

## The CNS Connection:

Understanding psychosocial aspects  
of CNS demyelinating disorders

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# Acknowledgments

Patients and families impacted by rare diseases



**SRNA**  
connect. care. cure.

Siegel  
Rare Neuroimmune  
Association

# Acknowledgments



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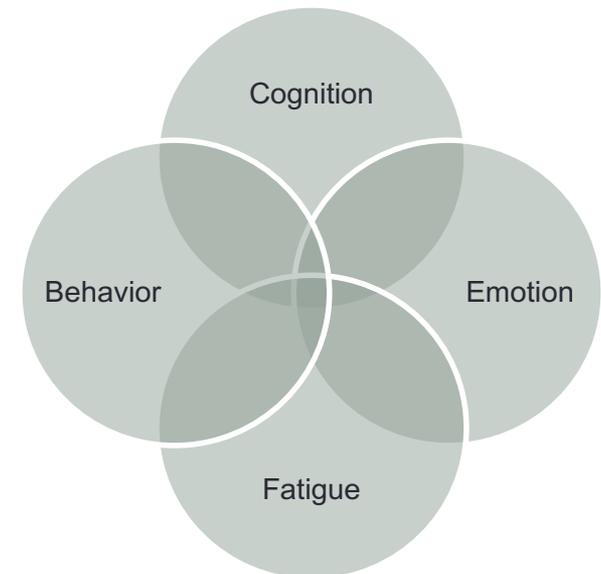


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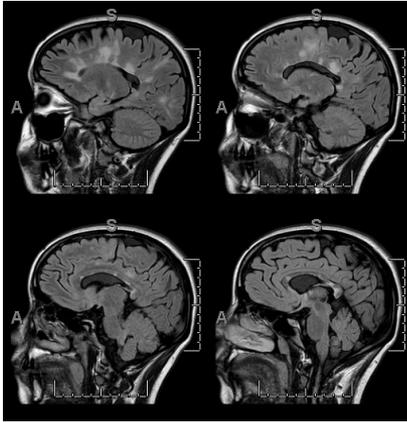


# Role of Neuropsychology

- Science of human behavior as it relates to central nervous system function



# Understanding the impact of rare disorders: Individual level



- Genetics
- Developmental History
- Age of onset or injury
- Developmental Stage
- Time since onset or injury
- Pre-morbid functioning (e.g., previous diagnosis of dyslexia)
- Nature of disease/injury
  - Acute vs. chronic
  - Developmental vs. acquired
- Disease Mechanisms
- Psychosocial Environment
  - Family
  - School
- Emotional Functioning
- Reserve/Resources
  - Support

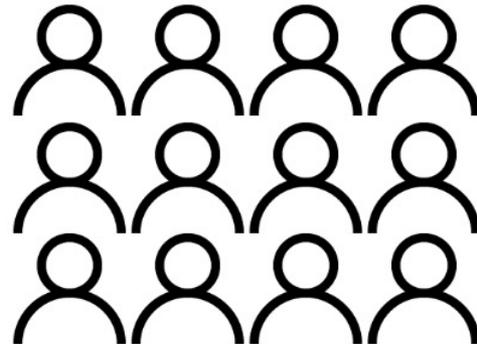


# Neuropsychologists as Clinician and Researcher

- Clinical individual evaluation
  - Focus on one person
  - Tailored evaluation and recommendations
- Research evaluating groups
  - Diagnostic groups
  - Age range
  - Test hypotheses at the group level



vs



# Identifying Groups to Compare

**Table 1.** Characteristics of CNS demyelinating diseases.

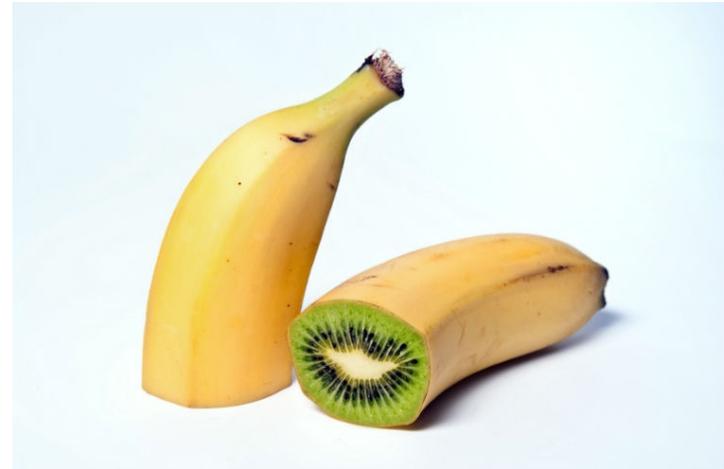
Disease	Most common	Areas affected	Disease course
MS	Adults	Brain, spinal cord, optic nerve	Chronic
ADEM	Children	Brain, spinal cord, optic nerve	Monophasic
NMO	Adults	Spinal cord, optic nerve	Chronic
TM	Adults	Spinal cord	Monophasic

MS: multiple sclerosis; ADEM: acute disseminated encephalomyelitis; NMO: neuromyelitis optica; TM: transverse myelitis.

Tan, Hague, Greenberg, & Harder (2017)

# Early Study Reveals Unexpected Findings

- Aim: Compare cognitive functioning in MS and TM (control group)
- Hypothesis: MS would be associated with higher rate of cognitive and school problems
- Result:
  - Equivalent rate of school problems
  - Cognitive problems also seen in TM



# Cognitive functioning in pediatric transverse myelitis

Lana L Harder<sup>1,2,3</sup>, Alice Ann Holland<sup>1,2</sup>, Elliot Frohman<sup>1,3</sup>,  
Donna Graves<sup>1,3</sup> and Benjamin M Greenberg<sup>1,3</sup>

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Domain	TM
Fine-motor coordination	43%
Memory Initial Learning	33%
Attention	41%
Fluency	25%
Parent-Reported Attention Problems	30%
Parent-Reported Depression	30%
School Problems	33%
Referral for Additional Testing	29%

**\*\*High rates of fatigue  
were noted**

# Questions

- Are there differences in cognition for MS and TM in larger samples?
- Is fatigue playing a role?
- Does depression impact cognition?

# MS AS A CONTROL IN RARE DISEASE RESEARCH

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Research suggests that cognition, mood, and fatigue are interrelated and that by treating one problem, you may also be treating another.

# Previous Research: Adult MS vs. NMO

	Sample	General Findings
Blanc et al., 2008	NMO (N=30) MS (N=30) Control (N=30)	NMO and MS performed worse compared to controls on PASAT, SDMT, Word Generation, Digit Span No differences between NMO and MS
Saji et al., 2012	NMO (N=14) MS (N=17) Control (N=37)	NMO and MS performed significantly worse in most areas assessed than controls 57% of NMO patients and 47% of MS patients showed cognitive impairment
Vanotti et al., 2012	NMO (N=14) MS (N=14) Control (N=14)	57% of NMO and 43% of MS patients showed impairment No difference between NMO and MS NMO showed problems with verbal fluency, memory, and attention

# Previous Research: Pediatric MS vs. ADEM

- Comparison of pediatric patients with MS (N=9) or ADEM (N=9)
- Patients with MS demonstrated greater impairment across cognitive domains
- Patients with ADEM showed normal levels in many areas and weaknesses in complex processing
- Chronic disease course of MS may underlie worse cognitive outcomes in MS

# The Topic of a Dissertation

The Role of Fatigue, Depression, and Other Clinical Factors in Determining Cognitive Status in Pediatric MS and TM

Cole Hague, PhD

Dissertation Committee:

Lana Harder, PhD, ABPP (Chair)

Benjamin Greenberg, MD, MHS

Alison Wilkinson-Smith, PhD, ABPP

Linda Hynan, PhD

Celia Heppner, PhD, ABPP

# MS and Fatigue

- One of the most commonly reported symptoms
- As many as 75% of adults
- Often called the most debilitating symptom of MS
- Impacts quality of life
- Significant number of pediatric patients with MS endorse fatigue

# MS and Depression

- Lifetime prevalence for depression is 50%
- Role of inflammation as the biological basis for depression
- Approximately 50% of those with pediatric-onset MS meet criteria for a psychiatric diagnosis

# MS and Cognition

- One half of adults and one third of children with MS experience cognitive dysfunction

# Current Study Objective

## Objective:

- To evaluate and compare fatigue and depression symptoms between groups of pediatric patients with MS and TM.
- To explore the relation of fatigue and depression to cognitive status.

# Current Study Methods

- Sample:
  - 67 participants with MS (mean age = 15 years)
  - 53 participants with TM (mean age = 12 years)
- Measures:
  - Participants completed a cognitive screening battery
  - Caregivers and patients completed the
    - Pediatric Quality of Life Inventory Multidimensional Fatigue Scale (PedsQL MFS)
      - General
      - Sleep/Rest
      - Cognitive
    - Behavior Assessment System for Children (BASC)
      - Depression Scale

# Key Findings: Fatigue

- No differences between groups:
  - General Fatigue
  - Sleep/Rest Fatigue
  - Cognitive Fatigue
- Compared to the normative mean...
  - Both groups showed statistically significantly worse fatigue in all areas of fatigue ( $p < .05$ )

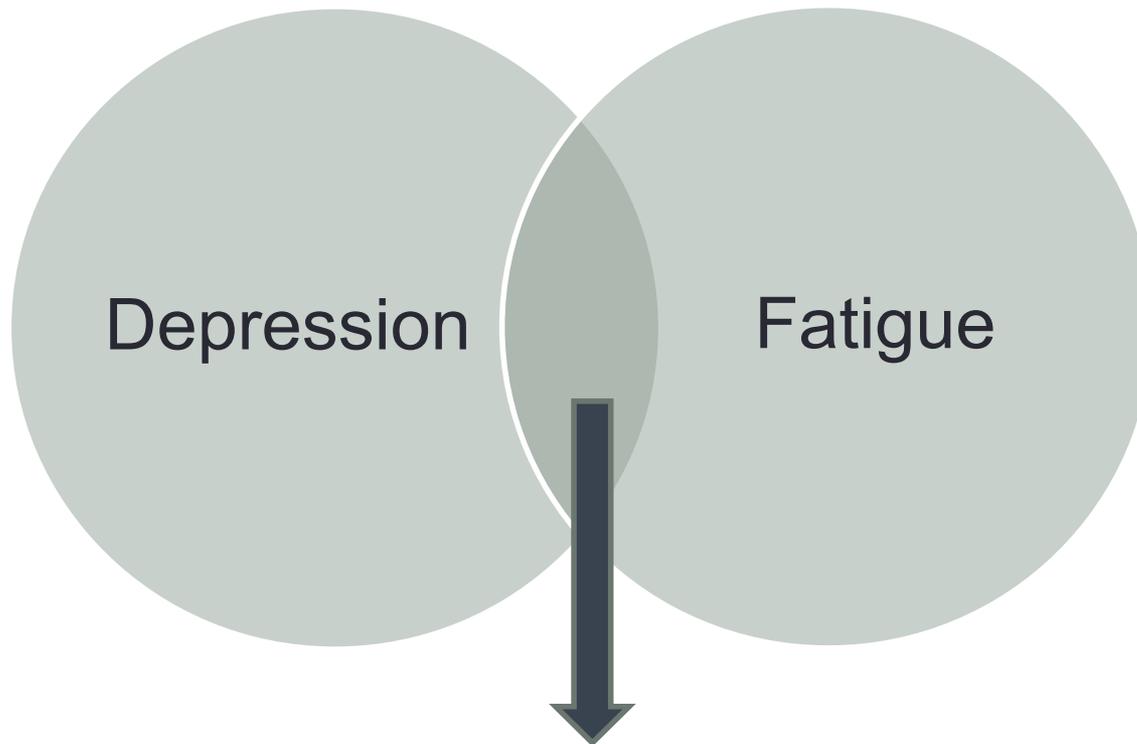
	MS (N=62)	TM (N=49)
General	66%	67%
Sleep/Rest	61%	49%
Cognitive	64%	53%

# Key Findings: Depression symptoms

- No differences between groups:
  - Depression symptoms
- There were no differences from the normative mean for MS or TM groups

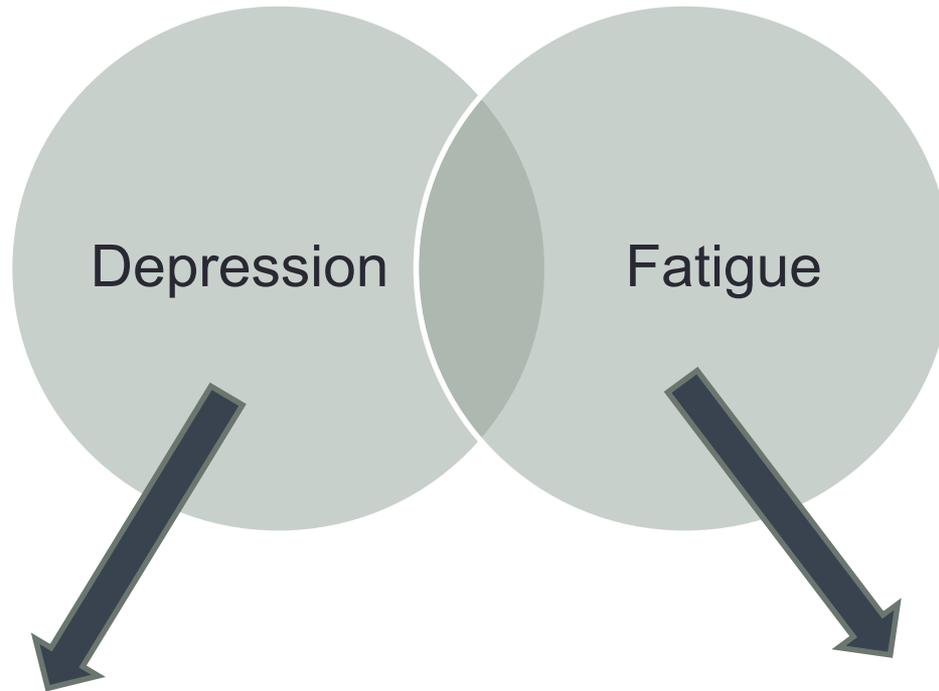
	MS (N=63)	TM (N=52)
Depression	25%	27%

# Overlapping symptoms



Changes in sleep, motor slowing, loss of energy, diminished engagement in activities, diminished cognitive skills (concentration, etc.)

# Additional Symptoms to Consider



Depressed mood  
Feeling sad, empty, hopeless  
Weight changes  
Motor agitation  
Feelings of worthlessness, guilt  
Recurrent thoughts of death and dying

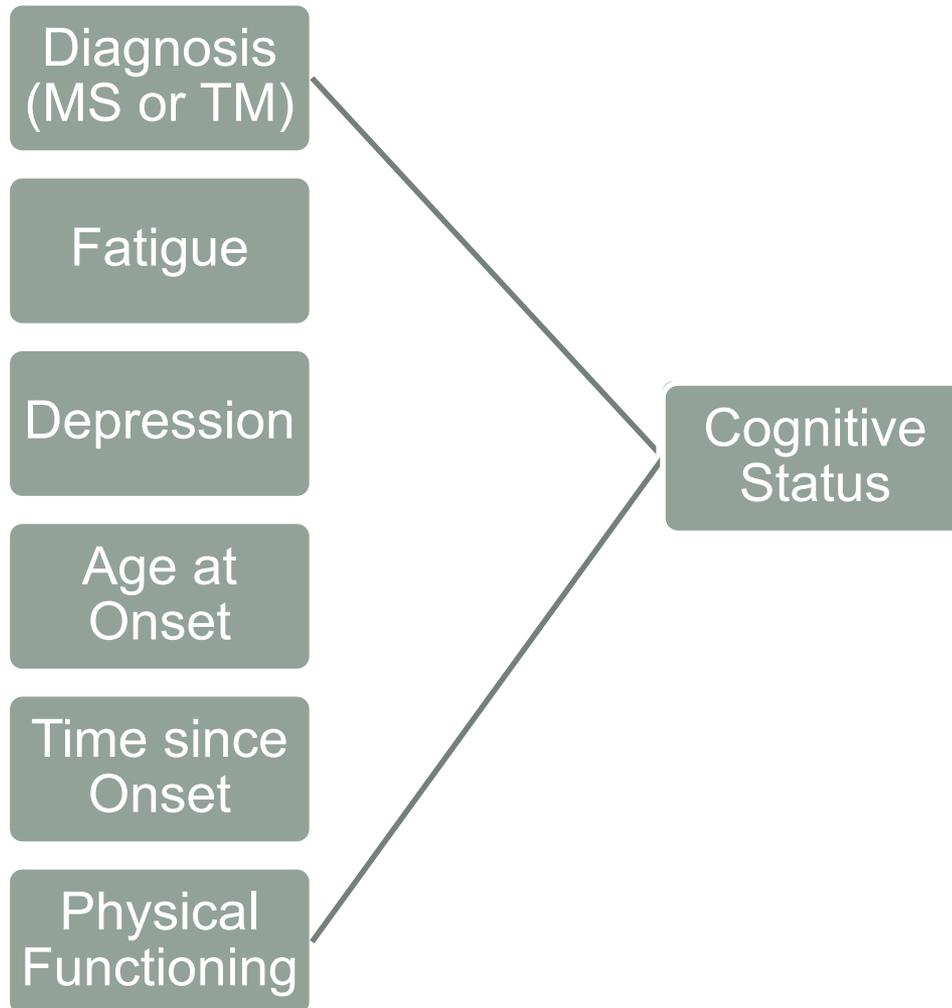
Feeling tired leads to reduced engagement in activities  
Feeling physically weak

# Key Findings: Cognition

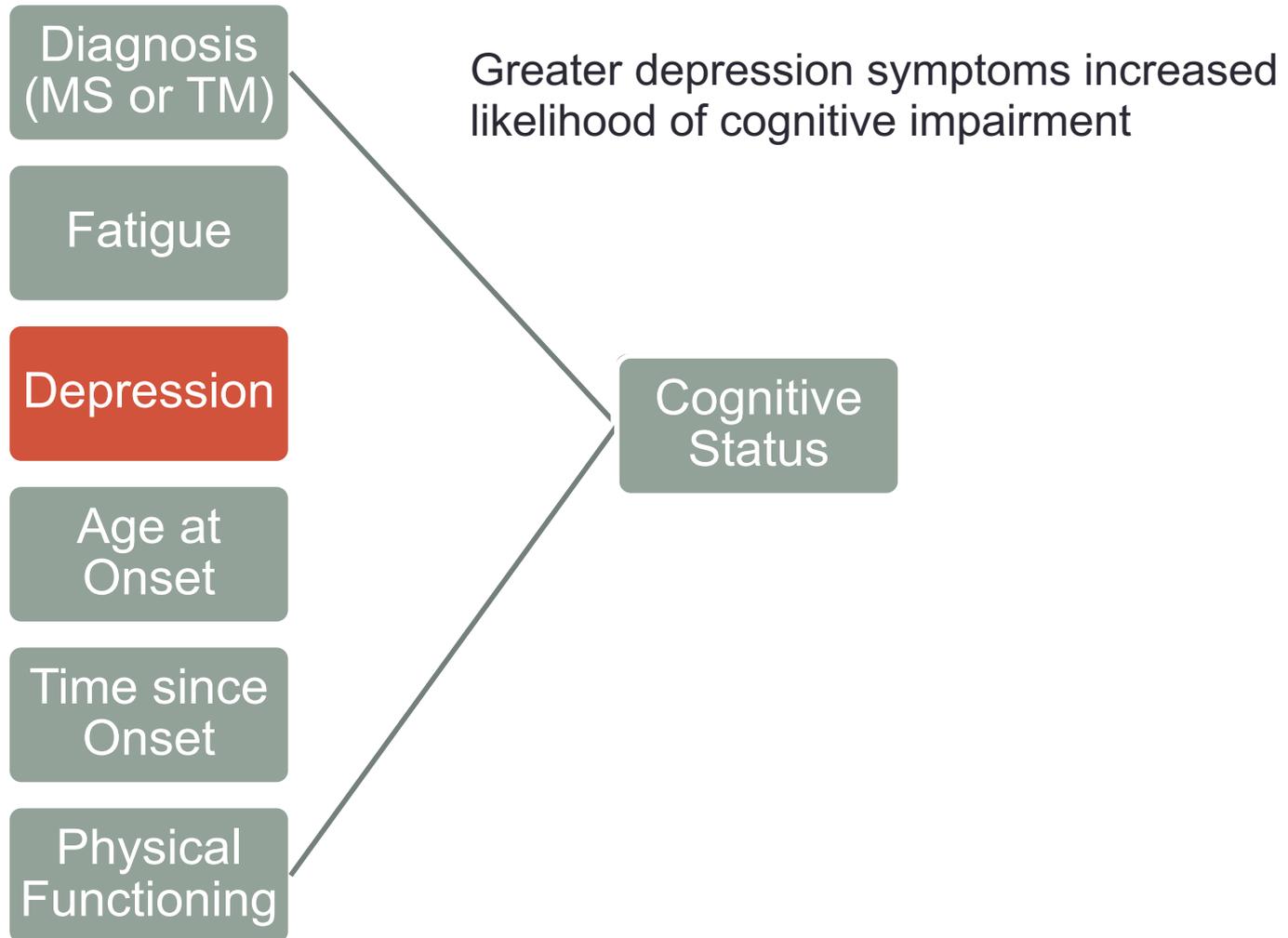
Rates of cognitive impairment significantly different between MS and TM ( $p < .05$ ):

- 42% of MS participants
- 21% of TM participants
- Those with cognitive impairment were more likely to have elevated general and sleep/rest fatigue problems ( $p < .05$ ).
- What factors predict cognitive status in MS and TM?

# Role of Clinical Factors in Determining Cognitive Status



# Role of Clinical Factors in Determining Cognitive Status



# Summary and Clinical Implications

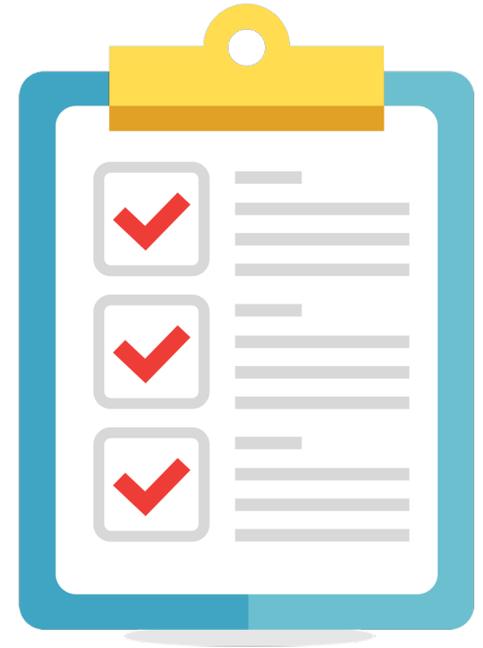
- Individuals with CNS demyelinating disorders are considered to be at risk for neuropsychological difficulties
  - Not all are affected
- Research may offer clues about areas for targeted intervention
  - Cognitive problems are associated with greater fatigue and depression symptoms
- There are many opportunities for intervention and these must be tailored to meet individual needs

# Who Should be Referred for Services?

- The individual and those who know that person well are in the best position to evaluate symptoms and changes over time
- Functional impact –problems interfere with daily functioning
- If there are concerns, speak with the primary physician regarding a referral or other care team professional

# Approach to Clinical Care

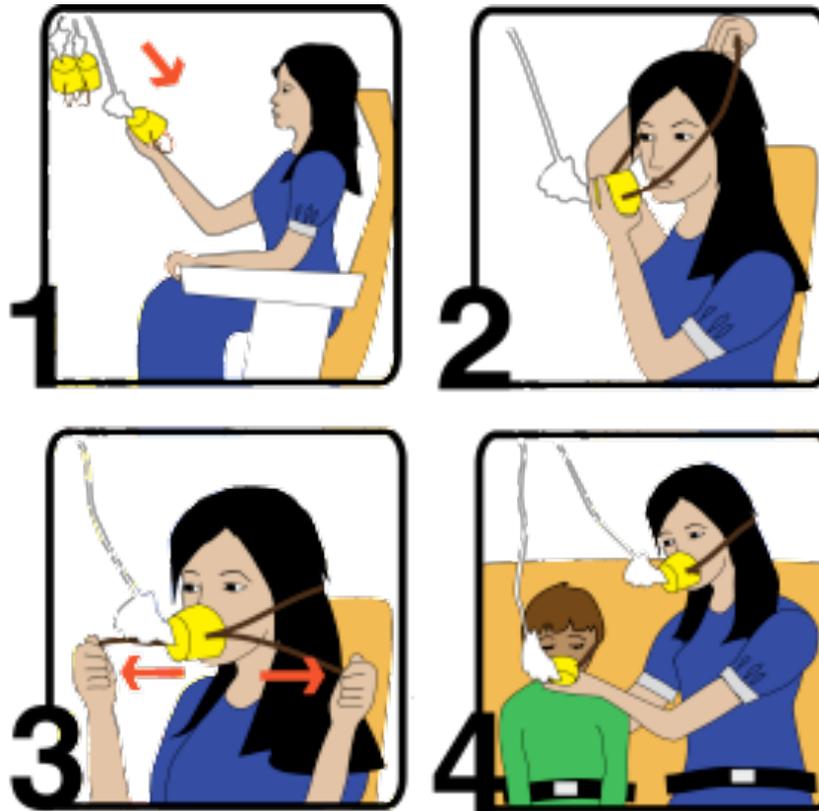
- Assessment with a neuropsychologist
  - Clinical interview(s)
  - Record review
  - Additional information
- Identification of primary problem(s)
  - Diagnosis, if applicable
- Strengths and weaknesses
- Tailored treatment plan
- Plan for follow-up



# Wellness



# Caring for the Caregiver





**MAKE TIME FOR MENTAL HEALTH EACH DAY!**

# Stronger together



Siegel  
Rare Neuroimmune  
Association