코로나 환자에서 폐 후유증

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코로나 후유증

- Chronic COVID-19 syndrome
- Late sequelae of COVID-19
- Long COVID or long haul COVID
- Long-term COVID-19
- Post COVID syndrome
- Post-acute COVID-19 syndrome
- Post-acute sequelae of SARS-CoV-2 infection
- Post-COVID-19 condition (WHO)

- **Post-COVID-19 condition**

  - ✓ History of probable of confirmed SARS-CoV-2 infection
  - ✓ Time period: 3 months from the onset of COVID-19
  - ✓ Symptoms: last for at least 2 months
  - ✓ Cannot be explained by an alternative diagnosis

Lancet Infect Dis 2022;22:e102-07

코로나 후유증

General assessment	Asthenia Muscle weakness Diffuse pain Myalgia, joint pain Weight loss Deterioration of quality of life
Respiratory	Dyspnoea Cough Radiologic sequelae Functional impairment Dysfunctional breathing Chronic oxygen dependence
Psychiatric and neurological	Post-traumatic stress Depression Anxiety Insomnia Headache Cognitive impairment (brain fog) Dysautonomia
Cardiovascular	Chest pain Palpitations Autonomic dysfunction Myocardial fibrosis Venous thromboembolic disease
Renal	Persistent impaired renal function
Ear-nose-throat	Persistent anosmia or parosmia Persistent ageusia
Endocrine	Thyroiditis Onset or worsening of diabetes
Dermatological	Hair loss Skin rash
Gastrointestinal	Diarrhoea

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Eur Respir J 2021;58:2101090

코로나 후유증

역 학

First author or study group [ref.]	Patients, n	Time after discharge	ICU, %	Mechanical ventilation, %	Prevalence of dyspnoea, %	Prevalence of cough, %
Zhao [3]	55	3 months	0	0	15	2
De Lorenzo [4]	185	23 days	2.2	0	31	NA
Jacobs [5]	183	35 days	NA	5	45	42
Bellan [8]	238	4 months	12	9	6	3
Huang [12]	1733	6 months	4	1	26	NA
COMEBAC [7]	478	4 months	30	11	16	5
González [15]	62	3 months	100	63	47	34
Lerum [10]	103	3 months	15	9	54	NA
Ghosn [6]	1137	6 months	29	NA	26	12
Shah [11]	60	3 months	NA	20	20	20
Wu [2]	83	3 months	NA	0	81	NA
		6 months			30	
		9 months			12	
		12 months			5	
Fernández-de-las-Peñas [19]	1950	11 months	7	NA	23	3
Augustin [9]	353	7 months	0	0	14	4

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Eur Respir Rev 2022;31:210185

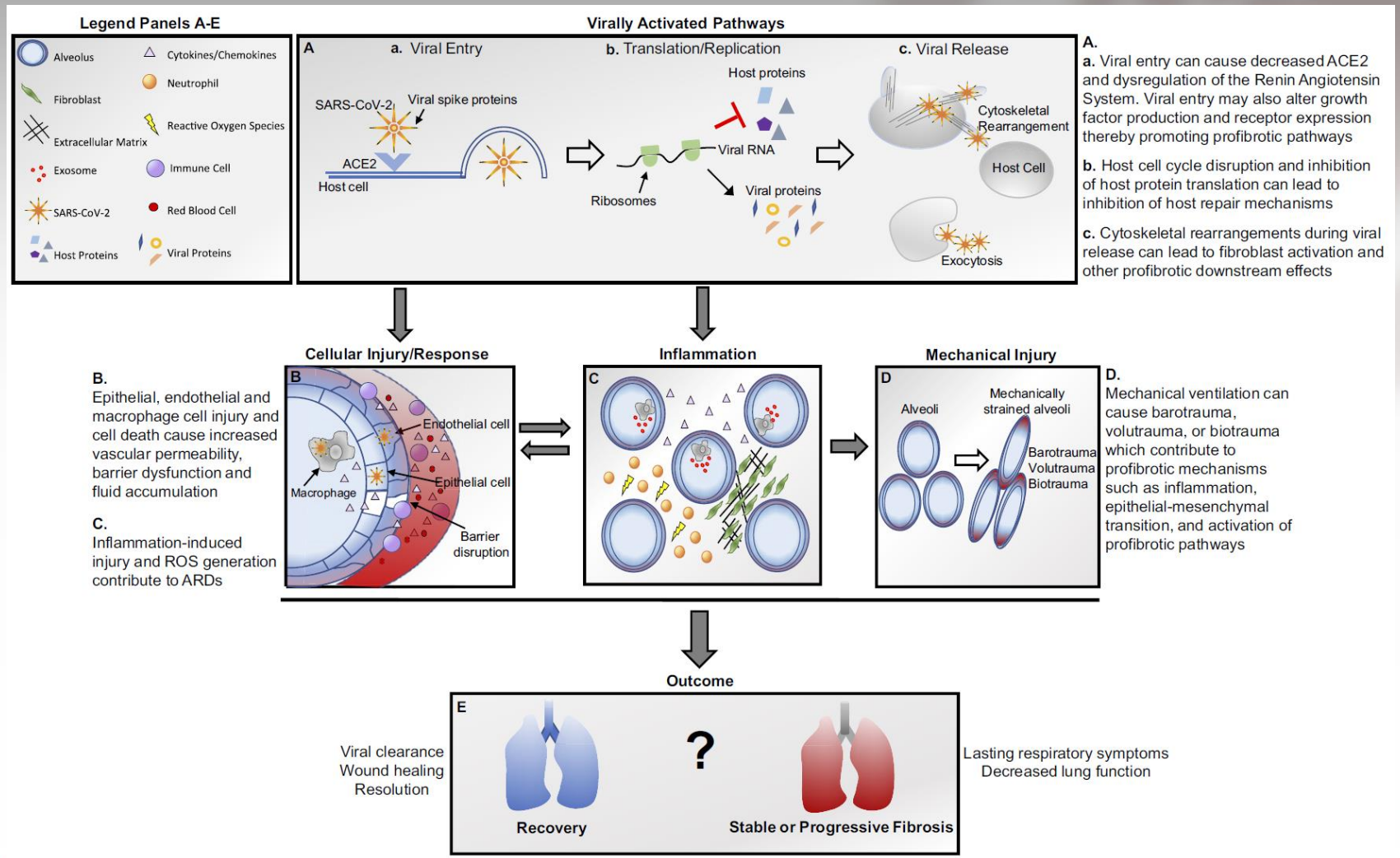
역 학

First author [ref.]	Patients, n	Time after discharge	FVC, % pred	TLC, % pred	FEV_1, % pred	D_{LCO}, % pred	Lung function abnormalities, n (%)	Low FVC <80% pred, n (%)	Low TLC <80% pred, n (%)	Low FEV_1 <80% pred, n (%)	D_{LCO} <70% pred, n (%)
Zhao [3]	55	3 months	NA	NA	NA	NA	14 (25.5)	6 (10.9)	4 (7.3)	NA	9 (16.4)
Bellan [8]	238	4 months	98.5 (90–109)	NA	101 (92–112)	79 (69–89)	NA	NA	NA	NA	113 (51.6)
González [15]	62	3 months	82±17	84±16	89±19	68±13	NA	NA	23 (37.1)	NA	50 (82)
Lerum [10]	103	3 months	94 (76–121)	NA	92 (84–106)	83 (72–92)	NA	7 (7)	NA	11 (11)	24 (24)
Shah [11]	57	3 months	94±16	86±13	93±16	77±16	33 (58)	NA	NA	NA	30 (52)
Wu [2]	83	3 months	92 (81–99)	87 (77–98)	90 (76–100)	77 (67–87)	NA	19 (23)	22 (27)	25 (30)	46 (55)
		6 months	94 (85–104)	91 (82–98)	92 (80–101)	76 (68–90)	NA	13 (16)	16 (19)	20 (24)	45 (54)
		12 months	98 (89–109)	91 (87–100)	96 (85–110)	88 (78–101)	NA	9 (11)	12 (15)	13 (16)	27 (33)
Sonnweber [151]	145	2 months	NA	NA	NA	NA	53 (42)	34 (27)	14 (11)	28 (22)	39 (31)
		4 months	NA	NA	NA	NA	48 (36)	29 (22)	15 (11)	30 (22)	28 (21)
Qin [152]	647	3 months	90±13	99±24	94±11	83±25	NA	17 (21)	NA	5 (6)	31 (38)
Gamberini [153]	178	12 months	97±19	NA	100±17	78±22	NA	NA	NA	NA	NA

Pulmonary function test data are presented as median (interquartile range) or mean±SD. FVC: forced vital capacity; TLC: total lung capacity; FEV_1: forced expiratory volume in 1 s; D_{LCO}: diffusing capacity of the lung for carbon monoxide; NA: not available.

Eur Respir Rev 2022;31:210185

호흡 곤란 기전



Am J Physiol Lung Cell Mol Physiol 2021;320:L257-65

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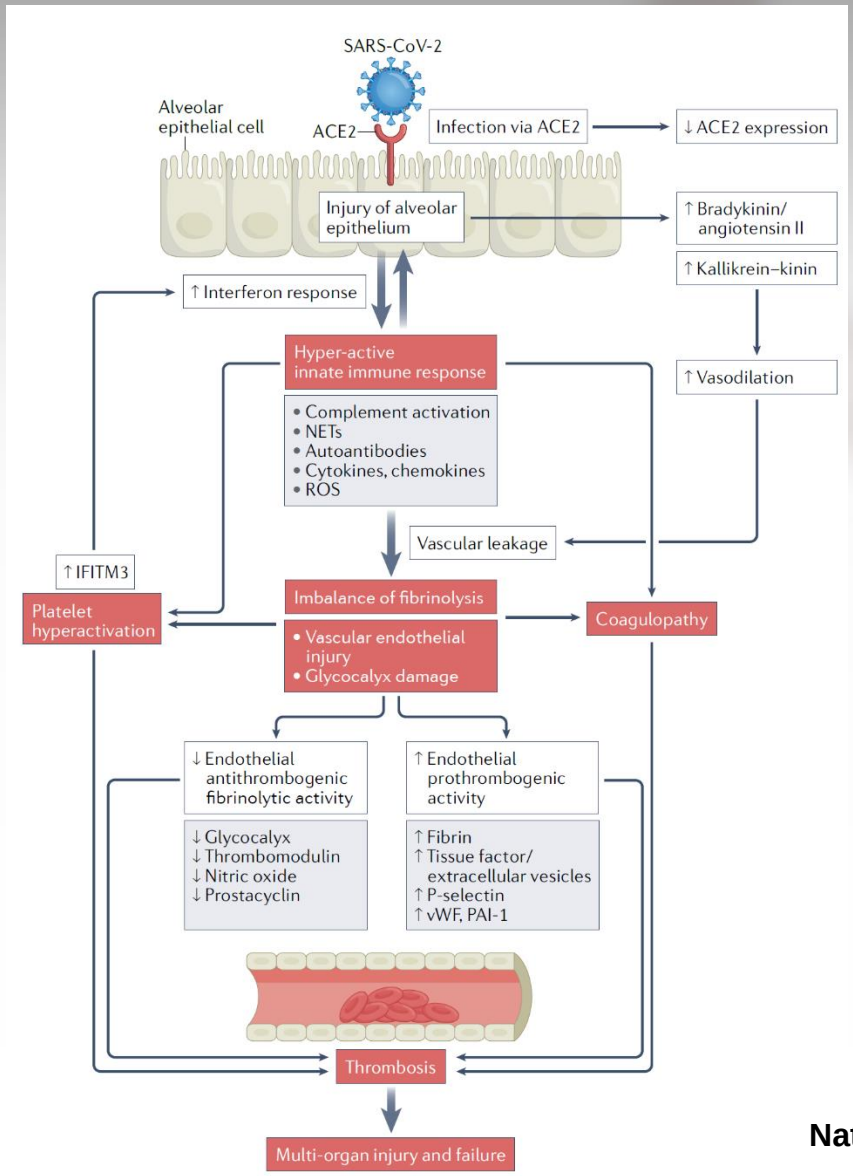
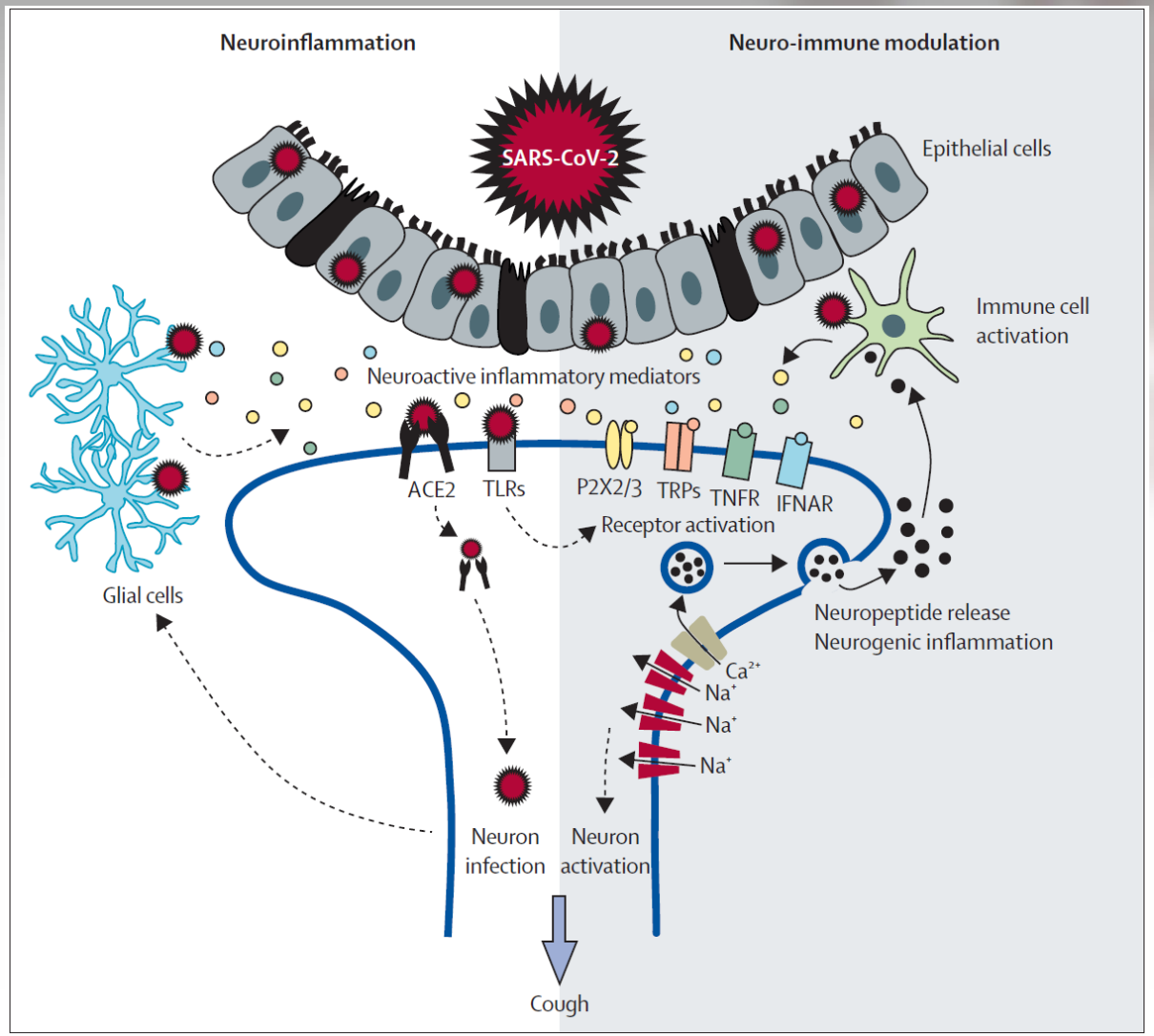


Nat Rev Immunol 2022;2:639-49

기침 기전



Lancet Respir Med 2021;9:533-44

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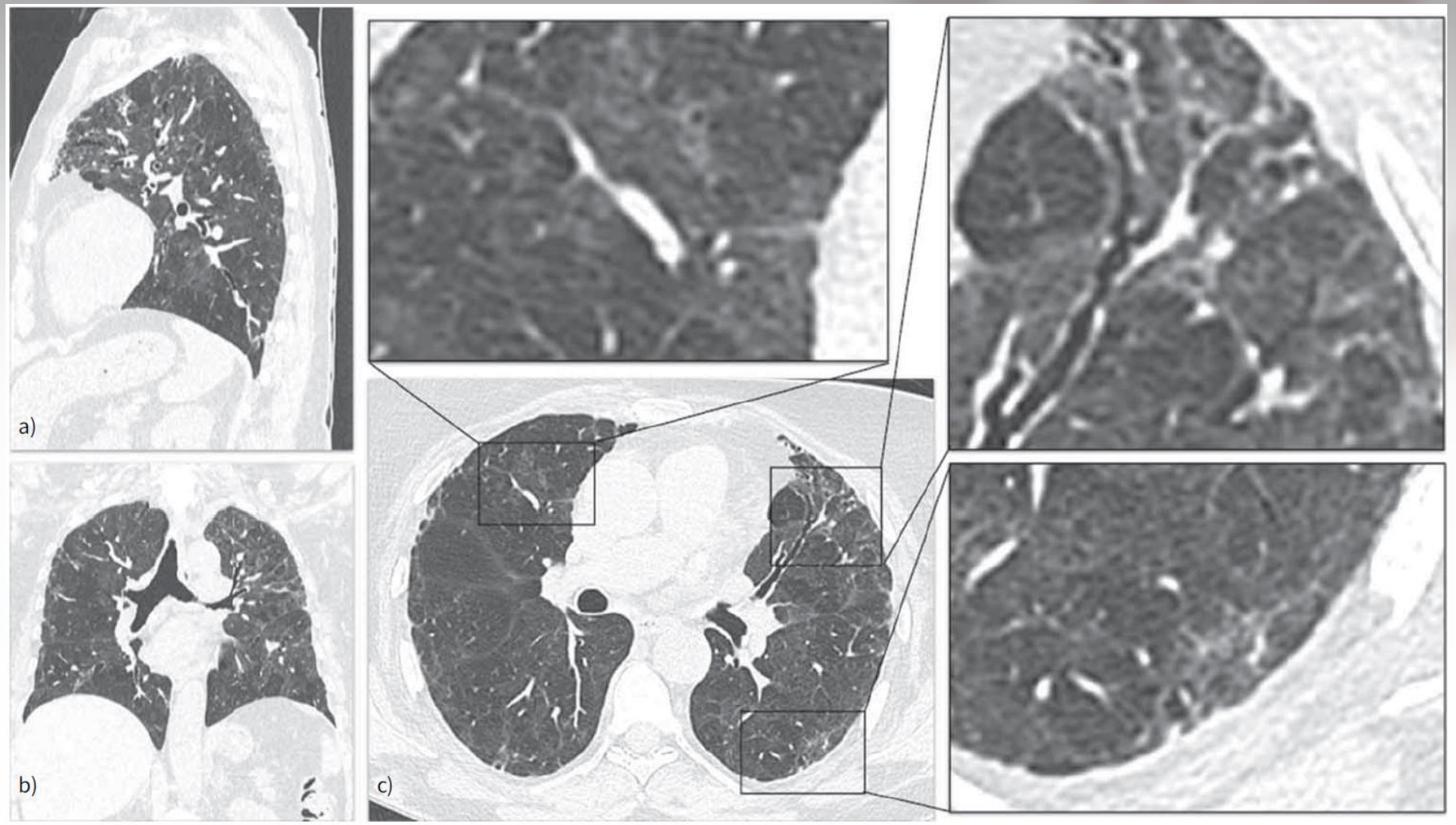

Eur Respir Rev 2022;31:210185

폐기능 검사

Author	Country	Design	Participants Male/Female	Age (years)	BMI (kg/m^2)	Smoking	Respiratory comorbidities	Time of assessment	Quality rating*
Frija-Masson et al, 2020	France	Retrospective	50 28 M/22F	54 (46–62)	27 (24.6–32.5)	Active 5 (10%) Former 9 (18%)	Emphysema 2 (4%) Asthma 2 (4%) Sarcoidosis 1 (2%)	30 days after symptoms onset	Fair
Huang et al, 2020	China	Retrospective	57 26 M/31F	46.7 ± 13.7	23.9 ± 3.5	History of smoking 9 (15.7%)	No patient was reported having chronic respiratory diseases	30 days after discharge from the hospital	Poor
Li et al, 2020	China	Prospective	18 NR	NR	NR	History of smoking 3 (16.6%)	History of tuberculosis 1 (5.5%)	Near to discharge and two weeks after	Poor
Liu et al, 2020	China	RCT	72 49 M/23F	69.1 ± 7.8	23 ± 3.7	NR	NR	NR	Fair
Mo et al, 2020	China	Prospective	110 55 M/55F	49.1 ± 14.0	23.5 ± 2.8	Smoker 13 (11.8%)	Asthma 1 (0.9%) Chronic bronchitis 1 (0.9%) Bronchiectasis 1 (0.9%)	27.9 ± 7 days after the onset of disease	Fair
You et al, 2020	China	Prospective	18 10 M/8F	50.7 ± 12.1	26.4 ± 2.8	NR	No patient was reported having chronic respiratory diseases	38 ± 13.4 days after hospital discharge	Poor
Zhao et al, 2020	China	Retrospective	55 22 M/23F	47.7 ± 15.5	NR	Active 2 (3.6%) Former 2 (3.6%)	No underlying pulmonary diseases were observed on admission	3 months after hospital discharge.	Fair

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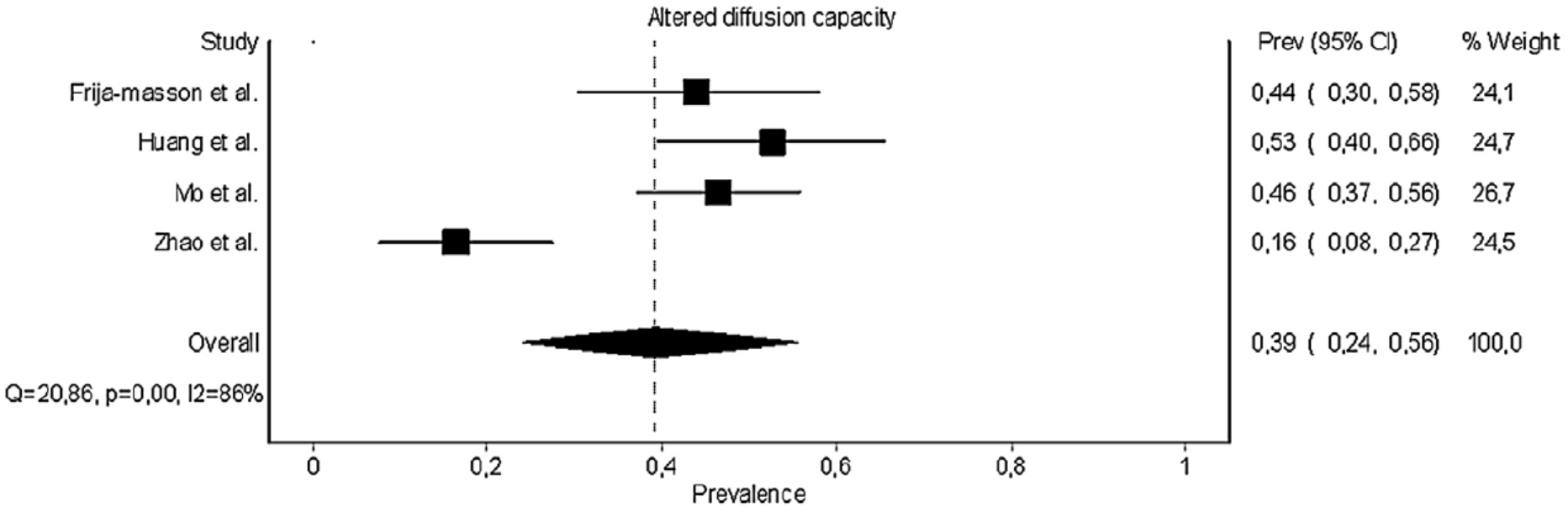
Pulmonology 2021;27:328-37

폐기능 검사



Prevalence of altered diffusion.

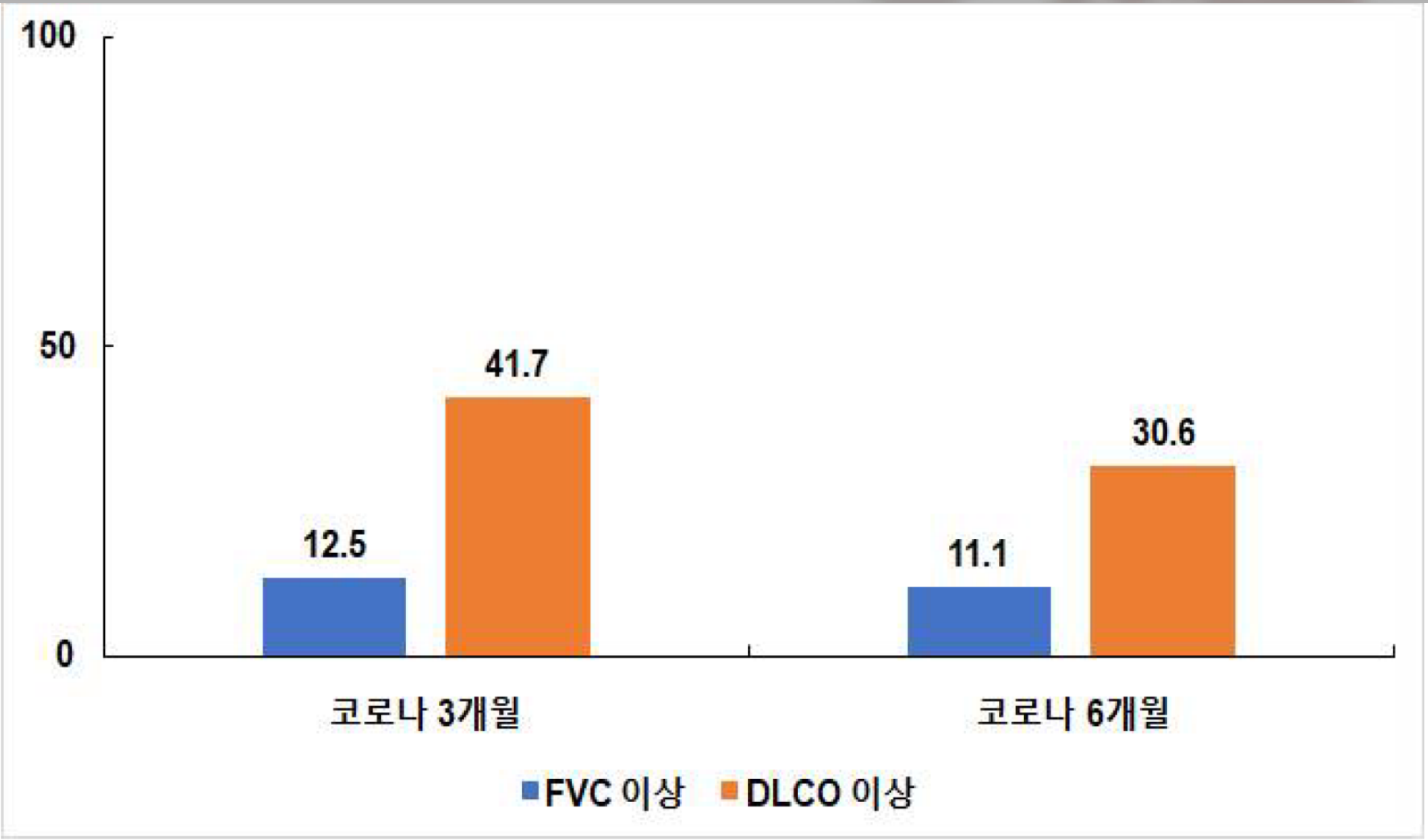
Pulmonology 2021;27:328-37

경증 코로나 연구

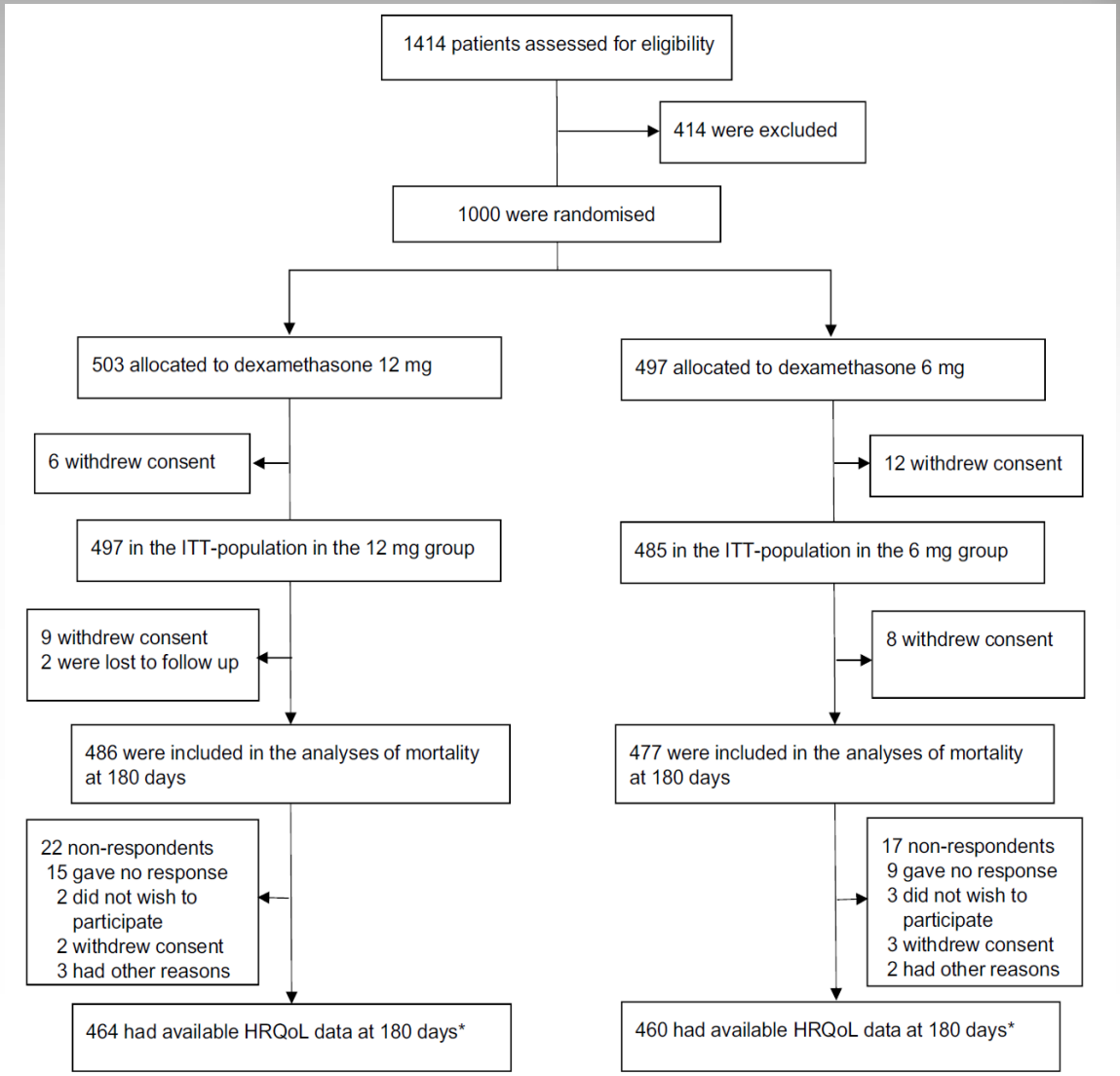
- 72 명 환자 등록 (3개월, 6개월 폐기능 검사)

호흡기계 평가 지표	3개월	6개월
FVC (L)	3.4 (1.8-5.2)	3.5 (2.0-4.9)
FVC (%)	93 (70-118)	90 (72-117)
FEV1 (L)	2.9 (1.5-4.5)	2.9 (1.5-4.2)
FEV1 (%)	92 (71-110)	87 (69-113)
FEV1/FVC	83 (65-97)	82 (68-99)
DLCO (L)	19.1 (7.9-32.3)	19.0 (8.6-30.9)
DLCO (%)	82 (37-112)	83 (57-107)
mMRC score	1 (0-2)	0 (0-2)
Respiratory rate	20 (16-22)	20 (18-20)
Oxygen saturation	99 (95-100)	99 (98-99)90

경증 코로나 연구



스테로이드 치료



Inclusion Criteria

- **oxygen at a flow of at 10 L/min**
- **non-invasive ventilation for hypoxemia,**
- **Invasive mechanical ventilation**

Intensive Care Med 2022;48:580-89

스테로이드 치료

Outcome measures at 180 days

	Dexamethasone 12 mg	Dexamethasone 6 mg	Adjusted risk difference or adjusted mean differences (99% CI)	*P* value[a]
Mortality				
Death by 180 days no./total no. (%)	164/486 (33.7)	184/477 (38.6)	− 4.3 (− 11.7 to 3)	0.13[b]
Health-Related Quality of Life[c] medians (IQRs)				
EQ-5D-5L index values	0.80 (0–0.97)	0.68 (0–0.95)	0.06 (− 0.01 to 0.12)	0.10[d]
Survivors only[e]	0.93 (0.81–1)	0.92 (0.77–1)	0.02 (− 0.02 to 0.07)	0.39
EQ VAS	65 (0–90)	55 (0–85)	4 (− 3 to 10)	0.22[f]
Survivors only[e]	80 (65–95)	80 (65–90)	0 (− 4 to 4)	0.49

Intensive Care Med 2022;48:580-89

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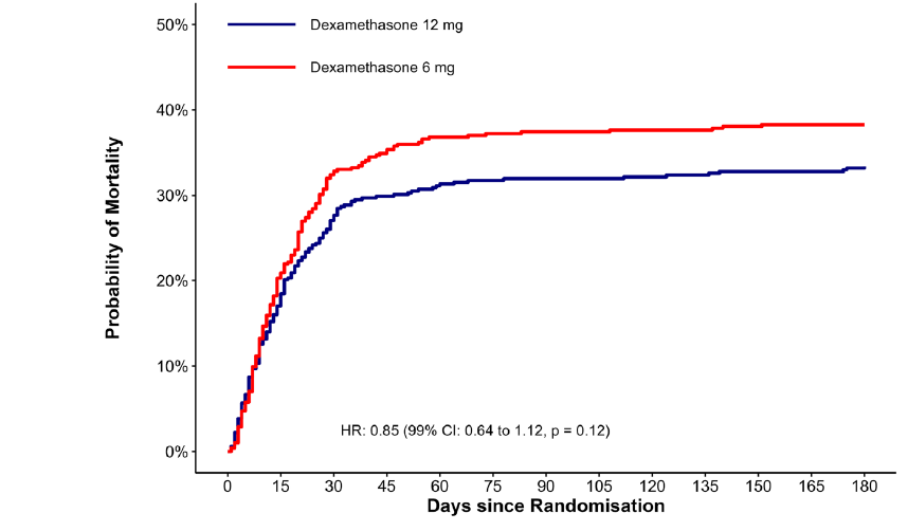
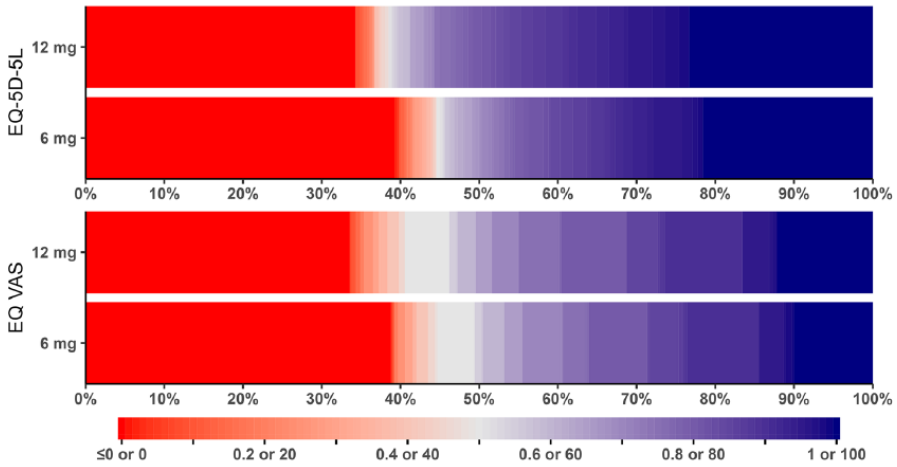
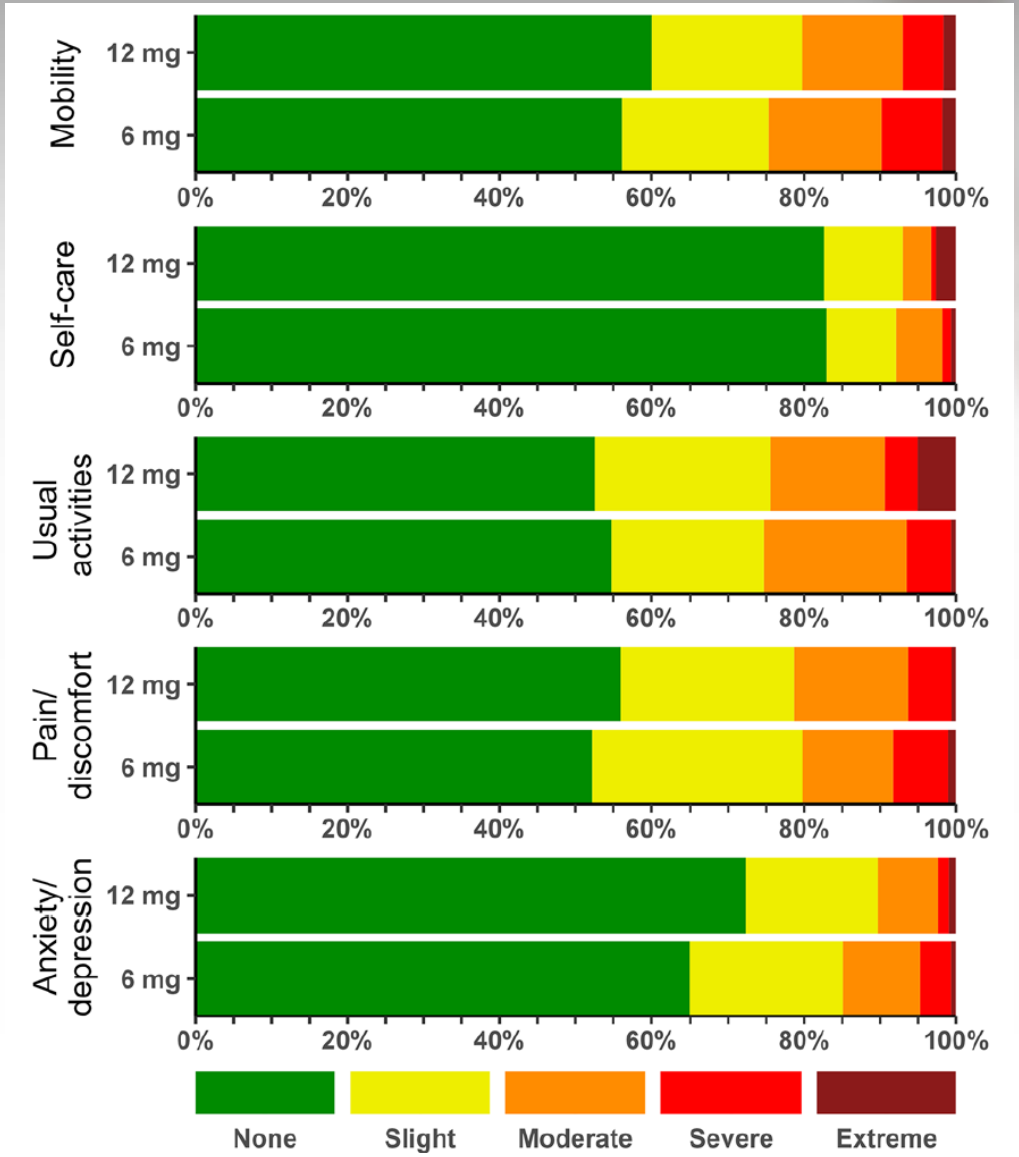
스테로이드 치료





Intensive Care Med 2022;48:580-89

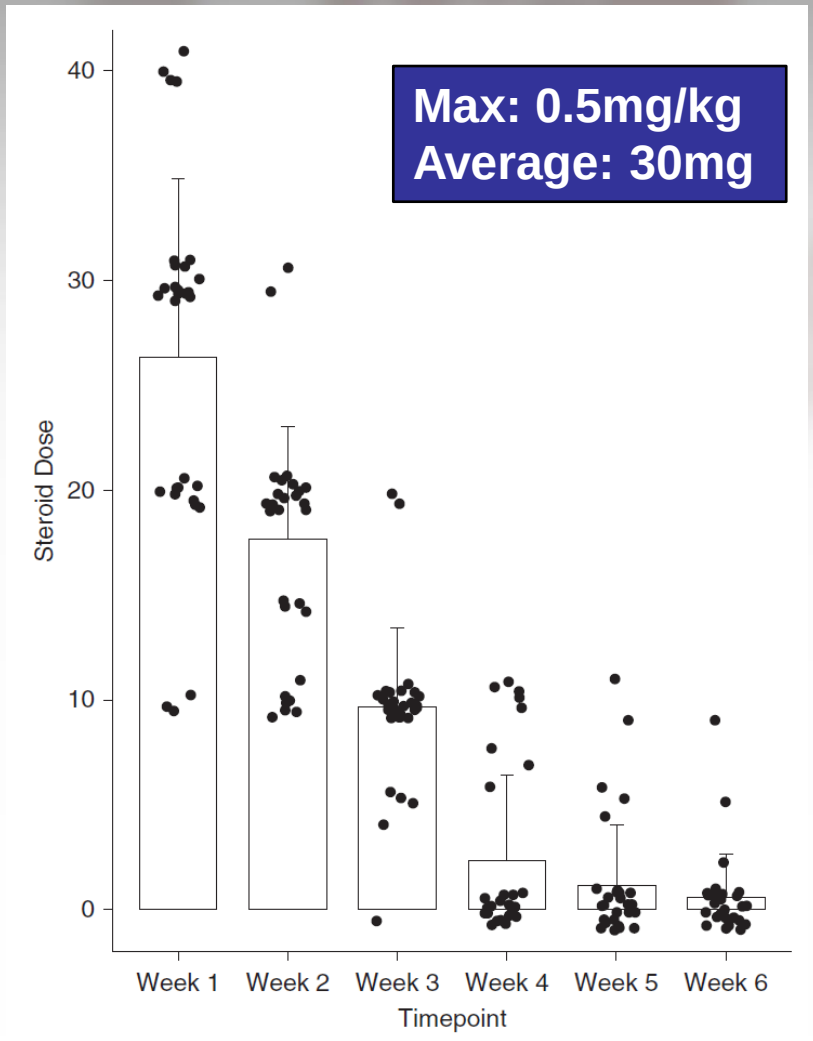
스테로이드 치료



Intensive Care Med 2022;48:580-89

스테로이드 치료

Characteristic	Value
Age, yr	60.5 ± 10.7
Sex	
Male	25 (71.4)
Female	10 (28.6)
BMI	28.3 ± 4.0
Smoking history	
Ever-smoker	21 (34.2)
Never-smoker	14 (65.7)
Comorbidities	
Obesity	9 (25.7)
Hypertension	11 (31.4)
Diabetes	8 (22.9)
CKD	2 (5.8)
HIV	1 (2.9)
Sickle cell	1 (2.9)
Asthma	8 (22.9)
COPD	2 (5.8)
Preexisting ILD	0



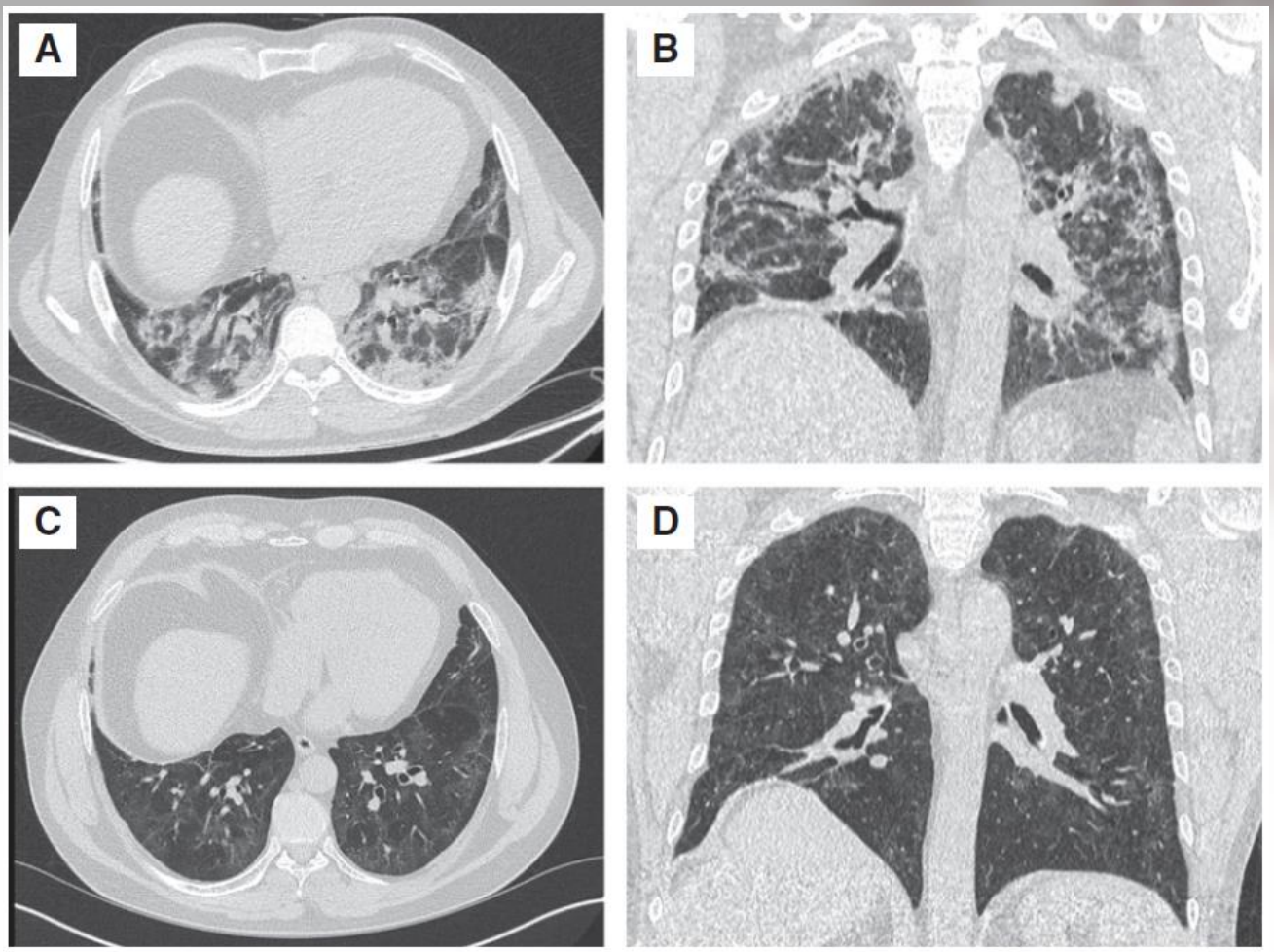
Ann Am Thorac Soc 2021;18:799-806

스테로이드 치료

Lung Function	Before Treatment	After Treatment	Mean Difference (95% CI)	*P* Value
FVC, L	3.07 ± 1.12	3.36 ± 1.11	0.42 (0.28–0.56)	0.014
FVC, %	86.8 ± 18.5	99.2 ± 19.1	9.63 (4.49–14.7)	0.004
T_{LCO}, SI	5.56 ± 2.56	7.05 ± 2.42	1.72 (1.18–2.25	<0.001
T_{LCO}, %	59.7 ± 21.1	82.6 ± 15.7	22.3 (14.1–32.5)	<0.001
KCO, T_{LCO}/L	1.25 ± 0.34	1.83 ± 0.36	0.27 (0.16–0.37)	0.025
KCO, %	82.9 ± 28.8	104.3 ± 24.0	19.9 (9.72–30.1)	0.002

Ann Am Thorac Soc 2021;18:799-806

스테로이드 치료



30 m Walk ➞ 30 min Run

Ann Am Thorac Soc 2021;18:799-806

재활 치료

Study	Country	N° of Participants			Inclusion Criteria	Exclusion Criteria	Follow Up	Dropout N°/Rate			
		Experi-mental Group	Control Group	Total				Time Points	Experimental Group	Control Group	Total
Li et al., 2021	China	59	61	120	- Formerly hospitalized COVID-19 survivors - mMRC dyspnea 2–3	- Resting heart rate > 100 bpm - Uncontrolled hypertension - Uncontrolled chronic disease - Cerebrovascular disease within 6 months - Intra-articular drug injection or surgical treatment of lower extremities within 6 months - Use of medication affecting cardiopulmonary function - Inability to walk independently with assistive device - Inability or Unwillingness to collaborate with assessments - Enrollment or participation in other trials within past 3 months - History of severe cognitive or mental disorder or substance abuse - Enrollment in other rehabilitation program	6 weeks (post treatment) 28 weeks (follow up)	6 weeks	7 (11.9%)	1 (1.6%)	8 (6.7%)
								28 weeks	2 (3.8%)	5 (8.3%)	7 (6.3%)
								Total	9 (15.3%)	6 (9.8%)	15 (12.5%)
Nambi et al., 2022	Saudi Arabia Egypt	38	38	76	- Men aged 60–80 - Post COVID-19 sarcopenia (appendicular skeletal muscle mass index score <7.0 kg/m^2) - Normal VO2 max (17–18 mL/kg/min) - Normal resting heartbeat (70–90 beats/min)	- Low muscle mass in observation - Handgrip strength less than 24 kg - Slow gait speed (<0.7 m/s) - Prior exercise training, under medication, history of lower limb surgeries, fractures, cardiac problems, respiratory problems, neurological problems, systemic problems, and any other contraindications for aerobic training	4 weeks 8 weeks 6 mo	4 weeks	0	0	0
								8 weeks	1 (2.6%)	2 (5.3%)	3 (3.9%)
								6 m	3 (8.1%)	1 (2.8%)	4 (5.5%)
								Total	4 (10.5%)	3 (7.9%)	7 (9.2%)
Srinivasan et al., 2021	India	24	24	48	- Patients at post COVID-19 follow up clinic - Aged 18–60	- Post COVID-19 cerebrovascular accident - Post COVID-19 renal failure - Post COVID-19 myocardial infarction	6 weeks	6 weeks	0	0	0
Liu et al., 2020	China	36	36	72	- Patients with a definite diagnosis of COVID-19 - Age ≥ 65 y - ≥ 6 mo after the onset of other acute diseases - MMSE score > 21 - No COPD or any other respiratory disease - FEV1 ≥ 70%	- Moderate or severe heart disease (Grade III or IV NYHA) - Severe ischemic or hemorrhagic stroke - Severe neurodegenerative diseases	6 weeks	6 weeks	2 (5.5%)	2 (5.5%)	4 (5.6%)
De Souza et al., 2021	Brazil	104	92	196	- Post COVID-19 phase - Not requiring ICU admission		6 weeks	6 weeks	16 (15.4%)	47 (51.1%)	63 (32.1%)

재활 치료

FUNCTIONAL OUTCOMES

Pulmonary Function

FEV1 (L): Forced expiratory volume in the first second is the amount of air you can force from your lungs in one second.

Li et al., 2021	Pre	Post	Follow-Up	Mean Difference ±SD for Before-After Comparison			Mean Difference (CI) for Between-Group Comparison			
				Pre-Post	Pre-Follow Up	*p* value	Post Intervention	*p* value	Follow-Up	*p* value
Intervention *n* = 59	2.24 ± 0.74	2.47 ± 0.65	2.43 ± 0.55	0.28 ± 0.51	0.29 ± 0.48	Not significant *	0.08 (−0.08 to 0.25)	Not significant	0.00 (−0.18 to 0.17)	Not significant
Control *n* = 61	2.14 ± 0.69	2.37 ± 0.77	2.48 ± 0.72	0.18 ± 0.53	0.29 ± 0.43	Not significant *				

Srinivasan et al., 2021	Pre	Post	Mean Difference for Before-After Comparison		Mean Difference (CI) for Between-Group Comparison	
			Pre-Post	*p* value	Post Test	*p* value
Intervention *n* = 24	60.04 ± 5.61	75.75 ± 3.80	10.58	<0.0001	5.28 (12.03 to 5.39) *	<0.0001
Control *n* = 24	63.58 ± 7.25	67.04 ± 7.14	6.40	<0.0001		

Liu et al., 2020	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Comparison	
			p value	Post Test	*p* value
Intervention *n* = 36	1.10 ± 0.08	1.44 ± 0.25	*p* < 0.05	2.66 (0.05 to 0.32) *	*p* < 0.05
Control *n* = 36	1.13 ± 0.14	1.26 ± 0.32	Not significant		

FVC (L): Forced vital capacity is the total amount of air you can forcibly exhale after the deepest inhalation possible.

Li et al., 2021	Pre	Post	Follow-Up	Mean Difference ± SD for Before-After Comparison			Mean Difference (CI) for Between-Group Comparison			
				Pre-Post	Pre-Follow-Up	*p* value	Post Intervention	*p* value	Follow-Up	*p* value
Intervention *n* = 59	2.85 ± 0.75	2.97 ± 0.75	3.00 ± 0.60	0.21 ± 0.47	0.30 ± 0.38	Not significant *	0.02 (−0.14 to 0.18)	Not significant	0.01 (−0.16 to 0.17)	Not significant
Control *n* = 61	2.69 ± 0.87	2.93 ± 0.91	3.04 ± 0.85	0.19 ± 0.40	0.27 ± 0.43	Not significant *				

Srinivasan et al., 2021	Pre	Post	Mean Difference for Before-After Comparison		Mean Difference (CI) for Between-Group Comparison	
			Pre-Post	*p* value	Post Test	*p* value
Intervention *n* = 24	65.88 ± 5.19	70.50 ± 5.53	5.29	<0.0001	0.66 (−2.21 to 4.38) *	Not significant
Control *n* = 24	67.04 ± 5.18	69.42 ± 5.81	5.35	<0.0001		

Liu et al., 2020	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Comparison	
			p value	Post Test	*p* value
Intervention *n* = 36	1.79 ± 0.53	2.36 ± 0.49	*p* < 0.05	2.73 (0.08 to 0.48) *	*p* < 0.05
Control *n* = 36	1.77 ± 0.64	2.08 ± 0.37	Not significant		

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Int J Environ Res Public Health 2022;19:5185

재활 치료

FUNCTIONAL OUTCOMES

MVV (L/min): Maximal voluntary ventilation is the maximum amount of air that can be breathed in and blown out over a sustained interval, such as 15 or 20 s.

Li et al., 2021	Pre	Post	Follow Up	Mean Difference ± SD for Before-After Comparison			Mean Difference (CI) for Between-Group Comparison			
				Pre-Post	Pre-Follow Up	*p* value	Post Intervention	*p* value	Follow-Up	*p* value
Intervention *n* = 59	74.30 ± 30.60	86.82 ± 28.51	89.17 ± 27.06	14.49 ± 21.60	18.47 ± 22.31	Not significant *	10.57 (3.26 to 17.88)	<0.05	5.20 (−2.33 to 12.73)	Not significant
Control *n* = 61	63.05 ± 26.12	70.87 ± 30.70	80.65 ± 35.96	5.61 ± 17.31	13.81 ± 20.78	0.014 *				

PEF (L/s): Peak expiratory flow is a person's maximum speed of expiration, as measured with a peak flow meter.

Li et al., 2021	Pre	Post	Follow-Up	Mean Difference ± SD for Before-After Comparison			Mean Difference (CI) for Between-Group Comparison			
				Pre-Post	Pre-Follow-Up	*p* value	Post Intervention	*p* value	Follow-Up	*p* value
Intervention *n* = 59	4.21 ± 2.33	5.06 ± 2.13	4.92 ± 2.23	0.98 ± 1.90	0.76 ± 1.92	Not significant *	0.38 (−0.24 to 1.00)	Not significant	−0.02 (−0.66 to 0.62)	Not significant
Control *n* = 61	3.66 ± 1.75	4.43 ± 2.23	4.76 ± 2.07	0.66 ± 1.95	0.97 ± 1.84	Not significant *				

DLCO%: Diffusing lung capacity for carbon monoxide is a measurement to assess the lungs' ability to transfer gas from inspired air to the bloodstream.

Liu et al., 2020	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Comparison	
			p value	Post Test	*p* value
Intervention *n* = 36	60.3 ± 11.3	78.1 ± 12.3	$p < 0.05$	4.98 (9.05 to 21.15) *	$p < 0.05$
Control *n* = 36	60.7 ± 12.0	63.0 ± 13.4	Not significant		

Muscle Mass and Strength
Muscle Mass: Muscle mass, measured by means of a magnetic resonance imaging (MRI) scan.
MRI—mid arm: cm^2

Nambi et al., 2022	Pre	Post	Follow-Up 1	Follow-Up 2	Mean Difference for Before-After Comparison			Mean Difference for Between-Group Comparison		
					Pre-Post	Pre-Follow-Up 1	Pre-Follow-Up 2	Post Intervention	Follow-Up 1	Follow-Up 2
Intervention *n* = 38	56.3 ± 1.1	57.9 ± 0.9	59.0 ± 0.5	61.5 ± 0.2	$p < 0.001$	$p < 0.001$	$p < 0.001$	1.88 (−0.03 to 0.83) * Not significant *	0.79 (−0.15 to 0.35) * Not significant *	0.15 (−0.07 to 0.27) * Not significant *
Control *n* = 38	55.9 ± 1.7	57.5 ± 1.0	58.9 ± 0.6	61.4 ± 0.5	$p < 0.001$	$p < 0.001$	$p < 0.001$			

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Int J Environ Res Public Health 2022;19:5185

재활 치료

FUNCTIONAL OUTCOMES

Functional Exercise Capacity

6MWT: The 6-min walk test assesses distance walked (in meters) over 6 min as a sub-maximal test of aerobic capacity/endurance. Assistive devices can be used.

Li et al., 2021	Pre	Post	Follow Up	Mean Difference ± SD for Before-After Comparison			Mean Difference (CI) for Between-Group Comparison			
				Pre-Post	Pre-Follow-Up	*p* value	Post Intervention	*p* value	Follow-Up	*p* value
Intervention *n* = 59	514.52 ± 82.87	588.40 ± 63.39	590.58 ± 69.67	80.20 ± 74.66	84.81 ± 80.38	<0.001 *	65.45 (43.80 to 87.10)	<0.001	68.62 (46.39 to 90.85)	<0.001
Control *n* = 61	499.98 ± 93.41	517.07 ± 88.87	521.38 ± 93.11	17.09 ± 63.94	15.17 ± 70.02	<0.001 *				

Liu et al., 2020	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Com-parison	
			p value	Post Test	*p* value
Intervention *n* = 36	162.7 ± 72.0	212.3 ± 82.5	<0.05	3.03 (18.77 to 91.43) *	*p* < 0.05
Control *n* = 36	155.7 ± 82.1	157.2 ± 71.7	Not significant		

STS: The 30-Second Sit to Stand Test is used to test leg strength and endurance. The participant is encouraged to complete as many full stands as possible within 30 s.

De Souza et al., 2021	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Comparison	
			p value	Post	*p* value
Intervention *n* = 104	12.7 ± 3.2	19.5 ± 3.1	<0.05	5.4 (3.6 to 9.1)	<0.001
Control *n* = 92	13.1 ± 2.9	14.5 ± 3.3	Not significant		

PADL: Physical Activity in Daily Life is assessed using a mobile phone app to measure the steps taken in a day.

De Souza et al., 2021	Pre	Post	Mean Difference for Before-After Comparison	Mean Difference (CI) for Between-Group Comparison	
			p value	Post	*p* value
Intervention *n* = 104	8671 ± 1355	10492 ± 1122	<0.05	1716 (975 to 2335)	<0.001
Control *n* = 92	8958 ± 1744	9063 ± 1201	Not significant		

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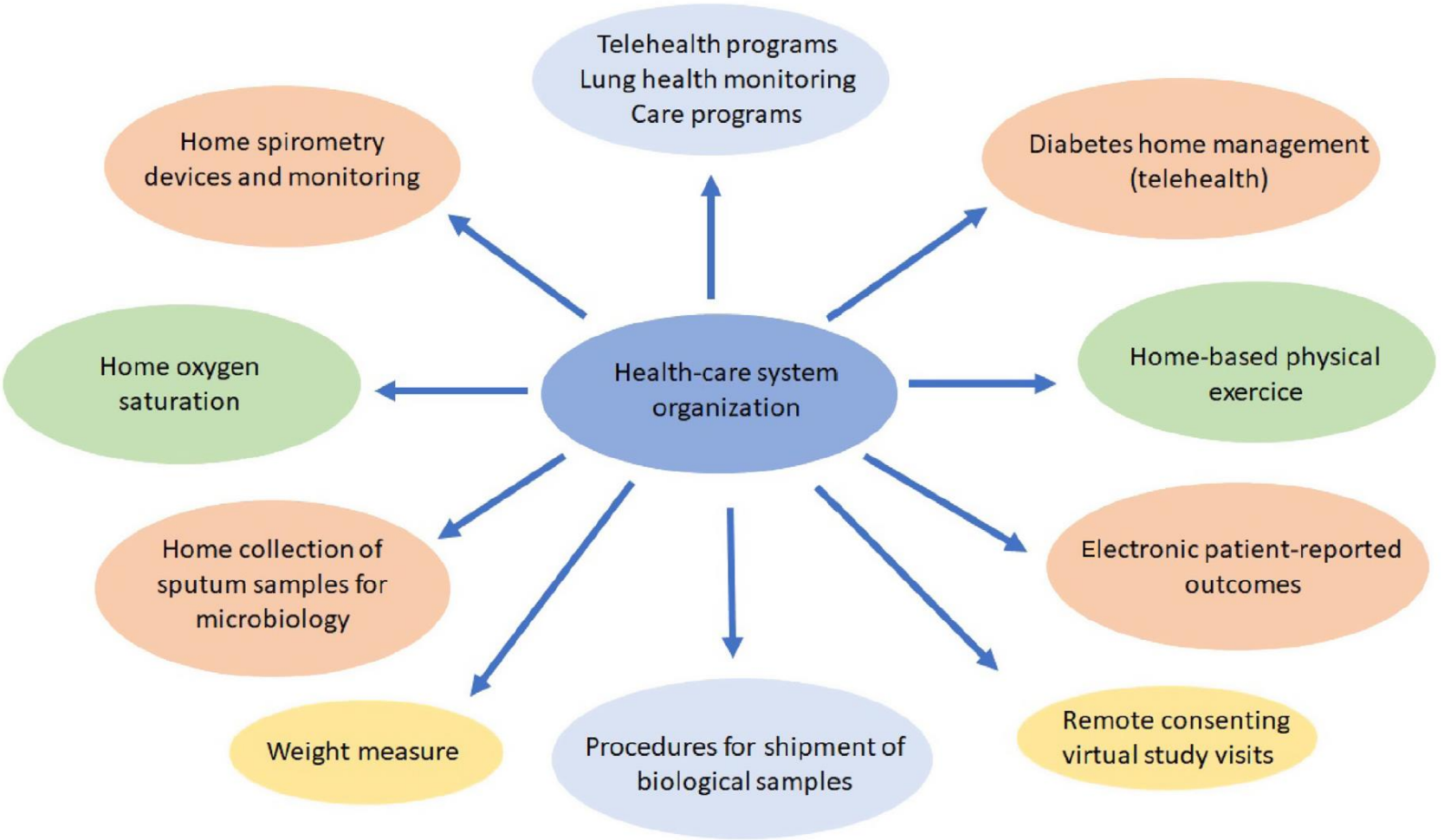
치료 접근



Arch Bronconeumol 2022;58:S39-50

치료 접근

Arch Bronconeumol 2022;58:S39-50

추적 관찰

Features of the acute disease characteristics best predicting abnormal D_{LCO} and pulmonary function	Age Severity of COVID-19 (oxygenation and ventilator modalities, ARDS, radiological data) Biological parameters (D-dimers, T-cell count, LDH, IL-6)
Follow-up strategies for persistent exertional dyspnoea, preserved lung volumes and normal or reduced D_{LCO} without evidence of parenchymal lung opacities on HRCT 3–6 months after discharge relating to thromboembolic events	Echocardiography Contrast-enhanced CT Lung perfusion studies: SPECT or DECT If evidence of significant PH refer to a specialist PH centre
Follow-up strategies relating to pulmonary physiology	PFTs ~3 months after onset of symptoms Expiratory flow rates, specifically D_{LCO}, D_{LCO} corrected for haemoglobin, TLC, V_A and K_{CO} Global harmonisation of results and parameters
Follow-up strategies relating to imaging in hospitalised patients, those with a more severe clinical course and patients with new or progressive respiratory symptoms in mid- to long-term post-acute COVID-19 syndrome	Caution regarding risk of over-calling lung fibrosis HRCT preferred to radiography or lung ultrasound Low-dose thin-section CT for younger patients Differentiate bronchial distortion from traction bronchiectasis *More imaging data needed to distinguish COVID-19 pneumonia sequelae and ventilator-induced lung injury*

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추적 관찰

Follow-up strategies relating to infection control	Adherence to local follow-up strategies due to lack of scientific evidence Attempt to identify patients at high risk for unusually long or recurrent viral shedding
Follow-up strategies relating to cognitive, psychological and QoL consequences	Psychosocial effects (depression, anxiety, psychosomatic preoccupations and insomnia) may indicate PTSD Patients may benefit from psychological support Assess psychological impact on caregivers and families Consensus needed: for symptom and QoL measures Consensus needed: when to refer for PR post-discharge Early rehabilitation mitigates long-term sequelae
Follow-up strategies relating to disability	Patients may present prolonged symptoms (dyspnoea and fatigue) for ≥4 weeks Symptoms impact functional performance and HRQoL Sequential questionnaires capture symptom burden Systematically follow-up patients with unresolved, new or progressive symptoms Develop appropriate disability management strategies of pulmonary sequelae
Follow-up strategies relating to home care follow-up (tele-medicine/tele-rehabilitation)	Tele-medicine/tele-rehabilitation appear to be acceptable Tele-health is effective as a mode of healthcare delivery Standardisation of the cost–effectiveness ratio is needed Careful attention is needed to integrate these services into current healthcare delivery Patient-centred and quality care must be preserved

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THANK YOU

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