

# Aspects of rehabilitation after Covid-19 in older people – a European perspective



## Functional recovery of moderate and severe COVID-19 survivors

Professor Rik Gosselink, PT, PhD, FERS

Faculty of Movement and Rehabilitation Sciences

Department Rehabilitation Sciences

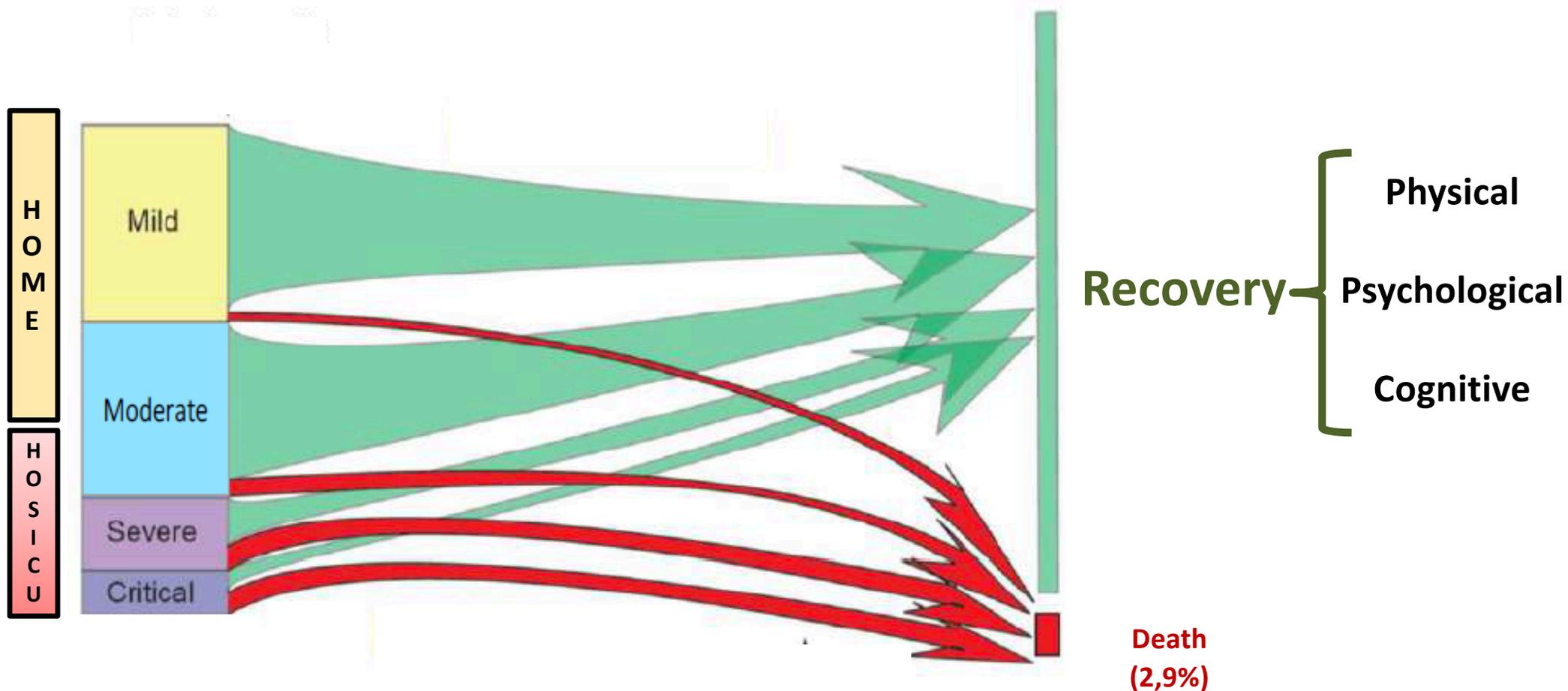
University Hospitals Leuven

KU Leuven Belgium



**KU LEUVEN**

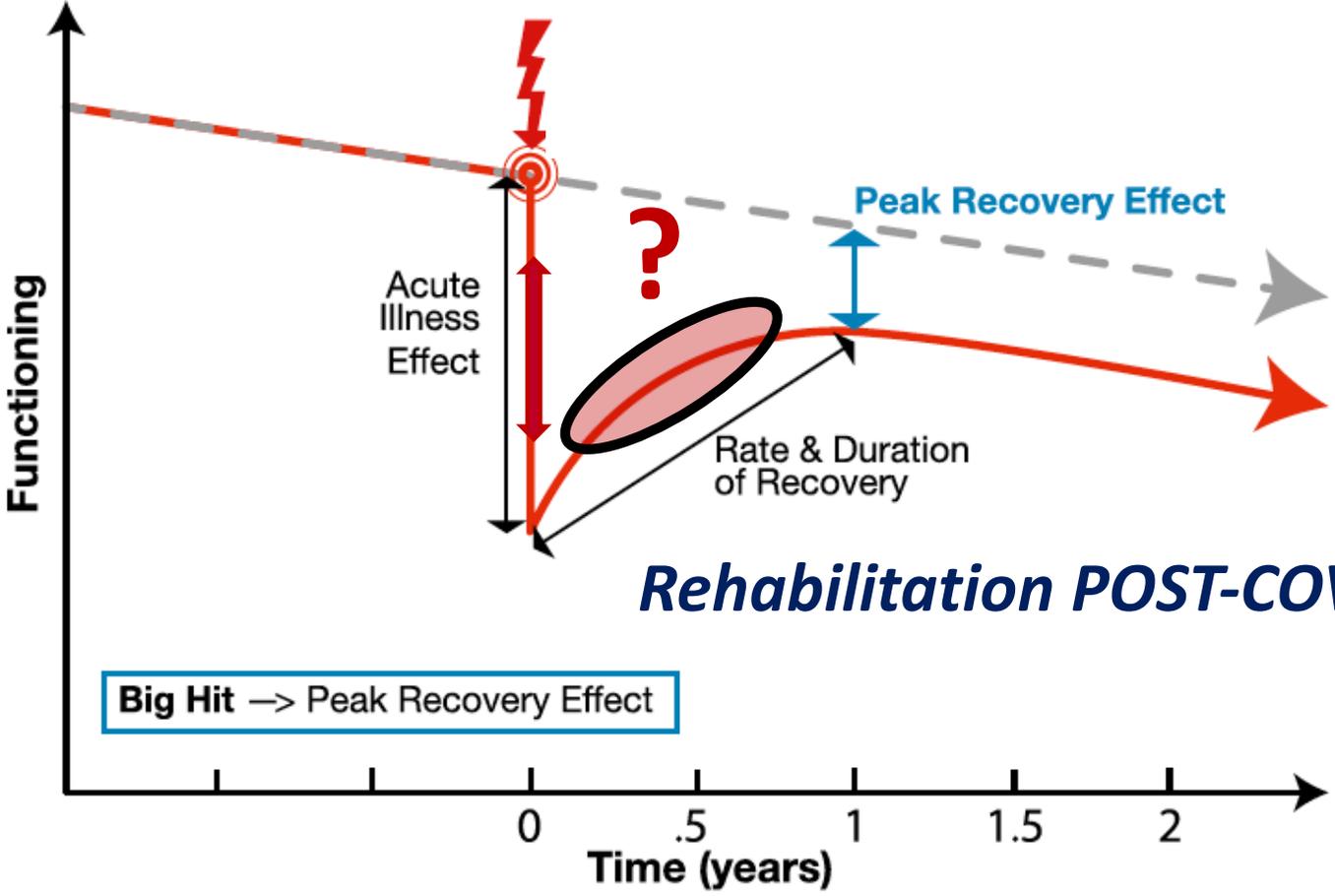
# CLINICAL OUTCOME OF CORONAVIRUS DISEASE 2019 (COVID-19)



Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)

COVID-19

The Big Hit



*Rehabilitation POST-COVID-19 ?*

*Apated adter Iwashyna TJ AJRCCM 2012: 186:302*

# The “Post-COVID” Syndrome: How Deep is the Damage?

Garg et al. J.Med. Virol. 2020

## POST-COVID-19 SYMPTOMATOLOGY VARIES SUBSTANTIALLY AMONGST STUDIES

- Study population:
  - Outpatient – Hospitalized – ICU !
  - Comorbidities ?
  - Age ?
  - Pre-COVID-19 functional status ?
- Post – viral syndrome (anaemia, vitamin D deficiency, hypothyroidism, cortisol insufficiency, and chronic kidney disease)

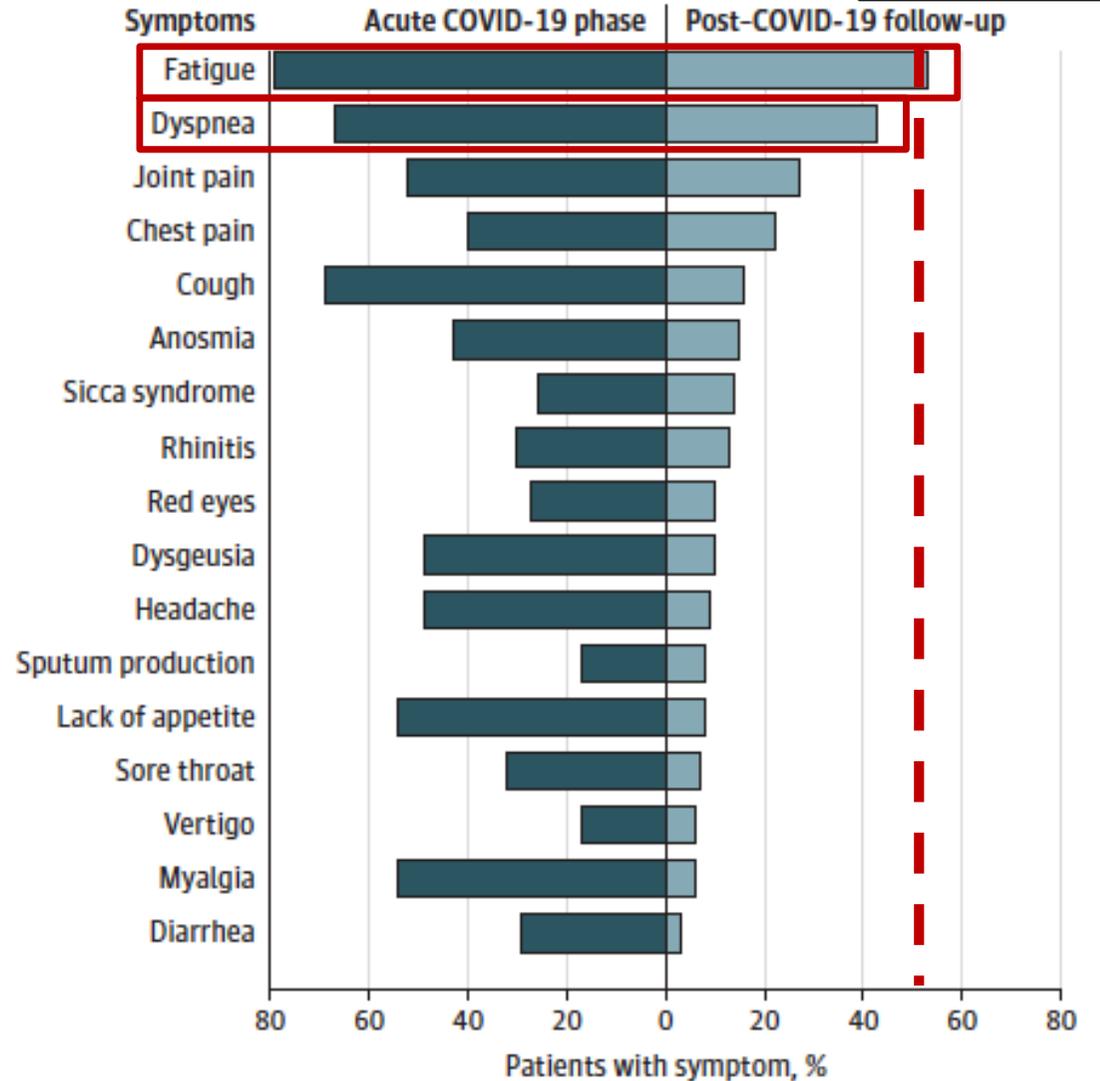
# Persistent Symptoms in Hospitalized Patients After Acute COVID-19

60 +/- 14 days

Table. Demographic and Clinical Characteristics of the Study Sample (N = 143)

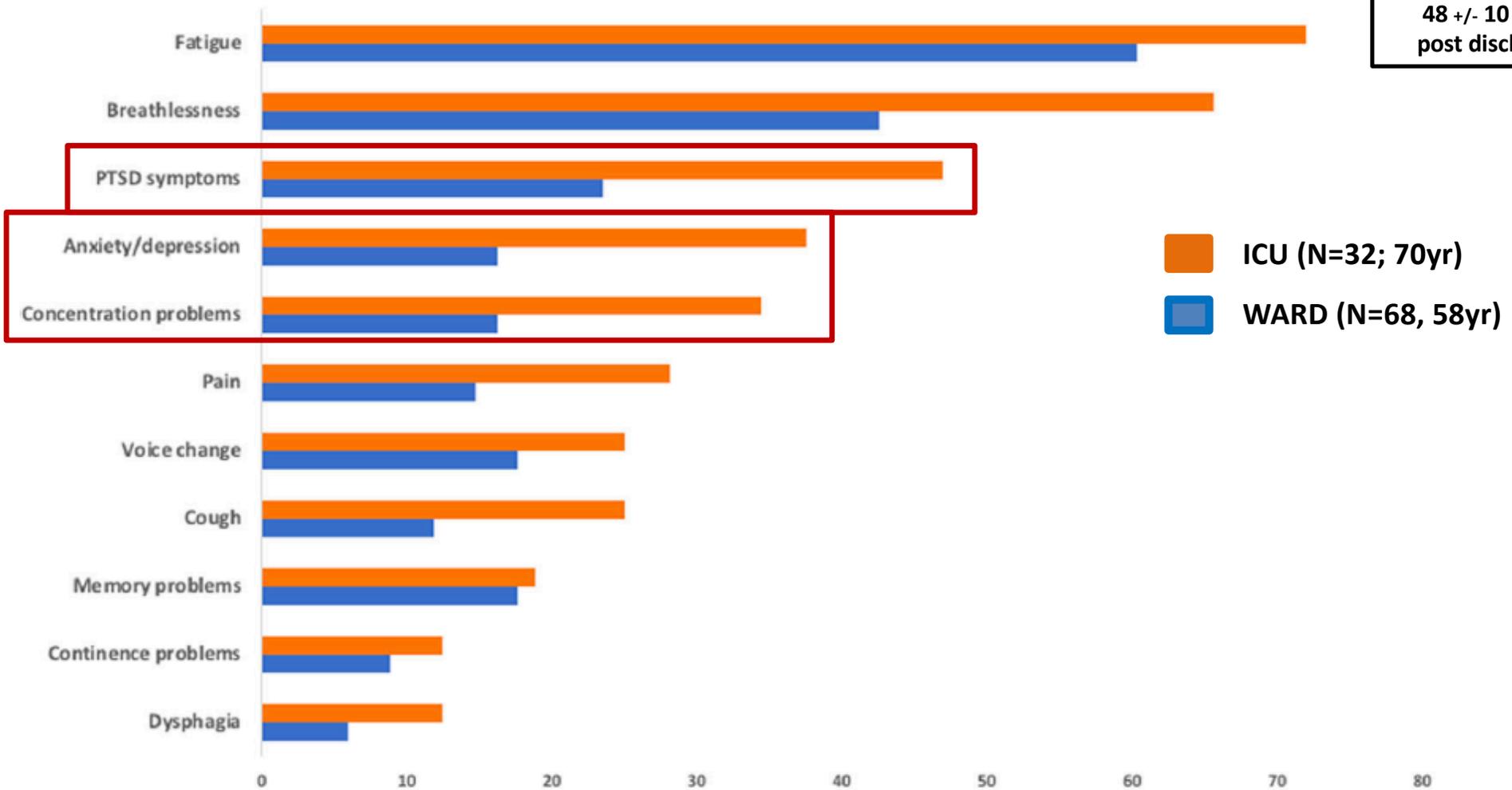
Characteristics	Value
Age, mean (SD), y	56.5 (14.6)
Female sex, No. (%)	53 (37.1)
Body mass index, mean (SD) <sup>a</sup>	26.3 (4.4)
Regular physical activity, No. (%)	90 (62.9)
Smoking status, No. (%)	
None	63 (44.1)
Active	15 (10.5)
Former	65 (45.4)
Acute COVID-19 characteristics, No. (%)	
Pneumonia diagnosed	104 (72.7)
Intensive care unit admission	18 (12.6)
Oxygen supplementation	
Oxygen therapy	77 (53.8)
Ventilation	
Noninvasive	21 (14.7)
Mechanical	7 (4.9)

Carfi et al JAMA 2020



## Prevalence of post-discharge COVID-19 symptoms

48 +/- 10 days  
post discharge



Halpin et al. J. Med Virology 2020

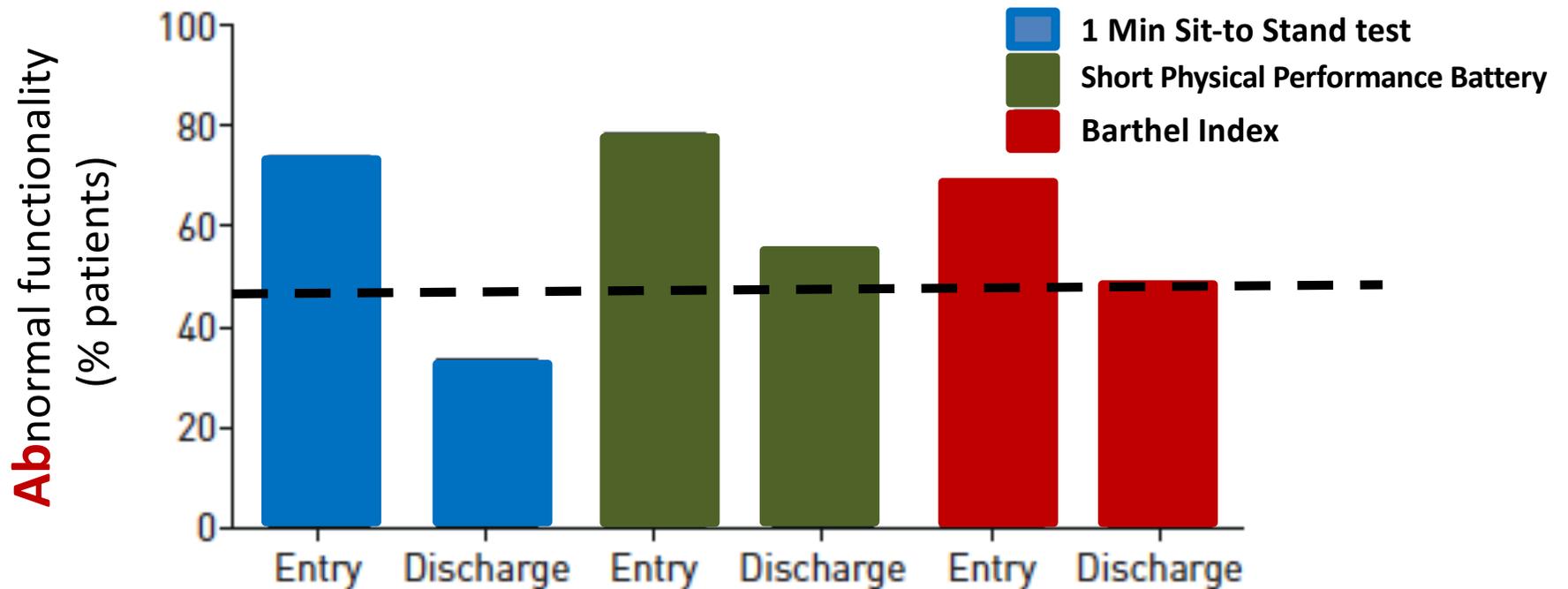
# Low physical functioning and impaired performance of activities of daily life in COVID-19 patients who survived hospitalisation

Belli et al ERJ 2020

**Entry:** post-acute hospital rehab center

N=115, 52% male, 74 +/- 13 yr, BMI: 26,6 +/- 5,8

**Discharge:** home from rehab center (16+/-7 days)



# Muscle Strength and Physical Performance in Patients Without Previous Disabilities Recovering From COVID-19 Pneumonia

Mara Paneroni, PT, MSc, Carla Simonelli, PT, Manuela Saleri, PT, Laura Bertacchini, PT, Massimo Venturelli, PhD, Thierry Troosters, PhD, Nicolino Ambrosino, MD, and Michele Vitacca, MD

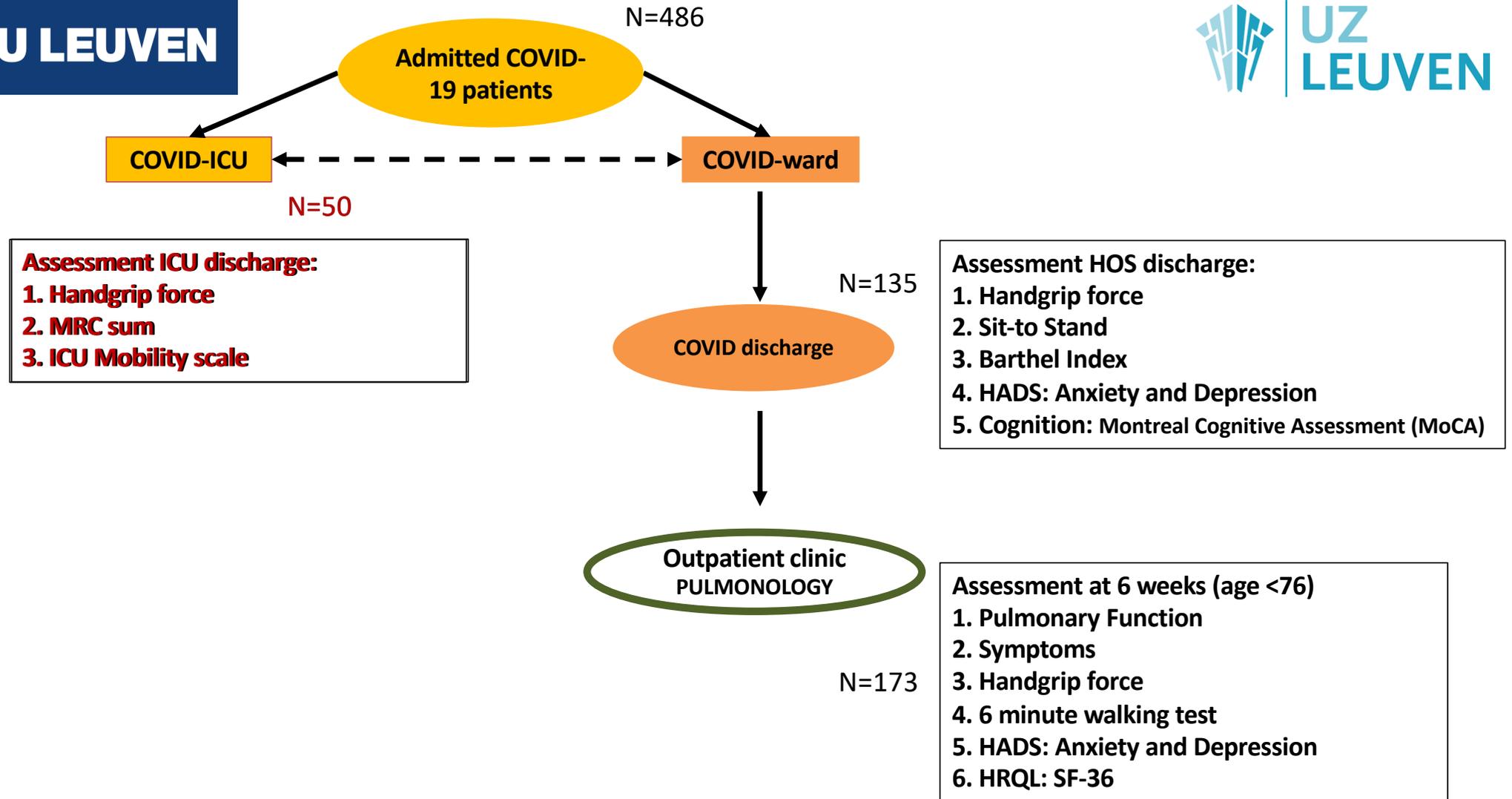
*American Journal of Physical Medicine & Rehabilitation* • Volume 100, Number 2, February 2021

**TABLE 1.** Patients characteristics

Patients, n	41
Age, yr	67.1 (11.6)
Range (min–max)	40–88
Males, n (%)	25 (61.0)
BMI, kg/m <sup>2</sup>	26.7 (4.9)
Patients with comorbidities, n (%)	17 (41.5)
Cardiac comorbidities	15 (36.6)
Pulmonary comorbidities	6 (14.6)
SpO <sub>2</sub> /FiO <sub>2</sub> at discharge	454.9 (8.7)
Time from symptom onset, d	28.6 (8.2)
Acute care hospital LOS, d	9.7 (5.5)
Postacute hospital LOS, d	10.6 (7.2)
Total hospital LOS, d	20.7 (7.5)
Patients treated with CPAP or NIV, n (%)	
In acute care hospital	9 (21.4)
In postacute hospital	1 (2.3)
Patients treated with invasive mechanical ventilation, n (%)	2 (4.8)
Patients treated with oxygen therapy only, n (%)	
In acute care hospital	28 (68.3)
In postacute hospital	36 (85.7)
Maximal FiO <sub>2</sub> used during hospitalization	0.49 (0.25)

# **QUESTION**

**HOW IS RECOVERY OF FUNCTIONALITY  
EVOLVING IN POST-COVID-19 PATIENTS ?**



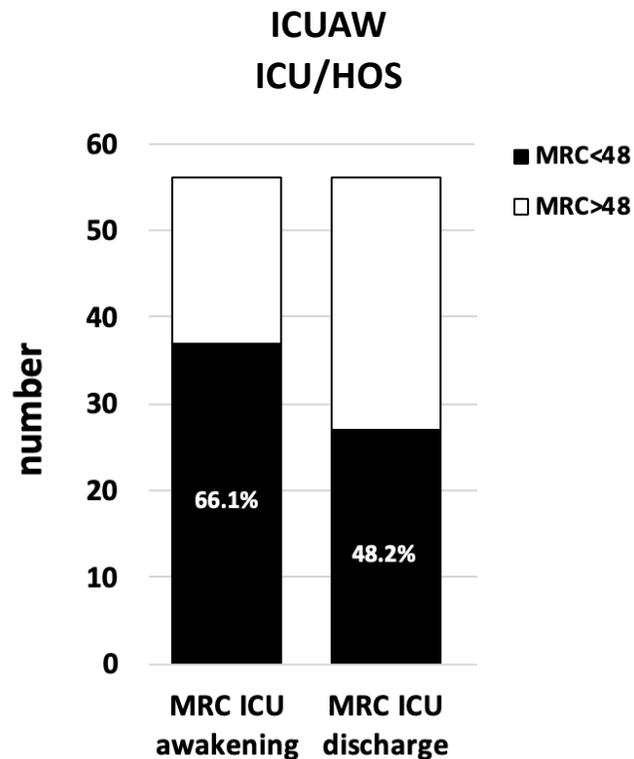
# Intensive care unit acquired muscle weakness in COVID-19 patients



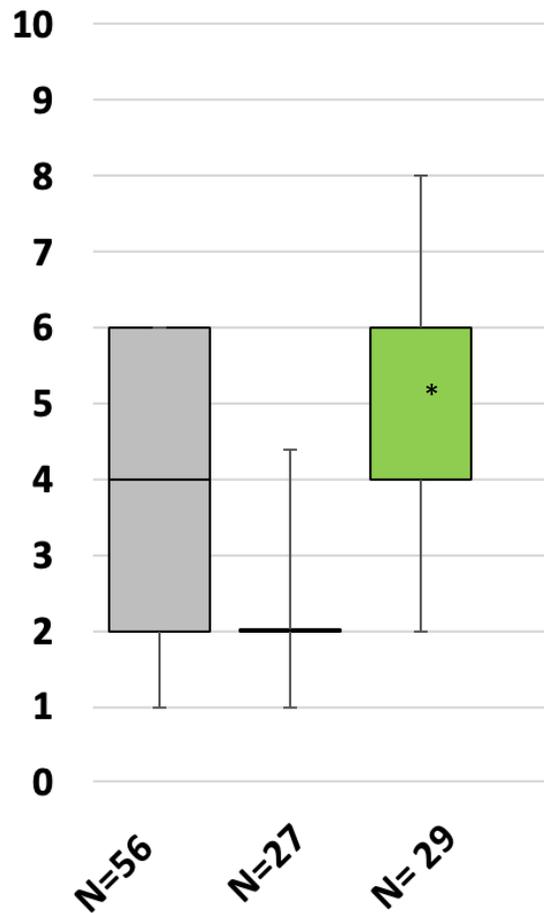
Nathalie Van Aerde<sup>1</sup>, Greet Van den Berghe<sup>1,3</sup>, Alexander Wilmer<sup>2</sup>, Rik Gosselink<sup>4</sup>, Greet Hermans<sup>1,2\*</sup> and COVID-19 Consortium

*Intensive Care Med* 2020

N=50  
mechanically ventilated



## ICU mobility scale ICU discharge



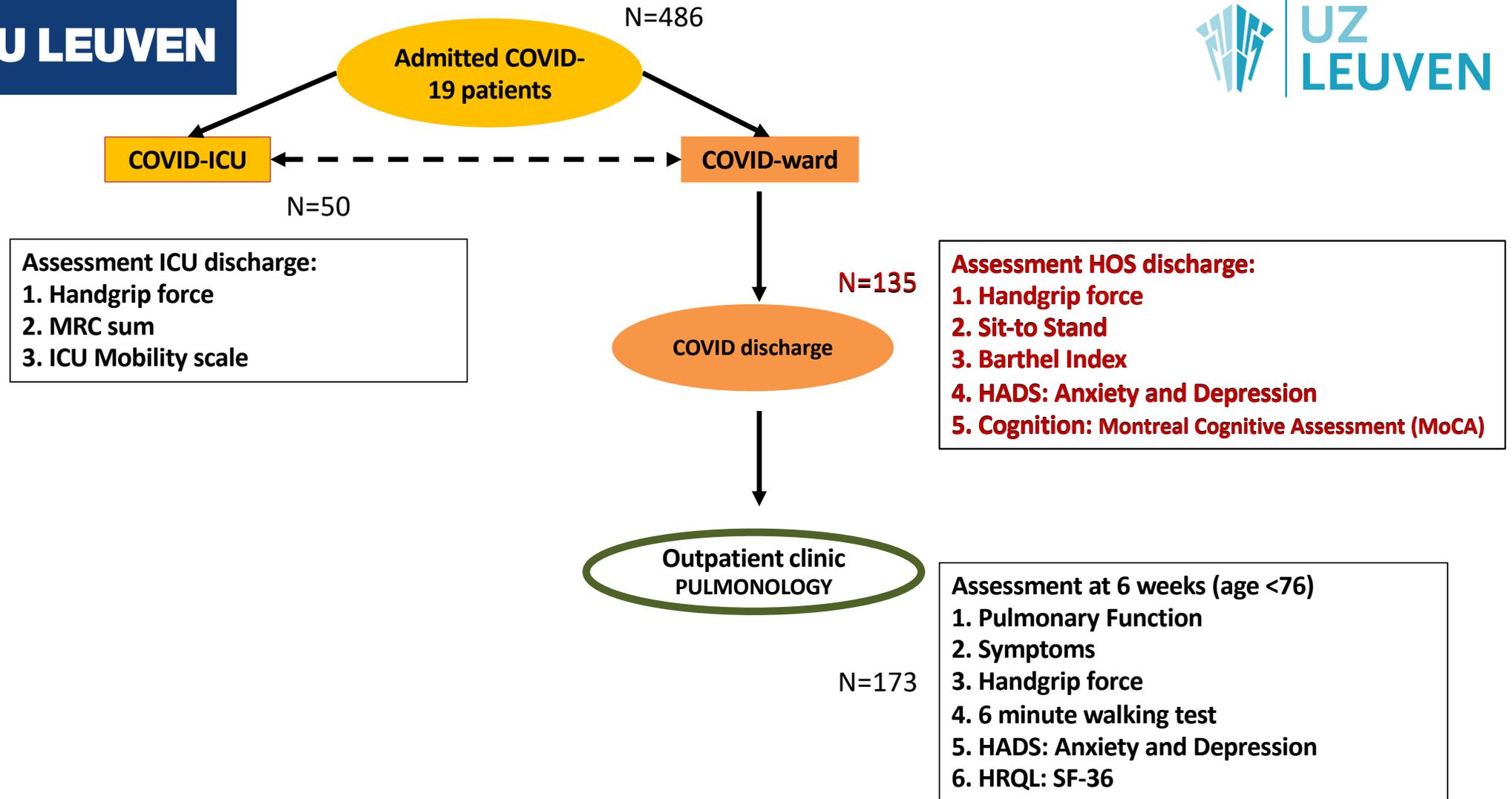
### Classification

- |    |   |
|----|---|
| 0  | Nothing (lying in bed)                      |
| 1  | Sitting in bed, exercises in bed            |
| 2  | Passively moved to chair (no standing)      |
| 3  | Sitting over edge of bed                    |
| 4  | Standing                                    |
| 5  | Transferring bed to chair                   |
| 6  | Marching on spot (at bedside)               |
| 7  | Walking with assistance of 2 or more people |
| 8  | Walking with assistance of 1 person         |
| 9  | Walking independently with a gait aid       |
| 10 | Walking independently without a gait aid    |

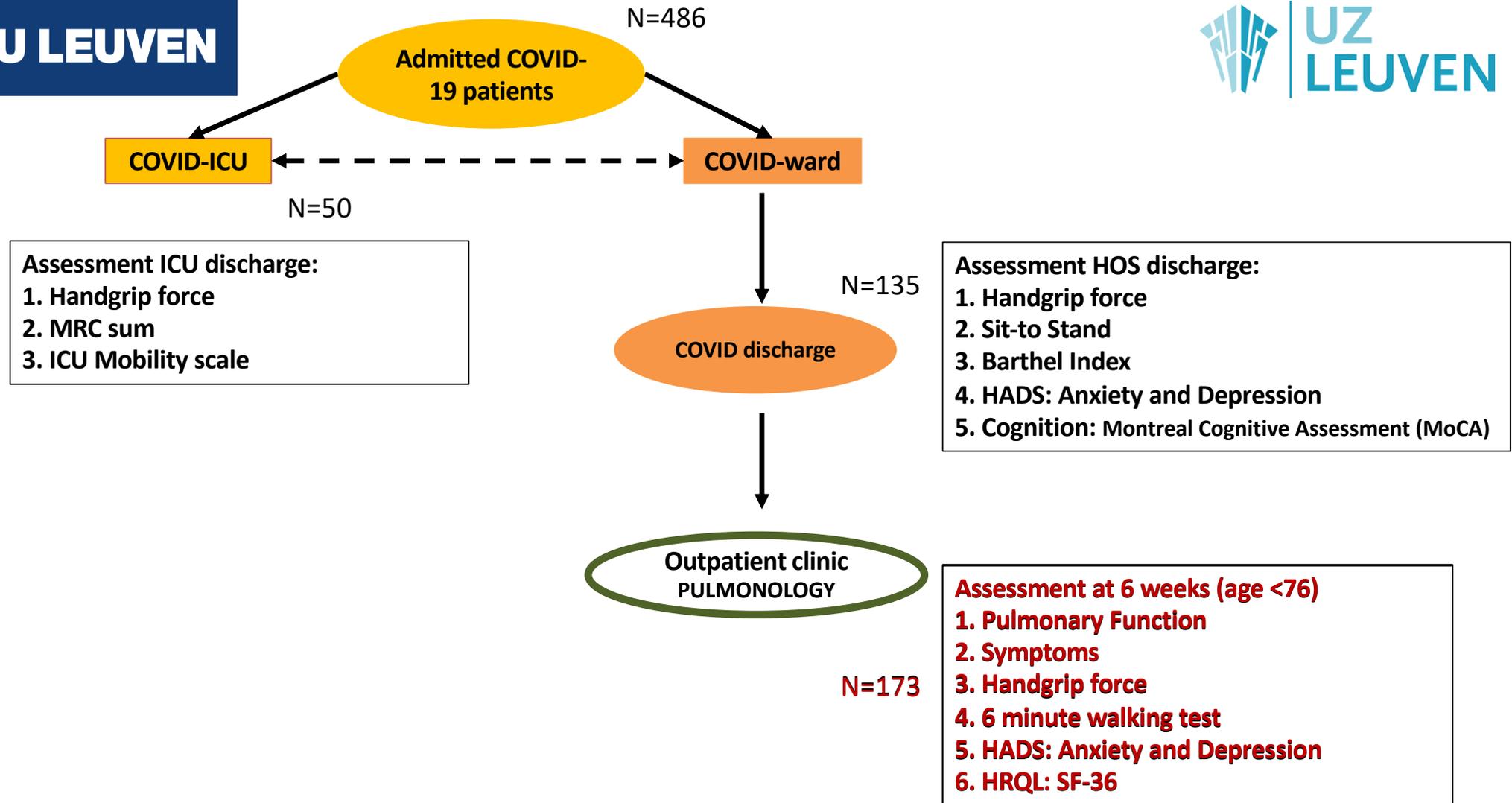
Total population with MRC

ICUAW at ICU discharge

No ICUAW at ICU discharge



Age: 72.0 years [58.0-86.0]	Total population N=135	Age <70 years N=62	Age ≥70 years N=73	ICU N=33 (60yr)	Non-ICU N=102 (77yr)
<b>Physical domain</b>					
HGF (%pred)	85.9 ± 30.5	81.6 ± 28.1	89.6 ± 32.3	69.8 ± 23.1	93.7 ± 30.7*
HGF <80% predi (N,%)	32/74 (43.2%)	18/34 (52.9%)	14/40 (35.0%)	16/24 (66.7%)	16/50 (32.0%)*
FTSTST (seconds)	14.5 [10.3-18.8]	13.0 [9.0-16.0]	17.0 [11.5-20.0]	16.0 [11.0-27.5]	14.0 [10.0-18.0]
FTSTST ≥ 14 or impossible to perform	71/86 (82.6%)	26/37 (70.3%)	45/49 (91.8%)*	22/25 (88.0%)	49/61 (80.3%)
<b>Functional domain</b>					
Barthel index	10.0 [4.0-18.0]	15.0 [7.5-19.0]	8.0 [4.0-11.0]*	9.0 [4.0-16.0]	10.0 [4.0-18.0]
Swallow screening impaired	3/53 (5.7%)	1/27 (3.7%)	2/26 (7.7%)	2/19 (10.5%)	1/34 (2.9%)
<b>Cognitive domain</b>					
MOCA	23.0 [18.8-27.0]	26.0 [21.0-27.0]	21.0 [11.0-24.5]*	26.0 [19.0-27.0]	23.0 [17.0-27.0]
MOCA < 26	21/38 (55.2%)	11/25 (44.0%)	11/13 (84.6%)*	7/15 (46.7%)	14/23 (60.9%)
<b>Psychological domain</b>					
HADS-D	6.0 [2.0-9.0]	5.5 [2-10.3]	6 [4.0-8.5]	5.5 [2.0-9.3]	6.0 [2.0-10.5]
HADS-A	6.0 [3.0-9.0]	6.0 [3.0-9.0]	6 [3.5-9.0]	6.0 [3.0-9.0]	6.0 [3.0-10.0]
HADS (0-21)	11.0 [6.0-17.0]	10.5 [4.8-17.5]	11 [8.5-18.0]	10.5 [5.8-15.5]	11.0 [6.0-21.0]
HADS-D > 7	16/47 (34.0%)	10/26 (38.5%)	6/21 (28.6%)	6/18 (33.3%)	10/29 (34.5%)
HADS-A > 7	16/47 (34.0%)	9/26 (34.6%)	7/21 (38.9%)	6/18 (33.3%)	10/29 (34.5%)



# CONCLUSIONS 1

---

- **AT ICU DISCHARGE:**

- **ICU ACQUIRED WEAKNESS IN 49% OF PATIENTS**

- **HANDGRIP FORCE: 30%pred**

- ICUAW: 15%pred**

- NON- ICUAW: 45%pred**

- **MOBILITY: STANDING**

- ICUAW: *PASSIVE* TRANSFER BED TO CHAIR**

- NON-ICUAW: *ACTIVE* TRANSFER BED TO CHAIR**

## CONCLUSIONS 2

---

- **AT HOSPITAL DISCHARGE:**
  - **MUSCLE WEAKNESS: HANDGRIP FORCE 85%pred – ICU 70%pred**
  - **SIT-STAND TEST: 70% abnormal; >70yr 91% abnormal**
  - **BARTHEL INDEX: 10/20 (support needed at home); > 70yr 8/20**
  - **COGNITION (MOCA): 55% abnormal; >70yr 85% abnormal**
  - **ANXIETY AND DEPRESSION: 34% abnormal**
  
- **THESE RESULTS ALSO IMPLY THAT ADEQUATE CARE/REHABILITATION AND FOLLOW-UP AFTER DISCHARGE IS ESSENTIAL FOR A SUBGROUP OF PATIENTS AT HOSPITAL DISCHARGE.**

**NOTE: ASSESSMENT WAS PERFORMED IN A SUBGROUP OF PATIENTS**

## **CONCLUSIONS 3**

---

- **6 WEEKS AFTER HOSPITAL DISCHARGE:**
  - **DIFFUSION CAPACITY WAS IMPAIRED IN 50%**
  - **VITAL CAPACITY WAS IMPAIRED IN 20%**
  - **MUSCLE WEAKNESS AND FUNCTIONAL CAPACITY WERE IMPAIRED IN 25%**
  - **PREVAILING SYMPTOMS WERE: DYSPNEA (80%!) AND FATIGUE (50%)**
  - **ANXIETY AND DEPRESSION WERE ONLY PRESENT IN 15%**
  - **HEALTH RELATED QUALITY OF LIFE WAS REDUCED IN FUNCTIONAL AND MENTAL DOMAINS (100%)**
  - **50% RESUMED WORK**
  - **56% OF SEVERE COVID-19 PATIENTS WERE ENROLLED IN REHABILITATION PROGRAMS**
- **FOLLOW-UP VISITS TO MONITOR RECOVERY AND/OR REHABILITATION IS ADVISED**

# Post-COVID-19 syndrome



5. DURING RECOVERY PERIOD PATIENTS COULD DEVELOP:

- PHYSICAL,
- COGNITIVE,
- AND PSYCHIATRIC DISABILITIES



InnovaHUCI

# Acknowledgements

Medical Intensive Care Unit, Dept Intensive Care Medicine, Dept Rehabilitation Sciences, Respiratory Division, Dept Physical and Rehabilitation Medicine University Hospitals Leuven, KU Leuven Belgium

Natalie Lorent, Greet Hermans, Nathalie Van Aerde, Stephanie Everaerts, Arne Heyns,, Wim Janssens, Greet Van den Berghe, Jan Gunst, Joost Wauters, Alexander Wilmer, Geert Meyfroid, Catherine Ingels, Bart Vrijzen, Vicky Aerts, Kim Caluwé, Bregje Frickx, Lot Demuynck, Eline Haghedoorn, Claudia Volker, Iris Coosemans, Jolan Dupont, Evelien Gielen, Johan Flamaing, Koen Peers, Blanche Staes, Ann Goeleven, Ann Meulemans, Hadi Waelkens, Hilde Beyens, Jos Tournoy



**KU LEUVEN**

**THANK YOU FOR YOUR ATTENTION**

