Post COVID-19: Neurocognitive Symptoms and Rehabilitation

Physical Medicine and Rehabilitation
Jennifer Yao MD, FRCPC
GF Strong Rehab Centre
Vancouver Acute

Evan Kwong MD, FRCPC
Holy Family Hospital Rehab
Providence Health
Disclosures

• Dr. Yao – Nothing to declare

• Dr. Kwong – Nothing to declare
Objectives

• Describe the neurocognitive sequelae of COVID-19
• Apply functional cognitive rehabilitation and treatment approaches to their clinical practice
• Understand the multidisciplinary approach to care that utilizes neuro-rehabilitation trained allied health professionals and when to refer patients to these services
• Discuss access to rehabilitation tools and resources to facilitate more effective clinical visits and optimize patient outcomes
Neurocognition

“Cognitive processes or functioning understood in relation to the specific neural mechanisms by which they occur in the brain and any impairment of these mechanisms” – American Psychological Association

• 6 domains defined by DSM 5
Common Post COVID-19 Neurocognitive Symptoms

• Attention and concentration deficits
• Short term memory deficits
• Verbal / word fluency deficits
• “Brain Fog” – slow processing
• Fatigue
• Sleep disturbances – insomnia / hypersomnia
• Mood swings – irritability, low frustration tolerance
• Lack of motivation / drive
• Sensory hypersensitivities (light or sound)
Physical Health

Psychological Health

Environmental influences
Pre-COVID-19
- Pre-existing conditions – e.g. mood and anxiety disorders
- Predispositions – e.g. gender

Active COVID-19
- Delirium during hospitalization (?)
- CNS injury – e.g. stroke, hypoxia (?)
- Severity (?)

Post-COVID-19
- Persistent symptoms – “long COVID-19”
- Environmental factors
- Psycho-social factors
Short-term neuropsychiatric outcomes and quality of life in COVID-19 survivors. (R.Mendez et al.)

(A)
- Neurocognitive Impairment
- Immediate Verbal Memory/Learning
- Semantic verbal fluency
- Delayed Verbal Memory
- Working memory

(B)
- Psychiatric Morbidity
- Anxiety
- Depression
- PTSD

Journal of Internal Medicine, Volume: 290, Issue: 3, Pages: 621-631, First published: 03 February 2021, DOI: (10.1111/joim.13262)
General Approach to Cognitive Rehabilitation

- Education – for patients and family/caregivers
- Identify areas for focused intervention
- Provide self-management strategies and support
- Opportunities to simulate cognitive demands in controlled manner
- Gradual exposure and building tolerance
- Counseling, Cognitive Behavioral Therapy
- Medical treatment of underlying mood, anxiety, sleep, or other medical conditions that impact function
- Refer to specialists as appropriate
- Regular and timely follow up
Why do I have these issues?

There are many complex reasons related to physical health, psychological health, and environmental factors.

After hearing the story and doing the examination, we can talk further about the next steps.
Will I get better?

Most studies show that people improve with time.

This includes symptoms such as fatigue, sleep disturbance, cognitive issues.
### TABLE 1 | Percentage of COVID-19 patients showing neuropsychiatric and cognitive effects.

<table>
<thead>
<tr>
<th>Reference</th>
<th>CNS(^1)</th>
<th>PNS(^2)</th>
<th>Affective disorders</th>
<th>Anxiety</th>
<th>Fatigue</th>
<th>PTSD</th>
<th>Impaired attention</th>
<th>Impaired memory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-term</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bo et al., 2020</td>
<td></td>
<td></td>
<td>20%</td>
<td>28%</td>
<td></td>
<td>96%</td>
<td>45%</td>
<td>28%</td>
</tr>
<tr>
<td>Crunfill et al., 2020</td>
<td></td>
<td></td>
<td>25%</td>
<td>35%(^a)</td>
<td>42%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lu et al., 2020</td>
<td>53%</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td>27%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Mao et al., 2020</td>
<td>40%</td>
<td>36%(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mirfazeli et al., 2020</td>
<td>62%</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varatharaj et al., 2020</td>
<td></td>
<td></td>
<td>29%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhang et al., 2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Long-term</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hampshire et al., 2020</td>
<td>10%</td>
<td>22%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.57SD(^c)</td>
</tr>
<tr>
<td>Lu et al., 2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28%</td>
</tr>
<tr>
<td>Woo et al., 2020</td>
<td>11%</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50%</td>
</tr>
</tbody>
</table>

\(^1\) Central nervous system (CNS) includes dizziness, headaches, mental state, ataxia, seizure, and acute cerebrovascular disease.

\(^2\) Peripheral nervous system (PNS) includes an impaired sense of smell, taste, vision, and nerve pain.

\(^a\) A count of PNS symptoms occurring, it is possible a single patient had multiple symptoms.

\(^b\) Average of reported PNS symptoms.

\(^c\) Significant SD away from the healthy control group, indicating cognitive impairments for groups with different levels of medical assistance, the value here is the SD for patients requiring hospitalization with a ventilator.
Systematic Review

• 66 studies included
  • Anxiety/depression
  • Post-traumatic stress disorder
  • Cognitive deficits
  • Fatigue
  • Sleep disturbances

Schou et al., 2021 - https://doi.org/10.1016/j.bbi.2021.07.018
Is there a workbook I can go through?

Let us first better understand what the specific cognitive issues are.

We will also need to understand what tasks you need to do for ___ (home, work, recreational, etc.)
General Goals of Cognitive Rehabilitation

Problem orientation, awareness, and goal setting

Compensation

Internalization

Generalization

Ref: ACRM Cognitive Rehabilitation Manual
Awareness? Excerpt from patient portal:
“How is this problem limiting my function?”

• “I continue to lose focus at work and in meetings”

• “Impossible to maintain active health lifestyle that I was used to. No longer able to participate in activities with wife and kids. Struggle with stamina for work.”

• “…I am not confident I will be able to succeed with my cognitive impairments...It feels like the productive member of society is gone.”

• “I can't work, I can't take proper care of my children, I can't drive, I can't do anything without getting symptoms and feeling drained. Getting breathless after any activity.”
Strategies

External strategies
• External to the patient
• Compensation, aids to assist
• Examples
  • Structured notebooks, planning systems
  • Task-specific aids
    • Calendars, sticky notes

Internal strategies
• Self-generated procedure
• Enhance conscious control
• Self-cuing with image, word, or action sequence

Ref: ACRM Cognitive Rehabilitation Manual
What “category” might COVID survivors with cognitive issues fall into?

• Hypothesis based upon clinical encounters
  • Mid to high self-awareness
  • Decreased attention, memory, processing speed

• In search for way to improve
  • Global long-term goals and plans
  • Limited ability to breaking down long-term goals into short-term goals

• Many demands at home, at work, recreationally
Case of training the trainer

- Mr. Trainer is a 52yo, otherwise healthy, independent, working as a personal trainer, manager
- Exercise 5 days/week, including weights, aerobic, high-intensity training
- COVID-19 positive Jan 2021, non-hospitalized
- Symptoms: shortness of breath, headaches, brain-fog
- Activities: physical activity, Excel data entry, cooking
- Course: Physically improving
- Issue: “He is looking for a similar type of training routine for his brain, as he is used to setting goals and progressing exercises physically.”
Progressive overload cognitively?

• In search of a way to “practice” e.g. a Grade 11 textbook to go through

• Physical exercise prescriptions may involve parameters such as type, intensity, duration, frequency, volume, progression. Is there anything like that with cognitive rehabilitation?
Attention – what is it?

Sustained Attention
- Data entry
- Cooking one dish

Alternating attention
- Data entry and interrupted by phone calls, e-mails
- Cooking + child care

Selective Attention
- Data entry, with music in the office, and construction noises outside the window
- Cooking with streaming TV program on

Divided Attention
- Data entry using complex software program with many buttons to use
- Cooking 5-course meal with simultaneous tasks, timing, etc.

Adapted from ACRM Cognitive Rehabilitation Manual, with original source from Sohlberg et al., 2001
How to use the framework of attention?

• Education with the patient about the different types of attention, in relation to their tasks

• E.g. with Mr. Trainer “Transferring numbers on a table in excel”
  • Type of activity: Data-entry
  • Attention needed: Sustained
  • Problem: 10 min resulted in “headache, brain fog”, needed to rest 30min

• E.g. with “Multi-task doing some cooking”
  • Type: Cooking
  • Attention needed: Divided attention
  • Problem: Difficult to make sure all of the food is ready at the same time
Suggestions for Mr. Trainer

• PHSA website to review first, symptom journaling
• Was to see Occupational therapist as well
• Follow-up appointment pending

Next appointment:
• Start further education about attention
• Broadly, start with simple to complex
• Break down tasks needed
• Consider role for any attention-training, vs. task-specific training
Case example: Steve

• 55 yo man – prev. independent. Hx of mild HTN.
• Tested +ve for COVID-19 3 months ago
• Was in hospital for 5 days – no ICU stay
• Since being home, he has struggled with the following symptoms:
  • Fatigue
  • Poor sleep – long latency and interrupted sleep
  • Short term memory impairment
  • Slower thinking
  • Difficulty concentrating – can’t work on computer for > 20 min
  • Reduced exercise tolerance and SOB with exertion
  • Irritability and frustration
Listen Actively

- What are the most prominent and disruptive symptoms?
- What have they tried?
- What are they not saying?
Impact of symptoms on Steve

- Not able to return to work as a landscaper
- Relationship stress with family – wife and teenage kids
- Social isolation
- Increased financial pressures
- Worries about not being able to recover and uncertain future
First Steps

**VALIDATE**
- What you are experiencing is real;
- You are not alone
- I can see how much worry this is causing you

**FOCUS**
- What are the top 2 or 3 symptoms that are most bothersome?
- If you can fix one symptom, what would it be?

**EMPOWER**
- Many symptoms are interrelated and feed into each other
- It will take some trial and error, but there are strategies you can use to improve your symptoms
Start with the BIG THREE

- Sleep (Fatigue)
- Mood (Depression, anxiety, irritability)
- Physical pain

Secondary things to work on:
- Memory
- Attention and concentration
- “Brain Fog”
- Sensory sensitivities
Sleep

• Long sleep latency – what can we improve?
  • Sleep hygiene – set sleep and awakening times
  • Anxiety / rumination
  • Sleep environment
• Early awakening
  • Concept of “sleep debt” or sleep restriction
  • Limit daytime naps (max 30 min)
  • Eliminate alcohol – especially at night
  • Cognitive behavioral therapy for insomnia (CBT-I)
• Encourage daily exercise as tolerated
• Rule out sleep disordered breathing
• Medications – consider “2 for 1’s”
Brain Fog

- Many features:
  - Poor concentration
  - Poor memory / retrieval
  - Poor multi-tasking
  - Slow processing / response time
  - May be associated with fatigue (physical and cognitive)
  - May be associated with depression

- Start with just 1-2 things
- Discourage multi-tasking
- Cut yourself some slack – expect fluctuations and lapses, not perfection
<table>
<thead>
<tr>
<th>ENERGY DEMAND</th>
<th>Physical</th>
<th>Chores/Work</th>
<th>Cognitive (Thinking)</th>
<th>Emotional/Social/Spiritual</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Aerobic exercise: Step ups, Running, high resistance Exercise bike/Fast road bicycle, cross trainer, roller blades (per half hour)</td>
<td>Building, constructing, large surface painting (per hour)</td>
<td>Detailed calculations, accurate form-filling, major decision-making (per hour)</td>
<td>Socializing, large group, 6 people or greater (per half hour)</td>
</tr>
<tr>
<td>9</td>
<td>Jogging in water, swimming, moderate effort bicycling (per half hour)</td>
<td>Work: Millwork, Forestry (per hour)</td>
<td>Reading a book or a report that is complex (per hour)</td>
<td>Anxiety/worrying—most of the day</td>
</tr>
<tr>
<td>8</td>
<td>Rowing machine, Walking hills, jogging, canoeing (per half hour)</td>
<td>Lifting and carrying groceries or household items (per hour)</td>
<td>Attending appointments (per hour)</td>
<td>Attending church or religious services (per hour)</td>
</tr>
<tr>
<td>7</td>
<td>Driving a car on a routine route (per hour)</td>
<td>Driving a car on a routine route (per hour)</td>
<td>Child care active, playing games (per hour)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Slow/light bicycling, moderate effort weight-lifting (per half hour)</td>
<td>Home repair-sawing wood (per hour)</td>
<td>Reading a book that is less complex (per hour)</td>
<td>Anxiety/worrying (per hour)</td>
</tr>
<tr>
<td>5</td>
<td>Sexual activity of higher effort (per hour)</td>
<td>Home repair-washing fence, painting outside (per hour)</td>
<td>Tutoring children in studies (per hour)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Water aerobics, dancing (per half hour)</td>
<td>Multiple household tasks, heavy cleaning, vacuuming, mopping (per hour)</td>
<td>Landscaping—planting trees (per hour)</td>
<td>Social media (per hour)</td>
</tr>
<tr>
<td>3</td>
<td>Home repair-painting, stacking wood, mowing lawn, gardening, pruning (per hour)</td>
<td>Work: Farm tasks (per hour)</td>
<td>Attending a doctor's appointment/dental appointment (per hour)</td>
<td>Disturbed sleep (per night)</td>
</tr>
<tr>
<td>2</td>
<td>Work: Farm tasks (per hour)</td>
<td>Screen time paying attention to TV, computer, cell phone screens (per hour)</td>
<td>Attending full church/religious services (per hour)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Water aerobics, dancing (per half hour)</td>
<td>Working on the computer (per hour)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fatigue / Energy Management – 3P’s

• PLAN: When am I going to do it?
  ❑ Plan out your week and distribute heavy tasks throughout
  ❑ Do challenging activities when you have the most energy
  ❑ Alternate heavy vs. light tasks and thinking vs. doing tasks
  ❑ Include activities in your day that bring you joy and “recharge” your energy bank

• PACE: How am I going to do it?
  ❑ Allow ample time for an activity – do not rush
  ❑ Have sufficient rest after task completion
  ❑ Take frequent brain breaks during the activity vs. one long break at the end

• PRIORITIZE: What am I going to do?
  ❑ Make a list – what needs to be done today? What can wait?
  ❑ Do most important task first
  ❑ Accept that not everything can get done
  ❑ Delegate tasks to others who offer to help
Case: Steve – 20 min screen tolerance

• Gradual return to easy activities first – e.g. just personal emails
• Start with short periods and take breaks - e.g. 5-10 min break after the first 10 min before doing another 10 min
• Modify the task to make it easier
• Aim for the "therapeutic zone" – use your symptoms as a guide
• Consider the overall amount of activity for each day and week, not just each individual activity
• Gradually increase the frequency, duration, and intensity of activities
SELF-MANAGEMENT STRATEGIES WEEKLY ACTION PLAN

1. The self-management strategy I WANT to try this week is:
   ______________________________________________________________

2. Describe the steps I will take:
   WHEN __________________________________________________________
   WHERE _______________________________________________________
   HOW OFTEN __________________________________________________

3. Barriers: What might get in the way of your plan?
   _______________________________________________________________
   _______________________________________________________________
   _______________________________________________________________

4. Plans to overcome barriers: What could you do to handle these barriers?
   _______________________________________________________________
   _______________________________________________________________
   _______________________________________________________________

5. Importance _____ and Confidence _____ ratings (1-10)
   How important is the plan to you on a scale of 1-10?
   How confident are you than you complete the entire action plan on a 1-10 scale?
   Self-evaluation: How did it go? Do I want to carry this plan forward? Could I make any adjustments?
   Remember to keep goals SMART!
   S – Specific
   M – Measurable
   A – Achievable
   R – Realistic
   T - Timely
Next steps in the journey

<table>
<thead>
<tr>
<th>Follow up</th>
<th>Need to have timely follow up – can be virtual or a phone call (Physician as coach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectations</td>
<td>Expect some “set backs”</td>
</tr>
<tr>
<td></td>
<td>This journey will take time – months, not weeks</td>
</tr>
<tr>
<td>Celebrate</td>
<td>Celebrate successes - even small ones</td>
</tr>
<tr>
<td>Don’t judge</td>
<td>Meet the patient where they are in terms of readiness and ability, and work from there</td>
</tr>
</tbody>
</table>
Multi-disciplinary Approach

Physicians have limited time and resources – you need a team approach

Occupational therapy
- Helps with activity planning and education
- Often have strategies on pacing, goal setting

Psychology / neuropsychology
- Provide CBT (cognitive behavioural therapy) strategies
- Help patient address mood, anxiety, and stress management issues

Physiotherapy
- Develop exercise plans with gradual increases

Social work
- Helps explore benefits and available financial assistances
- First line in counseling with patient and families

Vocational rehabilitation
- Advise on work benefits, accommodations
- Plan graduated return to work when ready
Access to other health providers

• Extended health funding for private services e.g. physio, psychology
• Employer benefit programs e.g. EFAP
• Community OT, PT, SW – available in some models of care
• Rehabilitation centres – usually for those with more severe symptoms and have no resources elsewhere (expect long waitlists)
• WorkSafe – if applicable
• Post-COVID 19 clinics – limited resources under development
Post-COVID-19 Care & Recovery

Support your understanding and management of symptoms as you recover from COVID-19.

Most people with COVID-19 recover within two weeks. But, some people with more severe symptoms can take twelve weeks or more to feel better.

This page includes fact sheets, links to external websites and other material that may support your understanding and management of your COVID-19 recovery.

Symptom management fact sheets

Tools for managing symptoms

Living In Your Energy Envelope
- Introduction to Living in your Energy Envelope Tool
- Living in your Energy Envelope Tool

Quick links

Post-COVID-19 recovery clinics
Post-COVID-19 clinical care resources
BCCDC COVID-19 health info

Cognitive Behavior Therapy Skills Group

https://cbtskills.ca/physicians/

- Physician led CBT group
- 8 week program for adults
- Patients can sign-up on their own or be referred by MD
- Need to have computer with camera and virtual capabilities
- Integrates psychoeducation, CBT and mindfulness practices
- $65 no-show deposit
Questions?