POST COVID SYNDROME
LONG COVID & WORKERS COMPENSATION

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LEARNING OBJECTIVES

UPON CONCLUSION OF THIS PROGRAM, PARTICIPANTS SHOULD BE ABLE TO:

1. Recognize the true presentation of Post COVID Syndrome.
2. Understand the basic elements of care.
3. Prepare for the challenges ahead in workers compensation
35 yo paramedic
COVID-19 3 months ago, with stroke
Sudden syncope, fatigue, dyspnea
Labile vital signs, constipation
Non supportive supervisor
Failed return to work
Worker’s compensation
COVID Activity Rehabilitation Program

- CARP
- April/May start
- Based on PICU work
- Formalized June 2020
- 300-400 patients
Post COVID Syndrome

- Mental health
- Return to work
- Physical conditions
- Medication side effects
- Loss of function
- Lack of social support
- Legal entanglements
- Financial stress
WHAT IS POST COVID SYNDROME?
Post COVID-19 Syndrome (long haul syndrome): Initial Cohort Characteristics from the Mayo Clinic

July 2021, Mayo Clinic Proceedings

1st 100 patients in CARP
Define characteristics
Identify risk factors
Diagnostic nuances
Describe treatment program
Understand functional implications
WHAT IS POST COVID SYNDROME?

-No universal definition

-Long haul COVID vs PASC vs PCS

-Mayo Clinic Working Case Definition

- Positive PCR, antigen, or antibody test

- $\geq 4$ weeks from acute infection start (symptoms or test)

- Symptoms consistent with PCS
The figure shows percentages of patients presenting with specific coronavirus disease 2019 (COVID-19)-related symptoms during the acute phase of the disease (left) and at the time of the follow-up visit (right).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Fatigue</td>
<td>80%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>59%</td>
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<tr>
<td>Neurologic</td>
<td>59%</td>
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<tr>
<td>Cognitive impairment</td>
<td>45%</td>
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<tr>
<td>Sleep disturbance</td>
<td>30%</td>
</tr>
<tr>
<td>Mental health sx</td>
<td>26%</td>
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<tr>
<td>CARP POPULATION UNIQUE SX</td>
<td></td>
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<tr>
<td>---------------------------</td>
<td></td>
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<tr>
<td>Tinnitus</td>
<td></td>
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<tr>
<td>Loss of taste and smell</td>
<td></td>
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<tr>
<td>Hair shedding</td>
<td></td>
</tr>
<tr>
<td>Syncope</td>
<td></td>
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<tr>
<td>Sinus pressure</td>
<td></td>
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<tr>
<td>Eye changes</td>
<td></td>
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</tbody>
</table>
75% not hospitalized
22% pre-existing respiratory/cardiac dx
34% pre-existing depression/anxiety
4% pre-existing chronic fatigue/fibromyalgia
Average age 45.4
68% female
34% impaired ADLS
82% impaired IADLS
63% returned to work in some form
46% (29/63) were back at baseline work
PROGNOSIS

Follow up of hospitalized patients, discharged Jan – May 2020

6 and 12 months

1276 participants

At least one sx: 68% and 49% at 6 and 12 months

Anxiety/depression: 23% and 26%

No difference in 6MWD

88% had returned to work in 12 months

Only 16 received rehabilitation

TREATMENT

- Post Acute Monitoring
- Psychosocial support
- Rehabilitation
- Management of dysautonomia
- Cognitive rehabilitation
POST ACUTE MANAGEMENT

- Rule out other serious conditions

- 31% of ICU patients – thromboembolic event

- 60% myocardial inflammation at 70 days

- 1250 discharged patients
  - Within 60 days
  - 10.4% ICU patients died
  - 6.7% general ward patients died
  - 15% readmitted

POST ACUTE MANAGEMENT

-Important history elements
  - Post exertional malaise?
  - Pre infection function
  - Abilities with ADLS/IADLS
  - Work ability
  - Sleep
  - Mood and anxiety
  - PHQ9, GAD-7, WLQ-5
POST ACUTE MANAGEMENT

-Initial diagnostics
  CBC
  CMP
  Thyroid panel
  IL-6
  Vitamin-D
  Vitamin-B12
  Ferritin
**TREATMENT: PSYCHOSOCIAL ASSESSMENT**

- Patients Feel “abandoned”
- Guilt/self doubt
- Clinical depression/anxiety/PTSD
- 12.9% reported needing psychological support
- Empathize, not medicalize or catastrophize


TREATMENT: PSYCHOSOCIAL SUPPORT

- Frequent interaction (Q2 weeks, EMR messaging)
- Employee Assistance Programs
- Psychological therapy
- Psychiatry
- Support Groups
TREATMENT: REHABILITATION

-SARS/MERS

- 19-33% reduction of 6MWT
- 78.6% decreased VO2 max

-COVID-19

- 41% reduced exercise capacity


**TREATMENT: REHABILITATION**

- Post Exertional Malaise in Chronic fatigue and fibromyalgia

- After physical stress:
  - 30% reported fatigue, flu like sx, muscle pain

- Comparison of treatment modalities:
  - Graded exercise – negative effect in 54-74%
  - Cognitive behavioral therapy – positive effect in 8-35%
  - Paced activity – positive effect in 44-82%


TREATMENT: REHABILITATION

-Rehabilitation ≠ exercise

-Use Adaptive Paced Therapy
  - Focus on daily function/activities in addition to rehab
  - Low level but consistent activity
  - Not simply “stop when it hurts”
  - Gradual increases (i.e., 10 min to 13 min of walking)

-Mayo Clinic Work Rehabilitation Center
  - PT/OT


THERAPY SPECIFICS

- Gauge condition: 6MWT, 1MSTS
- Borg Ratings of Perceived Exertion and Dyspnea
- Vitals after exercise
- Diaphragmatic breathing
- Strength training first
- Supine exercises are better tolerated
- Borg scale limit: 13 – somewhat hard
  - 11 if significant symptoms

- Dyspnea scale limit: 3 – moderate

- Keep O2 sats above 90%
  - Relaxed breathing if falls below

- 60 - 70% max heart rate during peak exercise

- 50 - 60% max heart rate during normal daily activity
TREATMENT: DYSAUTONOMIA

- Balance issues/Dizziness
- Tachycardia
- Pain
- Brain fog
- Shortness of breath
- Exercise intolerance
- Sleeping problems
- Mood swings
- Etc.....
TREATMENT: DYSAUTONOMIA

-Autonomic dysfunction was seen in SARS
-POTS preceded by viral illness in 21-40%
-Case reports of POTS in COVID-19

TREATMENT: DYSAUTONOMIA

-Mayo Clinic study of 27 patients

-Abnormalities on testing
  - Sudomotor function 36%
  - Cardiovagal function 27%
  - Cardiovascular adrenergic function 7%

-Diagnoses
  - 22% met criteria for POTS
  - Autoimmune autonomic ganglionopathy
  - Inappropriate sinus tachycardia
  - Vasodepressor syncope

TREATMENT: DYSAUTONOMIA

Autonomic Reflex Test

- Tilt Table
- QSART
- Thermoregulatory sweat test
- Epidermal nerve fiber biopsy
Distribution of sweat loss:

A (distal)
B (segmental)
C (dermatomal)
D (global)
E (normal)
F (regional)
TREATMENT: DYSAUTONOMIA

- Neurology consult
- Hydration (3L/day)
- Salt Intake (8-12 grams sodium)
- Compression stockings (30-40 mmHg and waist high)
- Abdominal biners, 10 mmHg
- Leg tensing, crossing, weight shifting
- Education***
- Medications
TREATMENT: DYSAUTONOMIA

- Metoprolol
- Propranolol
- Midodrine
- Fludrocortisone
- Methyldopa
- Pyridostigmine
TREATMENT: BRAIN REHABILITATION

-Brain Rehabilitation Clinic
  - Neuromuscular retraining
  - Neuropsychometric testing
  - Headache management
  - Sleep improvement
  - Speech therapy

EARLY OUTCOMES

-20% made a full recovery
  ▪ Started with very limited function
  ▪ Return to normal function
  ▪ Full duty work
  ▪ Recovered by 4 months after acute infection start
  ▪ Earlier start of treatment
  ▪ Less cognitive complaints than rest of population
  ▪ Observations, NOT inferences
NO STANDARD OBJECTIVE CRITERIA
### First 100 patients

<table>
<thead>
<tr>
<th>Tests performed</th>
<th>Abnormal tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 echocardiograms</td>
<td>13.8% (n=4)</td>
</tr>
<tr>
<td>28 pulmonary function tests</td>
<td>25.0% (n=7)</td>
</tr>
<tr>
<td>35 chest x-rays</td>
<td>2.9% (n=1)</td>
</tr>
<tr>
<td>21 autonomic reflex test (tilt and QSART)</td>
<td>57.1% (n=12)</td>
</tr>
</tbody>
</table>
## DIAGNOSTICS

**NO SPECIFIC PATTERN**

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<tr>
<td>CBC</td>
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<td>CMP</td>
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<tr>
<td>Thyroid Panels</td>
</tr>
<tr>
<td>Vitamin D</td>
</tr>
<tr>
<td>Vitamin B-12</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
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<tr>
<td>Epstein Barr Virus</td>
</tr>
<tr>
<td>IL-6</td>
</tr>
<tr>
<td>D-Dimer</td>
</tr>
<tr>
<td>Ferritin</td>
</tr>
<tr>
<td>CRP/ESR</td>
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</tbody>
</table>
NO STANDARD SUBJECTIVE CRITERIA
NO DIAGNOSTIC CRITERIA

Budapest Criteria for Complex Regional Pain Syndrome - We have nothing like this

1. Continuing pain that is disproportionate to any inciting event.

2. Must report at least one symptom in three of the four categories:
   a. Sensory: hyperesthesia and/or allodynia
   b. Vasomotor: temperature asymmetry and/or skin color changes and/or skin color asymmetry
   c. Sudomotor/edema: reports of edema or sweating changes and/or sweating asymmetry
   d. Motor/trophic: decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)

3. Must display at least one sign in two or more of the following categories:
   a. Sensory: hyperalgesia to pinprick, allodynia to light touch and/or deep somatic pressure and/or joint movement
   b. Vasomotor: evidence of temperature asymmetry and/or skin color changes and/or asymmetry
   c. Sudomotor/edema: evidence of edema and/or sweating changes and/or sweating asymmetry
   d. Motor/trophic: evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)

4. No other diagnosis that better explains the signs and symptoms.
NO CLEAR PHYSIOLOGIC BASIS
WHY IS THIS HAPPENING?

- Possible hyper-inflammatory/auto-immune state
- Evidence of early cytokine storm
- Abnormal function of CD8+ cells
- Increased IL-6 in CSF
- Accumulation of immune cells in brain perivascular/parenchyma on autopsy
- Genetic difference due to ACE2 receptor/TMPRSS2 variations
- Autoantibodies against ACE2
NOT RARE
THE RISE OF WORK-RELATED INFECTIONS

- Presumed to be work related in many states
- Burden on employer and insurer to prove otherwise
- 17 states provided workers comp coverage
- 9 states had presumption coverage
39 MILLION COVID-19 CASES
3.9 million Post COVID Syndrome cases
1,170,000 unable to RTW
Labs all normal
Holter monitor – no arrhythmia
Cardiac MRI – no signs of myocarditis
Thoracic echocardiogram – no motion abnormalities, EF 50%
6-hour blood pressure monitor – no hypertension/hypotension
Autonomic reflex screen – no dysautonomia
Overnight EEG – no seizure activity
Anorectal manometry – rectal evacuation disorder
- Treated with pelvic floor dysfunction therapy

Polysomnogram – Mild obstructive sleep apnea
- CPAP treatment

SYMPTOMS RESOLVED
No additional episodes for 4 months
Unable to return to safety sensitive work
Return to private driving after 3 months
Transitioning to new work role
Long term disability

ALL COVERED BY WORKERS COMPENSATION

How is OSA and pelvic floor dysfunction related to COVID? Who knows?
UNEXPLAINABLE ≠ NON-EXISTENT
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