

# Post-COVID Symptoms: Rehabilitation and Recovery

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MEDICINE

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# Overview

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- Evolution of Post-Acute COVID management: Post-ICU survivorship to Post-Acute COVID symptoms beyond the effects of critical illness
- Evolution of UW Post-COVID Rehabilitation and Recovery Clinic  
May, 2020-May, 2021
- Future Goals and Needs

# Post-COVID Rehabilitation and Recovery Clinic

## May, 2020

- Launched with 3 MDs: myself, Dr. Aaron Bunnell (expertise in post-ICU survivorship) and Dr. Julie Hodapp (outpatient rehab clinic medical director, Harborview Medical Center)
- Telemedicine MD evaluations for patients discharged from UW Medicine hospitals



### **Telehealth clinic addresses COVID-19 survivors' needs**

Aaron Bunnell, MD, discusses UW Medicine's post-COVID telehealth clinic for patients with lingering effects.

# Post-COVID Rehabilitation and Recovery Clinic Rational

## May, 2020

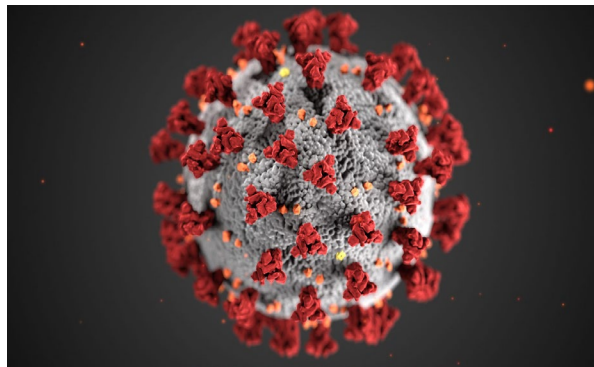
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COVID patients critically ill → ARDS, Prolonged Mechanical Ventilation, ECMO, NM Blockade

Critically ill patients at risk for:

- ICU Acquired Weakness (ICU-AW): Critical Illness myopathy, polyneuropathy, disuse atrophy
- Post Intensive Care Syndrome (PICS)
- Impairments: Physical Function, Cognition, Mental Health

Multidisciplinary team approach using existing rehabilitation strategies and resources effective for critically ill patients



# Severity of COVID-19 infection in all patients

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**Report from the Chinese Center for Disease Control and Prevention, 2020**

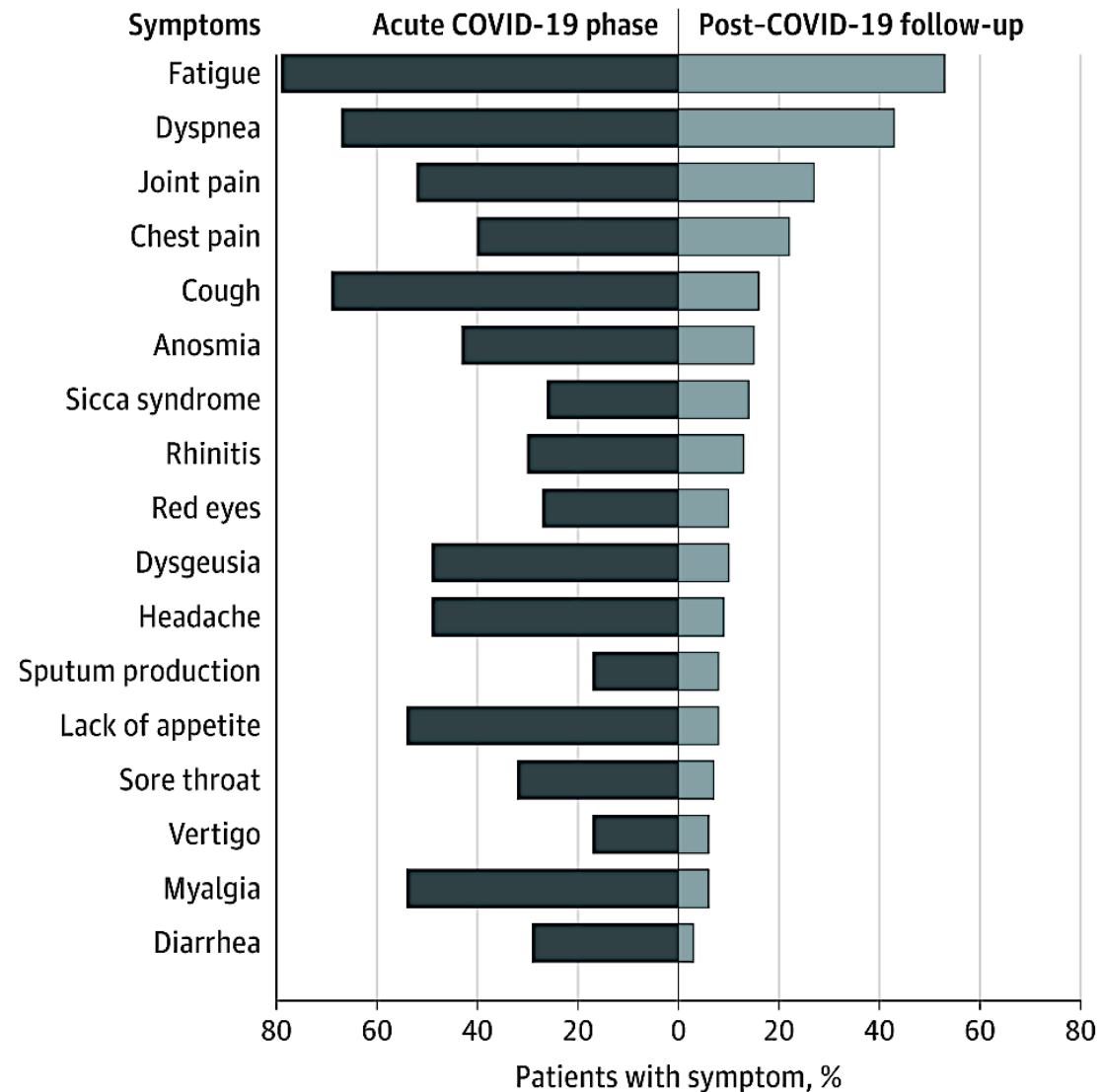
- 81% Mild disease (no or mild pneumonia)
- 14% Severe disease (dyspnea, hypoxia, or >50% lung involvement 24-48 hours)
- 5% Critical disease (respiratory failure, shock, or multiorgan dysfunction)

**2.3% overall case fatality rate**

(likely underestimates overall deaths attributable to COVID)

# PERSISTENT SYMPTOMS IN HOSPITALIZED PATIENTS

- Case series of 143 hospitalized patients in Italy
- 72.7% had interstitial pneumonia
- Mean LOS was 13.5 (SD, 9.7) days
- 21 patients (15%) received noninvasive ventilation
- 7 patients (5%) received invasive ventilation
- Persistent symptoms reported:  
Mean 60 days post onset of COVID diagnosis



# What about the 98% that survive?

## *Covid Survivors With Long-Term Symptoms Need Urgent Attention, Experts Say*

In a two-day meeting sponsored by the N.I.H., officials acknowledged an insufficient understanding of the issues and warned of a growing public health problem.



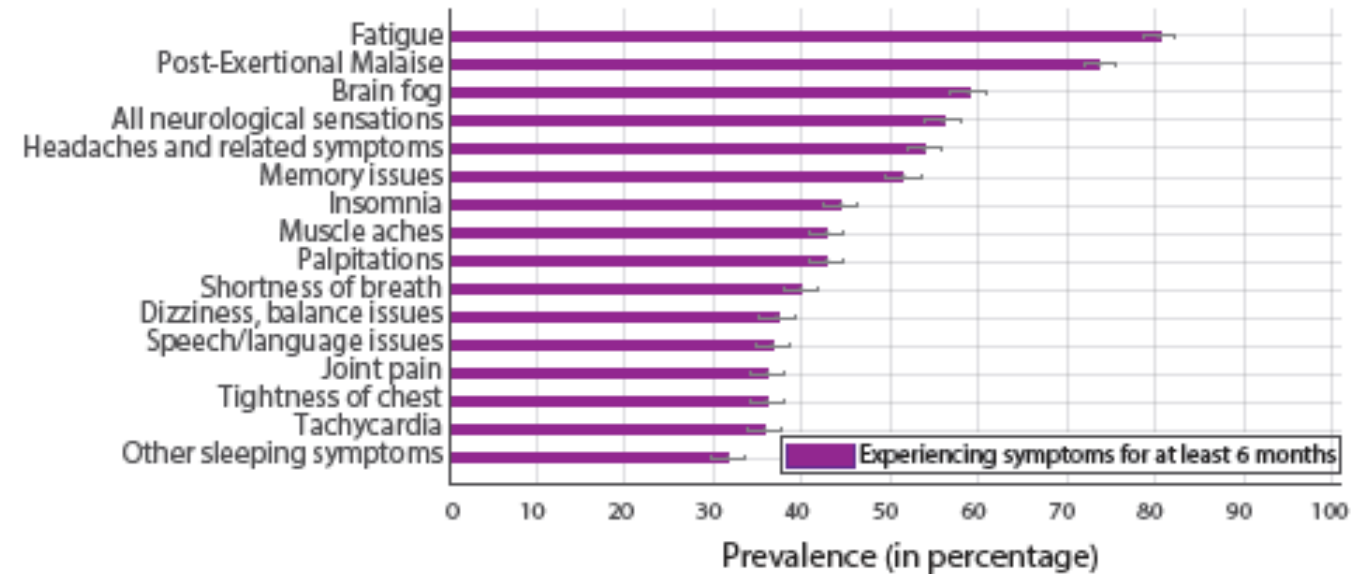
Chimère Smith, a teacher in Baltimore, has not been able to return to work since getting Covid in March. She



# Post-Acute Sequelae of COVID (PASC) Symptoms

- International Cohort Study, n= 7,285, >30 days from infection
- 205 symptoms in 10 organ systems prevalent
- Avg: 14.5 symptoms in 9.08 organ systems
- The most frequent symptoms reported after month 6 were:
  - **fatigue (78%)**
  - **post-exertional malaise (72%)**
  - **cognitive dysfunction (55%)**

a. Remaining symptoms after month 6 (prevalence > 30%)



Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact  
Patient-Led Research Collaborative Davis, et al, 2021 <https://doi.org/10.1101/2020.12.24.20248802>



# PASC: Charting the Unknown

There are multi-organ sequelae of COVID-19: this is a systemic issue that needs to be addressed holistically rather than addressing only individual symptoms.

The pathophysiology of PASC is still not clear, but may include:

- virus-specific pathophysiologic changes
- immunologic aberrations and inflammatory damage in response to the acute infection (e.g. prolonged hyperimmune response with inflammatory cytokines, autonomic dysregulation)
- expected sequelae of post-critical illness
- Other?

Nalbandian, A., Sehgal, K., Gupta, A. *et al.* Post-acute COVID-19 syndrome. *Nat Med* **27**, 601–615 (2021).

<https://doi.org/10.1038/s41591-021-01283-z>

**Table 2 | Active research studies and questions pertaining to post-acute COVID-19**

Question	Study name and/or ID <sup>a</sup>
<b>General</b>	
What are the long-term sequelae of COVID-19?	COVIDOM (NCT04679584) CO-Qo-ICU (NCT04401111) MOIST (NCT04525404) LIINC (NCT04362150) NCT04411147 NCT04573062 NCT04605757
What are the immunologic, enzymatic, metabolic and radiographic predictors of post-acute COVID-19?	BIOMARK-COVID (NCT04664023) MOIST (NCT04525404)
What are the long-term effects of COVID-19 on health-related quality of life?	COVIDOM (NCT04679584) RECOVER-19 (NCT04456036) CO-Qo-ICU (NCT04401111) COREG Extension (NCT04602260) NCT04586413 NCT04632355
What are the long-term effects of COVID-19 on functional exercise capacity?	CO-Qo-ICU (NCT04401111) COREG Extension (NCT04602260)
<b>Pulmonary</b>	
Is there a role for antifibrotic therapy for the prevention of development of pulmonary fibrosis and other respiratory complications in COVID-19 survivors?	NCT04652518 NCT04282902 NCT04541680 NCT04527354
Does pulmonary rehabilitation improve pulmonary outcomes in post-acute COVID-19?	NCT04649918 NCT04365738 NCT04406532 NCT04642040
<b>Hematologic</b>	
Does extended thromboprophylaxis lead to clinically meaningful benefit with regards to post-hospital discharge VTE in patients with COVID-19?	NCT04508439 COVID-PREVENT (NCT04416048)
Does prolonged thromboprophylaxis lead to clinically meaningful benefit with regards to venous thromboembolic events in outpatients with COVID-19?	ACTIV4 (NCT04498273) PREVENT-HD (NCT04508023)
Do anti-platelets such as aspirin have a role in primary thromboprophylaxis in patients with COVID-19 managed as outpatients?	ACTIV4 (NCT04498273)
<b>Cardiovascular</b>	
What are the medium- and long-term effects of COVID-19 on biventricular cardiac function?	CO-Qo-ICU (NCT04401111) MOIST (NCT04525404)
<b>Neuropsychiatric</b>	
What are the physical examination and brain-imaging characteristics in those with persistent neurological symptoms in post-acute COVID-19?	NCT04564287
What are the long-term psychiatric sequelae of COVID-19?	CO-Qo-ICU (NCT04401111) NCT04632355 MIND/COVID-19 (NCT04556565)
<b>Renal</b>	
What are the short- and long-term renal outcomes and their predictors in COVID-19 survivors?	NCT04353583 CO-Qo-ICU (NCT04401111) MOIST (NCT04525404)
<b>Gastrointestinal and hepatobiliary</b>	
What are the long-term consequences of COVID-19 on gastrointestinal symptoms, post-infection irritable bowel syndrome and dyspepsia?	NCT04691895

<sup>a</sup>Study IDs are for ClinicalTrials.gov.

# Impact of Cognitive Dysfunction

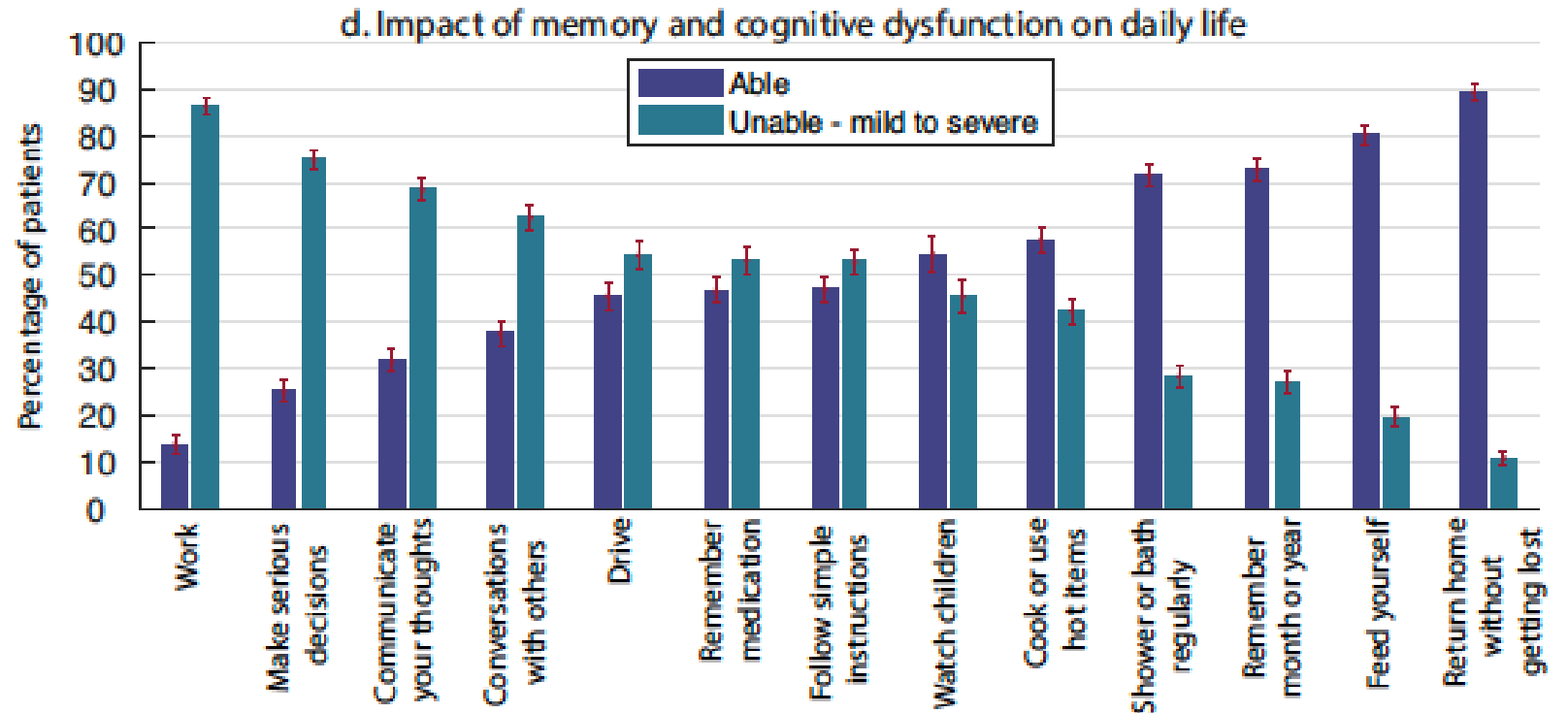
1,700 (45.2%) required a reduced work schedule compared to pre-illness

839 (22.3%) were not working at the time of survey due to their health.

Impacts of COVID-19 on ability to return to work:

- \$\$\$ impact
- Stress
- Anxiety
- Family/Relationships

Treatment must address return to work plans.



# Mental Health Complications

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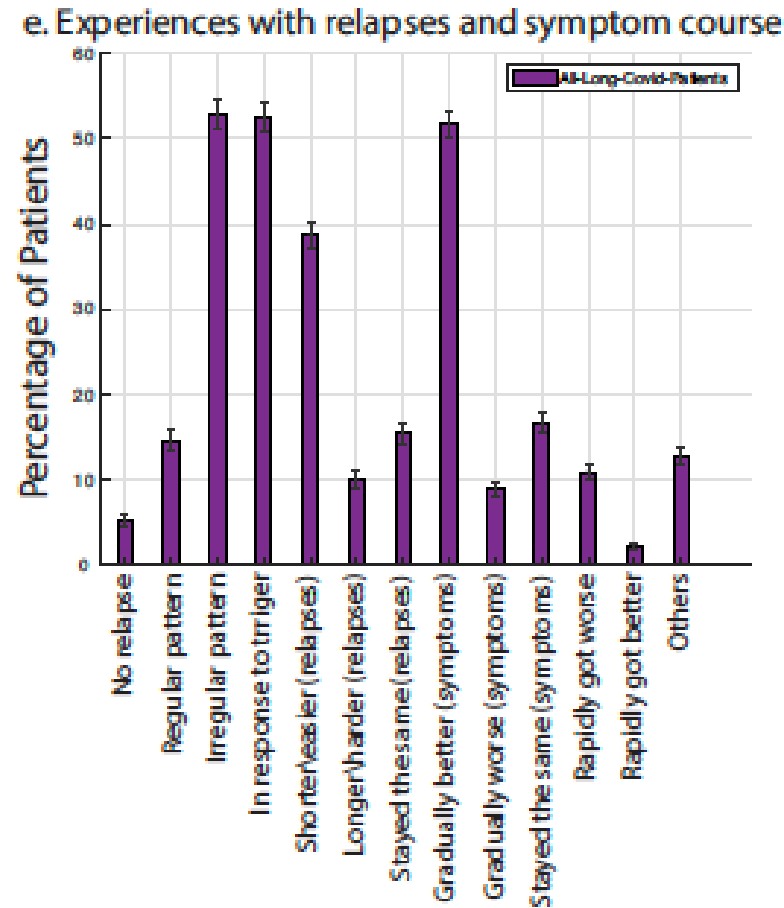
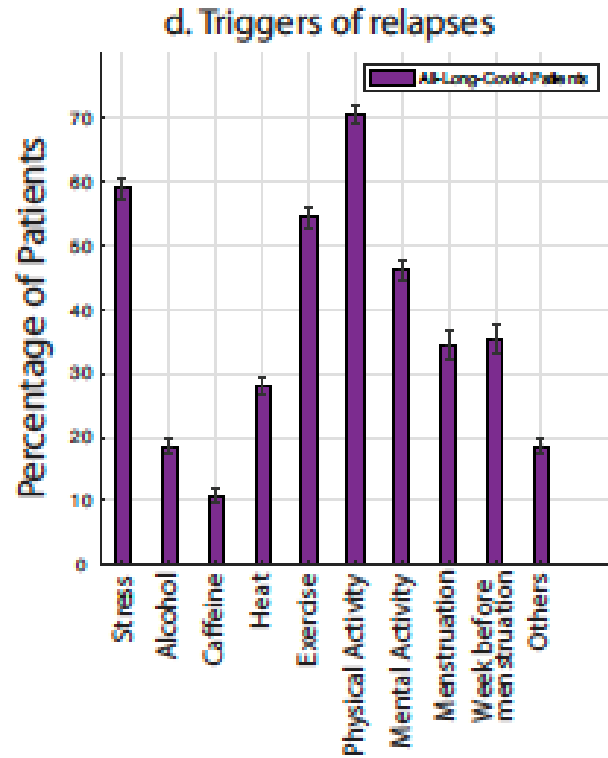
Anxiety, depression, sleep disturbance & PTSD: 30–40% of COVID-19 survivors

Pathophysiology is mechanistically diverse and includes:

- immune dysregulation
- inflammation
- microvascular thrombosis
- iatrogenic effects of medications
- psychosocial impacts of infection

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# Understanding Relapses and Addressing Triggers



Majority (>85%) experienced relapses, but >50% report gradually improving

Other Triggers Reported:

- Food with sugar and histamines
- Lack of sleep
- Smoke, pollution and chemicals
- Cold air
- Overworking

# UW Post-COVID Rehabilitation and Recovery Clinic

## May, 2021

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Demand for clinic services is growing rapidly: patients are struggling to find specialized services for PASC

Multidisciplinary approach with medical partners in internal medicine, family medicine, pulmonology, cardiology, allergy and infectious diseases, neurology, rheumatology and psychiatry

Focusing on serving a broader population of patients and improving access for vulnerable populations

### Clinic Leadership Team

Executive Director: Janna Friedly, MD, MPH

Rehabilitation Medicine Medical Directors: Aaron Bunnell, MD, Julie Hodapp, MD

General Internal Medicine Medical Directors: Jessica Bender, MD and Elizabeth Kaplan, MD

Family Medicine Medical Director: Nikki Gentile, MD

# UW Post-COVID Recovery and Rehabilitation Clinic

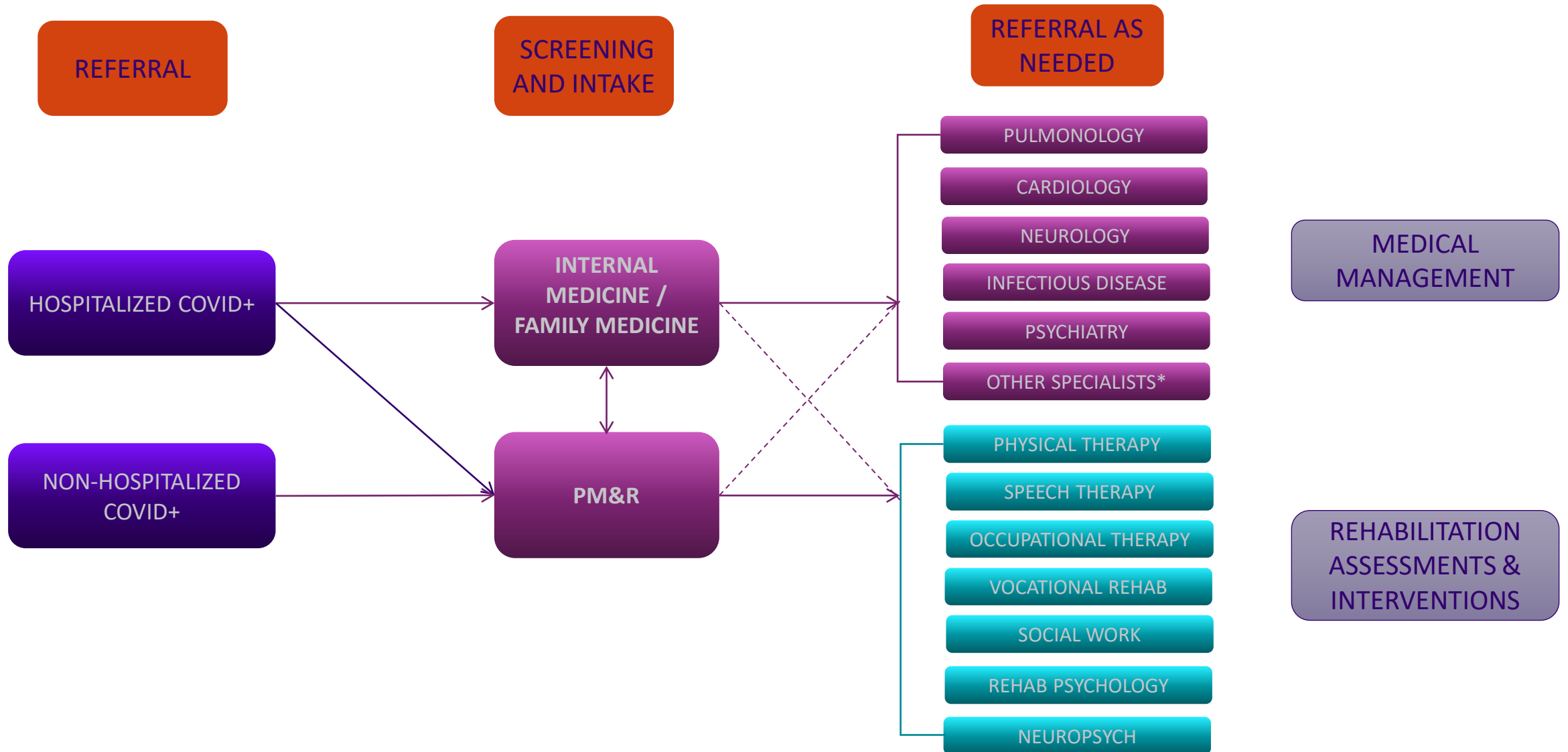
## May, 2021

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***Mission:*** To improve clinical and functional outcomes and quality of life for people recovering from COVID-19.

***Approach:*** The UW approach is to provide a comprehensive evaluation and coordinated care that integrates the most up-to-date research and clinical experiences of our renowned faculty and focuses patients on a path to recovery rather than a path to long-lasting disablement.

# POST-COVID RECOVERY AND REHABILITATION CLINIC STRUCTURE



\*Other Specialists: Sleep Medicine, Immunology, Occupational Medicine, Gastroenterology, Hematology, Nephrology, Dermatology



## UW MEDICINE REHABILITATION AND RECOVERY APPROACH

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- Achieve medical and emotional stability: partnership with medical specialties and primary care
- Help patients manage symptoms with medical and behavioral strategies
- Help patients cope with changes in physical and cognitive function
- Focus on lifestyle changes (sleep, nutrition, exercise, stress management) to support recovery
- Engage patients in structured exercise program to improve function and prevent relapses (including pacing, energy conservation, restorative exercise, slowly progressive low intensity aerobic exercise)

## FUTURE DIRECTIONS: SCALING UP

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Infrastructure to support a massive increase in cases of PASC

improving access

clinical coordination

rehab psychology & mental health support

physical therapy and exercise support

vocational services

Research collaboration

Education and outreach to community providers

Washington State as of May 1, 2021

Confirmed Cases	<b>374,882</b>
Probable Cases	<b>29,827</b>
Total Cases	<b>404,709</b>
Hospitalizations	<b>22,333</b>
Deaths	<b>5,499</b>
Percent of Deaths (deaths/total cases)	<b>1.4%</b>

# QUESTIONS?

