted living, adult family home, or boarding home
- ( ) 4 Skilled nursing facility, nursing home, hospital, or hospice
- ( ) 9 Unknown

Follow-Up 1

Subject's level of independence:
Initial visit: 1 Able to live independently
Previous visit: 1 Able to live independently

16. (FV 5.) What is the subject's level of independence?

- ( ) 1 Able to live independently
- (●) 2 Requires some assistance with complex activities
- ( ) 3 Requires some assistance with basic activities
- ( ) 4 Completely dependent
- ( ) 9 Unknown

Subject's primary residence type:
Initial visit: 1 Single - or multi-family private residence (apartment, condo, house)
Previous visit: 1 Single - or multi-family private residence (apartment, condo, house)

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- ( ) 3 Assisted living, adult family home, or boarding home
- ( ) 4 Skilled nursing facility, nursing home, hospital, or hospice
- ( ) 9 Unknown

Follow-Up 2

Subject's level of independence:
Initial visit: 1 Able to live independently
Previous visit: 2 Requires some assistance with complex activities

16. (FV 5.) What is the subject's level of independence?

- ( ) 1 Able to live independently
- ( ) 2 Requires some assistance with complex activities
- (●) 3 Requires some assistance with basic activities
- ( ) 4 Completely dependent
- ( ) 9 Unknown

Subject's primary residence type:
Initial visit: 1 Single - or multi-family private residence (apartment, condo, house)
Previous visit: 1 Single - or multi-family private residence (apartment, condo, house)

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- ( ) 1 Single - or multi-family private residence (apartment, condo, house)
- (●) 2 Retirement community or independent group living
- ( ) 3 Assisted living, adult family home, or boarding home
- ( ) 4 Skilled nursing facility, nursing home, hospital, or hospice
- ( ) 9 Unknown

Process Improvements to Operations

- Dynamic and up-to-date reports for completion and upcoming visits online

UAB ADRC - Upcoming Visits Report

P20 participants nearing 1 year (> 335 days since A1) - 2022-07-12

ADC ID	Race	A1 Visit Date	D1 Dx Date	Days since A1
	White	2021-08-03	2021-12-10	343 days
	Black / AA	2021-07-19	2021-12-06	358 days

UAB ADRC - Current Completion Report

Enrolled participants with missing components - 2022-07-12

		Coordinator				Rater		Nurse					Clinician		Notes for Review		
ID	Visit	A1-Subject Demog	A2-Copart Demog	B5-NPIQ	B7-FAS	B6-GDS	C2-Neuro Batt	A3-Family Hist	A4-Meds	A5-Personal Hist	D2-Medical Hist	B1-Vitals	B4-CDR	B9/B8-Clinical Exam	Nurse	Rater	Clinician
	iv	X	X				X										
	fv_001	X	X			X	X	X	X	•	X	X	X	X	X	X	X

Operational Support – Schedule Builder

- Application for creating and reviewing timelines of study visits and Center activities for participants

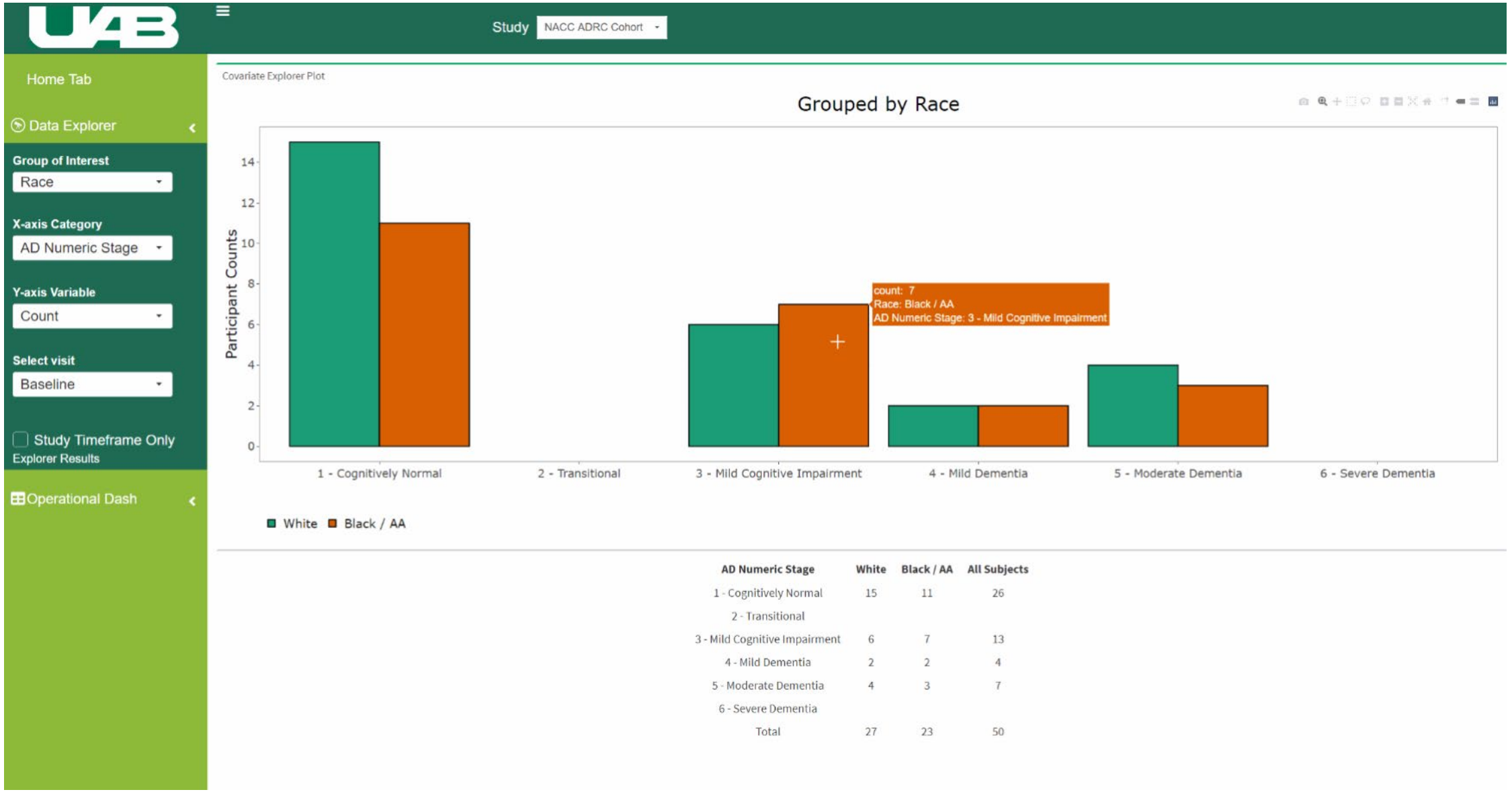
Operational Support – Review Comparison

- Online tool to easily identify differences in diagnosis between reviewers to facilitate consensus discussions

ADC001; A1 Age: 82; W F; NAY Edu (IV)

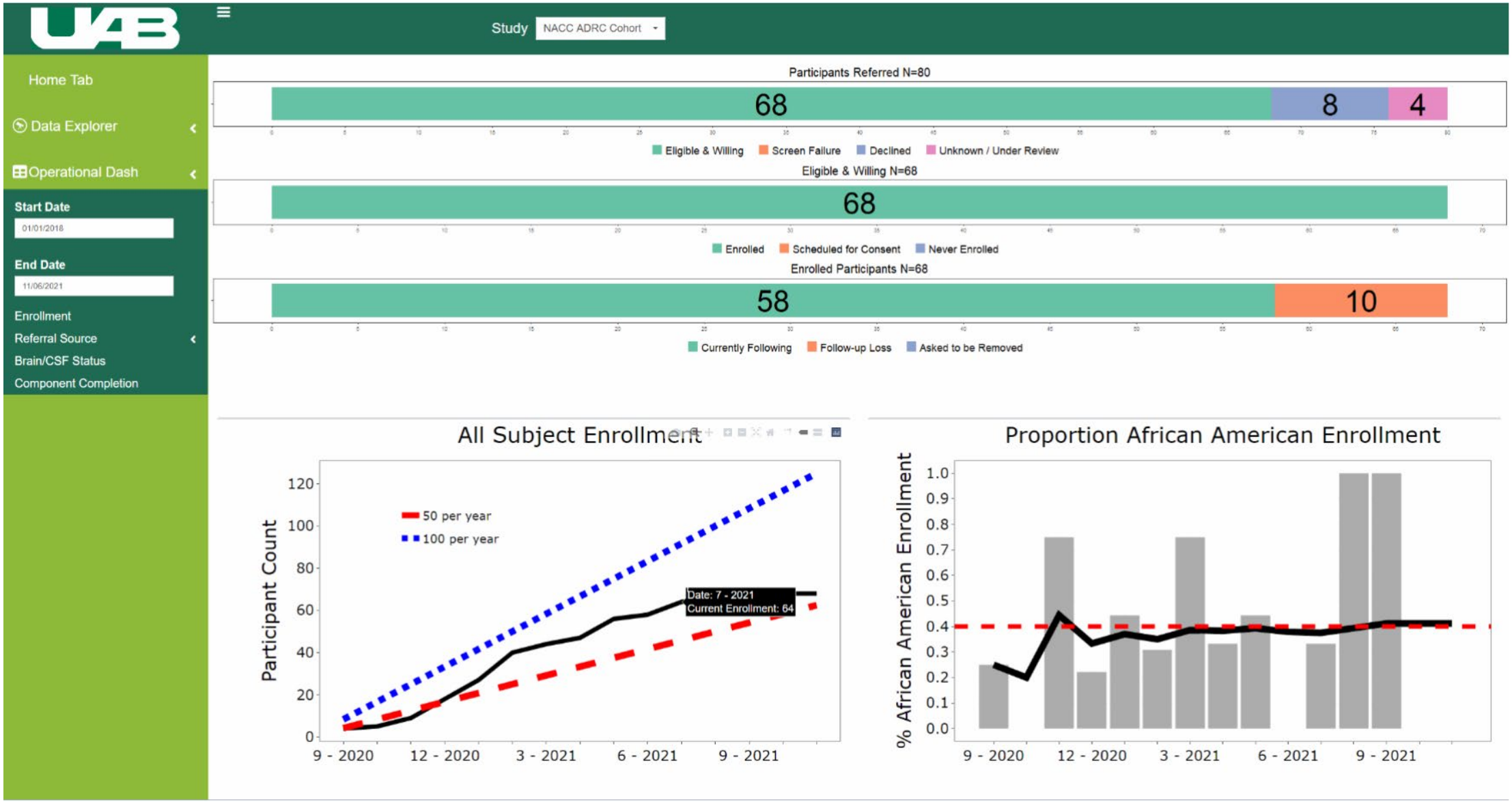
Question	Reviewer1 NA - 2022-05-29	Reviewer2 NA - 2022-05-27
13a. Per the clinician (e.g., neuropsychologist, behavioral neurologist, or other suitably qualified clinician), based on the UDS Neuropsychological examination, the subject's cognitive status is deemed:	3 One or two test scores are abnormal	4 Three or more scores are abnormal or lower than expected
2. Does the subject have normal cognition (global CDR=0 and/or neuropsychological testing within normal range) and normal behavior (i.e., the subject does not exhibit behavior sufficient to diagnose MCI or dementia due to FTLD or LBD)?	0 No	0 No
3. Does the subject meet the criteria for dementia?	0 No	1 Yes
4a. Amnestic multidomain dementia syndrome		1 Present
5c. Non-amnestic MCI, single domain (naMCI SD)	1 Present	
5c3. Executive	1 Yes	
11. Alzheimer's disease		1 Present
11a. If Alzheimer's disease present, is it primary, contributing or non-contributing?		1 Primary
25. Cognitive impairment due to other neurologic, genetic, or infectious conditions not listed above		1 Present
25a. If other cognitive impairment present, is it primary, contributing or non-contributing?		2 Contributing
Notes or observations IN SUPPORT of a diagnosis	NPT suggests visuospatial specific dysfunction with values below norms	Results suggest both memory and visuospatial impairment; health history indicates impairment
Notes or observations AGAINST a diagnosis	Potential amnestic impairments but CDR unclear	Specifics of impairment unclear
Syndromal Staging of Cognitive Continuum	Mild Cognitive Impairment	Dementia
Numeric Staging of Cognitive Continuum	3 - Mild Cognitive Impairment	4 - Mild Dementia
DISCREPANCY NOTED - PLEASE REVIEW		

Operational Support – UAB ADRC Dashboard

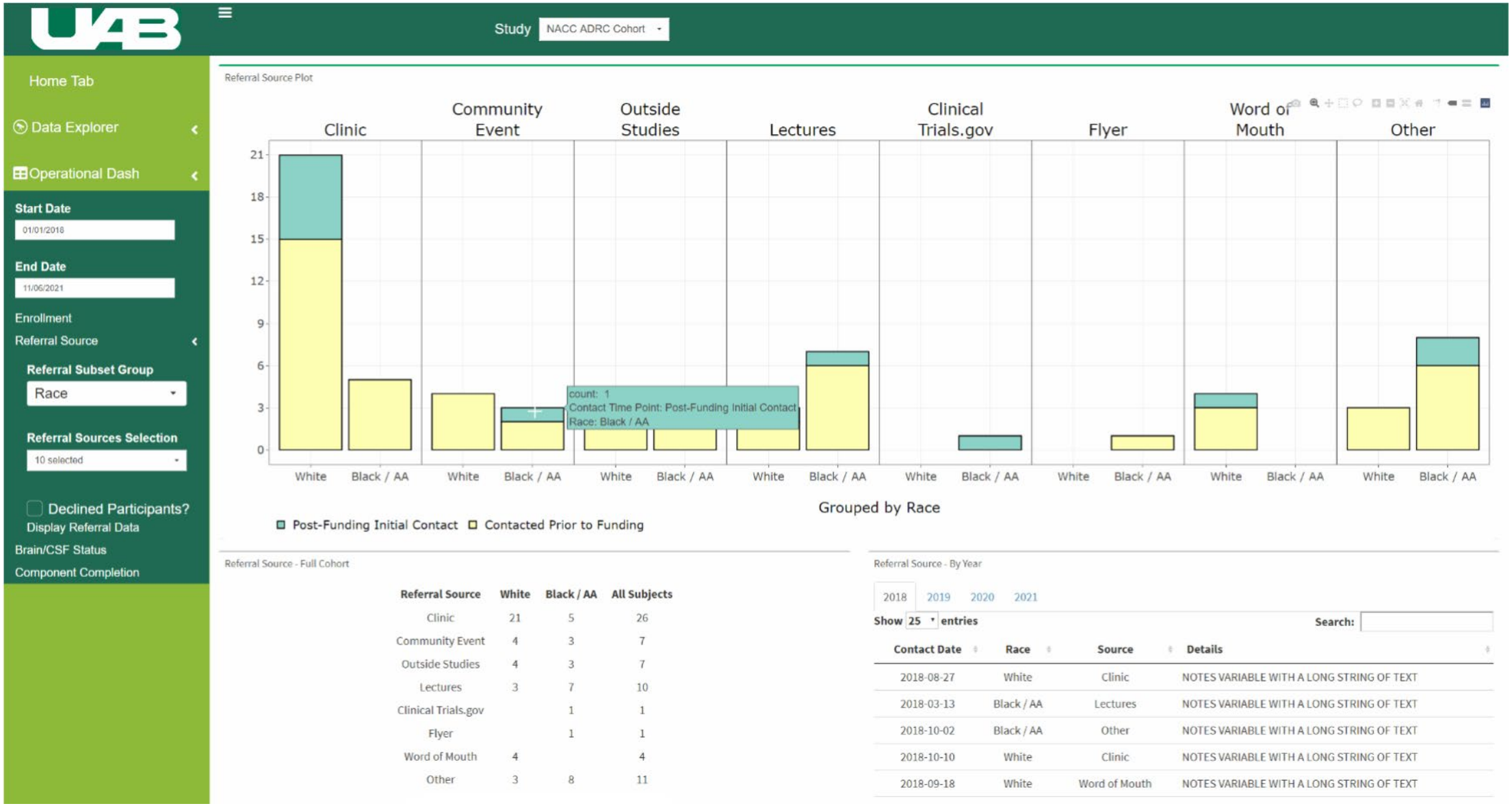


AD Numeric Stage	White	Black / AA	All Subjects
1 - Cognitively Normal	15	11	26
2 - Transitional			
3 - Mild Cognitive Impairment	6	7	13
4 - Mild Dementia	2	2	4
5 - Moderate Dementia	4	3	7
6 - Severe Dementia			
Total	27	23	50

Operational Support – UAB ADRC Dashboard



Operational Support – UAB ADRC Dashboard



Referral Source - Full Cohort

Referral Source	White	Black / AA	All Subjects
Clinic	21	5	26
Community Event	4	3	7
Outside Studies	4	3	7
Lectures	3	7	10
Clinical Trials.gov		1	1
Flyer		1	1
Word of Mouth	4		4
Other	3	8	11

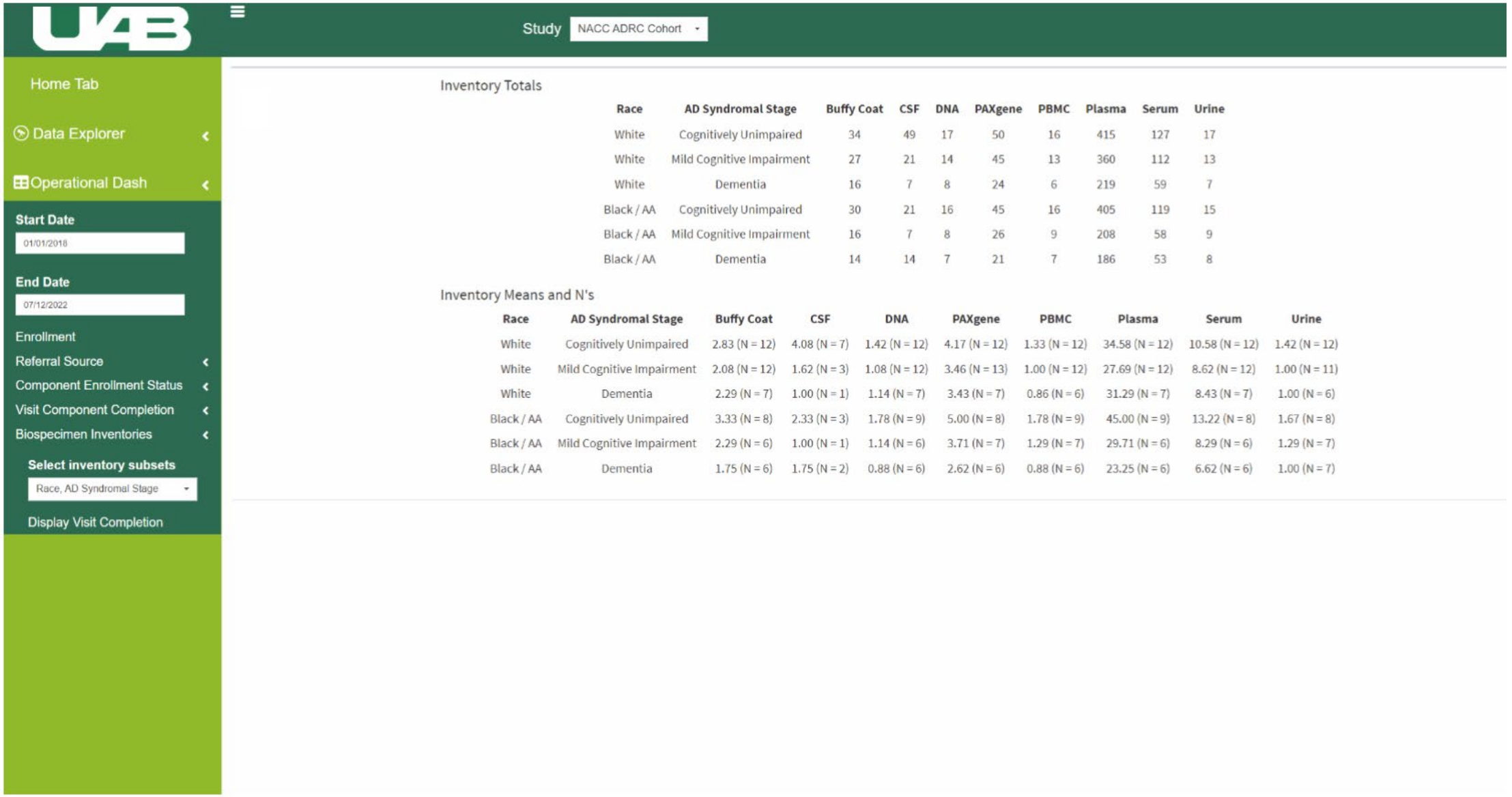
Referral Source - By Year

2018 2019 2020 2021

Show 25 entries Search:

Contact Date	Race	Source	Details
2018-08-27	White	Clinic	NOTES VARIABLE WITH A LONG STRING OF TEXT
2018-03-13	Black / AA	Lectures	NOTES VARIABLE WITH A LONG STRING OF TEXT
2018-10-02	Black / AA	Other	NOTES VARIABLE WITH A LONG STRING OF TEXT
2018-10-10	White	Clinic	NOTES VARIABLE WITH A LONG STRING OF TEXT
2018-09-18	White	Word of Mouth	NOTES VARIABLE WITH A LONG STRING OF TEXT

Operational Support – UAB ADRC Dashboard



Inventory Totals

Race	AD Syndromal Stage	Buffy Coat	CSF	DNA	PAXgene	PBMC	Plasma	Serum	Urine
White	Cognitively Unimpaired	34	49	17	50	16	415	127	17
White	Mild Cognitive Impairment	27	21	14	45	13	360	112	13
White	Dementia	16	7	8	24	6	219	59	7
Black / AA	Cognitively Unimpaired	30	21	16	45	16	405	119	15
Black / AA	Mild Cognitive Impairment	16	7	8	26	9	208	58	9
Black / AA	Dementia	14	14	7	21	7	186	53	8

Inventory Means and N's

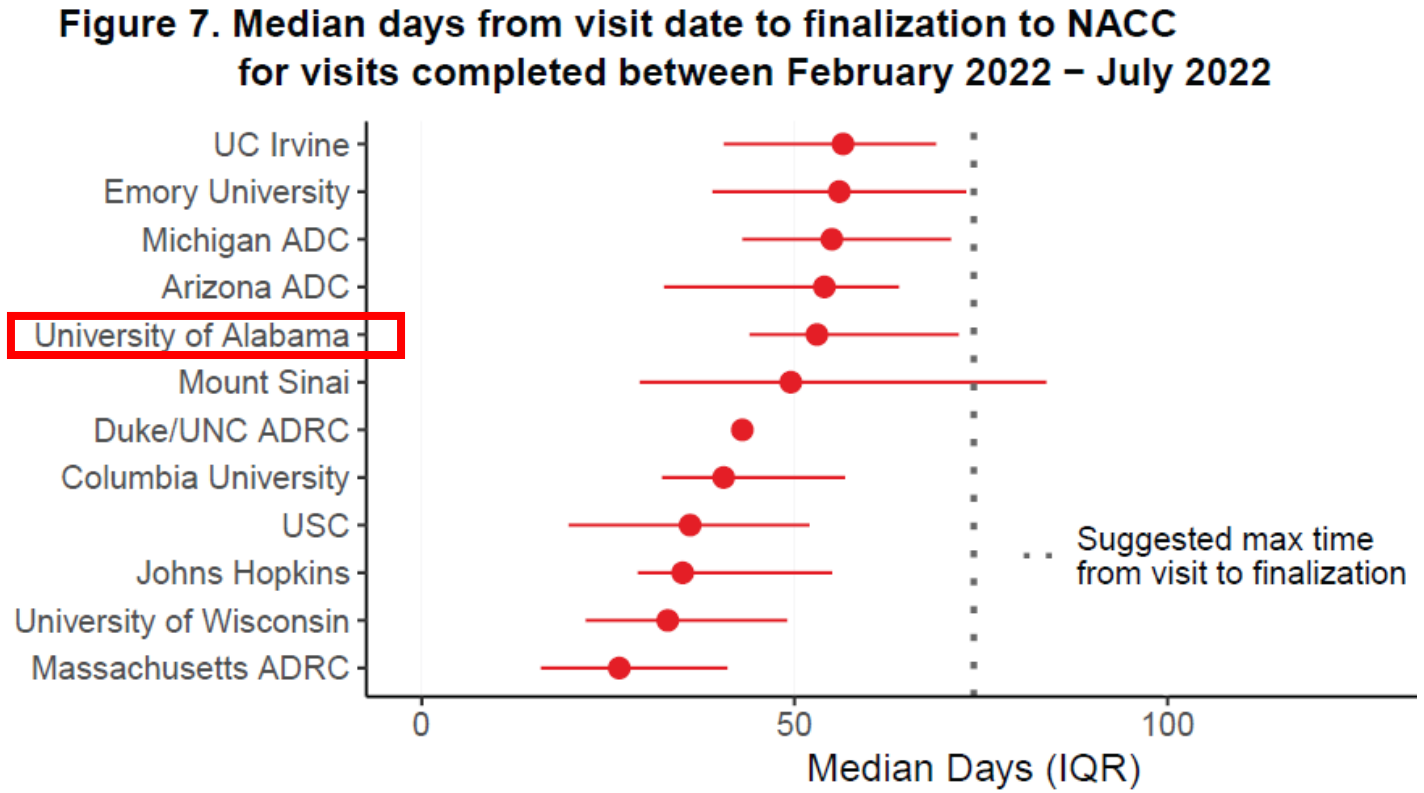
Race	AD Syndromal Stage	Buffy Coat	CSF	DNA	PAXgene	PBMC	Plasma	Serum	Urine
White	Cognitively Unimpaired	2.83 (N = 12)	4.08 (N = 7)	1.42 (N = 12)	4.17 (N = 12)	1.33 (N = 12)	34.58 (N = 12)	10.58 (N = 12)	1.42 (N = 12)
White	Mild Cognitive Impairment	2.08 (N = 12)	1.62 (N = 3)	1.08 (N = 12)	3.46 (N = 13)	1.00 (N = 12)	27.69 (N = 12)	8.62 (N = 12)	1.00 (N = 11)
White	Dementia	2.29 (N = 7)	1.00 (N = 1)	1.14 (N = 7)	3.43 (N = 7)	0.86 (N = 6)	31.29 (N = 7)	8.43 (N = 7)	1.00 (N = 6)
Black / AA	Cognitively Unimpaired	3.33 (N = 8)	2.33 (N = 3)	1.78 (N = 9)	5.00 (N = 8)	1.78 (N = 9)	45.00 (N = 9)	13.22 (N = 8)	1.67 (N = 8)
Black / AA	Mild Cognitive Impairment	2.29 (N = 6)	1.00 (N = 1)	1.14 (N = 6)	3.71 (N = 7)	1.29 (N = 7)	29.71 (N = 6)	8.29 (N = 6)	1.29 (N = 7)
Black / AA	Dementia	1.75 (N = 6)	1.75 (N = 2)	0.88 (N = 6)	2.62 (N = 6)	0.88 (N = 6)	23.25 (N = 6)	6.62 (N = 6)	1.00 (N = 7)

Improving Our Performance as a NACC ADRC

- NCRAD GWAS coverage has gone from 35% in January 2022 to 80% in September 2022 with expectation of 96%
- Time from participant visit to NACC upload has been reduced by 59% from January to September; now at 71 days compared to NACC median of 105
- Rate of packets-in-error has been held at 0% since March
- All while maintaining a 35-40% enrollment of B/AA participants per our Center focus

Improving Our Performance as a NACC ADRC

- Process improvements along with leveraging our data management tools and working with NACC have allowed us to make notable gains in NACC engagement over the last year



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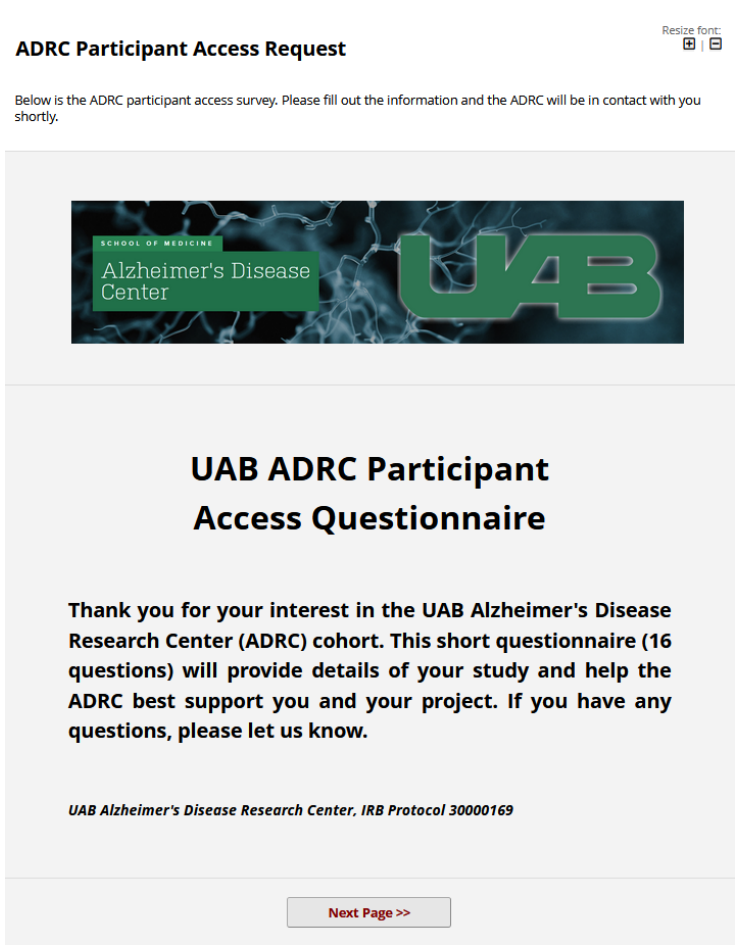
Looking to the Future

Collaboration and Resource Sharing

- Implemented data use request surveys for collaborators



ADRC Participant Access Request

Resize font:

Below is the ADRC participant access survey. Please fill out the information and the ADRC will be in contact with you shortly.

SCHOOL OF MEDICINE
Alzheimer's Disease Center
UAB

UAB ADRC Participant Access Questionnaire

Thank you for your interest in the UAB Alzheimer's Disease Research Center (ADRC) cohort. This short questionnaire (16 questions) will provide details of your study and help the ADRC best support you and your project. If you have any questions, please let us know.

UAB Alzheimer's Disease Research Center, IRB Protocol 30000169

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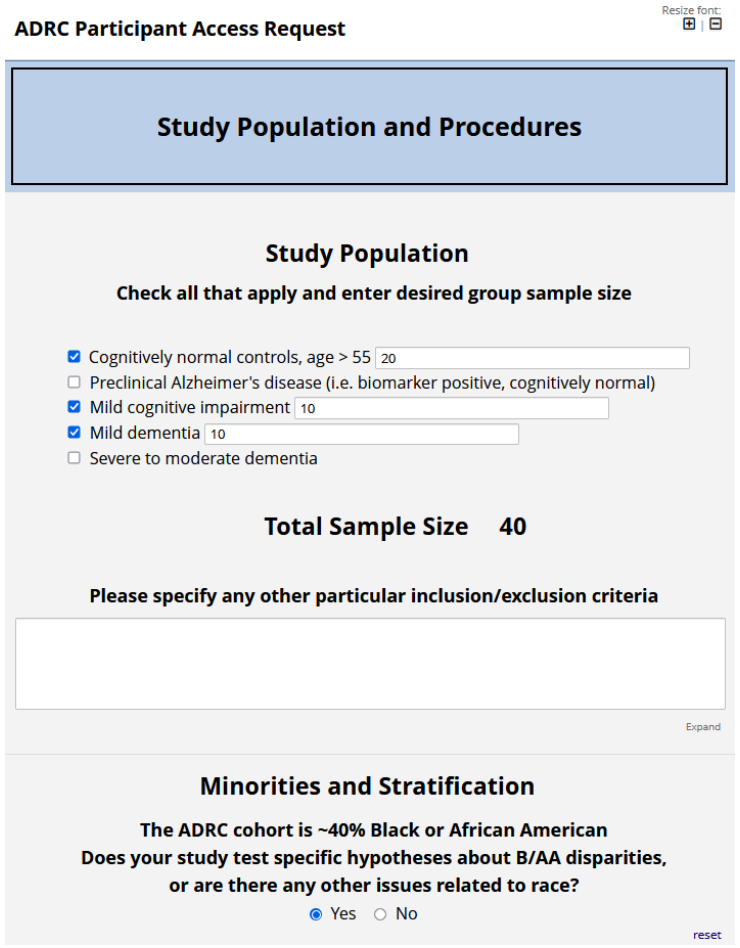

ADRC Participant Access Request

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Study Population and Procedures

Study Population

Check all that apply and enter desired group sample size

- [x] Cognitively normal controls, age > 55 — 20
- [ ] Preclinical Alzheimer's disease (i.e. biomarker positive, cognitively normal)
- [x] Mild cognitive impairment — 10
- [x] Mild dementia — 10
- [ ] Severe to moderate dementia

Total Sample Size 40

Please specify any other particular inclusion/exclusion criteria

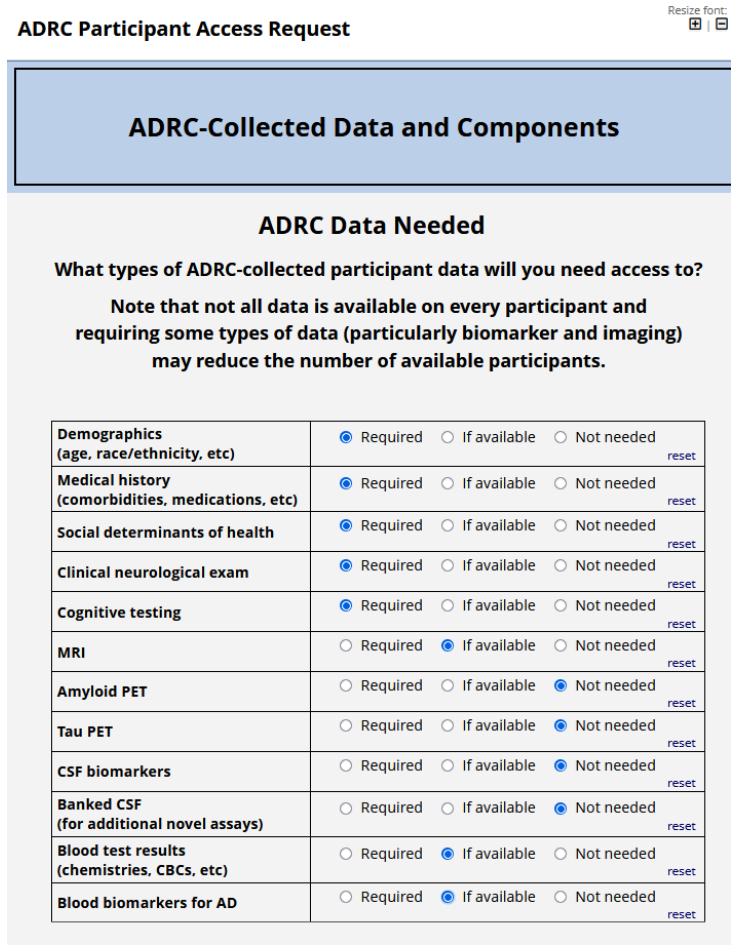
Expand

Minorities and Stratification

The ADRC cohort is ~40% Black or African American
Does your study test specific hypotheses about B/AA disparities, or are there any other issues related to race?

(•) Yes ( ) No

reset



ADRC Participant Access Request

Resize font:

ADRC-Collected Data and Components

ADRC Data Needed

What types of ADRC-collected participant data will you need access to?

Note that not all data is available on every participant and requiring some types of data (particularly biomarker and imaging) may reduce the number of available participants.

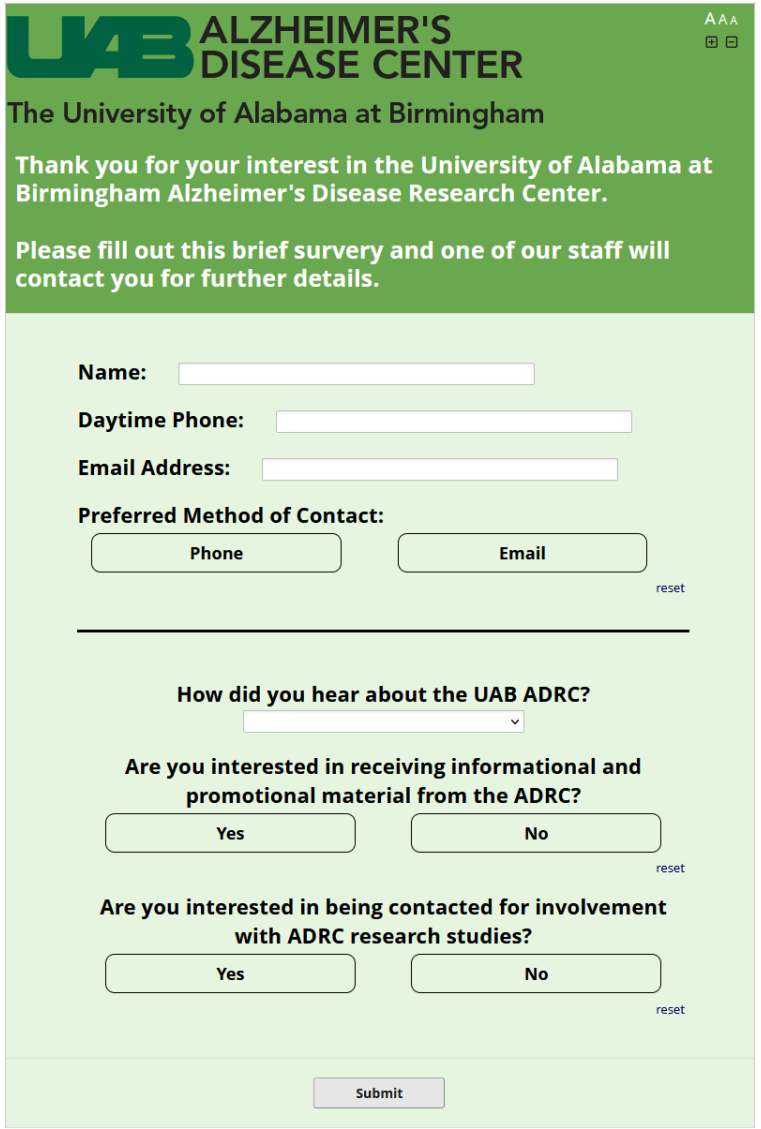
Demographics (age, race/ethnicity, etc)	(•) Required	( ) If available	( ) Not needed	reset
Medical history (comorbidities, medications, etc)	(•) Required	( ) If available	( ) Not needed	reset
Social determinants of health	(•) Required	( ) If available	( ) Not needed	reset
Clinical neurological exam	(•) Required	( ) If available	( ) Not needed	reset
Cognitive testing	(•) Required	( ) If available	( ) Not needed	reset
MRI	( ) Required	(•) If available	( ) Not needed	reset
Amyloid PET	( ) Required	( ) If available	(•) Not needed	reset
Tau PET	( ) Required	( ) If available	(•) Not needed	reset
CSF biomarkers	( ) Required	( ) If available	(•) Not needed	reset
Banked CSF (for additional novel assays)	( ) Required	( ) If available	(•) Not needed	reset
Blood test results (chemistries, CBCs, etc)	( ) Required	(•) If available	( ) Not needed	reset
Blood biomarkers for AD	( ) Required	(•) If available	( ) Not needed	reset

Success as a Collaborative Center

- Within Alabama
  - UA at Birmingham – R01MH121928; U01NS041588
  - UA Tuscaloosa – R03AG059188
- As well as with other ADRC's and Institutions
  - UC San Francisco – RF1AG059009
  - Duke University – U19AG063744
  - Washington University – R01AG067505
  - Medical University of South Carolina – R56AG073670

Expanding the Cohort

- Increase in CODI Community Events has led to establishment of a UAB ADRC Registry
- Allows for engagement beyond the clinical cohort
- Publicly available via REDCap for use by subjects or used at events
- Can be used operationally to “widen the funnel” to studies

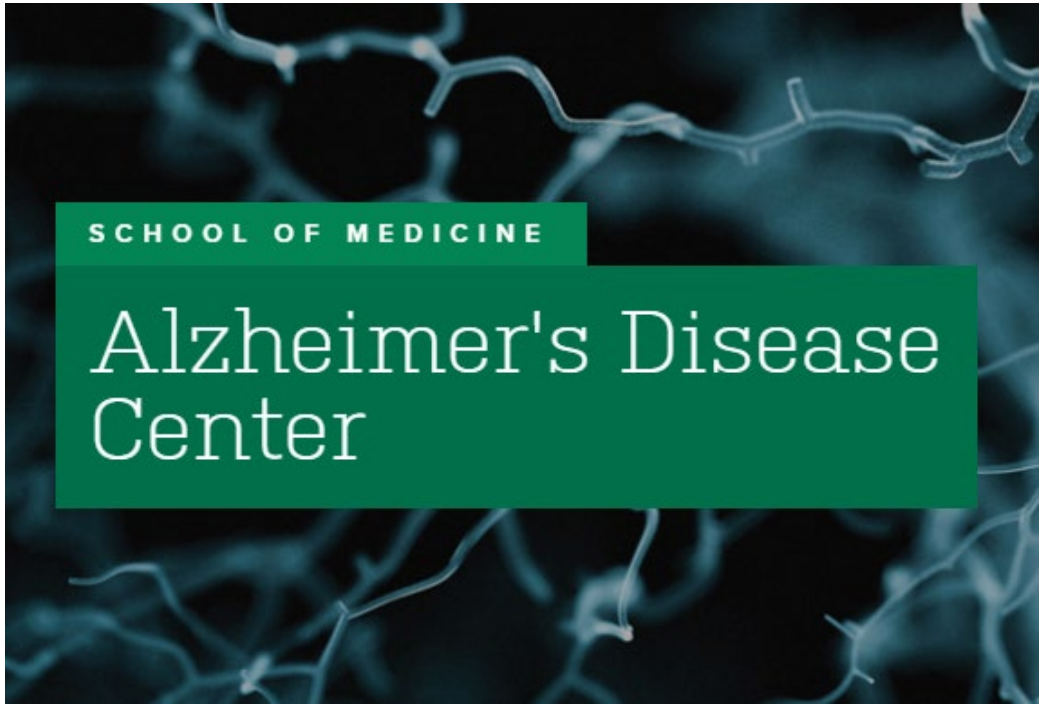


Next Steps

- Continued engagement with NACC / NIA as a Center
- Improving our tools even more
  - Expanding collaboration requests and tracking
  - Increasing Dashboard accessibility at UAB and beyond
  - Working to improve access to the UAB ADRC server
  - Integration into a public facing website
- Reinforcing our Core structure as a Center
  - Supporting CODI's continued activity of community events
  - Expanding architecture for P30 cores (Data, Imaging, Pathology)
  - Enhancing cross-Core interactions

Acknowledgements

- Erik Roberson, MD PhD
  Neurology, Alzheimer's Disease Research Center
- Lloyd Edwards, PhD
  Biostatistics, Data Management and Analysis Center
- Richard Kennedy, MD PhD
  Medicine, Integrative Center for Aging Research
- Carol Chambless, MBA, MPH
  Neurology, Alzheimer's Disease Research Center
- The ADRC and DOM-IT Staff



Funding Support

UAB Exploratory Alzheimer's Disease Research Center
NIA – P20AG068024