11th Cyprus Dietetic & Nutrition Association International Conference

19-21 November, 2021

The post-Covid syndrome, the new data for diabetes

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- ❑ I do not have any potential conflict of interest

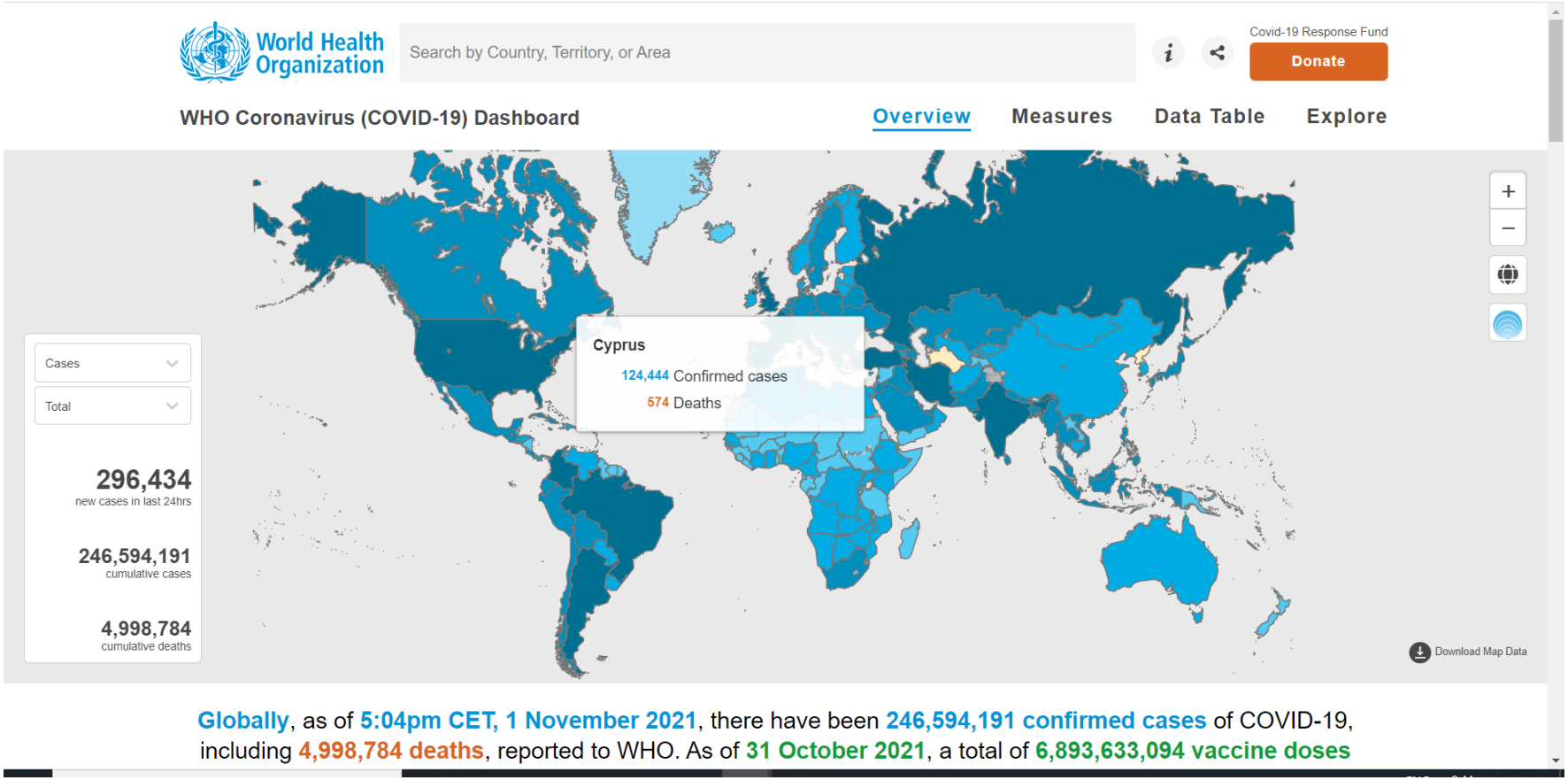
Presentation structure

- **Epidemiology and clinical manifestation of covid-19 disease**

- **Post Covid-19 syndrome**
  - *Definition*
  - *Epidemiology*
  - *Clinical features*
  - *Pathophysiology*

- **Covid-19 and diabetes**
- *Epidemiology*
- *Prognosis*
- *Obesity-Covid-Diabetes*
- *Drug treatment and mortality*
- *Post covid-19 and diabetes*

The global epidemiological picture at a glance

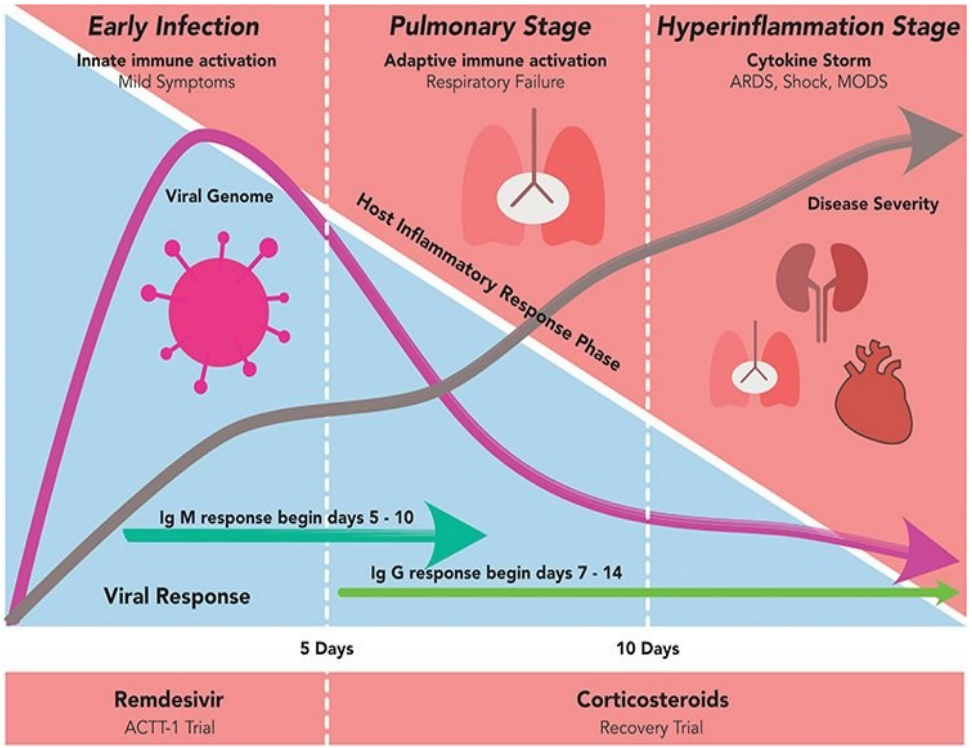


Clinical manifestations of Covid-19

Mild disease (or asymptomatic): 80-85%

Severe disease:10-15%

Critical disease:5%



Journal of Inflammation Research 2021:14

Comorbidities the CDC classifies as risk factors for severe COVID-19* [1,2]

Established, probable, and possible risk factors (comorbidities that have been associated with severe COVID-19 in at least 1 meta-analysis or systematic review [starred conditions], in observational studies, or in case series)

- Cancer*
- Cerebrovascular disease*
- Children with certain underlying conditions¶
- Chronic kidney disease*
- COPD* and other lung disease (including interstitial lung disease, pulmonary fibrosis, pulmonary hypertension, cystic fibrosis)
- Diabetes mellitus, type 1* and type 2*
- Down syndrome
- Heart conditions (such as heart failure, coronary artery disease, or cardiomyopathies)*
- HIV
- Neurologic conditions, including dementia
- Obesity* (BMI ≥30 kg/m^2) and overweight (BMI 25 to 29 kg/m^2)
- Pregnancy*
- Smoking* (current and former)
- Sickle cell disease or thalassemia
- Solid organ or blood stem cell transplantation
- Substance use disorders
- Use of corticosteroids or other immunosuppressive medications

Possible risk factors but evidence is mixed (comorbidities have been associated with severe COVID-19 in at least 1 meta-analysis or systematic review, but other studies had reached different conclusions)

- Asthma
- Hypertension
- Immune deficiencies
- Liver disease

COVID-19: coronavirus disease 2019; CDC: Centers for Disease Control and Prevention; COPD: chronic obstructive pulmonary disease; BMI: body mass index.

* These comorbidities are associated with severe COVID-19 in adults of all ages. Risk of severe disease also rises steadily with age, with more than 80% of deaths occurring in adults older than age 65 years. People of color are also at increased risk of severe disease and death, often at a younger age, due to systemic health and social inequities.

¶ Underlying medical conditions are also associated with severe illness in children, but evidence implicating specific conditions is limited. Children with the following conditions might be at increased risk for severe illness: medical complexity; genetic, neurologic, or metabolic conditions; congenital heart disease; obesity; diabetes; asthma or other chronic lung disease; sickle cell disease; immunosuppression.

References:

1. *Centers for Disease Control and Prevention. Underlying medical conditions associated with high risk for severe COVID-19: Information for healthcare providers. Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/underlyingconditions.html (Accessed on April 5, 2021).*
2. *Centers for Disease Control and Prevention. Science brief: Evidence used to update the list of underlying medical conditions that increase a person's risk of severe illness from COVID-19. Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/underlying-evidence-table.html (Accessed on April 5, 2021).*

UpToDate®

CDC Centers for Disease Control and Prevention

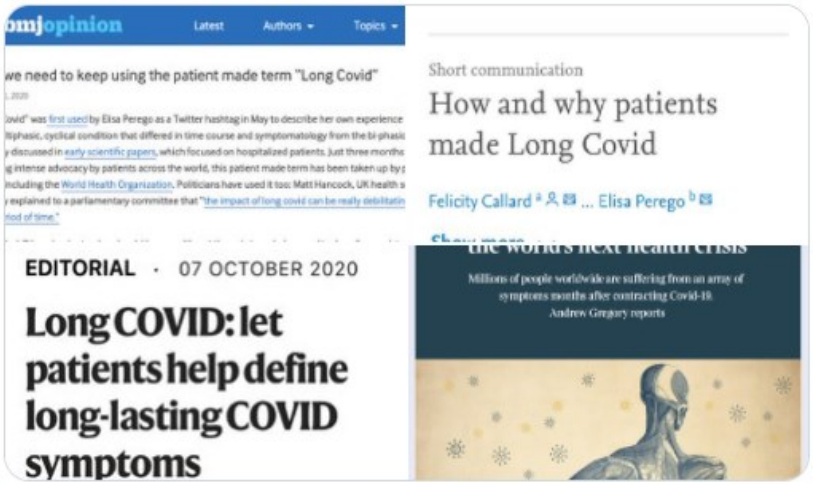
What is post(long) covid syndrome ?

Diagnosis by the patients…

Καρφιτσωμένο Tweet

Dr Elisa Perego @elisaperego78 · 20 Μαΐ

Today one year ago the term #LongCovid was born as a Twitter hashtag.
A single tweet from a person who was not recovering from COVID-19. A single tweet very few noticed at the beginning.
We have come a long way.
We built a movement we hope will help change medicine.



39 425 1 χιλ.

Felicity Callard
@felicitycallard

A crucial part of the nascent history & anthropology of #LongCovid: the term 'long-haulers' was coined* by Amy Watson

*full explanation in the text below🧢😄

Kate Porter @katemeredithp
Replying to @felicitycallard
Oh that's funny... it absolutely came from Amy. She named the group that because of her favorite trucker hat she wore when she got tested. 😊 #longcovid

Hey Long Haulers-

As of right now our page is two weeks old! I created this page because I felt so alone in this, and also because the other COVID pages were seriously bumming me out. None of us wanted to be in this club, and yet here we are. Thank you for being here and for sharing this journey back to wellness.

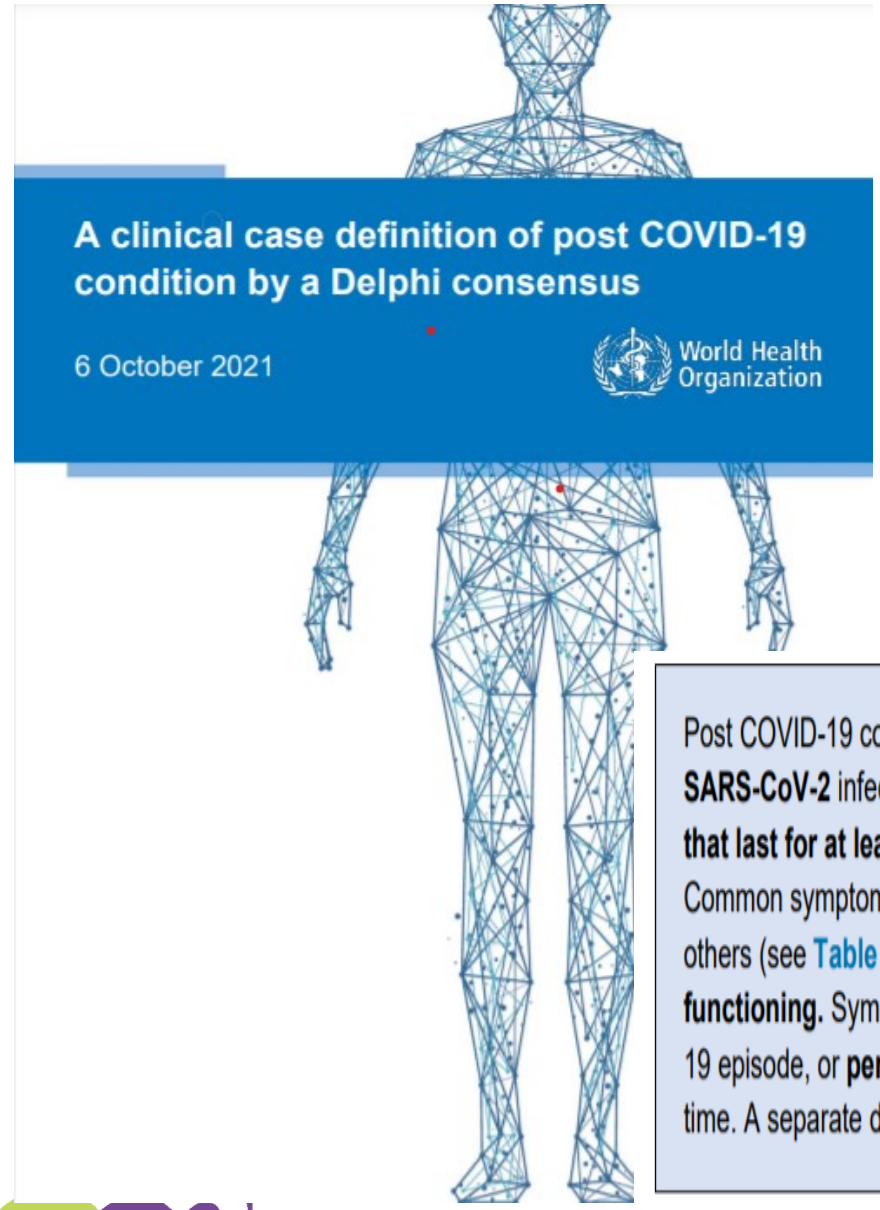
A quick announcement: If you want to invite others to join our group, please just message them about it and tell them to request to join themselves. We have put in place some mandatory questions and group rules for new members to make sure we maintain the integrity of the group, especially as we continue to grow. New members will need to answer the questions to gain admittance, and if members use the "invite" tool, they're unfortunately missing the questions. That makes for a lot of extra admin work for Kate, Jeannie, and myself. I honestly thought there would be maybe a dozen of us in this group, but wow! I was so wrong! While I'm sorry you're here because you're unwell, I know we're going to get through this together. ❤️

PS: Our somewhat goofy group name comes from my favorite trucker cap I wore when I got my first COVID test at a drive up site. I'm starting to think maybe it's not so lucky.... 😬

10:20 PM · Jun 28, 2020

12 Share this Tweet

Tweet your reply



A clinical case definition of post COVID-19 condition by a Delphi consensus

6 October 2021

World Health Organization

Post COVID-19 condition occurs in individuals with **a history of probable or confirmed SARS-CoV-2** infection, **usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis.** Common symptoms include **fatigue, shortness of breath, cognitive dysfunction** but also others (see Table 3 and Annex 2) which generally have an **impact on everyday functioning.** Symptoms may be **new onset,** following initial recovery from an acute COVID-19 episode, or **persist** from the initial illness. Symptoms may also **fluctuate** or **relapse** over time. A separate definition may be applicable for children.

Annex 1. Repository of published/available definitions of post COVID-19 condition

Source	Text
Wellcome	Symptoms persisting beyond 4 weeks after symptom onset suggestive of COVID-19 *(33)*.
Lancet	Multiorgan symptoms after COVID-19 are being reported by increasing numbers of patients. They range from cough and shortness of breath, to fatigue, headache, palpitations, chest pain, joint pain, physical limitations, depression, and insomnia, and affect people of varying ages. At the Lancet–Chinese Academy of Medical Sciences conference on 23 November 2020, Bin Cao presented data (in press at the Lancet) on the long-term consequences of COVID-19 for patients in Wuhan, and warned that dysfunctions and complications could persist in some discharged patients for at least 6 months. So-called long COVID is a burgeoning health concern and action is needed now to address it *(34)*.
NICE	Signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis *(35)*.
Scientific American	Individuals whose symptoms persist or develop outside the initial viral infection, but the duration and pathogenesis are unknown *(36)*.
Royal Society	The onset of persistent or recurrent episodes of one or more of the following symptoms, within x* weeks of infection with SARS-CoV-2 and continuing for y* weeks or more: severe fatigue, reduced exercise capacity, chest pain or heaviness, fever, palpitations, cogintive impairment, anosomia or ageusia, vertigo and tinnitus, headache, peripheral neuropathy, metallic or bitter taste, skin rash joint pain or swelling *(3)*. * Maximum period between acquisition of the infection (if known) and the onset of symptoms, and the minimum duration of symptoms, should be specified in the definition.
Haute Autorité de santé, France	Three criteria: Having presented with a symptomatic form of COVID-19; presenting with one or more initial symptoms 4 weeks after the start of the disease; and none of these symptoms can be explained by another diagnosis *(37)*.
CDC	Long COVID: While most persons with COVID-19 recover and return to normal health, some patients can have symptoms that can last for weeks or even months after recovery from acute illness. Even people who are not hospitalized and who have mild illness can experience persistent or late symptoms *(38)*.
Wikipedia	Condition characterized by long-term sequelae – persisting after the typical convalescence period – of coronavirus disease 2019 (COVID-19) *(39)*.
Nature	Post-acute COVID-19 as persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection beyond 4 weeks from the onset of symptoms *(40)*.

How often is post –covid syndrome ?

World Health Organization(WHO):
10-20%

- **United Kingdom** => prevalence of Long-COVID-19 (questionaries based)
  - **970.000** people(1.5% population)
  - **1 in 5** people with COVID-19 for >5 weeks.
  - **1 in 10** people with COVID-19 για > 12 weeks.

Office for National Statistics

JAMA Network | Open

Original Investigation | Infectious Diseases

Short-term and Long-term Rates of Postacute Sequelae of SARS-CoV-2 Infection
A Systematic Review

Destin Groff, BA; Ashley Sun, BA; Anna E. Ssentongo, DrPH, MPH; Djibril M. Ba, PhD, MPH; Nicholas Parsons, MPhil; Govinda R. Poudel, PhD; Alain Lekoubou, MD, MSc; John S. Oh, MD; Jessica E. Ericson, MD, MPH; Paddy Ssentongo, MD, PhD, MPH; Vernon M. Chinchilli, PhD

Abstract

IMPORTANCE Short-term and long-term persistent postacute sequelae of COVID-19 (PASC) have not been systematically evaluated. The incidence and evolution of PASC are dependent on time from infection, organ systems and tissue affected, vaccination status, variant of the virus, and geographic region.

OBJECTIVE To estimate organ system–specific frequency and evolution of PASC.

EVIDENCE REVIEW PubMed (MEDLINE), Scopus, the World Health Organization Global Literature on Coronavirus Disease, and CoronaCentral databases were searched from December 2019 through March 2021. A total of 2100 studies were identified from databases and through cited references. Studies providing data on PASC in children and adults were included. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines for abstracting data were followed and performed independently by 2 reviewers. Quality was assessed using the Newcastle-Ottawa Scale for cohort studies. The main outcome was frequency of PASC diagnosed by (1) laboratory investigation, (2) radiologic pathology, and (3) clinical signs and symptoms. PASC were classified by organ system, ie, neurologic; cardiovascular; respiratory; digestive; dermatologic; and ear, nose, and throat as well as mental health, constitutional symptoms, and functional mobility.

FINDINGS From a total of 2100 studies identified, 57 studies with 250 351 survivors of COVID-19 met inclusion criteria. The mean (SD) age of survivors was 54.4 (8.9) years, 140 196 (56%) were male, and 197 777 (79%) were hospitalized during acute COVID-19. High-income countries contributed 45 studies (79%). The median (IQR) proportion of COVID-19 survivors experiencing at least 1 PASC was 54.0% (45.0%-69.0%; 13 studies) at 1 month (short-term), 55.0% (34.8%-65.5%; 38 studies) at 2 to 5 months (intermediate-term), and 54.0% (31.0%-67.0%; 9 studies) at 6 or more months (long-term). Most prevalent pulmonary sequelae, neurologic disorders, mental health disorders, functional mobility impairments, and general and constitutional symptoms were chest imaging abnormality (median [IQR], 62.2% [45.8%-76.5%]), difficulty concentrating (median [IQR], 23.8% [20.4%-25.9%]), generalized anxiety disorder (median [IQR], 29.6% [14.0%-44.0%]), general functional impairments (median [IQR], 44.0% [23.4%-62.6%]), and fatigue or muscle weakness (median [IQR], 37.5% [25.4%-54.5%]), respectively. Other frequently reported symptoms included cardiac, dermatologic, [illegible], nose, and throat disorders.

CONCLUSIONS AND RELEVANCE In this systematic review, more than half of COVID-19 survivors experienced PASC 6 months after recovery. The most common PASC involved functional mobility impairments, pulmonary abnormalities, and mental health disorders. These long-term PASC effects occur on a scale that could overwhelm existing health care capacity, particularly in low- and middle-income countries.

JAMA Network Open. 2021;4(10):e2128568. doi:10.1001/jamanetworkopen.2021.28568

Key Points

Question What are the short-term and long-term postacute sequelae of COVID-19 (PASC) infection?

Findings In this systematic review of 57 studies comprising more than 250 000 survivors of COVID-19, most sequelae included mental health, pulmonary, and neurologic disorders, which were prevalent longer than 6 months after SARS-CoV-2 exposure.

Meaning These findings suggest that long-term PASC must be factored into existing health care systems, especially in low- and middle-income countries.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Clinical manifestations

Type, proportion, and duration of persistent COVID-19 symptoms*

Persistent symptom ¶	Proportion of patients affected by symptom	Approximate time to symptom resolution Δ
Common physical symptoms		
Fatigue	15 to 87%[1,2,6,9,14]	3 months or longer
Dyspnea	10 to 71%[1,2,6-9,14]	2 to 3 months or longer
Chest discomfort	12 to 44%[1,2]	2 to 3 months
Cough	17 to 34%[1,2,9,12]	2 to 3 months or longer
Anosmia	10 to 13%[1,3-5,9,11]	1 month, rarely longer
Less common physical symptoms		
Joint pain, headache, sicca syndrome, rhinitis, dysgeusia, poor appetite, dizziness, vertigo, myalgias, insomnia, alopecia, sweating, and diarrhea	<10%[1,2,8,9,11]	Unknown (likely weeks to months)
Psychologic and neurocognitive		
Post-traumatic stress disorder	7 to 24%[6,10, 14]	6 weeks to 3 months or longer
Impaired memory	18 to 21%[6,15]	weeks to months
Poor concentration	16%[6]	Weeks to months
Anxiety/depression	22 to 23%[2,7,8,10, 12,13, 14]	Weeks to months
Reduction in quality of life	>50%[8]	Unknown (likely weeks to months)

COVID-19: coronavirus disease 2019.
* These data are derived from an earlier period in the pandemic; information on patient recovery and persistent symptoms is evolving, and these figures may change as longer-term data emerge.
¶ More than a third of patients with COVID-19 experience **more than one** persistent symptom.
Δ Time course for recovery varies depending on premorbid risk factors and illness severity and may be shorter or longer than that listed. Hospitalized patients, and in particular critically ill patients, are more likely to have a more protracted course than those with mild disease.

Annals of Internal Medicine

JAMA
The Journal of the American Medical Association

THE LANCET

Wolters Kluwer
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Acute Complications of COVID-19

Neuropsychiatric
- Cerebrovascular accident
- Large vessel disease
- Encephalopathy, delirium
- Anosmia, ageusia

Respiratory
- Pneumonia
- Hypoxemic respiratory failure, ARDS

Cardiovascular
- Arrhythmia
- Myocarditis

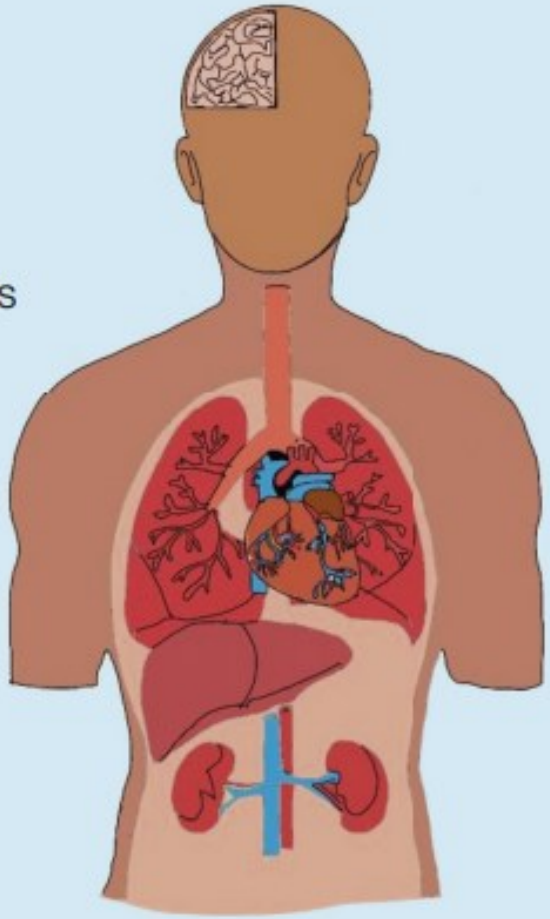
Hematologic, Vascular
- Coagulopathy
- Thrombotic events

Renal
- Acute kidney injury

Gastrointestinal, Hepatobiliary
- Diarrhea
- Acute liver injury

Musculoskeletal
- Rhabdomyolysis

Dermatologic
- Livedo reticularis
- Maculopapular or urticarial rash



Post-COVID Symptoms, Sequelae

Neuropsychiatric
- Neurocognitive deficits
- Mood changes
- Sensory & motor deficits
- Chronic fatigue and sleep disruption

Respiratory
- Persistent dyspnea
- Chronic cough

Cardiovascular
- Chest pain
- Palpitations

Hematologic, Vascular
- Persistent or recurrent thrombosis

Renal
- Chronic kidney disease

Gastrointestinal, Hepatobiliary
- Persistent liver dysfunction

Musculoskeletal
- Muscle wasting
- Weakness
- Deconditioning

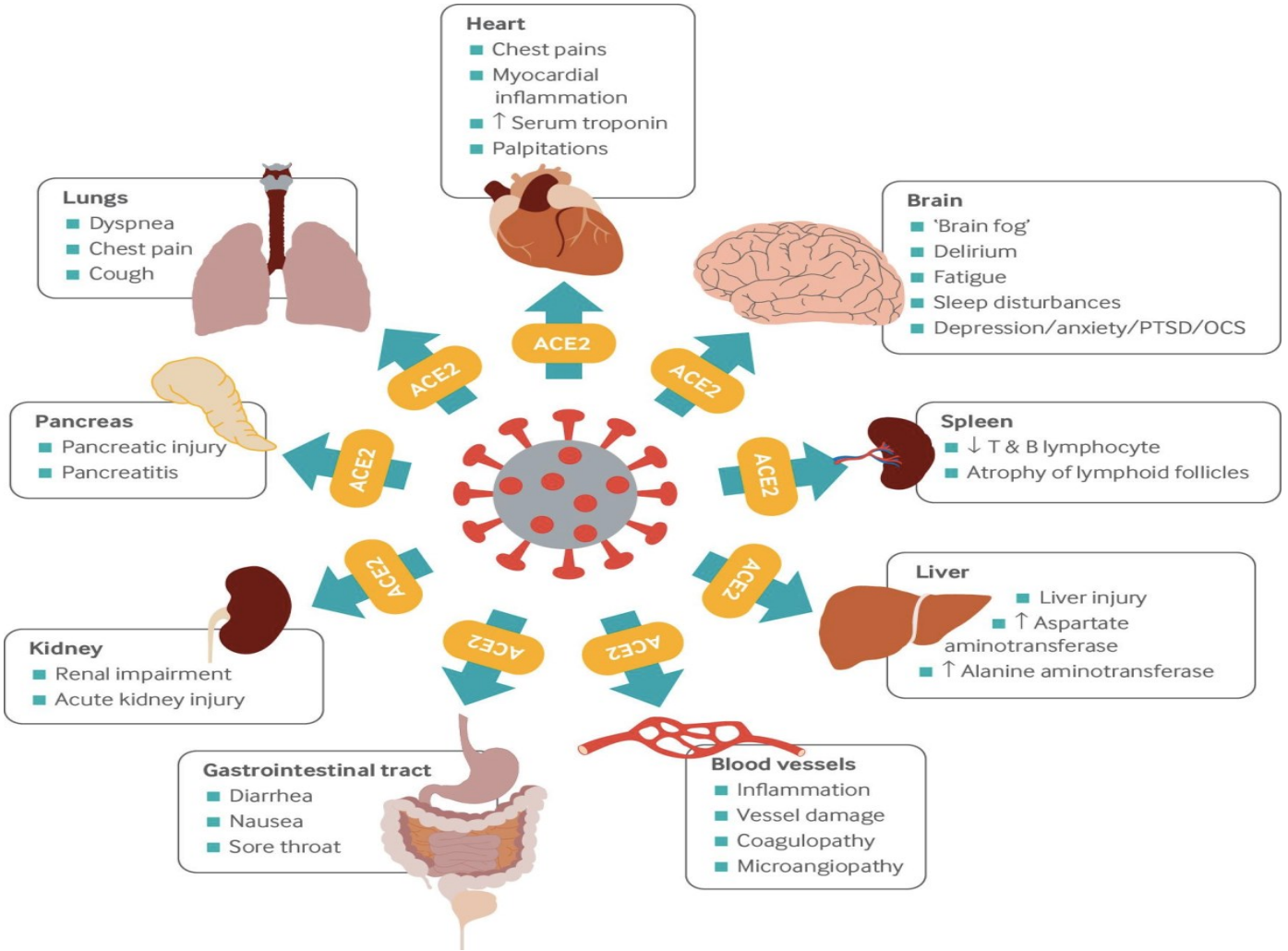
Dermatologic
- Hair loss

Poskit et al;A Clinic Blueprint for Post-Coronavirus Disease 2019 RECOVERY Learning From the Past, Looking to the Future
CHEST 2021; 159(3):949-958

Pathophysiology

- Direct action of the virus/cell damage
- Entothelial damage and microcirculation disorders
- Immune regulation dysfunction and activation hyperinflammatory condition
- Mast cell activation
- Pre-thrombotic condition and thrombosis(immune thrombosis, activated platelets etc).
- ACE2
- Virus
- Autoimmune
- Dysautonomy

Altman et al., BMJ 2020
McElvaney, O. J. et al. Am. J. Respir. Crit. Care Med. 202, (2020).
Tang, N., et al., J. Thromb. Haemost. 18, (2020).

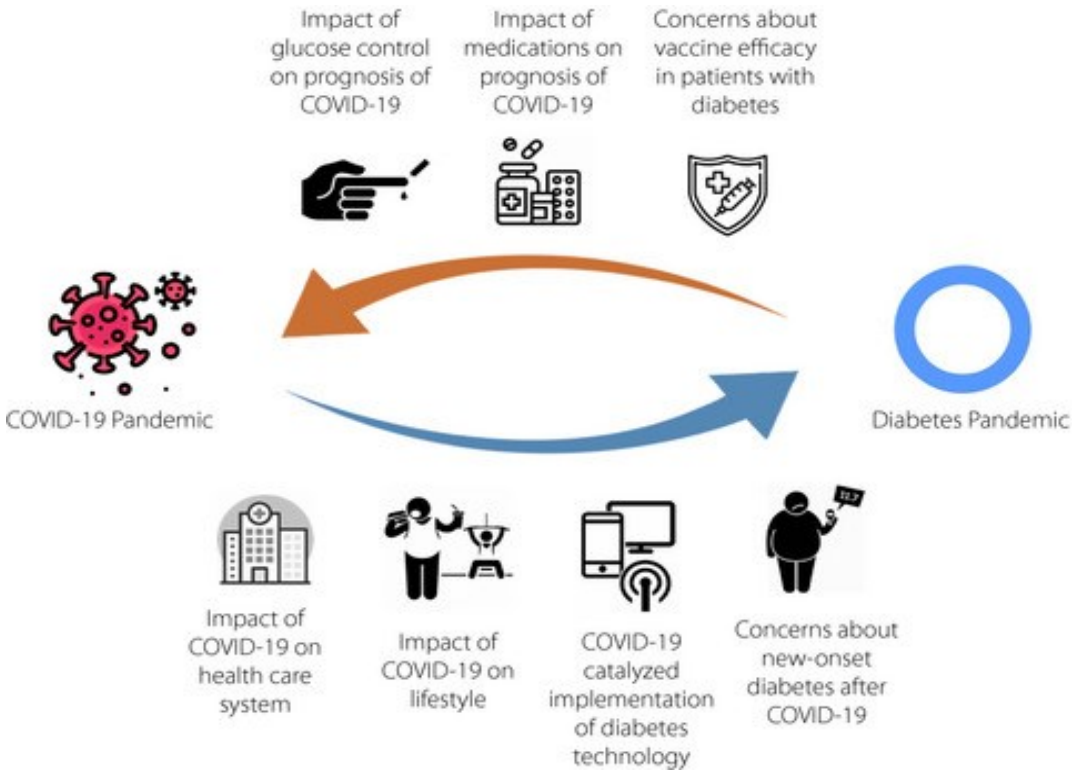

Heart
Chest pains
Myocardial inflammation
↑ Serum troponin
Palpitations
Lungs
Dyspnea
Chest pain
Cough
Brain
'Brain fog'
Delirium
Fatigue
Sleep disturbances
Depression/anxiety/PTSD/OCS
ACE2
Pancreas
Pancreatic injury
Pancreatitis
Spleen
↓ T & B lymphocyte
Atrophy of lymphoid follicles
Liver
Liver injury
↑ Aspartate aminotransferase
↑ Alanine aminotransferase
Kidney
Renal impairment
Acute kidney injury
Gastrointestinal tract
Diarrhea
Nausea
Sore throat
Blood vessels
Inflammation
Vessel damage
Coagulopathy
Microangiopathy

BMJ 2021

CORONAVIRUS
DIABETES

Covid-19 Pandemic ↔ Diabetes Pandemic

- Lifestyle
- Glucose control
- Comorbidities
- Vaccine efficacy
- New- onset diabetes?



Tan et al ;Journal of Diabetes Accosiation 2021
https://doi.org/10.1111/jdi.13644

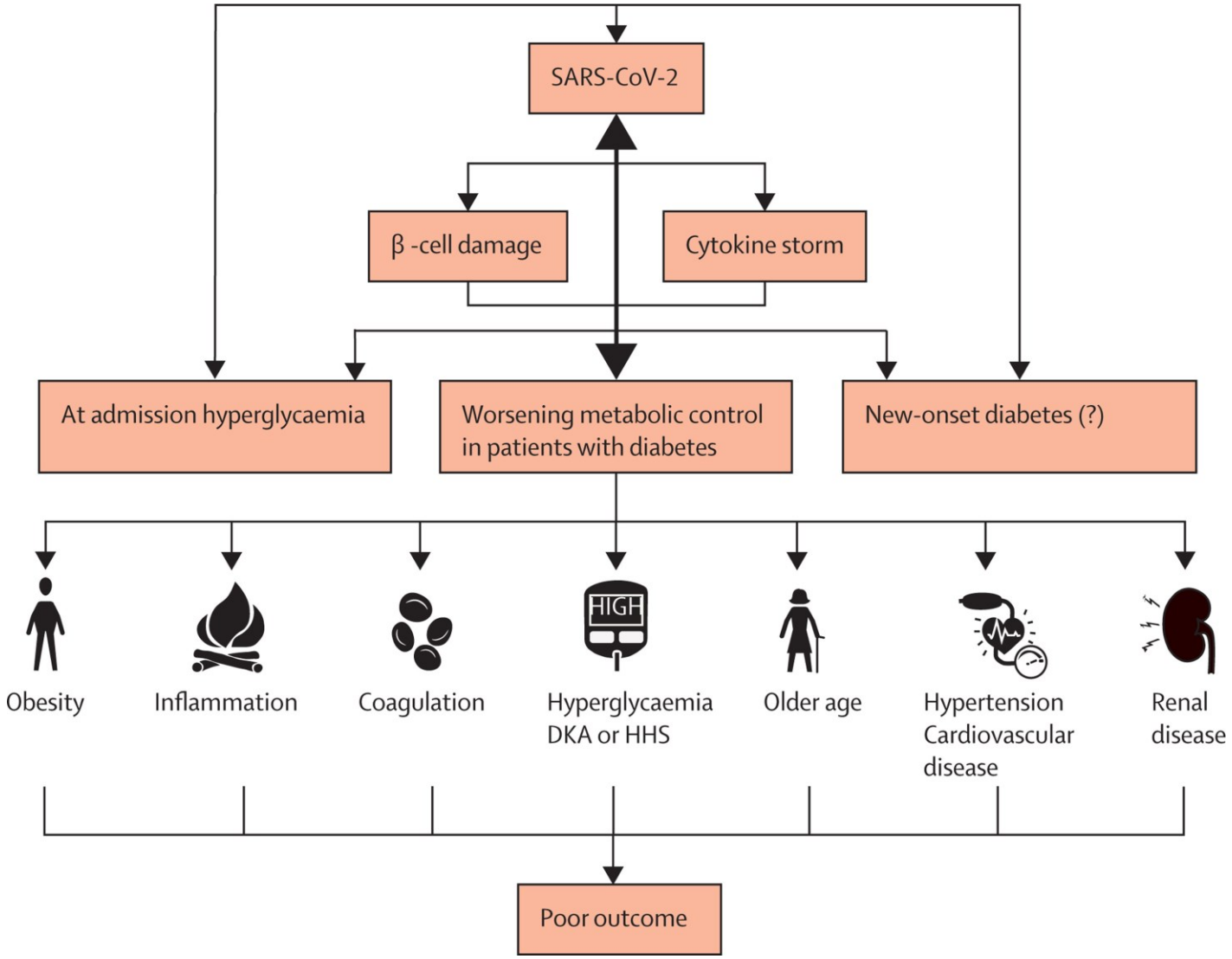
Epidemiology of Diabetes in patients with Covid-19

- 5%-36% in different series of patients depending on age and severity disease
- 6% outpatients
- 24% inpatients
- 32% ICU patients

- Diabetes complications (cardiovascular disease, CKD, Heart failure) are associated with an increased risk of disease and increased mortality

Corrao S. et al. Frontiers in Endocrinology March 2021
Hartmann-Boyce J et al. Diabetes Care, Oct 2021
www.cdc.gov

Diabetes + Covid 19 =poor outcome



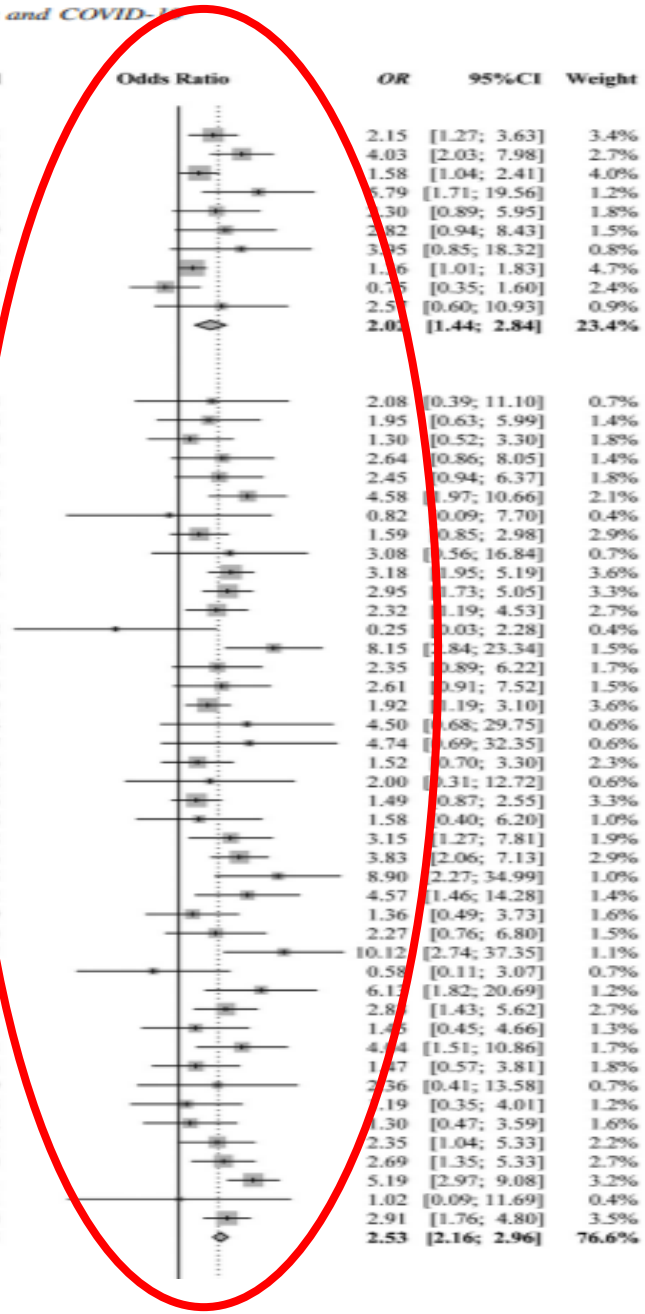
Del Prato et al,www.thelancet.com/diabetes-endocrinology Vol 8 September 2020

	Article type	Study population	Prevalence of diabetes	Outcome	Risk
Zhang et al[3]	Retrospective	258	24%	Mortality	3·64 (1·08–12·21)*
Kumar et al[4]	Meta-analysis	16 003	9·8%	Severe disease	2·75 (2·09–3·62)*
Kumar et al[4]	Meta-analysis	16 003	9·8%	Mortality	1·90 (1·37–2·64)*
Guan et al[10]	Retrospective	1590	NA	Composite†	1·59 (1·03–2·45)‡
Li et al[11]	Meta-analysis	1525	9·7%	ICU admission§	2·21 (0·88–5·57)¶
Fadini et al[12]	Meta-analysis	1687	NA	Severe disease	2·26 (0·98–4·82)‖
Fadini et al[12]	Meta-analysis	355	35·5%	Mortality	1·75‖
Petrilli et al[13]	Retrospective	5279	22·6%	Hospital admission	2·24 (1·84–2·73)*
Roncon et al[14]	Meta-analysis	1382	NA	ICU admission	2·79 (1·85–4·22)*
Roncon et al[14]	Meta-analysis	471	NA	Mortality	3·21 (1·82–5·64)*
Zhou et al[15]	Retrospective	191	19%	Mortality	2·85 (1·35–6·05)*
Zhu et al[16]	Retrospective	7337	13%	Mortality	1·49 (1·13–1·96)‡
Yan et al[17]	Retrospective	193	25%	Mortality	1·53 (1·02–2·3)‡
Sardu et al[18]	Retrospective	59	44%	Survival	0·172 (0·051–0·576)‡
Yang et al[19]	Meta-analysis	4648	NA	Severe disease	2·07 (0·88–4·82)*
Barron et al[20]	Cohort study	61 414 470	0·4% type 1 diabetes	Mortality	3·50 (3·15–3·89)*
Barron et al[20]	Cohort study	61 414 470	4·7% type 2 diabetes	Mortality	2·03 (1·97–2·09)*

ICU=intensive care unit. NA=not given. *Odds ratio (95% CI). †ICU admission, or invasive ventilation, or death. ‡Hazard ratio (95% CI). §Calculated for 1056 patients (in three of six studies). ¶Risk ratio (95% CI). ‖Rate ratio (95% CI not given).

Table 1: **COVID-19 outcomes according to pre-existing diabetes**

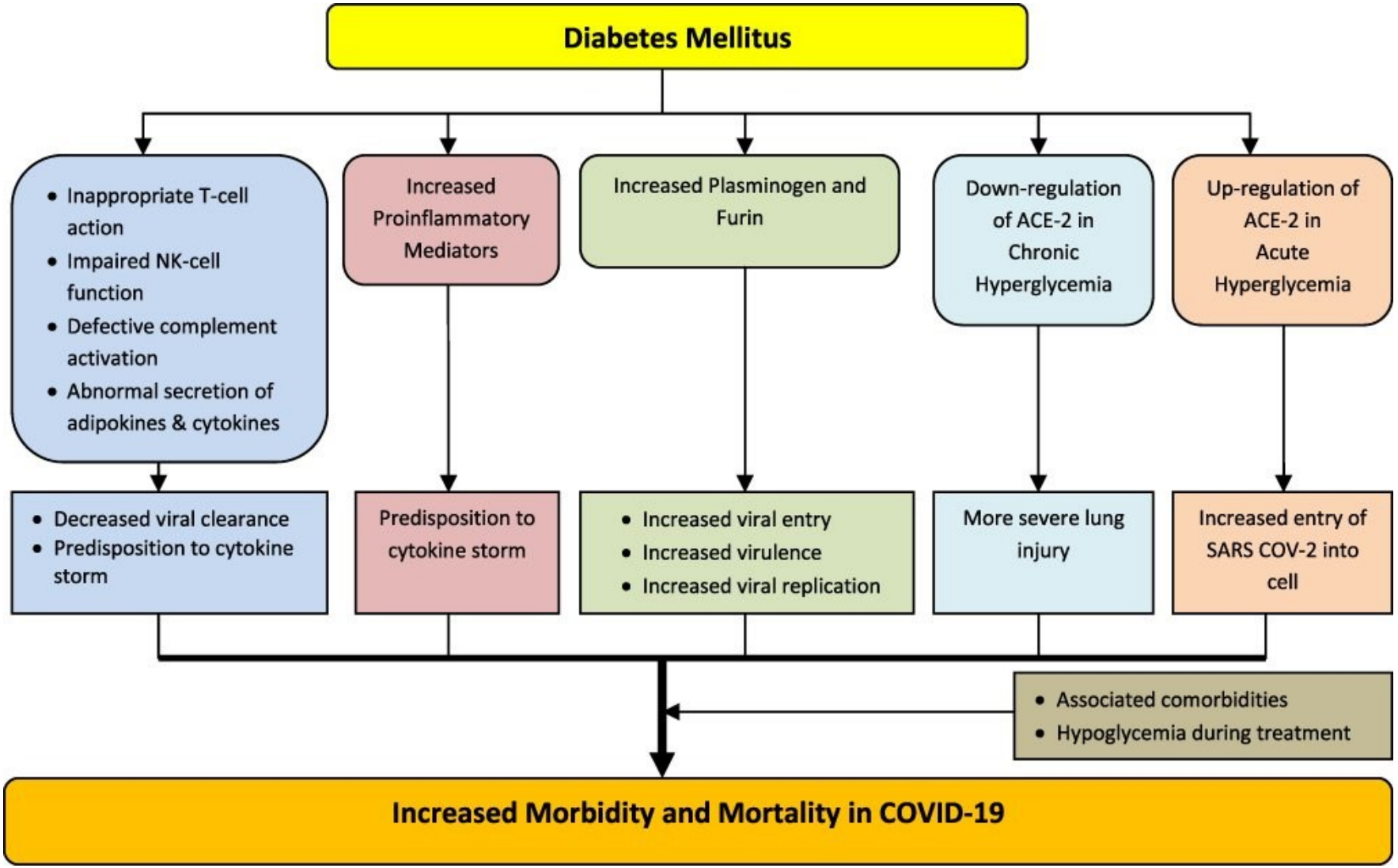
Del Prato et al,www.thelancet.com/diabetes-endocrinology Vol 8 September 2020



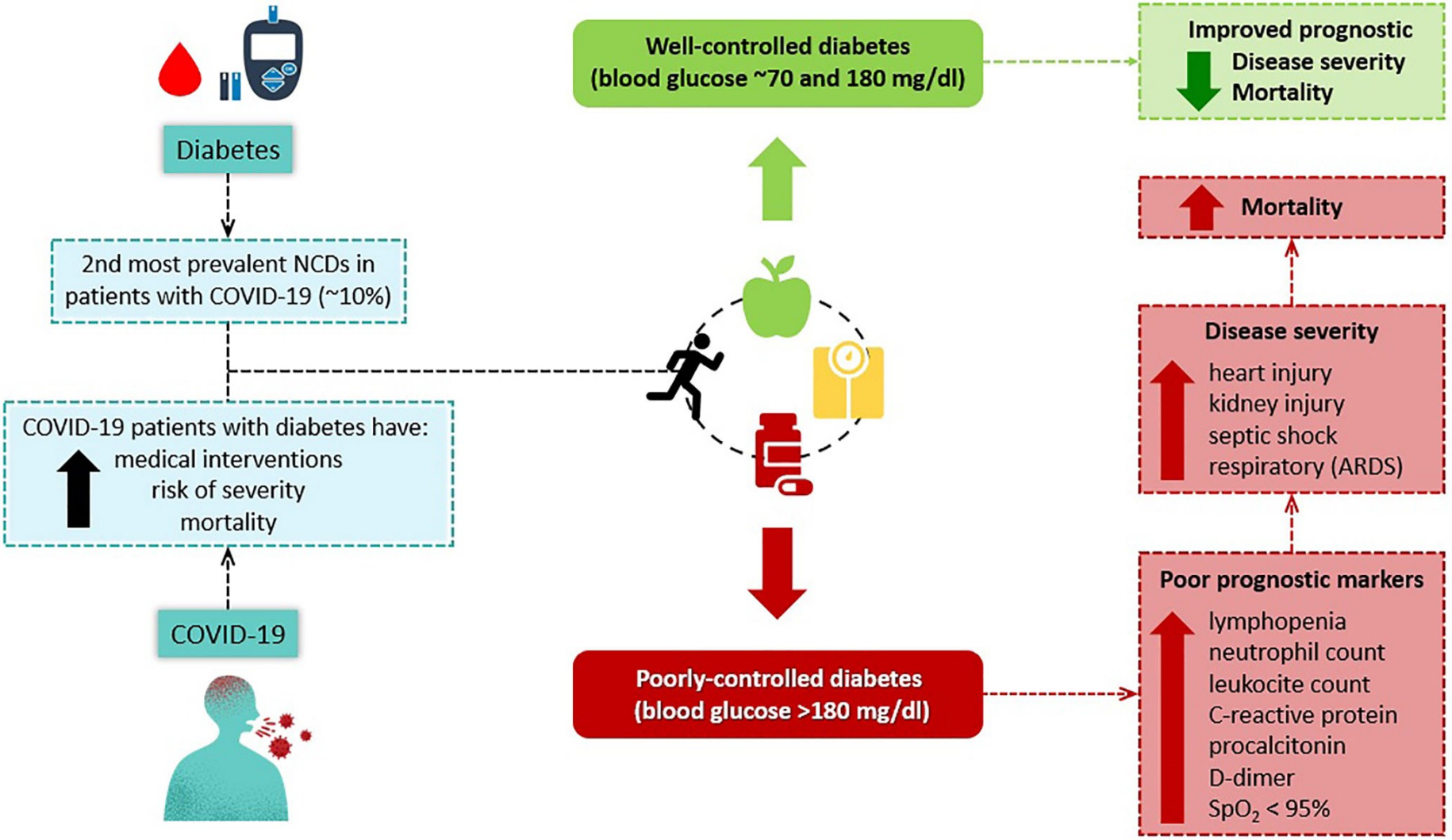
Study	Severe Infection Events	Total	Non-severe Events	Total	OR	95%CI	Weight
location = Outside of China							
Abdullah A 2020	29	82	68	335	2.15	[1.27; 3.63]	3.4%
Antoni Sisó−A 2020	18	56	28	266	4.03	[2.03; 7.98]	2.7%
Aurora J 2020	47	157	82	386	1.58	[1.04; 2.41]	4.0%
Chung SM 2020	8	13	21	97	5.79	[1.71; 19.56]	1.2%
Edward I 2020	8	26	22	136	2.30	[0.89; 5.95]	1.8%
Faryal K 2020	11	24	9	39	2.82	[0.94; 8.43]	1.5%
Kyung Soo H 2020	3	13	6	85	3.95	[0.85; 18.32]	0.8%
Michael G 2020	101	236	271	764	1.36	[1.01; 1.83]	4.7%
Pellaud C 2020	11	49	41	147	0.75	[0.35; 1.60]	2.4%
Reza S 2020	3	11	13	102	2.54	[0.60; 10.93]	0.9%
Random effects model		**667**		**2357**	**2.02**	**[1.44; 2.84]**	**23.4%**
Heterogeneity: $I^2 = 55\%$, $\chi^2 = 0.1358$, $p = 0.02$							
location = China							
Cao ZH 2020	3	27	3	56	2.08	[0.39; 11.10]	0.7%
Chen C (a) 2020	5	24	15	126	1.95	[0.63; 5.99]	1.4%
Chen C (b) 2020	9	23	36	109	1.30	[0.52; 3.30]	1.8%
Chen QQ 2020	7	43	7	102	2.64	[0.86; 8.05]	1.4%
Chen X 2020	7	50	15	241	2.45	[0.94; 6.37]	1.8%
Di Q 2020	12	50	14	217	4.58	[1.97; 10.66]	2.1%
Fan LC 2020	1	8	7	47	0.82	[0.09; 7.70]	0.4%
Feng Y 2020	17	124	32	352	1.59	[0.85; 2.98]	2.9%
Feng ZC 2020	2	15	6	126	3.08	[0.56; 16.84]	0.7%
Guan WJ (a) 2020	28	173	53	926	3.18	[1.95; 5.19]	3.6%
Guan WJ (b) 2020	19	99	111	1491	2.95	[1.73; 5.05]	3.3%
Hu L 2020	33	172	14	151	2.32	[1.19; 4.53]	2.7%
Huang CL 2020	1	13	7	128	0.25	[0.03; 2.28]	0.4%
Huang R 2020	8	23	11	179	8.15	[2.84; 23.34]	1.5%
Huang YS 2020	12	98	7	125	2.35	[0.89; 6.22]	1.7%
Li Q 2020	5	26	25	199	2.61	[0.91; 7.52]	1.5%
Li XC 2020	52	269	31	279	1.92	[1.19; 3.10]	3.6%
Liu JY 2020	3	17	2	44	4.50	[0.68; 29.75]	0.6%
Liu W 2020	2	11	3	67	4.74	[0.69; 32.35]	0.6%
Mao L 2020	15	88	15	126	1.52	[0.70; 3.30]	2.3%
Nie SK 2020	2	25	3	72	2.00	[0.31; 12.72]	0.6%
Qin C 2020	53	286	22	166	1.49	[0.87; 2.55]	3.3%
Shi PY 2020	4	46	5	88	1.58	[0.40; 6.20]	1.0%
Shi Y 2020	7	49	22	458	3.15	[1.27; 7.81]	1.9%
Targher G 2020	23	63	36	206	3.83	[2.06; 7.13]	2.9%
Wan SX 2020	9	40	3	135	8.90	[2.27; 34.99]	1.0%
Wang DW(a) 2020	8	36	6	102	4.57	[1.46; 14.28]	1.4%
Wang LW 2020	10	57	8	59	1.36	[0.49; 3.73]	1.6%
Wang YP 2020	5	45	12	234	2.27	[0.76; 6.80]	1.5%
Wei YY 2020	7	30	4	131	10.12	[2.74; 37.35]	1.1%
Xie HS 2020	2	28	6	51	0.58	[0.11; 3.07]	0.7%
Yan SJ 2020	7	36	5	132	6.12	[1.82; 20.69]	1.2%
Yan YL 2020	32	92	16	101	2.80	[1.43; 5.62]	2.7%
Yang LH 2020	4	29	17	171	1.45	[0.45; 4.66]	1.3%
Yang QX 2020	10	33	10	103	4.04	[1.51; 10.86]	1.7%
Zhang GQ 2020	7	55	15	166	1.47	[0.57; 3.81]	1.8%
Zhang HZ 2020	3	14	3	29	2.36	[0.41; 13.58]	0.7%
Zhang JG 2020	4	30	12	105	1.19	[0.35; 4.01]	1.2%
Zhang JJ (a) 2020	8	58	9	82	1.30	[0.47; 3.59]	1.6%
Zhang JJ (b) 2020	17	127	10	162	2.35	[1.04; 5.33]	2.2%
Zhang SY 2020	12	78	45	710	2.69	[1.35; 5.33]	2.7%
Zhang YT 2020	26	229	27	1121	5.19	[2.97; 9.08]	3.2%
Zhao XY 2020	1	30	2	61	1.02	[0.09; 11.69]	0.4%
Zhou Y 2020	42	117	42	260	2.91	[1.76; 4.80]	3.5%
Random effects model		**2986**		**10005**	**2.53**	**[2.16; 2.96]**	**76.6%**
Heterogeneity: $I^2 = 24\%$, $\chi^2 = 0.0616$, $p = 0.08$							

Possible cause of increased morbidity and mortality in patients with covid-19 disease and Diabetes

- Disorganization of the immune system (fuctional and quantitative in terms of T-cell expression and secretion)
- Presence of chronic complications and comorbidities.
- Glucotoxicity
- Endothelial damage
- Thrombotic microangiopathy
- Oxidative stress
- Cytokine storm



Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 2021



Ciolac et al, Frontiers in endocrinology, 2020

MAYO CLINIC

SPECIAL ARTICLE

Obesity and Outcomes in COVID-19: When an Epidemic and Pandemic Collide

Check for updates

Fabian Sanchis-Gomar, MD, PhD; Carl J. Lavie, MD; Mandeep R. Mehra, MD, MSc; Brandon Michael Henry, MD; and Giuseppe Lippi, MD

Abstract

Obesity has reached epidemic proportions in the United States and in much of the westernized world, contributing to considerable morbidity. Several of these obesity-related morbidities are associated with greater risk for death with coronavirus disease 2019 (COVID-19). Severe acute respiratory syndrome coronavirus 2 penetrates human cells through direct binding with angiotensin-converting enzyme 2 receptors on the cell surface. Angiotensin-converting enzyme 2 expression in adipose tissue is higher than that in lung tissue, which means that adipose tissue may be vulnerable to COVID-19 infection. Obese patients also have worse outcomes with COVID-19 infection, including respiratory failure, need for mechanical ventilation, and higher mortality. Clinicians need to be more aggressive when treating obese, especially severely obese, patients with COVID-19 infection.

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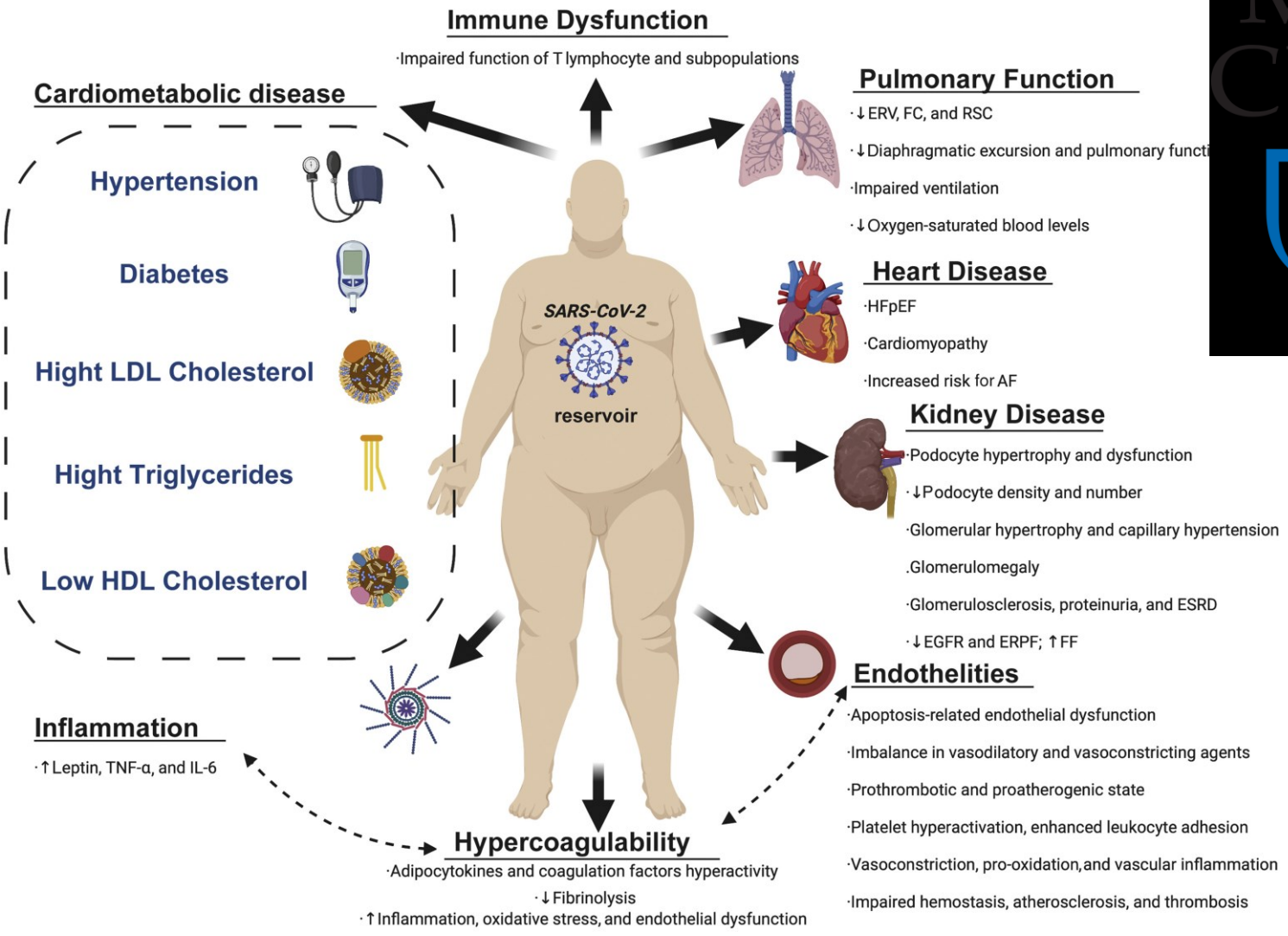
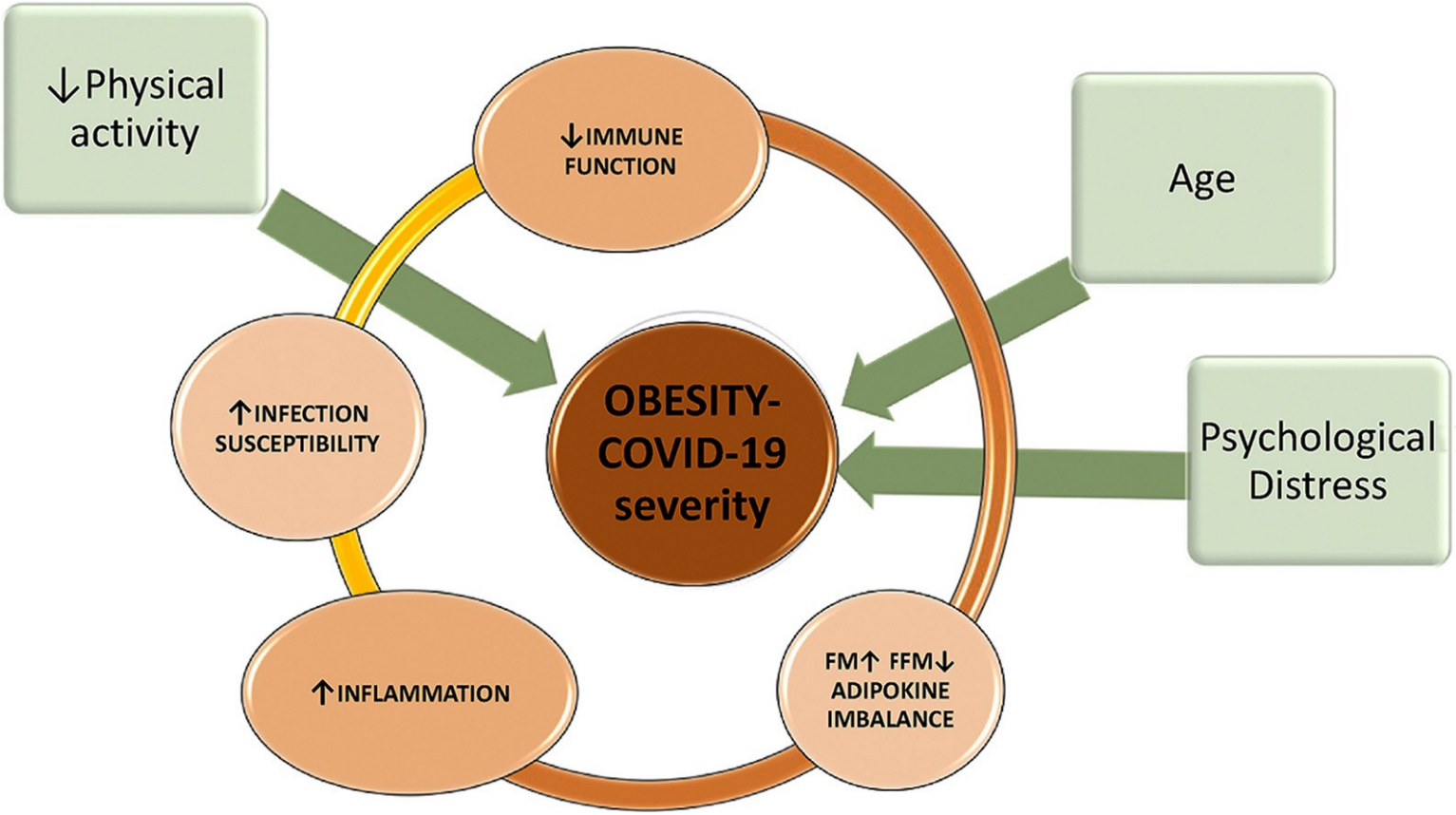

Immune Dysfunction
·Impaired function of T lymphocyte and subpopulations
Cardiometabolic disease
Hypertension
Diabetes
Hight LDL Cholesterol
Hight Triglycerides
Low HDL Cholesterol
SARS-CoV-2
reservoir
Pulmonary Function
·↓ERV, FC, and RSC
·↓Diaphragmatic excursion and pulmonary functi
·Impaired ventilation
·↓Oxygen-saturated blood levels
Heart Disease
·HFpEF
·Cardiomyopathy
·Increased risk for AF
Kidney Disease
·Podocyte hypertrophy and dysfunction
·↓Podocyte density and number
·Glomerular hypertrophy and capillary hypertension
.Glomerulomegaly
·Glomerulosclerosis, proteinuria, and ESRD
·↓EGFR and ERPF; ↑FF
Endothelities
·Apoptosis-related endothelial dysfunction
·Imbalance in vasodilatory and vasoconstricting agents
·Prothrombotic and proatherogenic state
·Platelet hyperactivation, enhanced leukocyte adhesion
·Vasoconstriction, pro-oxidation,and vascular inflammation
·Impaired hemostasis, atherosclerosis, and thrombosis
Inflammation
·↑Leptin, TNF-α, and IL-6
Hypercoagulability
·Adipocytokines and coagulation factors hyperactivity
·↓Fibrinolysis
·↑Inflammation, oxidative stress, and endothelial dysfunction

Diabetes - Obesity - Covid 19



Cava et al, Clinical Nutrition 2021

Diabetes, Drug Treatment and Mortality in COVID-19: A Multinational Retrospective Cohort Study

Running Title: Treatment for Diabetes and COVID-19 Outcomes

*§Jennifer E. Nyland PhD, *Nazia T. Raja-Khan MD, Kerstin Bettermann MD, PhD, Philippe A. Haouzi MD, PhD, Douglas L. Leslie, PhD, Jennifer L. Kraschnewski MD, MPH, Leslie J. Parent MD & *§Patricia Sue Grigson PhD

Abstract

Patients with type 2 diabetes mellitus (T2DM) are at increased risk of severe COVID-19 outcomes possibly due to dysregulated inflammatory responses. Glucose-regulating medications such as glucagon-like peptide-1 receptor (GLP-1R) agonists, dipeptidyl peptidase-4 (DPP-4) inhibitors, and pioglitazone are known to have anti-inflammatory effects that may improve outcomes in patients with SARS-CoV-2 infection. In a multinational retrospective cohort study, we used the TriNetX COVID-19 Research Network of 56 large healthcare organizations to examine these medications in relation to the incidence of hospital admissions, respiratory complications, and mortality within 28 days following a COVID-19 diagnosis. After matching for age, sex, race, ethnicity, body mass index, and significant comorbidities, use of GLP-1R agonists and/or pioglitazone was associated with significant reductions in hospital admissions (GLP-1R: 15.7% vs 23.5%; RR, 0.67 [95% CI, 0.57-0.79]; P <.001; pioglitazone: 20.0% vs 28.2%; RR, 0.71 [95% CI, 0.54-0.93]; P =.01). Use of GLP-1R agonists was also associated with reductions in respiratory complications (15.3% vs 24.9%; RR, 0.62 [95% CI, 0.52-0.73]; P <.001) and incidence of mortality (1.9% vs 3.3%; RR, 0.58 [95% CI, 0.35-0.97]; P =.04). Use of DPP-4 inhibitors was associated with a reduction in respiratory complications (24.0% vs 29.2%; RR, 0.82 [95% CI, 0.74-0.90]; P <.001), and continued use of DPP-4 inhibitors after hospitalization was associated with a decrease in mortality compared with those who discontinued use (9% vs 19%; RR, 0.45 [95% CI, 0.28-0.72]; P <.001). In conclusion, use of glucose-regulating medications such as GLP-1R agonists, DPP-4 inhibitors, or pioglitazone may improve outcomes for COVID-19 patients with T2DM; randomized clinical trials are needed to further investigate this possibility.

Short Communication

Post COVID-19 Syndrome ("Long COVID") and Diabetes: Challenges in Diagnosis and Management

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Keywords:
Diabetes
Long COVID
Post COVID syndrome
Sarcopenia
Fatigue
Tachycardia

A B S T R A C T

Background and Aims: Post Covid-19 syndrome (PCS) is a major cause of morbidity. In this article we intend to review the association and consequences of PCS and diabetes.
Methods: We reviewed all studies on "Long Covid", "Post COVID-19 Syndrome" and diabetes in PubMed and Google Scholar.
Results: The symptoms of PCS can be due to organ dysfunction, effects of hospitalisation and drugs, or unrelated to these. Type 2 diabetes mellitus has a bidirectional relationship with COVID-19. Presence of diabetes also influences PCS via various pathophysiological mechanisms. COVID-19 can add to or exacerbate tachycardia, sarcopenia (and muscle fatigue), and microvascular dysfunction (and organ damage) in patients with diabetes.
Conclusion: PCS in patients with diabetes could be detrimental in multiple ways. Strict control of diabetes and other comorbidities, supervised rehabilitation and physical exercise, and optimal nutrition could help in reducing and managing PCS.

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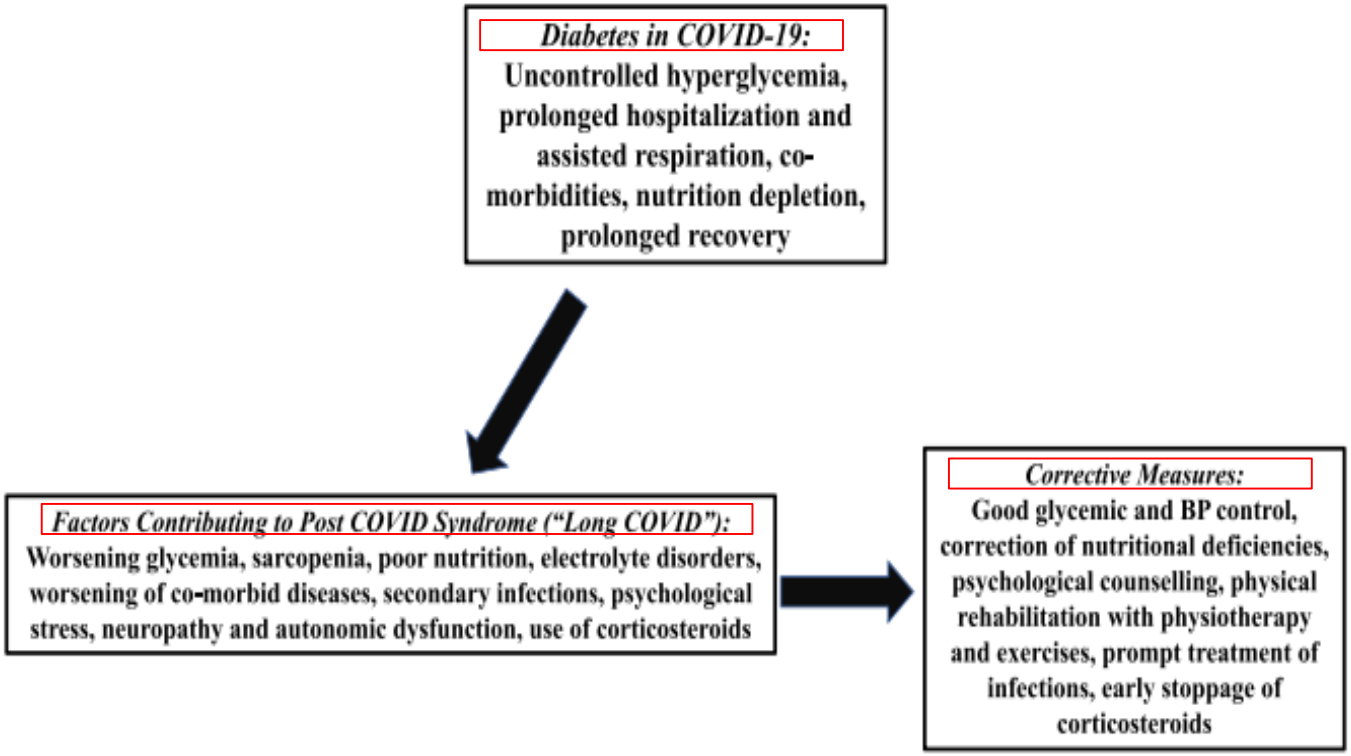

Fig. 1. Relationship between post COVID-19 syndrome and diabetes mellitus and suggested corrective measures.

In conclusion

- Good glycemic control can reduce the chance of poor outcome.
- Close monitoring of comorbidities to avoid complications and serious illness.
- Vaccination with booster dose , 6 months after the 2nd dose.
- Observe the measure to prevent and avoid to SARS-CoV-2 even after vaccination

Thank you