Post-COVID Recovery and Management of Respiratory Symptoms

Jake Massey PT, DPT, CSCS
Outpatient Physical Therapist,
Post-COVID Research Physical Therapist
Post-COVID Education and Support Group Facilitator

Disclosures

- **Both Allison and Jake are employed by Madonna Rehabilitation Hospitals**

- **Developing a Model System of Rehabilitation Care for Patients Post-COVID-19.** U.S. Department of the Treasury, Rescue Act Funds. FAIN: SLFRP1615 (2022 to 2025). *Project Director: Burnfield. Research PT: Massey. Post-COVID Speech Therapist and Support Group Facilitator: Carson.*
- **COVID-19 Neuro Databank/Biobank ("NeuroCOVID Study").** National Institutes of Health / NINDS. FAIN: U24NS113844 (2022-2024). Principal Investigator: Troxel. *Site Principal Investigator: Burnfield. Research PT: Massey. Post-COVID Speech Therapist and Support Group Facilitator: Carson.*
- **Development and Implementation of a Model System of Care to Address the Rehabilitation Needs of Nebraskans Recovering from Long COVID, Focusing on the Needs of the Spanish-speaking Population to Reduce Disparities and Provide Access to Comprehensive, Coordinated and Person-centered Post-COVID Care.** The Sherwood Foundation (2024 to 20267). *Project Director: Burnfield. Post-COVID Physical Therapist: Massey. Post-COVID Speech Therapist and Support Group Facilitator: Carson.*

Learning Objectives

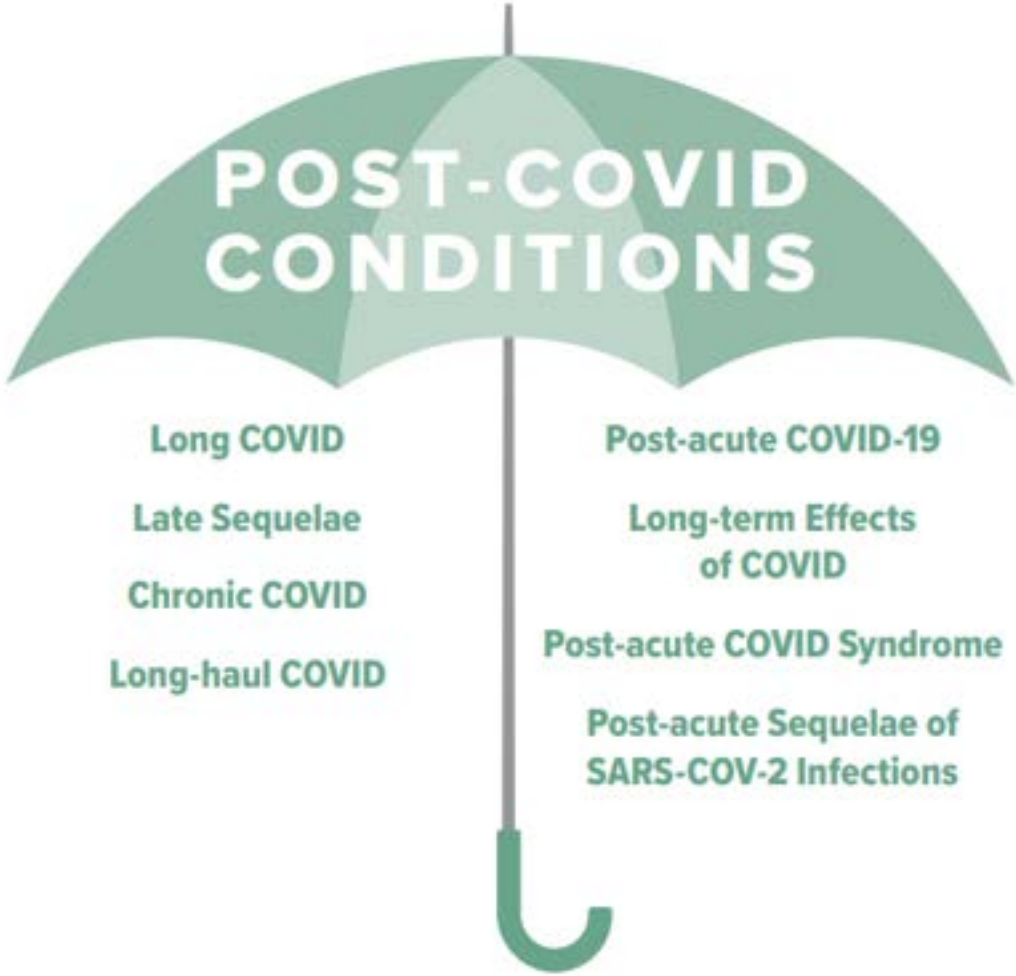
1. Participants will understand the physiological manifestations of respiratory symptoms in the Post-COVID patient population.

2. Participants will be able to identify and select appropriate assessment tools to evaluate Post-COVID respiratory symptoms.

3. Participants will be able to identify and select evidence-based treatment targets for Post-COVID respiratory symptoms.

What is Post-COVID

- ***Definition:*** Continuation or development of new symptoms 3 months after initial COVID-19 infection
  - No other explanation for symptoms
  - Currently there are not biomarkers that can diagnose Post-COVID; diagnosis is based on symptoms
- ***Impact:*** Can affect anyone exposed to COVID-19, regardless of age or severity of symptoms from initial infection
- ***Heterogeneity:*** Over 200 different symptoms have been reported



Who gets Post-COVID?

Risk factors

- Severe initial infection/hospitalization
- Asthma or COPD
- Diabetes
- Depression
- Overweight/obese
- Female gender
- Smoking/vaping

Most patients struggling with Post-COVID had a mild initial infection

Adult Nebraskans	Proportion	Estimated Number
Ever had COVID	60.1%	891,722
Experienced Post-COVID	19.7%	292,311

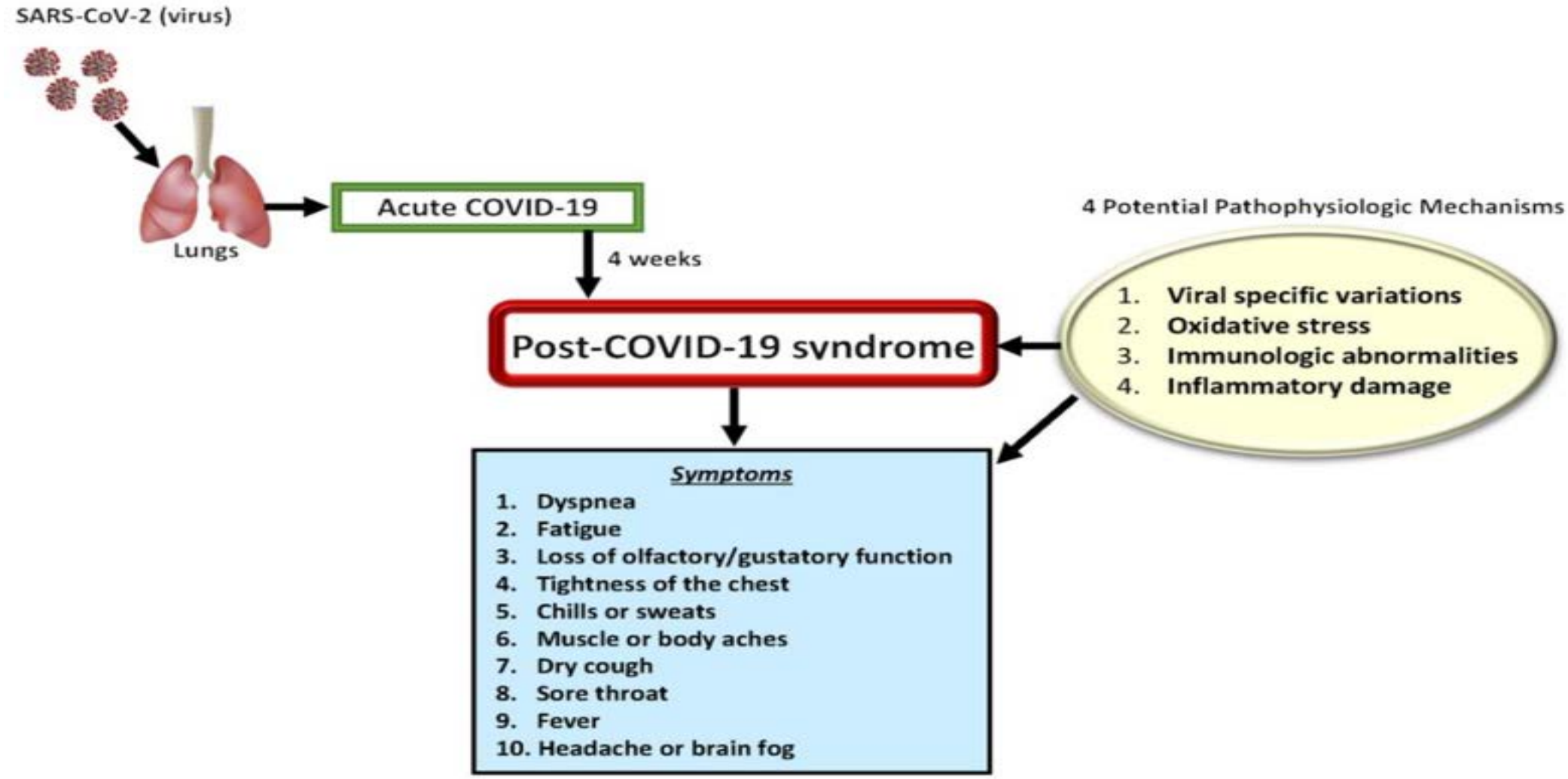
- Davis HE et al (2023). Long COVID: Major findings, mechanisms and recommendations. *Nat Rev Microbiol.* Published online January 13, 2023:1-14. DOI: 10.1038/s41579-022-00846-2.
- Subramanian A et al (2022). Symptoms and risk factors for long COVID in non-hospitalized adults. Nat Med 28, 1706–1714. DOI: 10.1038/s41591-022-01909-w.
- Tsampasian V et al (2023). Risk factors associated with Post−COVID-19 condition: A systematic review and meta-analysis. *JAMA Intern Med,* 183(6):566–580. DOI: 10.1001/jamainternmed.2023.0750.

Common Post-COVID Symptoms

- Post-exertional malaise (87%)
- **Fatigue (85%)**
- Brain fog (64%)
- Dizziness (62%)
- Gastro-Intestinal (59%)
- **Palpitations (57%)**
- **Shortness of Breath (36%)**
- **Chronic Cough (33%)**
- **Sleep Disorders (32%)**

Thaweethai T et al (2023). Development of a definition of Postacute Sequelae of SARS-CoV-2 infection. *JAMA,* 329(22):1934-1946. DOI: 10.1001/jama.2023.8823.

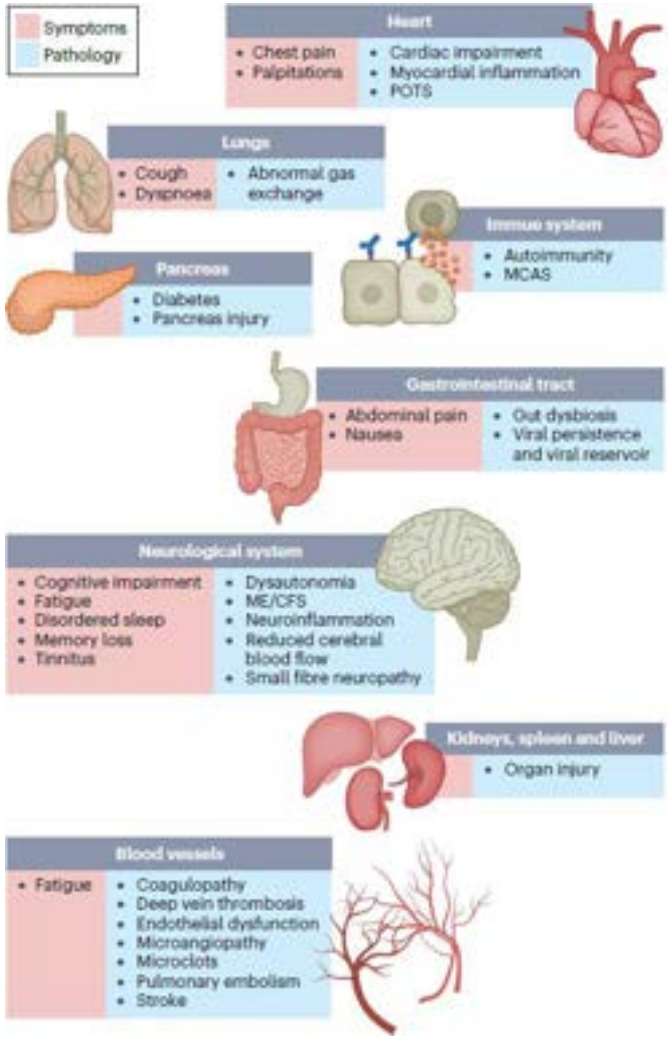
Hypothesized Causes of Post-COVID Respiratory Symptoms



• Pierce, Janet D.; Shen, Qiuhua; Cintron, Samantha A.; Hiebert, John B.. Post-COVID-19 Syndrome. Nursing Research 71(2):p 164-174, 3/4 2022. | DOI: 10.1097/NNR.0000000000000565

Respiratory System Impact

- COVID-19 is a heterogeneous condition and can potentially impact lung function contributing to:
  - Breathlessness
  - Shortness of Breath
  - Difficulty coordinating breaths with activity and connected speech
  - Fatigue
- Diaphragm weakness can lead to different breathing patterns and faster onset of fatigue.
- Therapy assessment must identify, evaluate and treat each patient's unique symptoms



Davis HE et al (2023). Long COVID: major findings, mechanisms and recommendations. *Nature Reviews Microbiology*, *21*(3), 133-146.

Assessment of Respiratory Symptoms

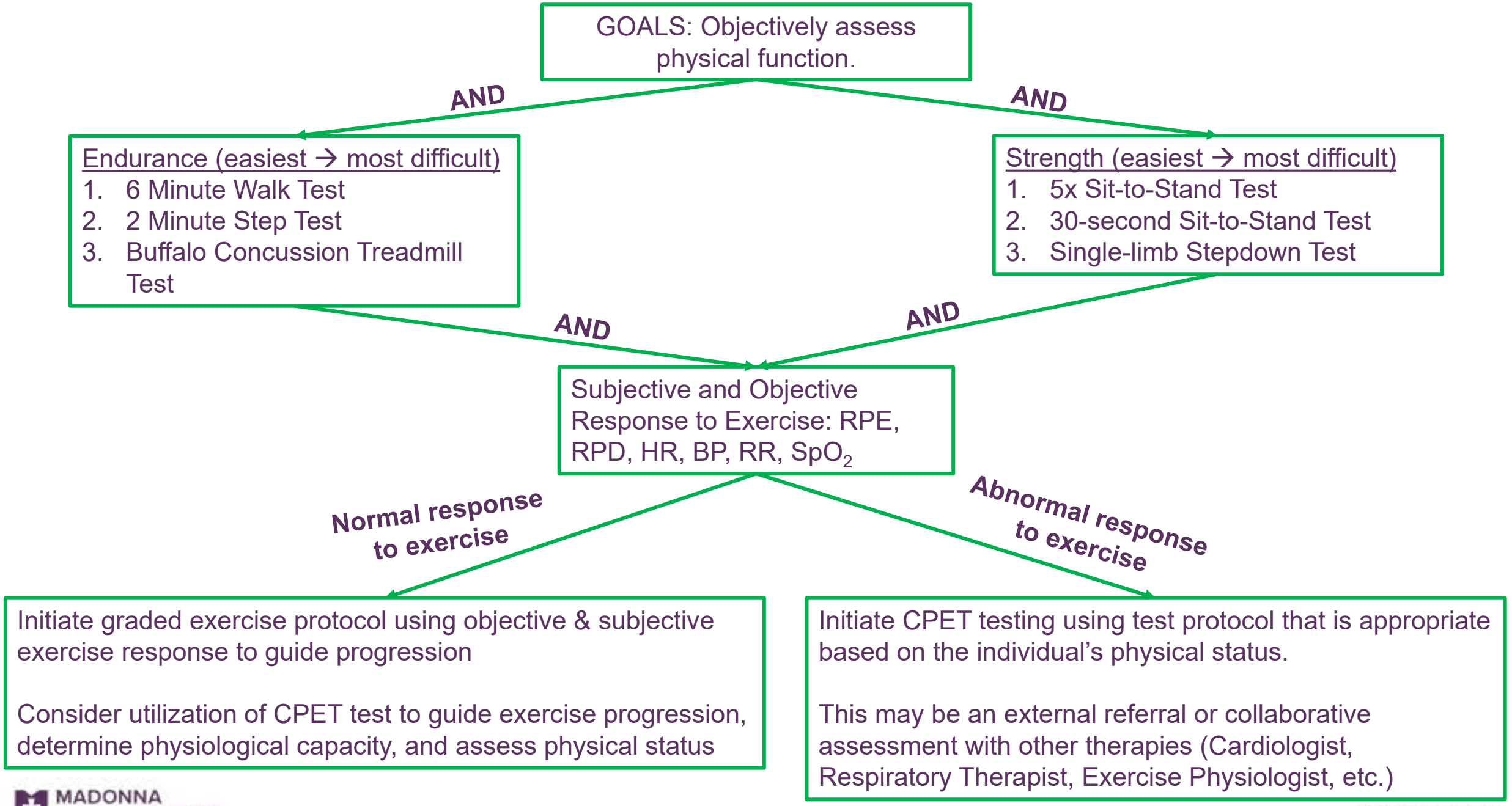
Therapy Assessments

Respiratory Muscle Testing
- Observe Rate & Rhythm; Posture & Pattern of Breathing
- Maximum Phonation Time
- Syllables Per Breath Group
- MIP/MEP on Respiratory Pressure Meter

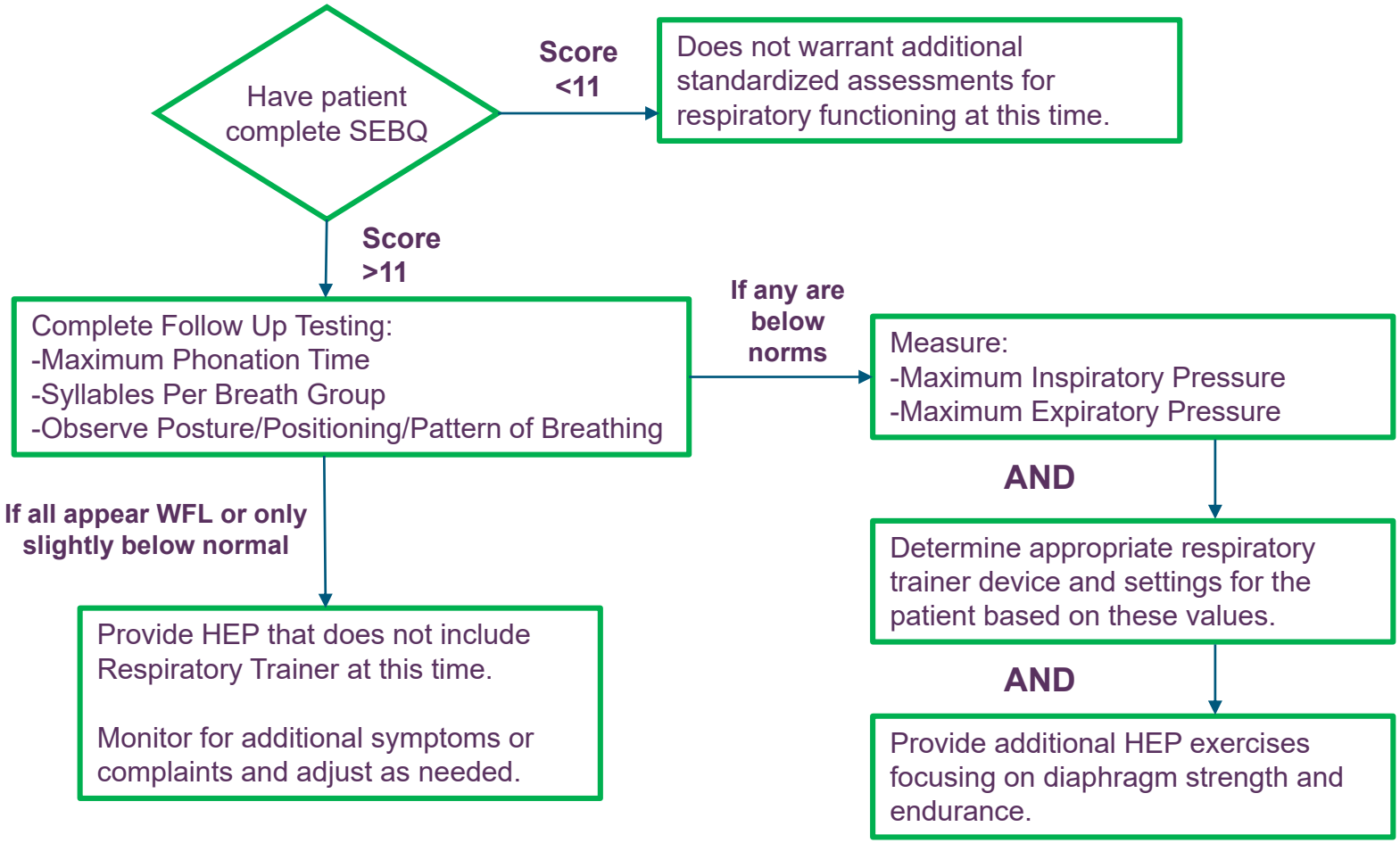
Subjective Patient Questionnaires
- Self Evaluation of Breathing Questionnaire
- Patient Specific Functional Scale
- Orthostatic Hypotension Questionnaire
- Survey of Autonomic Symptoms

Functional Capacity Testing
- 6 Minute Walk Test
- 2 Minute Step Test
- 30-second Sit-to-Stand Test

Cardiopulmonary Exercise Testing
- Bruce Treadmill Test
- Balke Treadmill Protocol
- Rockport Walk Test
- Astrand Treadmill Test
- Bicycle Stress Test


GOALS: Objectively assess physical function.
AND
AND
Endurance (easiest → most difficult)
1. 6 Minute Walk Test
2. 2 Minute Step Test
3. Buffalo Concussion Treadmill Test
Strength (easiest → most difficult)
1. 5x Sit-to-Stand Test
2. 30-second Sit-to-Stand Test
3. Single-limb Stepdown Test
AND
AND
Subjective and Objective Response to Exercise: RPE, RPD, HR, BP, RR, SpO_2
Normal response to exercise
Abnormal response to exercise
Initiate graded exercise protocol using objective & subjective exercise response to guide progression
Consider utilization of CPET test to guide exercise progression, determine physiological capacity, and assess physical status
Initiate CPET testing using test protocol that is appropriate based on the individual's physical status.
This may be an external referral or collaborative assessment with other therapies (Cardiologist, Respiratory Therapist, Exercise Physiologist, etc.)

SLP Decision Tree



Common Findings & Trends

- Significant dyspnea with stable oxygen saturation
- Chronotropic Incompetence: Slight elevation in resting HR with blunted HR response to exercise
- Anaerobic Threshold: Significant jump in HR at exercise onset accompanied with increase in symptom prevalence/severity
- Other symptoms (SOB, fatigue, malaise, pain) limiting exercise progression greater than physiologic limitations
- Decreased volume, pace, strength, or quality of connected speech
- Frequent throat clear/cough impacting speech production and/or sensation
- Decreased strength and endurance for breathing pattern
- Brain Fog symptoms present, sometimes as a result of periods of hypoxia

Post COVID and Reduced Exercise Capacity

- Post COVID symptoms associated with reduced exercise capacity on cardiopulmonary exercise testing > 1 year after infection
- Reduced exercise capacity associated with early elevations in inflammatory markers
- Chronotropic incompetence was most common abnormal finding

Durstenfeld MS et al (2023). Reduced exercise capacity, chronotropic incompetence, and early systemic inflammation in cardiopulmonary phenotype Long Coronavirus Disease 2019. *The Journal of Infectious Diseases,* 228(5):542–554. DOI: 10.1093/infdis/jiad131.

Treatment of Respiratory Symptoms

Cumulative Treatment Goals

- Re-establish Pattern of Breathing and diaphragm strength
- Increase strength, endurance, and functional capacity
- Improve breath sequencing with exercise
- Utilize pacing strategies to increase participation in physical activities & work/life roles
- Inspiratory/Expiratory Muscle Trainers, as indicated
- Encourage consistent carryover of home exercise program(s)
- Facilitate accessory respiratory muscle relaxation and stretching
- Speech tasks of increasing length and with increased movement or positioning changes

Physical Therapy

Exercise Principles

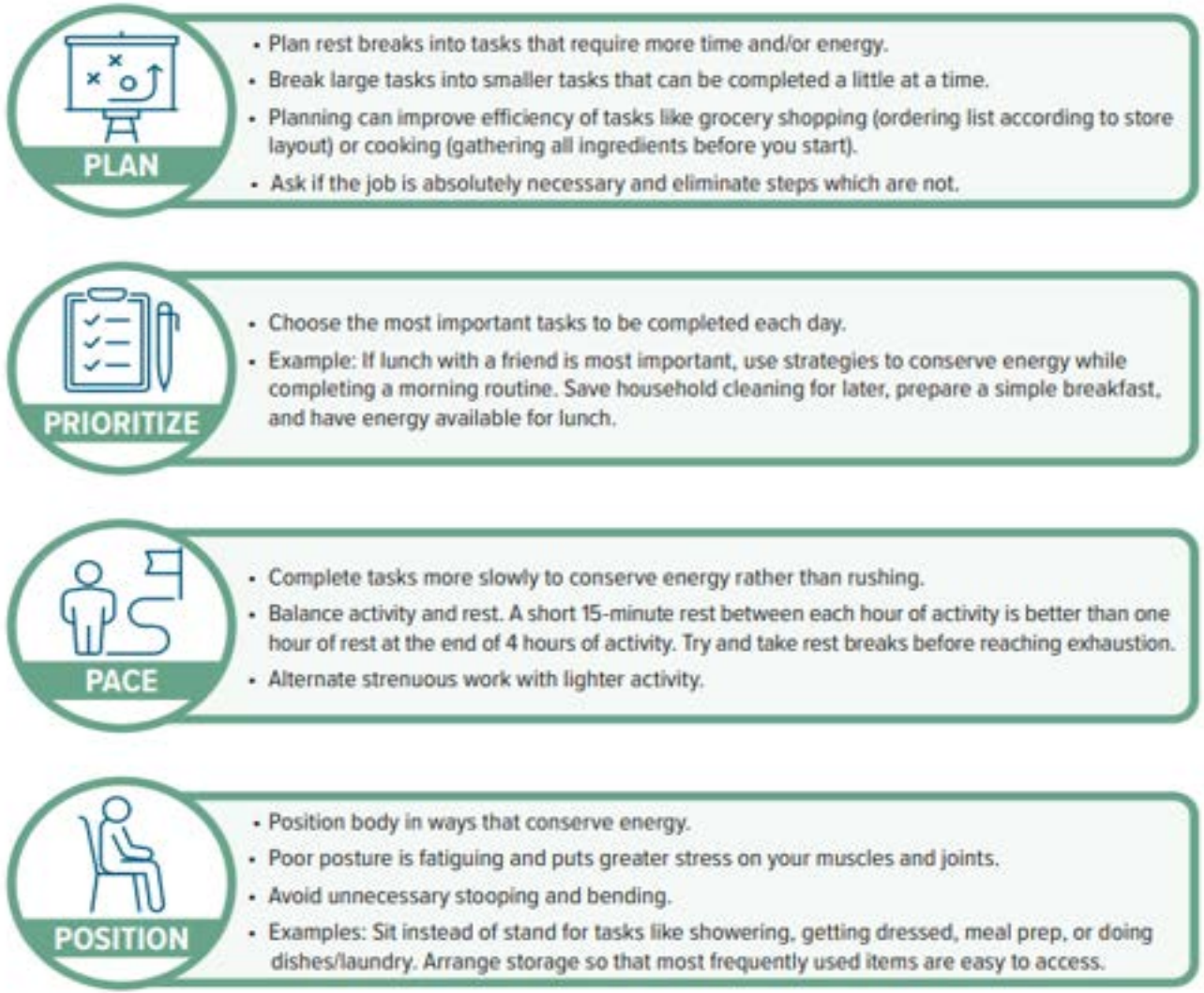
- Symptom-titrated exercise; establish a safe entry-point
- Gradual progression based on symptom anchors
- Flexibility with exercise prescription

Treatment/Education Strategies

- Exercise in recumbent position
- Blood pressure monitoring
- Sleeping with HOB elevated 4-6”
- Compression garments
- Increased salt and fluid intake

Occupational Therapy

The 4 Ps for Energy Management



Speech Therapy

Patient Education

- Anatomy and Physiology of upper airway
- Typical Breathing Pattern
- Explain:
  - Why is this happening?
  - How can we make it better?

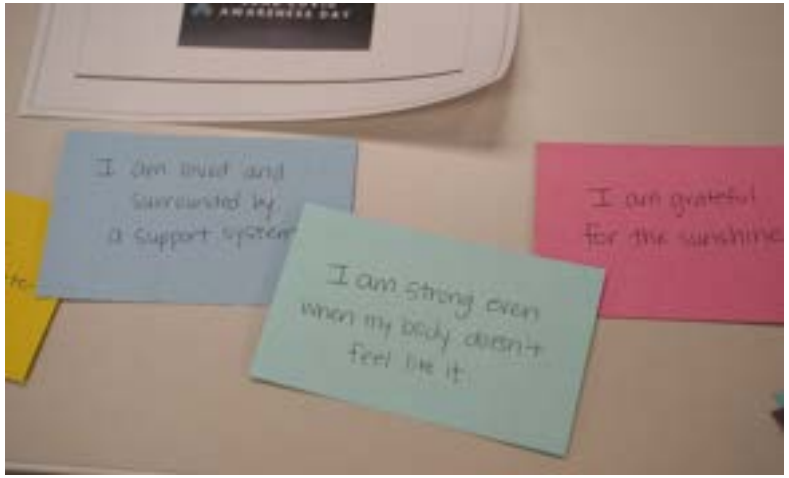
Breath Training

- Posture/Positioning
- Muscle Relaxation or Manual Techniques
- Sustained Phonation and Reading Practice
- Pairing Exercises with movement

Home Program

- Diaphragmatic Breathing
- Paired with Speech
- Respiratory Trainer Device
- Optional Apps (i.e. Breathly)

Counseling Services



JOIN US IN PERSON OR VIRTUALLY.

Omaha	Lincoln
12–1 p.m. on the second Thursday of each month	**4–5 p.m.** on the fourth Tuesday of each month
Dodge Conference Room 17500 Burke Street Omaha, NE 68118	Clay Conference Room 5401 South Street Lincoln, NE 68506

Scan the QR Code or
Visit Madonna.org/Post-COVID

- Focuses on Mental Health needs
- Provides social interaction
- Training on mediation, mindfulness, or grounding strategies
- Teaches patients to practice self-compassion & be kind to themselves
- Can help patient find an activity that is engaging to mind, body, and spirit
- Can improve quality of sleep
- Encourages attendance at Support Group

Respiratory Training Devices

The Breather:

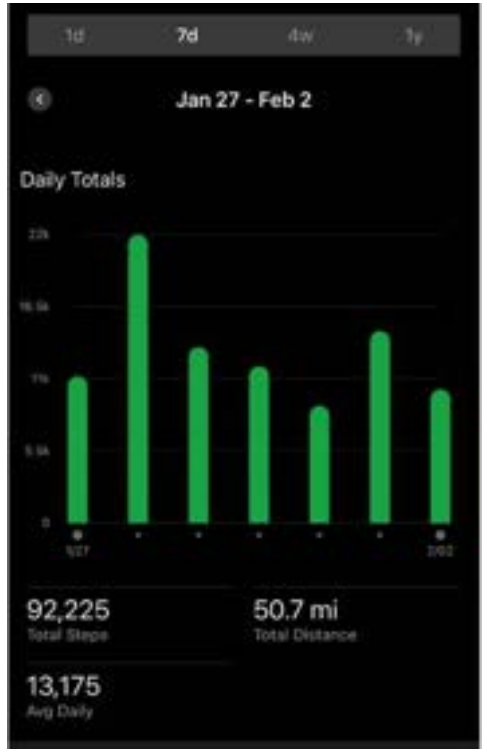
- Inspiratory and Expiratory muscle trainer
- Inhale resistance: -10→-52 cmH20
- Exhale resistance: 5-31 cmH20
- Can be used for both endurance and strengthening
- Can also help cough efficiency and decreased work of breathing

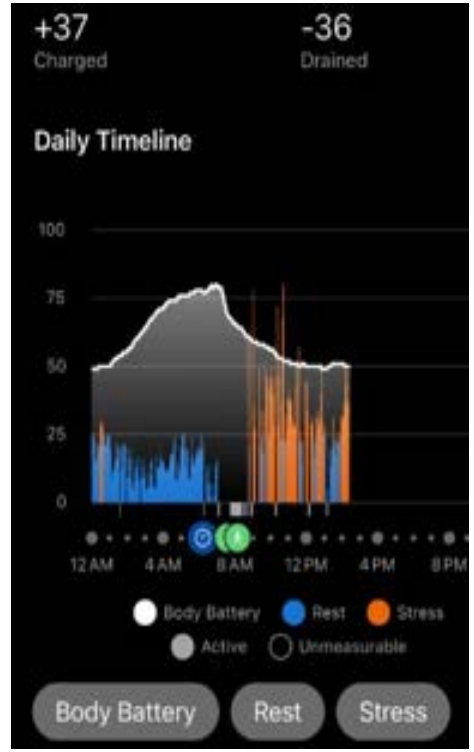
EMST 150/75Lite:

- Expiratory muscle trainer
- Resistance of 75Lite: 0-75cmH20
- Resistance of 150: 30-150cmH20
- Primarily used for strengthening

Wearable Sensors and Post-COVID

- Monitoring methods
  - ECG, HR monitor
  - Wearable sensors
- Wearable sensors can measure a variety of features such as heart rate, physical activity (e.g., steps), sleep patterns and stress
- Have shown validity in tracking activity and improving HEP compliance in multiple populations





Carvalho Marques K et al (2023). Cardiovascular autonomic dysfunction in “Long COVID”: Pathophysiology, heart rate variability, and inflammatory markers. *Frontiers in Cardiovascular Medicine: Section General Cardiovascular Medicine,* 10. DOI: 10.3389/fcvm.2023.1256512.

Additional Considerations

Impact of Sleep



Better Sleep = Better Health = Better Recovery

- Keep a consistent sleep schedule. Try and wake up and go to bed at the same time each day.
- Strive to have exposure to daily sunlight through spending time outside or sitting by a window.
- Find ways to be active each day.
- Be conscious of TV or phone time in the evening and try to limit screens 30-60 minutes before bed.
- Keep bedroom dark and at a cooler temperature (62-67 degrees).
- Avoid large, late-night meals and alcohol.
- Try and limit caffeine intake after lunch, and avoid excessive water consumption right before bed.
- Deep breathing, book reading, or soft music may help to relax before bed.
- If day time naps are needed, keep the naps at the same time and no longer than 90 minutes.
- Use a noise reduction machine or run a fan to reduce noise.
- Restrict the time spent in bed to the actual time spent sleeping or being intimate.

Relaxation & Mindfulness

1. CREATE TIME AND SPACE

Choose a regular time each day for mindfulness meditation practice, ideally a quiet place free from distraction. This does not need to be long! Even a few minutes of these activities has positive effects. Allow this to fit into your schedule.

2. FIND A COMFORTABLE POSITION

Sit in a comfortable chair, lay down, or recline in a peaceful environment.

3. TAKE DEEP BREATHS

Relax your shoulders and keep your chest open. Focus on slowly inhaling through your nose and slowly exhaling through your nose or mouth. Deep breathing helps settle the body and establish your presence in the space.

4. DIRECT ATTENTION TO YOUR BREATH AND HOW YOUR BODY IS FEELING

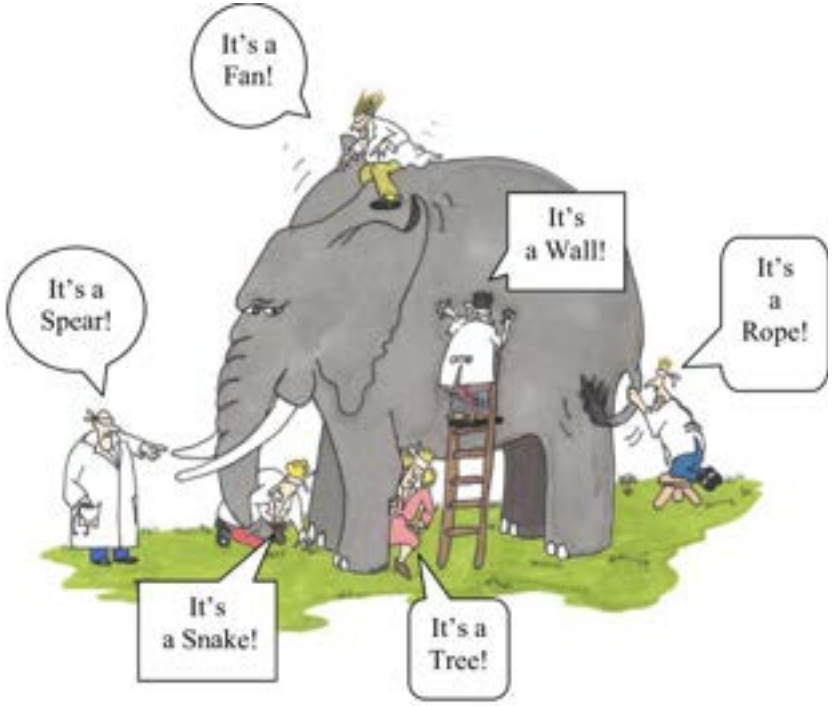
Focus on your breathing pattern and notice areas of your body that begin to relax.

5. MAINTAIN ATTENTION TO YOUR BREATH AND HOW YOUR BODY IS FEELING

It's normal for your mind to wander. If you notice this, return your focus to your breath for this short period of time. Try and let go of thoughts, feelings, and distractions to allow your body to relax.

Take Home Message

- Multiple factors contribute to Post-COVID symptoms
- Common causes can be similar to those found in other known diagnoses
- Monitor exertion subjectively and objectively
- In addition to assessment and treatment, patient education is paramount
  - Self monitor ADLs and exercise
  - Pacing with all activities
  - Education on energy/exercise threshold
  - Activity tracking log to capture ‘crash’ experiences
  - This is not just ‘deconditioning’
  - **Validate patient experience**



Contact Information

Allison Carson M.S. CCC-SLP
Outpatient Speech Therapy Clinical Supervisor,
Post-COVID Education and Support Group Facilitator
(acarson@madonna.org)

Jake Massey PT, DPT, CSCS
Outpatient Physical Therapist,
Post-COVID Research Physical Therapist
(jmassey@Madonna.org)

Brandi Becker, CMA
Outpatient Post COVID Clinic Coordinator
bbecker@madonna.org | 402-413-3930

Questions?