

Unitat Covid Persistent

Rehabilitación de pacientes con condición post-COVID-19: un enfoque basado en la evidencia

Roser Coll Fernández, MD PhD

Servei de Rehabilitació

Hospital Universitari Germans Trias i Pujol Badalona

Professora associada UAB

Salut/



Germans Trias i Pujol
Hospital

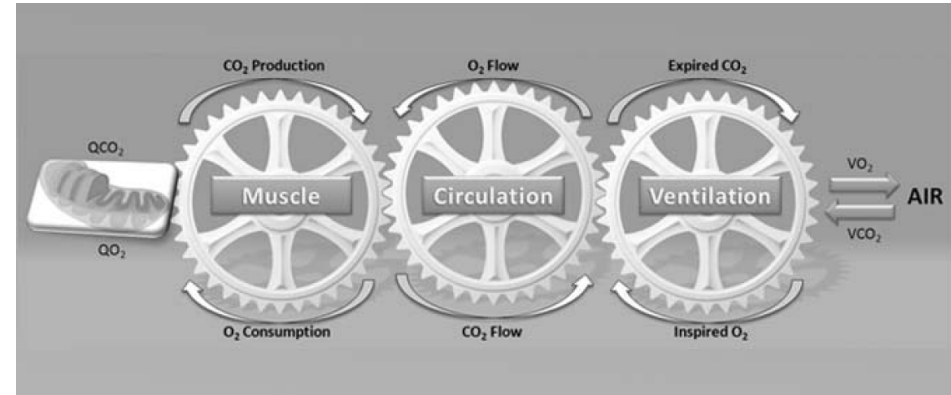


Índice

- Músculo como órgano diana
- Disfunción muscular en la condición post-COVID-19
- Evidencia científica rehabilitación
- Programa rehabilitación en la Unidad COVID Persistente
- Conclusiones

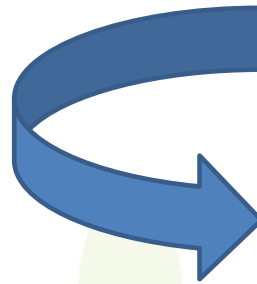


Fisiología muscular



Wasserman K

Músculos estriados → Elementos contráctiles



- Movimiento
- Generación de flujo aéreo y sanguíneo esencial para el intercambio de gases

Interacción sistemas
cardiorrespiratorio y músculo-
esquelético

Fisiología muscular

Fuerza (*strength*)

Capacidad para desarrollar un esfuerzo breve y máximo

Depende de la masa muscular y de la proporción de **fibras tipo II** (metabolismo anaerobio)

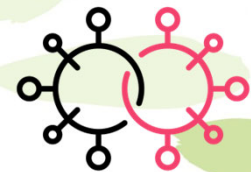
Tiempo más corto y esfuerzo máximo

Resistencia (*endurance*)

Capacidad para mantener una contracción submáxima en el tiempo

Depende de las propiedades aeróbicas del músculo (densidad capilar, **fibras tipo I**, actividad enzimática)

Tiempo más largo y esfuerzo submáximo



UnitatCovidPersistent

Gea J. Expert Rev Respir Med 2012; 6: 75-90

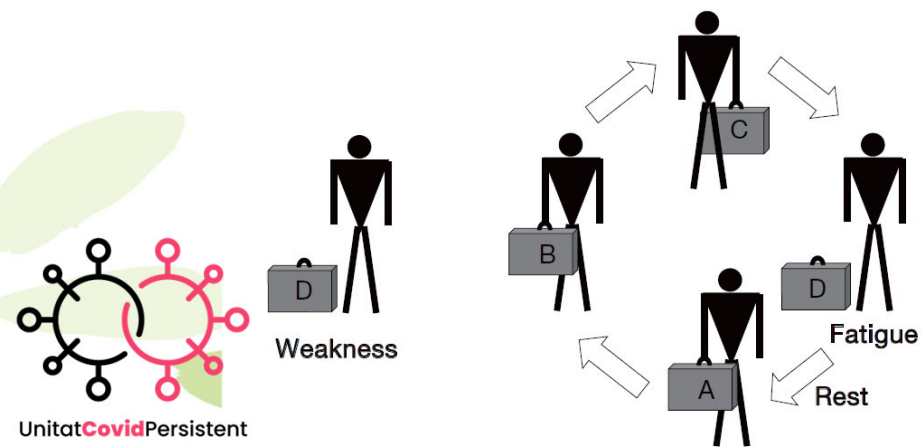


Germans Trias i Pujol
Hospital
Institut Català de la Salut

Disfunción muscular

Alteración de la fuerza y/o resistencia de los músculos periféricos y respiratorios, que comporta la incapacidad para desarrollar adecuadamente sus funciones fisiológicas

DEBILIDAD (FUERZA)	FATIGA (RESISTENCIA)
Déficit de fuerza (<i>strength</i>)	Déficit de resistencia (<i>endurance</i>)
Condición estable que requiere de intervenciones a largo plazo (entrenamiento muscular/aportes nutricionales)	Disfunción temporal que es reversible con el reposo



Un músculo débil se fatiga antes

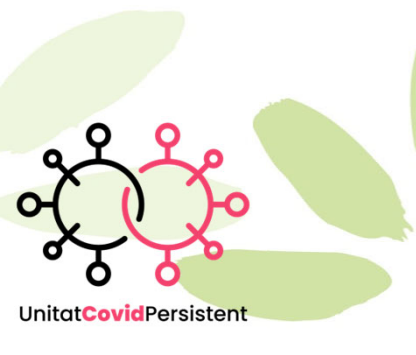
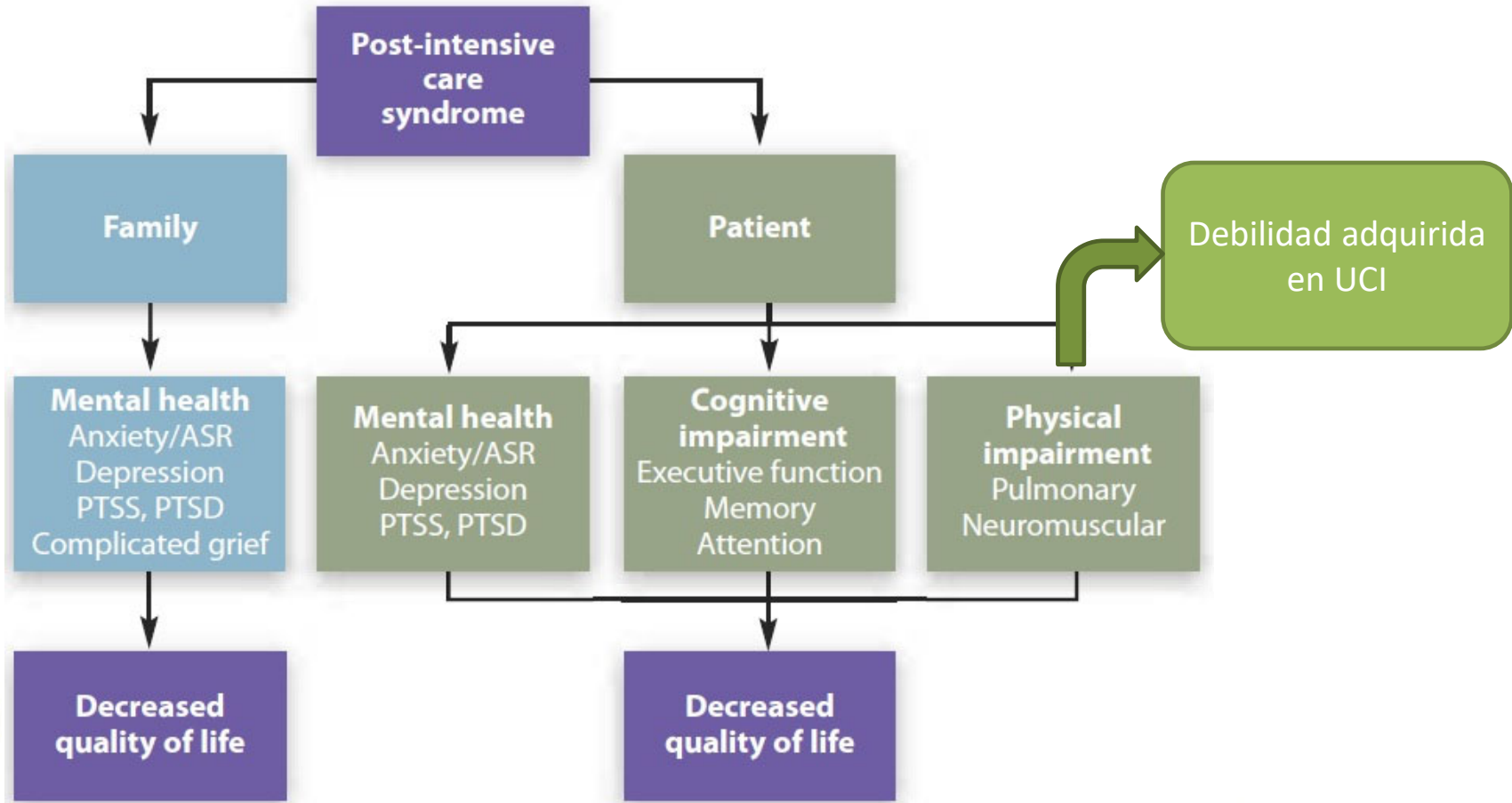
Gea J. J Thorac Dis 2015; 7: E418-E438

Índice

- Músculo como órgano diana
- Disfunción muscular en la condición post-COVID-19
- Evidencia científica rehabilitación
- Programa rehabilitación en la Unidad COVID Persistente
- Conclusiones



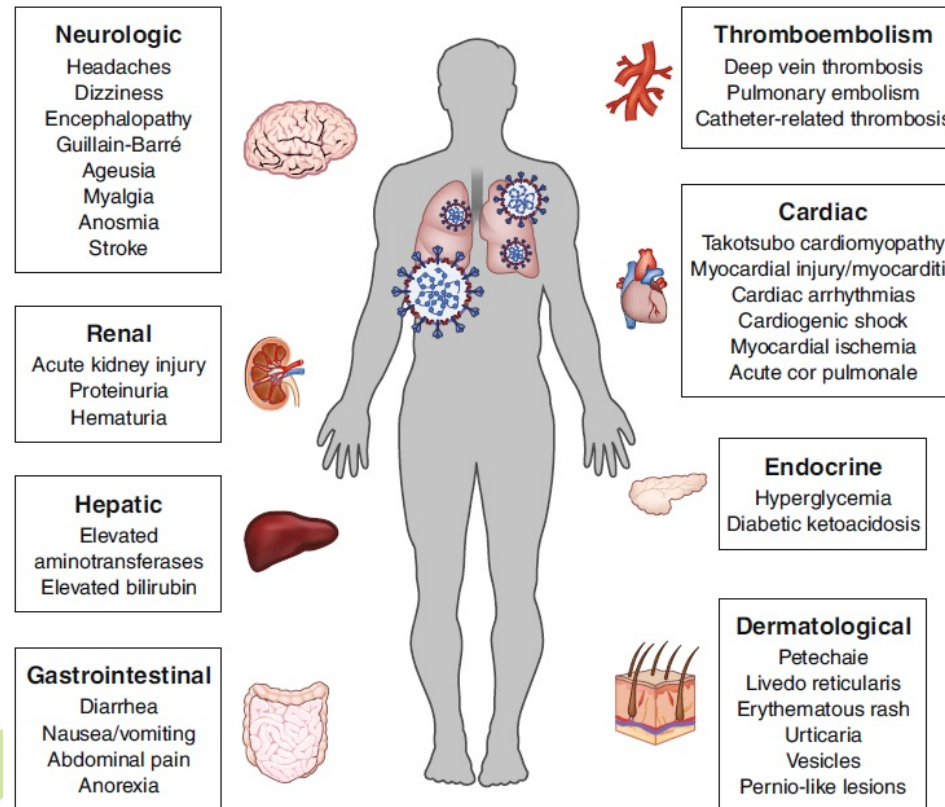
PICS model



Davidson JE. American Nurse Today 2013

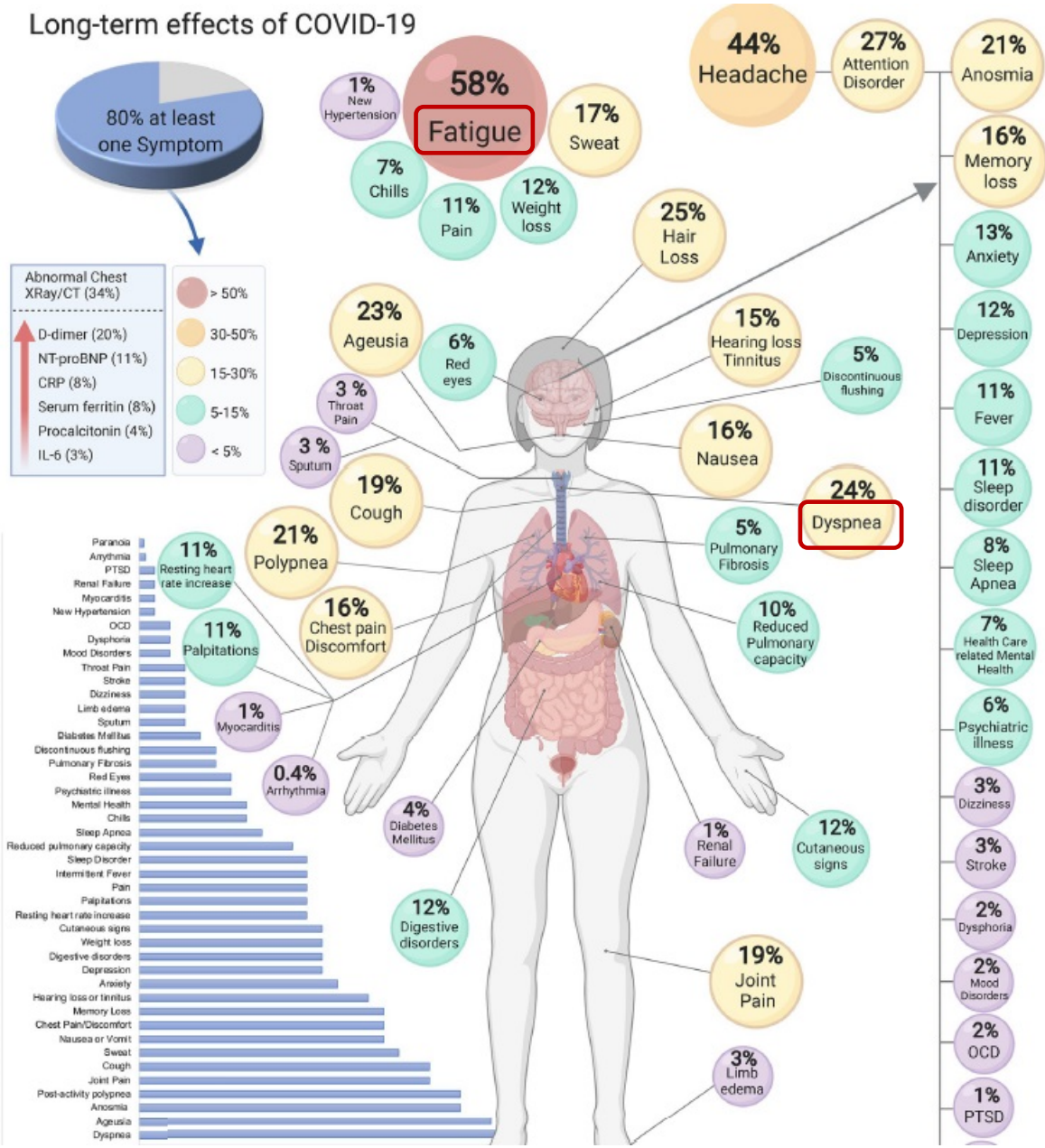
Manifestaciones extrapulmonares COVID-19

Musculo-esquelético???



Gupta A. Nat Med 2021: 1017-1032

Long-term effects of COVID-19



Lopez-Leon S. Sci Rep 2021

Controversias en rehabilitación respiratoria

Entre las razones que explican el debate sobre la rehabilitación respiratoria mantenido en los últimos años es una de las más importantes. En los últimos años la rehabilitación ha perdido el puesto de herramienta de primera línea que ha utilizado como el FEV₁. Es curioso que los neumólogos nos hayamos empeñado en mejorar un parámetro espirométrico que por el propio concepto de la EPOC, obstrucción irreversible del flujo aéreo, no es mejorable. En realidad el sentirse o encontrarse bien es

Sobradillo V. Medicina Integral 2001; 37: 127

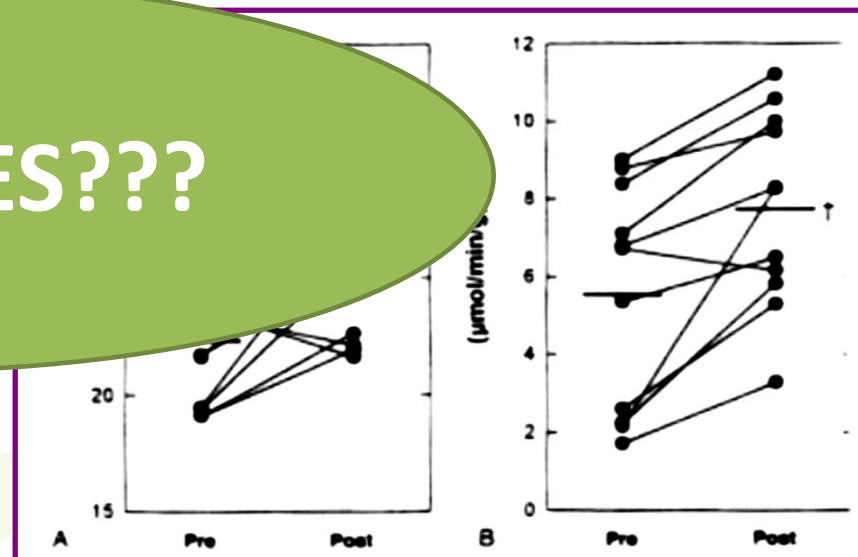
Physical Training Fails to Improve Ventilatory Muscle Endurance in Patients with Chronic Obstructive Pulmonary Disease*

Michael J. Belman, M.B., B.Ch., F.C.C.P.; and Brian A. Kendregan, M.D.

ARRD 1981;123:256

Killian. Am Rev Resp Dis 1992;146:935

OUTCOMES???



Citrato Sintetasa

3OHCoA Deshid

Maltais. AJRCCM 1996;154:442

Germans Trias i Pujol Hospital
Institut Català de la Salut

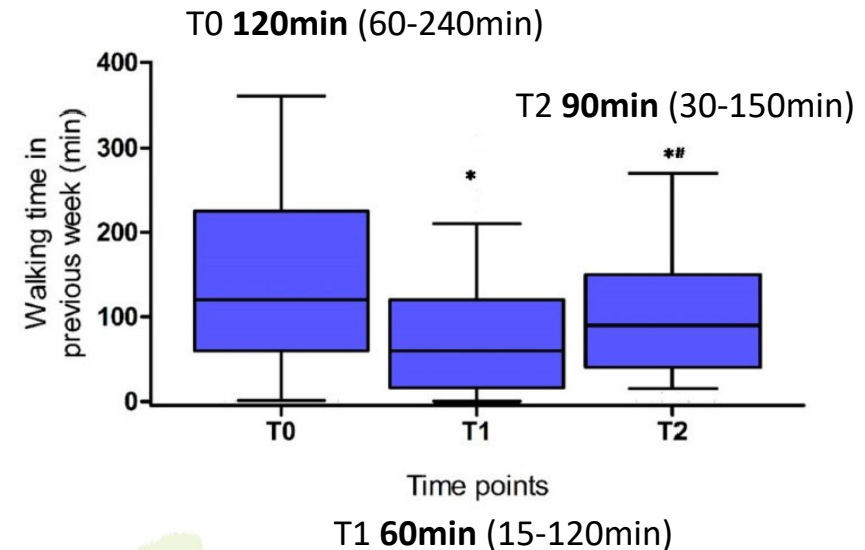
Article

The Impact of Post-COVID-19 Syndrome on Self-Reported Physical Activity

Delbressine J.M. Int J Environ Res Public Health 2021; 18: 6017

- Estudio longitudinal (subestudio). Cuestionario Online T1 (Junio 2020) / T2 (Setiembre 2020)
- 239 participantes
- Media de tiempo dedicado a caminar / actividad física previa a COVID-19 (retrospectivo) T0
- Media de tiempo dedicado a caminar / actividad física T1 - T2

OMS mínimo de 150 minutos / semana de ejercicio aeróbico de moderada intensidad Bull F.C. Br. J. Sports Med 2020, 54, 1451



83% ♀
Edad media 50 años (39-56a)
Hospitalización 26%

Media caminar < 150 min / sem

Media caminar ≥ 150 min / sem

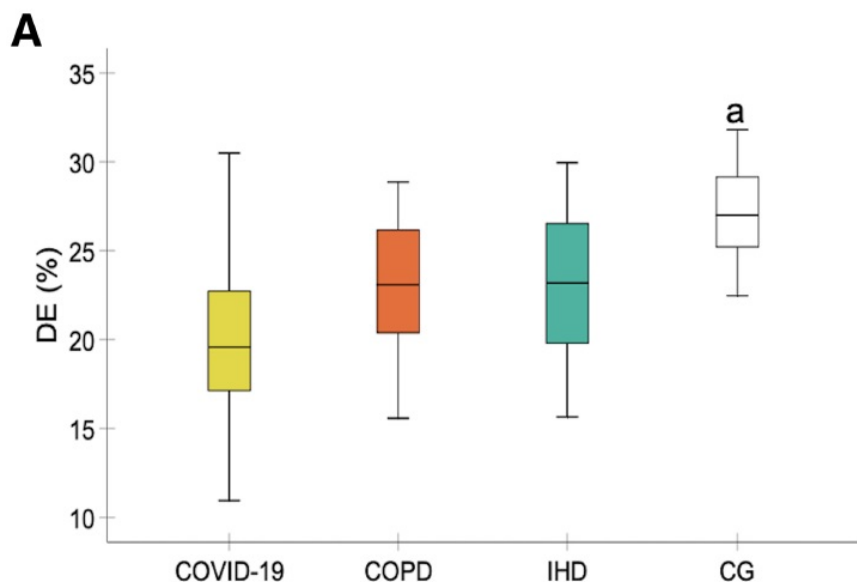
Armands Trias i Pujol
Hospital
Institut Català de la Salut



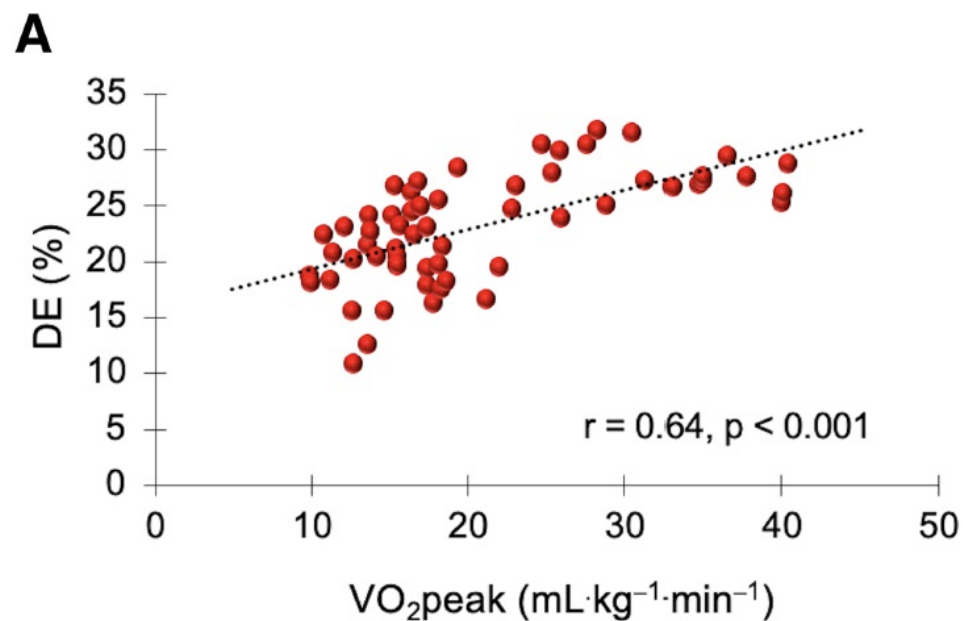
Severe loss of mechanical efficiency in COVID-19 patients

Pleguezuelos E. J Cachexia Sarcopenia Muscle 2021; 12: 1056

- Pacientes adultos que requirieron de ingreso en UCI por SDRA secundario a neumonía bilateral COVID-19
- Grupo control – voluntarios sanos
- Pacientes EPOC / IC (bases de datos)
- Valoraciones a las 8 semanas alta hospitalaria
- Test de ejercicio cardiopulmonar
 - Cicloergómetro
 - Eficiencia mecánica – Eficiencia delta (DE): relación entre cambio trabajo externo y cambio en el gasto energético. Parámetro predictivo de la eficiencia musculoesquelética

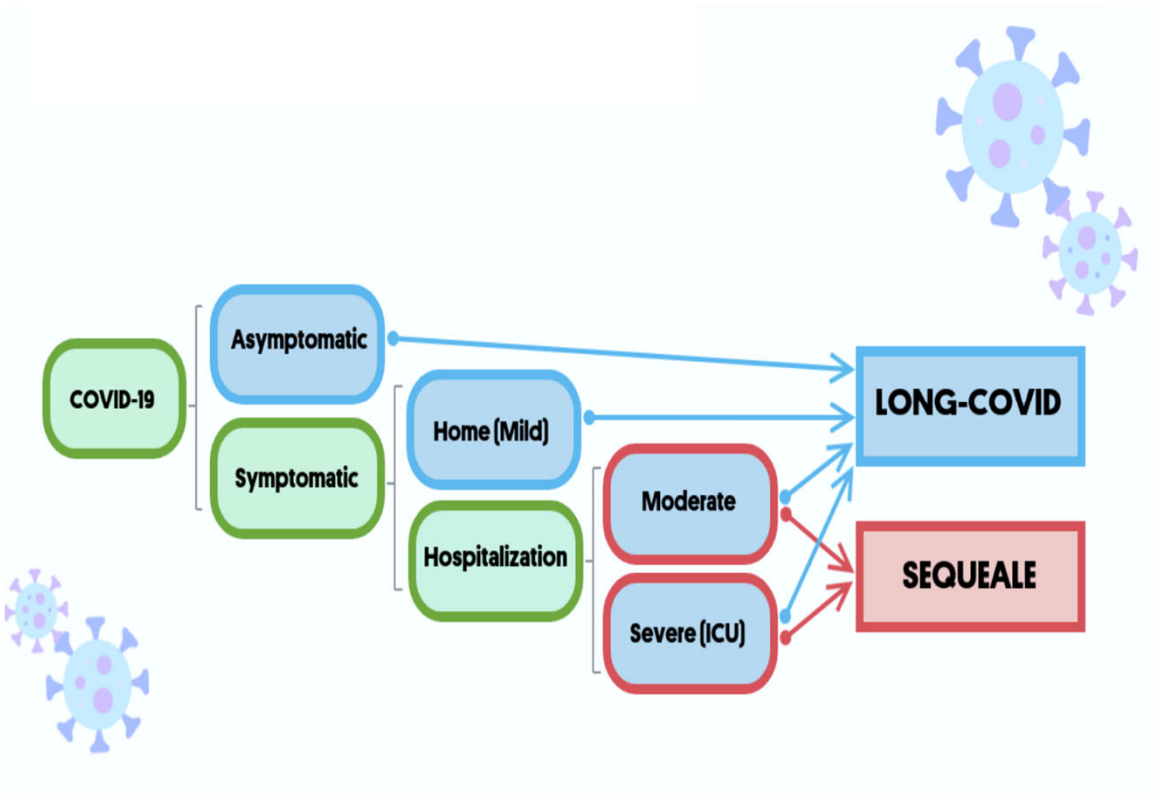


> DE grupo control que en grupo COVID-19 y EPOC ($P < 0,001$ y $P = 0,033$, respectivamente).



Correlación significativa ($r = 64, P < 0,001$) entre el VO₂pico y DE

- ✓ Pacientes con infección por COVID-19 mostraron una marcada ineficiencia mecánica similar a la observada en pacientes con EPOC / IC
- ✓ El factor limitante fue la potencia muscular desarrollada durante el pedaleo
- ✓ Disfunción muscular en pacientes con COVID-19 como factor sintomático determinante



- **Post Intensive Care Syndrome.**
Patients after ICU admission with target organ damage as part of the systemic inflammatory response. Example: lung, heart, renal damage and myopathy or neuropathy in critically ill patients.
- **Sequelae arising from post-thrombotic or haemorrhagic complications.**
Such as cerebrovascular and thrombo-embolic events, myocardial infarction, and arterial ischaemia.
- **Sequelae resulting from immuno-mediated phenomena in the acute phase.**
Such as Guillain-Barre syndrome, encephalitis, myelitis, idiopathic thrombocytopenic purpura or systemic autoimmune diseases.
- **MIS-C and MIS-A.**
Multisystemic inflammatory syndrome in children (MIS-C) and adults (MIS-A) that can appear 3-4 weeks after viral infection, with high morbidity and mortality and significant risk of sequelae.

GCMSC, Report June 2021

Índice

- Músculo como órgano diana
- Disfunción muscular en la condición post-COVID-19
- Evidencia científica rehabilitación
- Programa rehabilitación en la Unidad COVID Persistente
- Conclusiones



Review

Rehabilitation of patients post-COVID-19 infection: a literature review

Revisión literatura
22 estudios incluidos
Destaca el papel de la fisioterapia

Demeco A. J Int Med Res 2020

REVIEW

Rehabilitation of patients with COVID-19

Tiantian Sun^a, Liyun Guo^a, Fei Tian^{a,b}, Tiantian Dai^a, Xiaohong Xing^a, Junqing Zhao^a and Qiang Li^a

Expert Rev Respir Med 2020; 14:1249-1256

Tratamiento durante hospitalización
Disminuir estancia hospitalaria
Mejorar la calidad de vida del paciente



Outpatient Pulmonary Rehabilitation in Patients with Long COVID Improves Exercise Capacity, Functional Status, Dyspnea, Fatigue, and Quality of Life

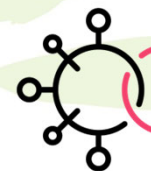
Nopp S. Respiration 2022; 24: 1-9

Table 2. Change from baseline to end of 6-week-rehabilitation in primary and secondary end points and in pulmonary function testing

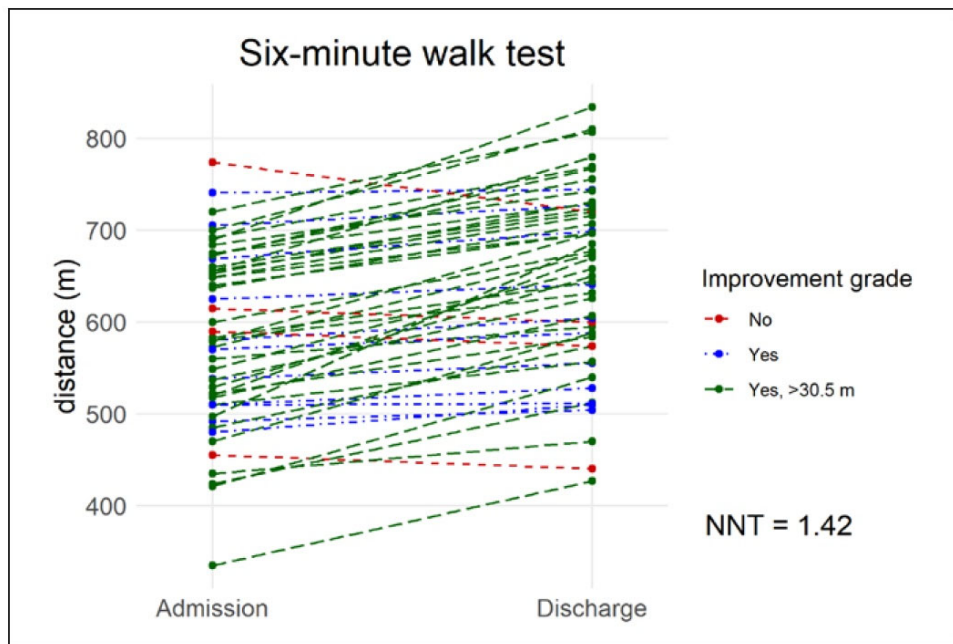
	Patients, <i>n</i>	Baseline	Discharge	Change	<i>p</i> value
Primary endpoint					
6MWD, m	51	584.1 (±95.0)	647.0 (±99.5)	62.9 (±48.2)	<0.001
Secondary endpoints					
PCFS scale	53	2 (2–3)	1 (0–2)	–	<0.001
Borg dyspnea score at max exertion	49	7 (6–8)	7 (4–7)	–	<0.001
mMRC scale	56	1 (0–1)	0 (0–1)	–	<0.001
1-MSTST, count	48	33.3 (±10.4)	42.5 (±13.7)	9.2 (±7.7)	<0.001
Maximal workload, watt	57	156.4 (±80.4)	178.3 (±61.0)	21.8 (±74.0)	0.030
EQ-5D index score	34	0.89 (0.81–0.91)	0.91 (0.84–1.00)	–	0.075
EQ-5D VAS	35	63.7 (±17.9)	78.6 (±13.9)	14.9 (±13.2)	<0.001
Fatigue assessment scale	39	26 (20–32)	20 (16–25)	–	<0.001
Exploratory endpoints – pulmonary function tests					
FEV1, % predicted	58	82.6 (±18.4)	89.5 (±16.2)	6.9 (±20.0)	0.011
FEV1/FVC, % predicted	58	77.7 (±10.1)	78.6 (±9.5)	0.9 (±10.0)	0.502
DLCO, % predicted	42	83.9 (±19.9)	88.0 (±16.9)	4.1 (±11.3)	0.037
Maximal inspiratory pressure, mbar	54	90.2 (±30.1)	115.6 (±30.0)	25.4 (±18.1)	<0.001

- ✓ May 2020 and April 2021
- ✓ Outpatient pulmonary rehabilitation center (Viena)
- ✓ Austrian guidelines for outpatient pulmonary rehabilitation
- ✓ Individualized endurance, strength, and inspiratory muscle training over a 6 weeks period, 3 times per week for 3–4 h each
- ✓ Individualized patient education, psychosocial counseling by a psychologist, nutritional education by a dietologist, and smoking cessation sessions

Age 47 years
43% ♀
Mild / moderate 62%, Severe 19%, Critical 19%

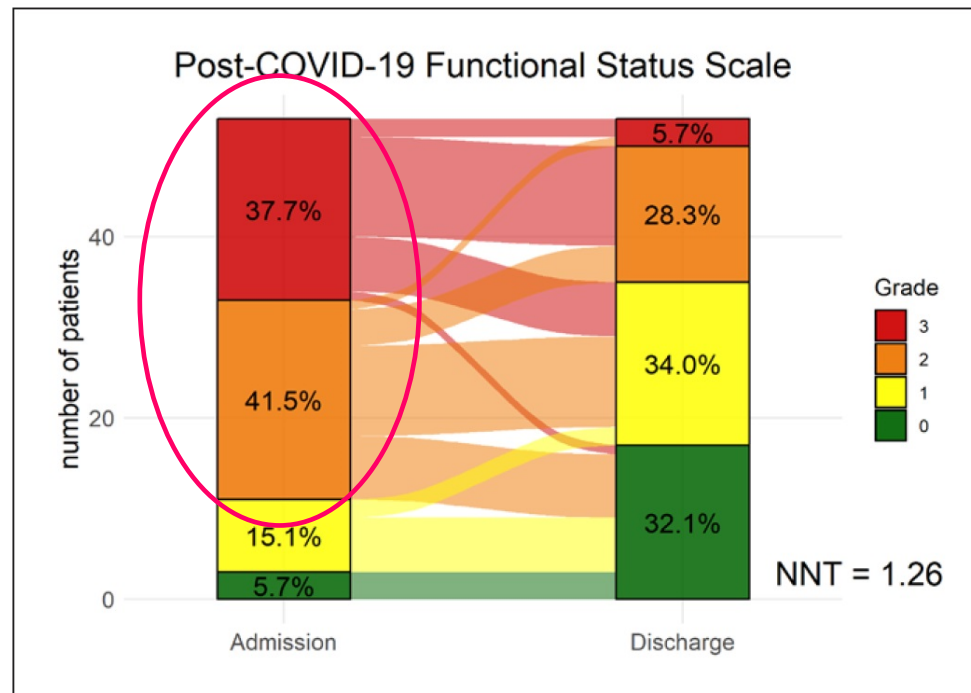


Primary outcome. Diferencia distancia recorrida 6MWT



- ✓ Incremento distancia recorrida 6MWT 62,9 metros (MCID)
- ✓ 36 pacientes > 30,5 metros
- ✓ 11 pacientes mejoraron pero por debajo de MCID
- ✓ 4 pacientes no mejoraron tras la rehabilitación
- ✓ El número necesario a tratar para mejorar la distancia del 6MWT fue de 1,42

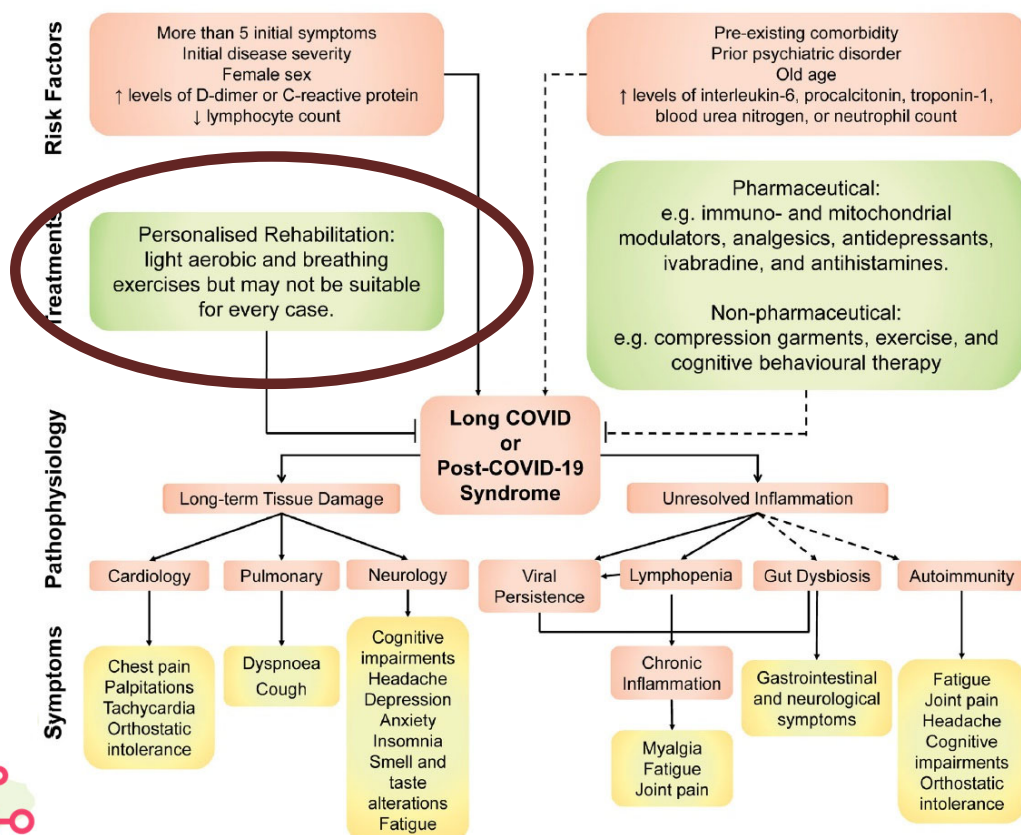
Secondary outcome



- ✓ Tras 6 semanas de rehabilitación pulmonar, la escala PCFS disminuyó mediana de 2 (RIC, 2-3) a 1 (RIC, 0-2; $p < 0,001$)
- ✓ El número necesario a tratar para mejorar 1 punto en la calificación de la escala PCFS fue 1,26.

Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments

Yong SJ. Infect Dis 2021; 53: 737-754



- Light aerobic exercise paced according to individual capacity + breathing exercises
- Complementary behavioural modification and psychological support may also help improve survivors' well-being and mental health
- May not always respond favourably to physical rehabilitation, which includes patients with postural orthostatic tachycardia syndrome (POTS) or myalgic encephalomyelitis or chronic fatigue syndrome (ME/CFS) with post-exertional malaise

NICE cautions against using graded exercise therapy for patients recovering from covid-19

Post-exertional malaise

The large number of patients experiencing post-viral fatigue after covid-19 has now shone a spotlight on the controversial technique again.

Among this number is Paul Garner, professor of infectious disease at the Liverpool School of Tropical Medicine and director of the Centre for Evidence Synthesis in Global Health. Early in his recovery Garner realised that he was experiencing post-exertional malaise, as every time he did any exercise that increased his heart rate, such as cycling or yoga, he found himself back in bed.⁸⁹

“Obviously, I know that if I increase my exercise I will be thrown back to bed,” he said. “What I struggle with as a highly driven medic is stopping myself overdoing it. That’s what I need help with—I don’t need help to increase my exercise.”

Torjesen I. BMJ 2020

Índice

- Músculo como órgano diana
- Disfunción muscular en la condición post-COVID-19
- Evidencia científica rehabilitación
- Programa rehabilitación en la Unidad COVID Persistente
- Conclusiones



Anamnesis

- Antecedentes patológicos / quirúrgicos relevantes
- Resumen infección por SARS-CoV-2
- Situación funcional, actividad física previa
- Situación laboral
- Nivel funcional actual. Índice de Barthel
- Actividad física actual

Disnea / Tos
Fatiga
Tolerancia al esfuerzo
Esfera cognitiva
Disfonía / Disfagia
Dolor torácico
Otros (cefalea, artralgias / mialgias)

Valoración

- Musculatura periférica (MRC-SS) en pacientes con antecedentes de ingreso en UCI
- Musculatura prensión de manos
 - Dinamometría prensión de manos (kg) dominante / no dominante
- Musculatura respiratoria
 - PIM valor absoluto (cmH2O y porcentaje teórico) / PEM valor absoluto (cmH2O y porcentaje teórico)
- Capacidad funcional (6MWT)
- *5 repetition sit to stand test*

MRC scale	
0	complete paralysis
1	minimal contraction
2	active movement with gravity eliminated
3	weak contraction against gravity
4	active movement against gravity and resistance
5	normal strength

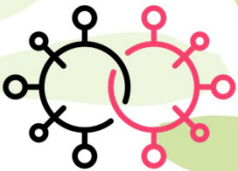


Shoulder abduction
Elbow flexion
Wrist extension
Hip flexion
Knee extension
Foot dorsiflexion

Hermans G. Muscle Nerve 2012; 45: 18



Germans Trias i Pujol
Hospital
Institut Català de la Salut



UnitatCovidPersistent

Programa rehabilitación postCOVID-19

Ejercicio resistencia
Entrenamiento a fuerza
Entrenamiento
musculatura inspiratoria

Fisioterapia
Terapia ocupacional
Logopedia

Técnicas ahorro
energético
Reeducar ABVD
Adaptaciones domicilio

Reeducación
fonorespiratoria
Deglución



Long COVID and self-management

People with COVID-19 often have symptoms in the long term (ie, long COVID), including fatigue, breathlessness, and neurocognitive difficulties.¹ The disease mechanisms causing long COVID are unknown, and there are no evidence-based treatment options. Clinical guidelines focus on symptom management, and various treatment options are being evaluated.¹ The scarcity of advice has often left people with long COVID feeling isolated and frustrated in their search for therapies.

Studies have reported a wide range of self-prescribed medications being used for prevention and management of acute COVID-19, including anti-retrovirals, penicillin, vitamin C, traditional medicines, and chloroquine or hydroxychloroquine.²⁻⁴

There are potential risks of self-prescription, such as harmful drug-drug interactions and use of inappropriate treatments.⁵ Medicines can be used off label, in unsafe doses, and sometimes purchased in an unregulated manner overseas. Harmful drug-drug interactions are enhanced due to the complexity and multiple symptoms of long COVID leading to use of multiple treatments.

People with long COVID have sought advice from social media platforms, such as Facebook, where individuals share their self-management experiences, and online resources, including medical blogs and journals. Due to the small evidence base, these platforms are a potential source of conflicting information and misinformation.

Self-management of symptoms in the long term is often costly, with some individuals using a substantial

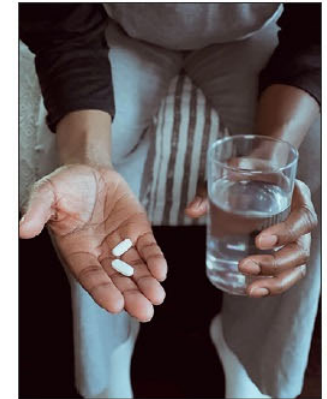
patient review expert engagement and is a citizen scientist member for the Global Horizon scanning panel of the COVID-END Evidence synthesis network. All other authors declare no competing interests. This Correspondence and our work are independent research jointly funded by the National Institute for Health Research and UK Research and Innovation (TLC Study, COV-LT-0013). The views expressed in this Correspondence are those of the authors and not necessarily those of the National Institute for Health Research or the Department of Health and Social Care. We thank the patients who advised us for this Correspondence.

*Kirsty Brown, Asma Yahyouche, Shamil Haroon, Jenny Camaradou, Grace Turner

krb700@alumni.bham.ac.uk

University of Birmingham PPI (JC), Institute of Clinical Sciences (AY), and Institute of Applied Health Research (KB, SH, GT), University of Birmingham, Birmingham B15 2TT, UK

- 1 Crook H, Raza S, Nowell J, Young M, Edison P. Long covid—mechanisms, risk factors, and management. *BMJ* 2021; 374: n1648.
- 2 Sadio AJ, Gbeasor-Komlanvi FA, Konu RY, et al. Assessment of self-medication practices in the context of the COVID-19 outbreak in Togo. *BMC Public Heal* 2021; 21: 58.
- 3 Quispe-Cañari JF, Fidel-Rosales E, Manrique D,



Grace Cary/Getty Images

Conclusiones

- Importancia de caracterizar los diferentes **fenotipos**
- Investigación **en la rehabilitación de la Condición Post-COVID-19**
- Importancia de definir los **programas de rehabilitación**
- Creación de grupos **multidisciplinares**
- Es necesario **invertir en asistencia e investigación**

