IMPACT OF SARS-CoV-2 ON CARDIOVASCULAR DISEASES

Gianfranco Parati

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Milan, Italy

DISCLOSURES

Gianfranco Parati

No confict of interest in relation to this topic

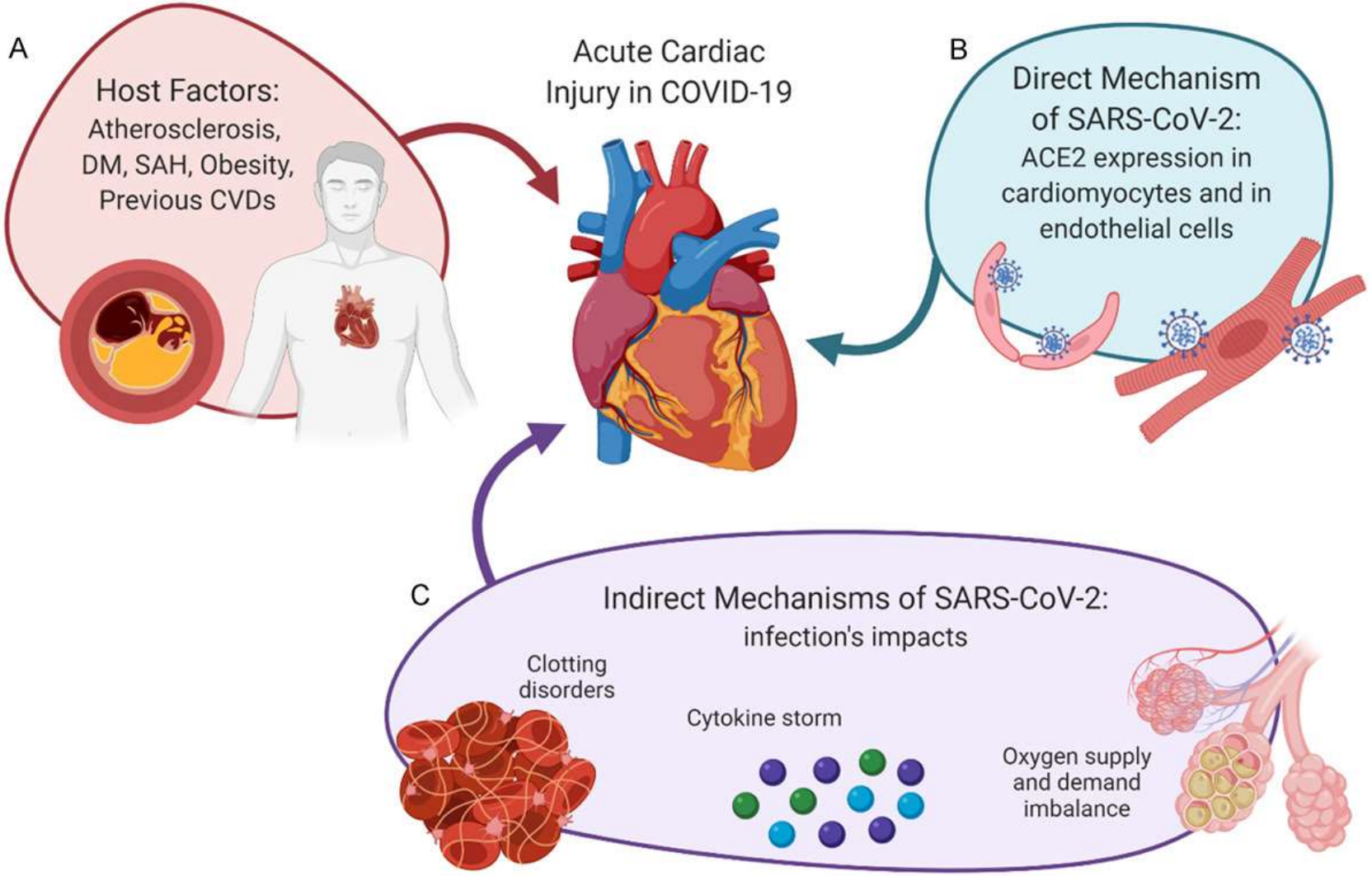
COVID-19 and Cardiovascular Diseases

1. Direct Impact of SARS-CoV-2 on Cardiovascular System
2. Impact of COVID-19 on CV Diseases Management
3. Role of Telemedicine for CV Patients Care.

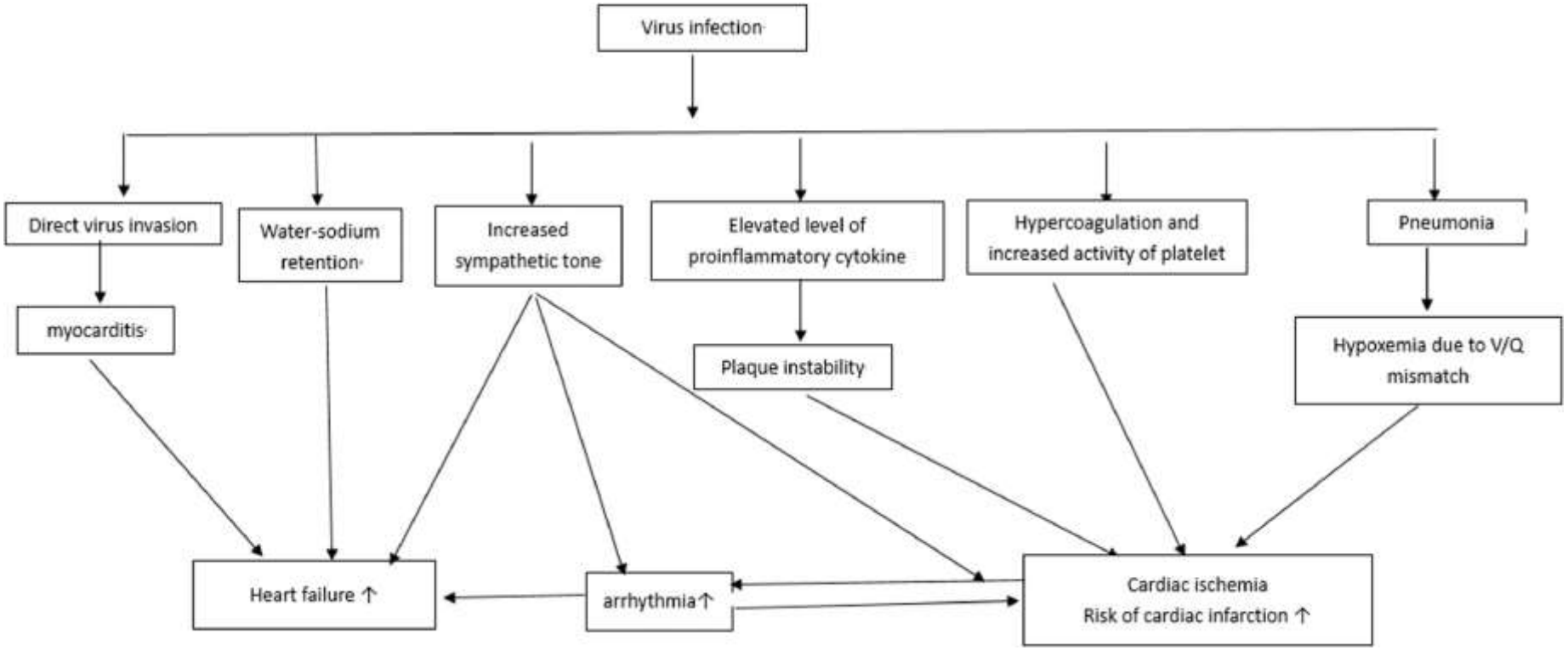
COVID-19 and Cardiovascular Diseases

1. **Direct Impact of SARS-CoV-2 on Cardiovascular System**
2. **Impact of COVID-19 on CV Diseases Management**
3. **Role of Telemedicine for CV Patients Care.**

Possible Mechanisms of Acute Cardiac Injury in COVID-19

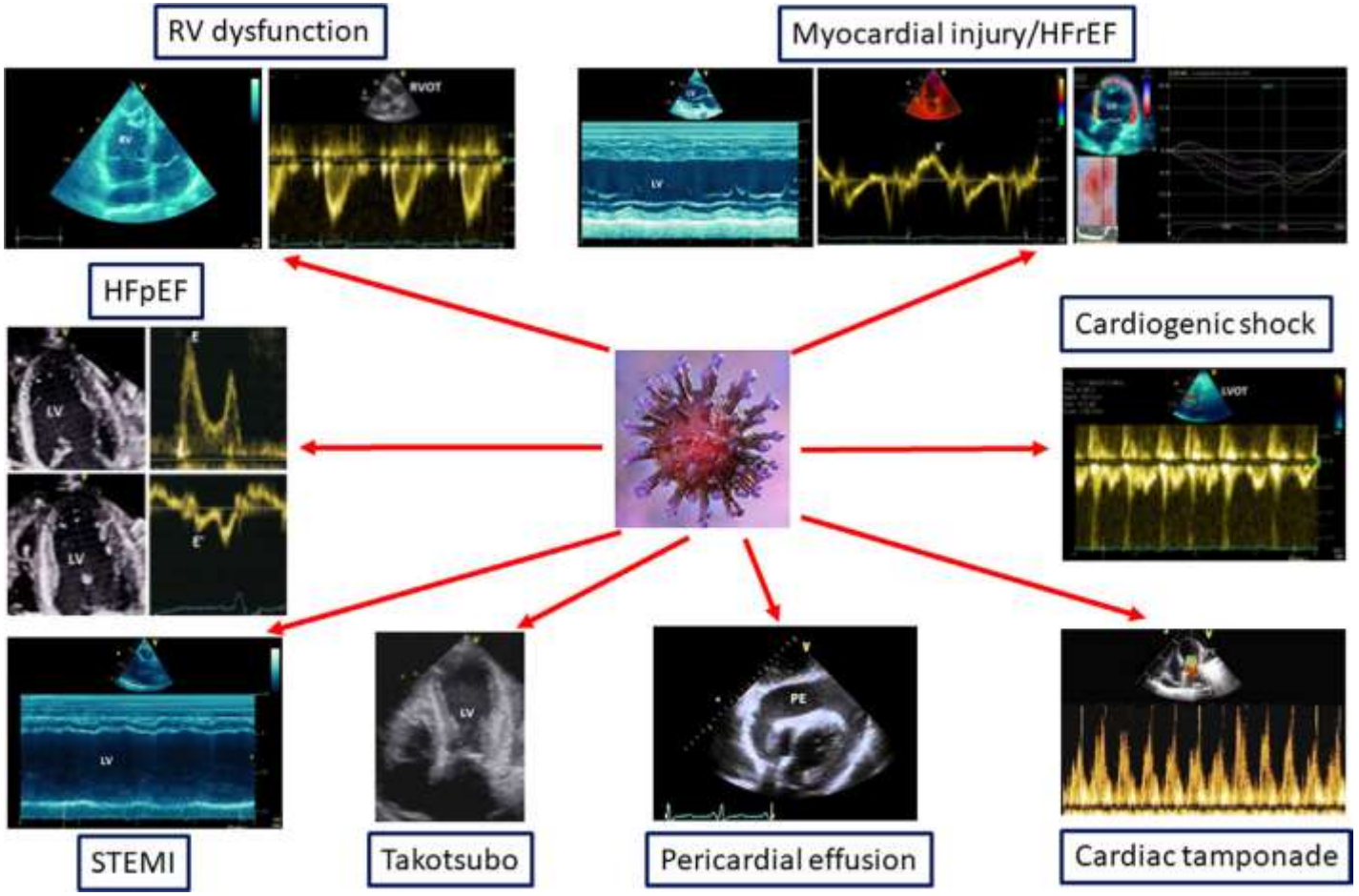


Cardiovascular complications in COVID-19



Lulu Ma, et al. Coronavirus Disease-2019 (COVID-19) and Cardiovascular Complications. Journal of Cardiothoracic and Vascular Anesthesia DOI: 10.1053/j.jvca.2020.04.041

Spectrum of **cardiovascular syndromes and echocardiographic abnormalities** in patients with COVID-19 infection.



Capotosto L, et al. **Heart, COVID-19, and echocardiography.** Echocardiography. 2020;00:1–11.

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 76, NO. 18, 2020

PUBLISHED BY ELSEVIER

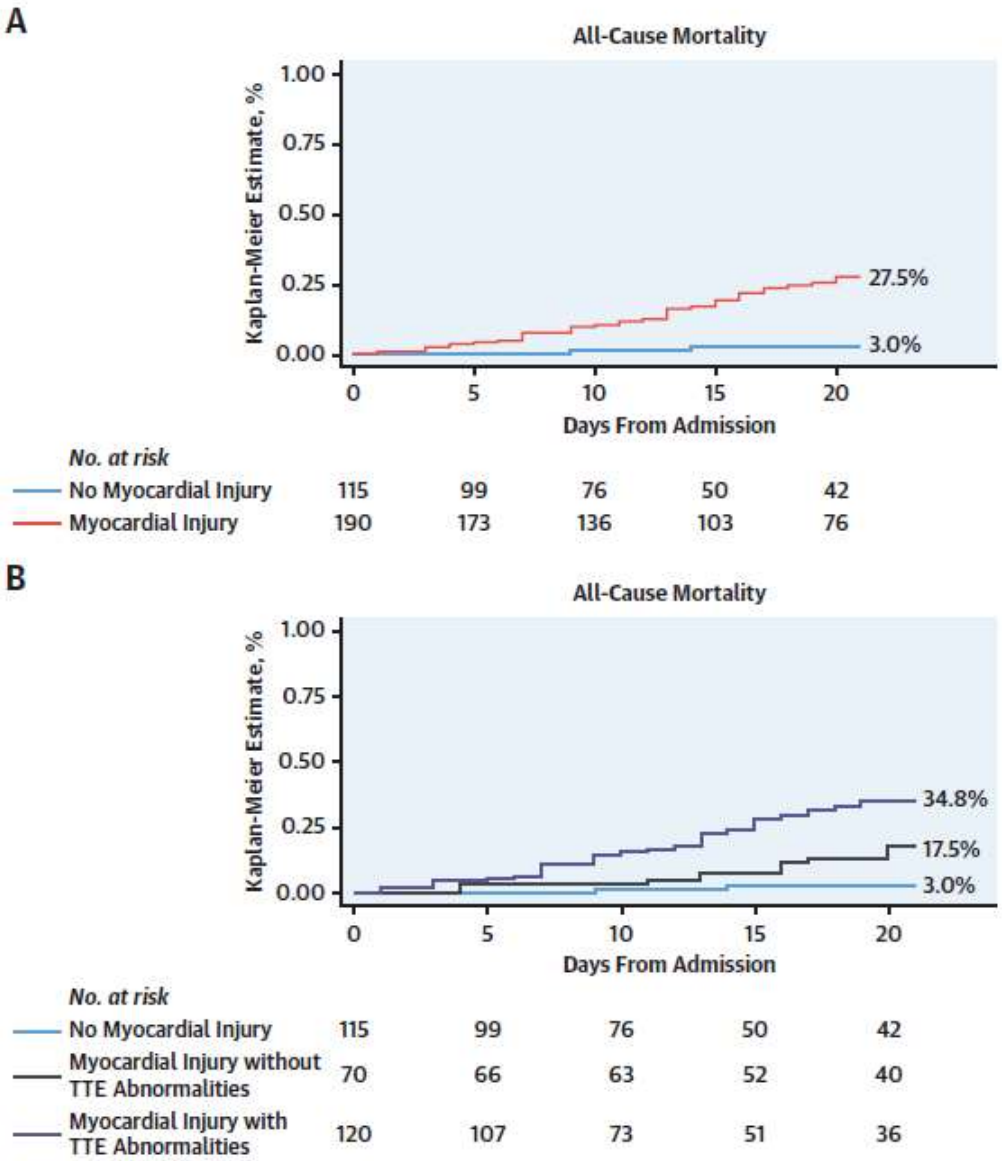
ORIGINAL INVESTIGATIONS

Characterization of Myocardial Injury in Patients With COVID-19

Gennaro Giustino, MD,[a,*,†] Lori B. Croft, MD,[a,*] Giulio G. Stefanini, MD, PhD,[b,†] Renato Bragato, MD,[b] Jeffrey J. Silbiger, MD,[c] Marco Vicenzi, MD,[d,e] Tatyana Danilov, MD,[f] Nina Kukar, MD,[g] Nada Shaban, MD,[h] Annapoorna Kini, MD,[a] Anton Camaj, MD, MS,[a] Solomon W. Bienstock, MD,[a] Eman R. Rashed, MD,[a,c] Karishma Rahman, MD, PhD,[a] Connor P. Oates, MD,[a] Samantha Buckley, BS,[a] Lindsay S. Elbaum, MD,[a,c] Derya Arkonac, MD,[f] Ryan Fiter, MD,[a] Ranbir Singh, MD,[a] Emily Li, MD,[a] Victor Razuk, MD,[a] Sam E. Robinson, MD,[c] Michael Miller, MS,[a] Benjamin Bier, MD,[a] Valeria Donghi, MD,[b] Marco Pisaniello, MD,[d] Riccardo Mantovani, MD,[b] Giuseppe Pinto, MD,[b] Irene Rota, MD,[d] Sara Baggio, MD,[b] Mauro Chiarito, MD,[b] Fabio Fazzari, MD,[b] Ignazio Cusmano, MD,[e] Mirko Curzi, MD,[b] Richard Ro, MD,[a] Waqas Malick, MD,[a] Mazullah Kamran, MD,[c] Roopa Kohli-Seth, MD,[i] Adel M. Bassily-Marcus, MD,[i] Eric Neibart, MD,[a] Gregory Serrao, MD,[a] Gila Perk, MD,[a] Donna Mancini, MD,[a] Vivek Y. Reddy, MD,[a] Sean P. Pinney, MD,[a] George Dangas, MD, PhD,[a] Francesco Blasi, MD, PhD,[j,k] Samin K. Sharma, MD,[a] Roxana Mehran, MD,[a] Gianluigi Condorelli, MD,[b] Gregg W. Stone, MD,[a] Valentin Fuster, MD, PhD,[a,l] Stamatios Lerakis, MD, PhD,[a,‡] Martin E. Goldman, MD[a,‡]

CONCLUSIONS Among patients with COVID-19 who underwent TTE, cardiac structural abnormalities were present in nearly two-thirds of patients with myocardial injury. Myocardial injury was associated with increased in-hospital mortality particularly if echocardiographic abnormalities were present. (J Am Coll Cardiol 2020;76:2043-55) © 2020 by the American College of Cardiology Foundation.

FIGURE 1 In-Hospital Mortality in Patients With COVID-19, Myocardial Injury, and Echocardiographic Abnormalities



Kaplan-Meier curves for all-cause mortality in patients with versus without myocardial injury **(A)** and in patients with versus without myocardial injury according to the presence or absence of major echocardiographic abnormalities **(B)**. Includes wall motion abnormalities, global left ventricular dysfunction, diastolic dysfunction, right ventricular dysfunction, and presence of pericardial effusion. Event rates are censored at 20 days from hospital admission. TTE = transthoracic echocardiography.

ESC European Society of Cardiology

European Journal of Heart Failure (2020)
doi:10.1002/ejhf.2058

RESEARCH ARTICLE

Haemodynamic characteristics of COVID-19 patients with acute respiratory distress syndrome requiring mechanical ventilation. An invasive assessment using right heart catheterization

Sergio Caravita[1,2†], Claudia Baratto[1,3†], Fabiano Di Marco[4], Alice Calabrese[5], Giulio Balestrieri[5], Filippo Russo[6], Andrea Faini[1], Davide Soranna[1], Giovanni Battista Perego[1], Luigi P. Badano[1,3], Lorenzo Grazioli[6], Ferdinando Luca Lorini[6], Gianfranco Parati[1,3*‡], and Michele Senni[5‡]

ESC European Society of Cardiology
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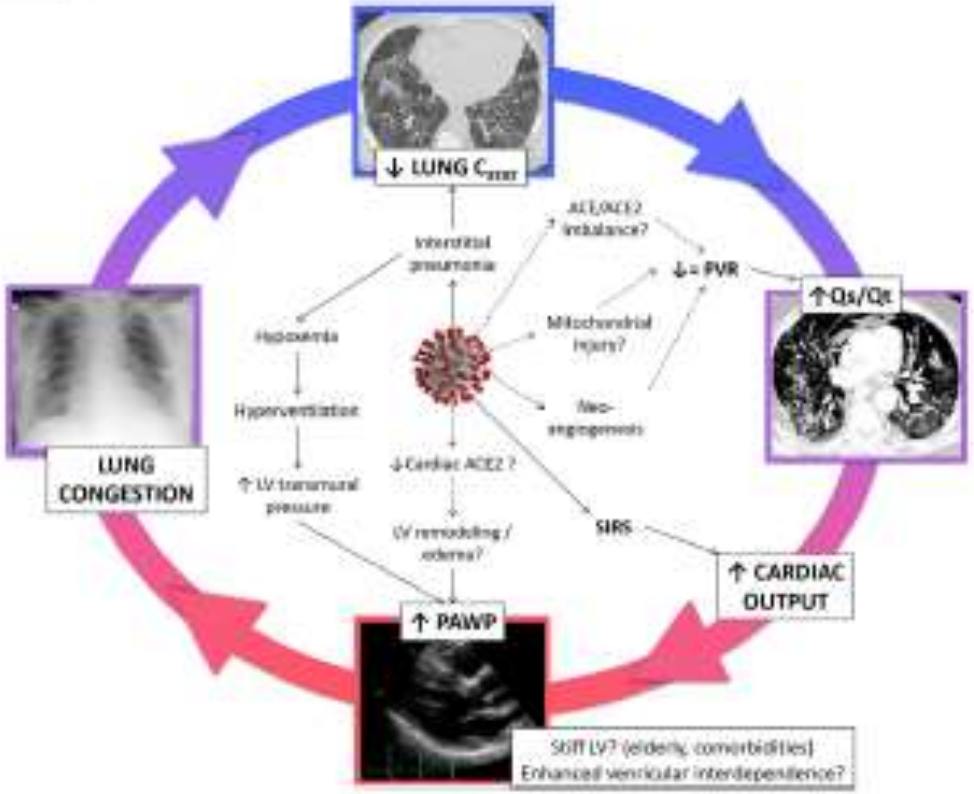
RESEARCH ARTICLE

Haemodynamic characteristics of COVID-19 patients with acute respiratory distress syndrome requiring mechanical ventilation. An invasive assessment using right heart catheterization



Vicious circle between the lung and the heart in COVID-19. Coronavirus-2 causes an interstitial pneumonia characterized by low lung compliance. The ventilation/perfusion mismatch of non-ventilated but perfused lung zones is enhanced by specific virus-related mechanisms, with blunted hypoxic pulmonary vasoconstriction and normal PVR, further promoting the intrapulmonary shunt. High cardiac output due to acute inflammation and hypoxaemia, with low PVR and unimpeded left ventricular preload, predisposes to high filling pressure, which might be favoured by patient characteristics (elderly with cardiovascular comorbidities) and further exacerbated by virus-related cardiac remodelling. High left ventricular filling pressure promotes lung congestion with further reduction of lung compliance. ACE, angiotensin-converting enzyme; C_{STAT}, static lung compliance; LV, left ventricle; PAWP, pulmonary artery wedge pressure; PVR, pulmonary vascular resistance; Qs/Qt, intrapulmonary shunt; SIRS, systemic inflammatory response syndrome.

COVID-19 thromboembolic complications

DECT. Multiple iodine map "perfusion defects" in a case of CTEPH (white stars). Note also an increased RV:LV ratio with mild paradoxical bowing of the interventricular septum (black arrows).

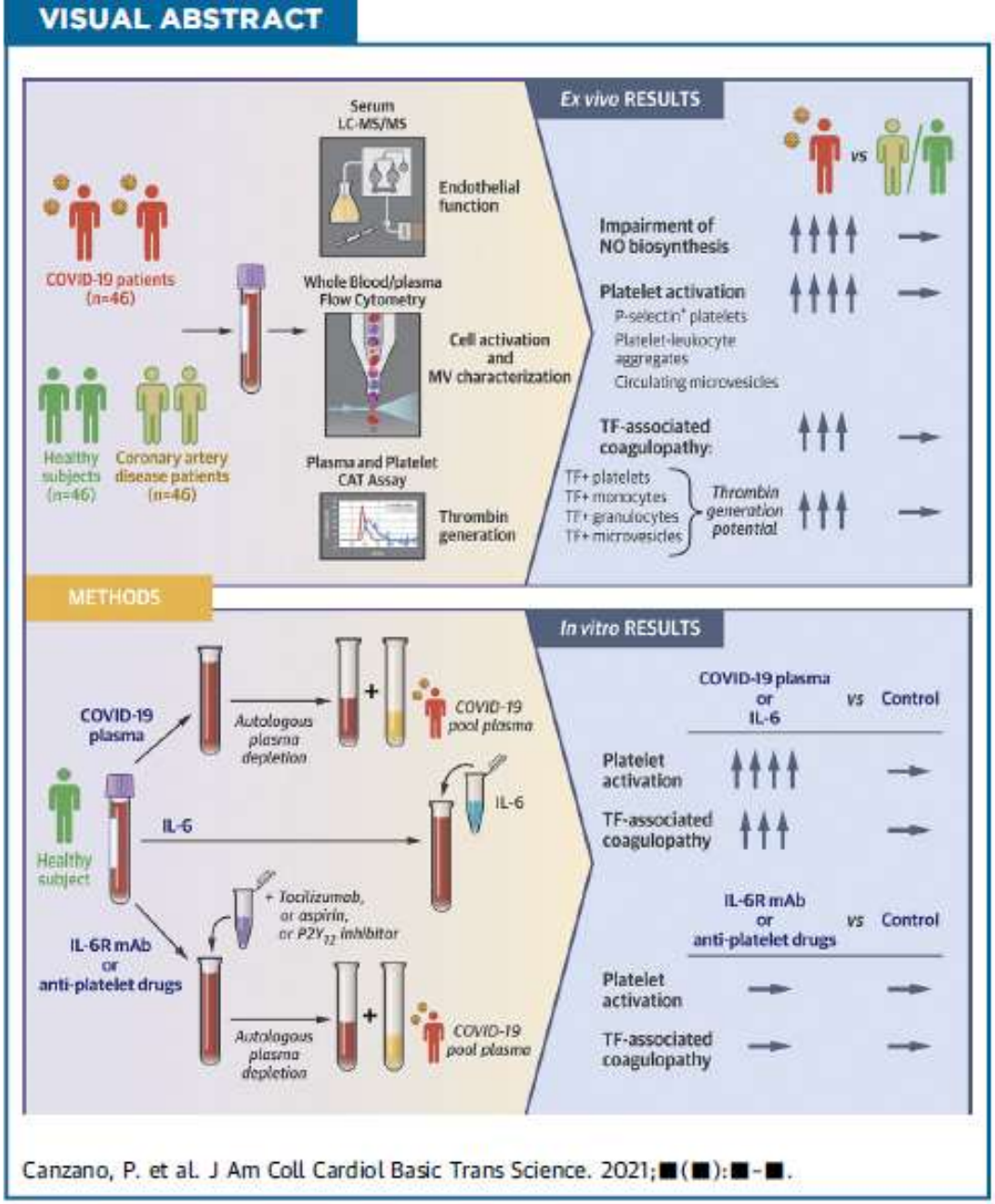
R. McStay et al. / Clinical Radiology 76 (2021) 74.e1e74.e14

JACC: BASIC TO TRANSLATIONAL SCIENCE VOL. ■, NO. ■, 2021

NEW RESEARCH PAPER

Platelet and Endothelial Activation as Potential Mechanisms Behind the Thrombotic Complications of COVID-19 Patients

Paola Canzano, PhD,[a,*] Marta Brambilla, PhD,[a,*] Benedetta Porro, PhD,[a] Nicola Cosentino, MD, PhD,[a] Elena Tortorici, MD,[b] Stefano Vicini, MD,[b] Paolo Poggio, PhD,[a] Andrea Cascella, MD,[b] Martino F. Pengo, MD, PhD,[b] Fabrizio Veglia, PhD,[a] Susanna Fiorelli, PhD,[a] Alice Bonomi, PhD,[a] Viviana Cavalca, PhD,[a] Daniela Trabattoni, MD,[a] Daniele Andreini, MD, PhD,[a] Emanuela Omodeo Salè, PhD,[a] Gianfranco Parati, MD,[b] Elena Tremoli, PhD,[a,†] Marina Camera, PhD[a,c,†]



JACC: BASIC TO TRANSLATIONA L SCIENCE VOL. 6, NO. 3, 2021 Canzano et al.
MARCH 2021:202 – 218 COVID-19: Platelet and Endothelial Activation

COVID-19 and Cardiovascular Diseases

1. COVID-19 and Cardiovascular Patients Care in Milano
2. Direct impact of SARS-CoV-2 on Cardiovascular System
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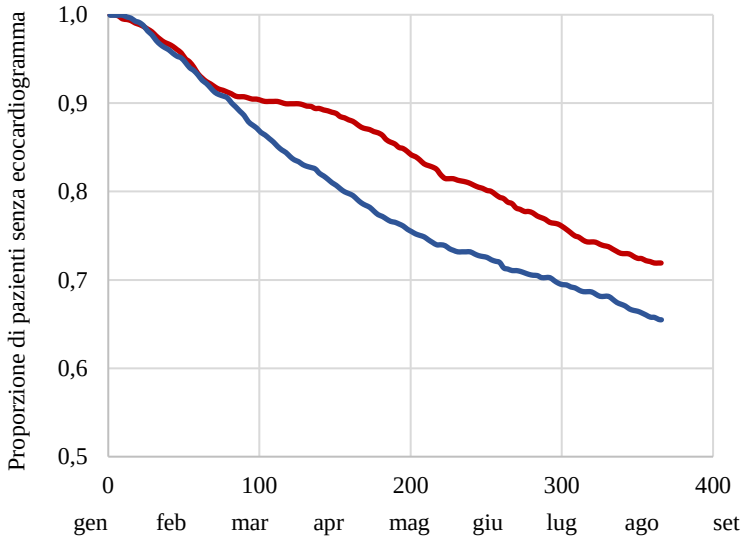
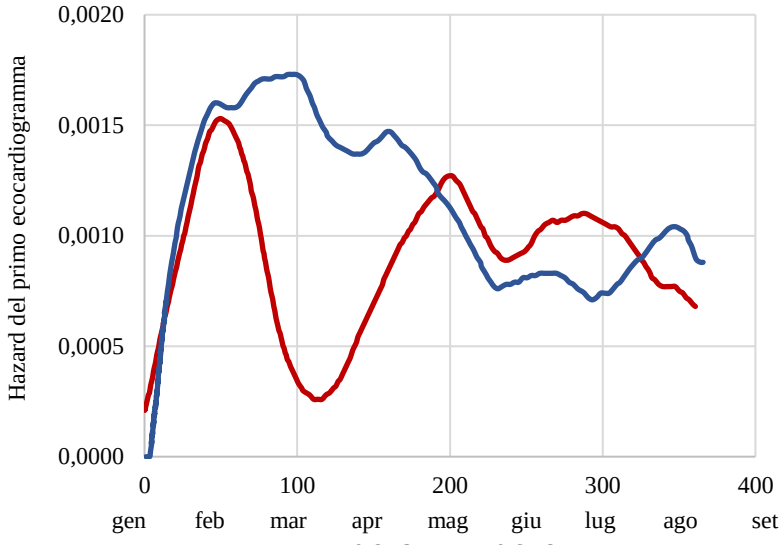
4. Role of Telemedicine for CV Patients Care.

Social Isolation
No Access to Cardiology Clinics

Cardiac Ultrasounds Test performed in Heart Failure Patients - Lombardy Region

Courtesy of G.Corrao and F.Rea



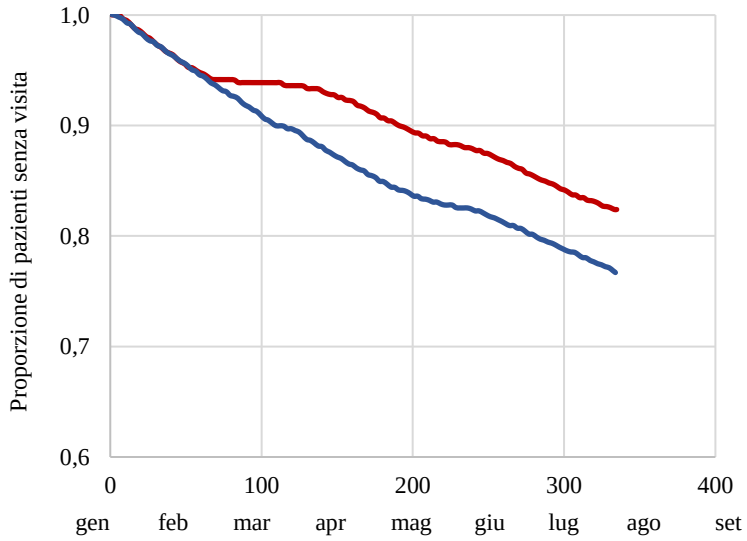


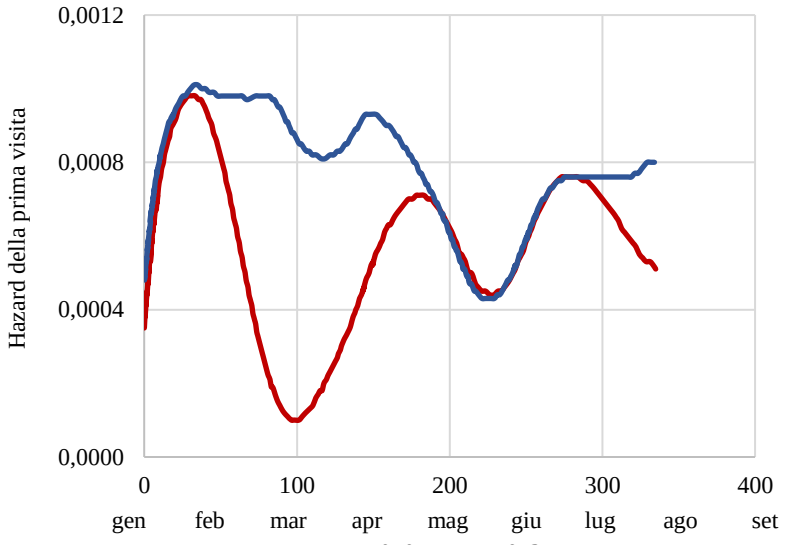
2020

2019

Clinic Cardiology Consultation of Hypertensive Patients under Antihypertensive Treatment - Lombardy Region

Courtesy of G.Corrao and F.Rea



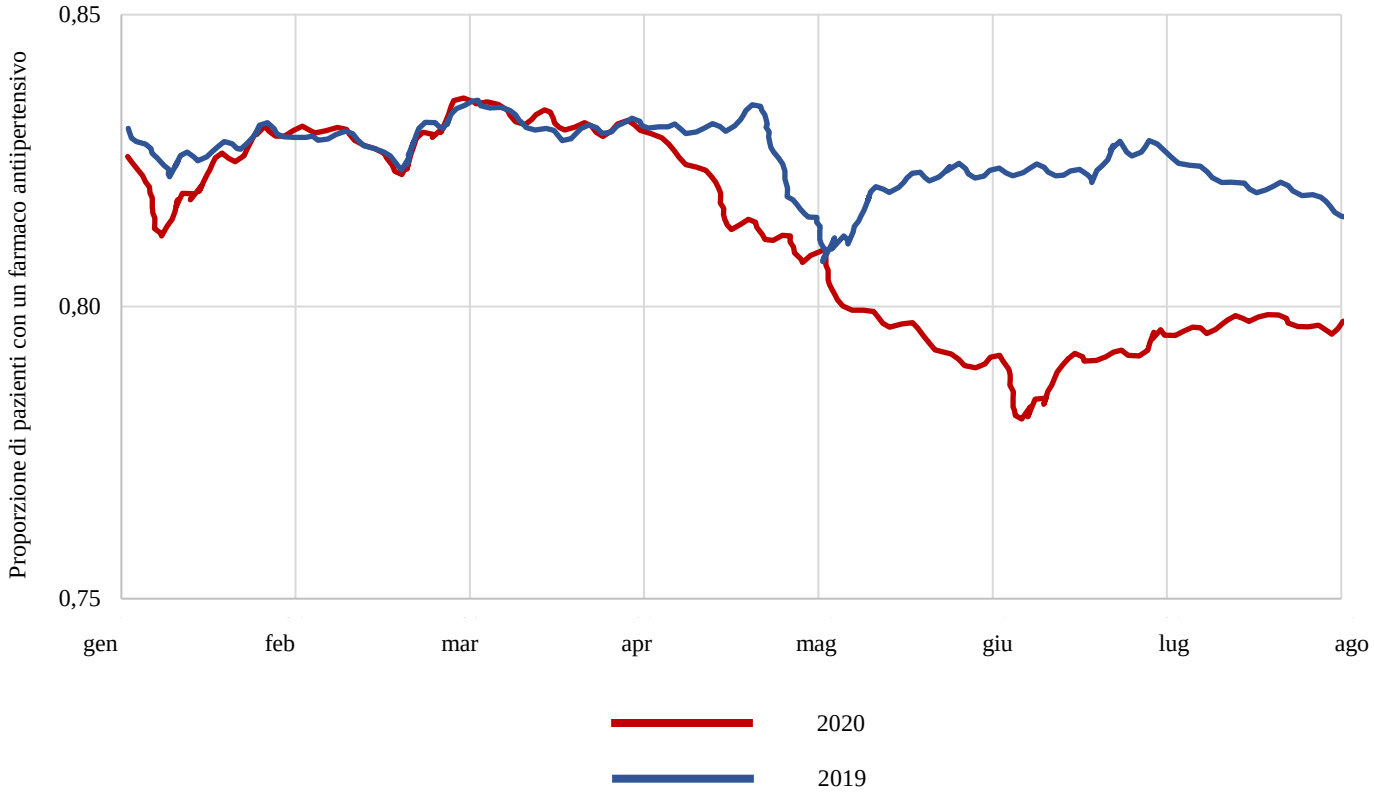


2020

2019

Proportion of Hypertensive Patients with an Antihypertensive Drug Available - Lombardy Region

Courtesy of G.Corrao and F.Rea



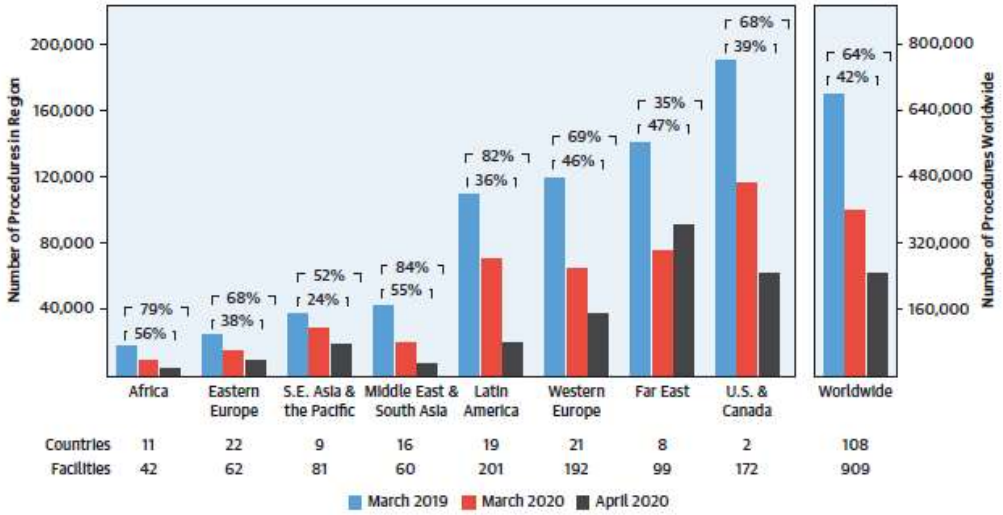
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 77, NO. 2, 2021

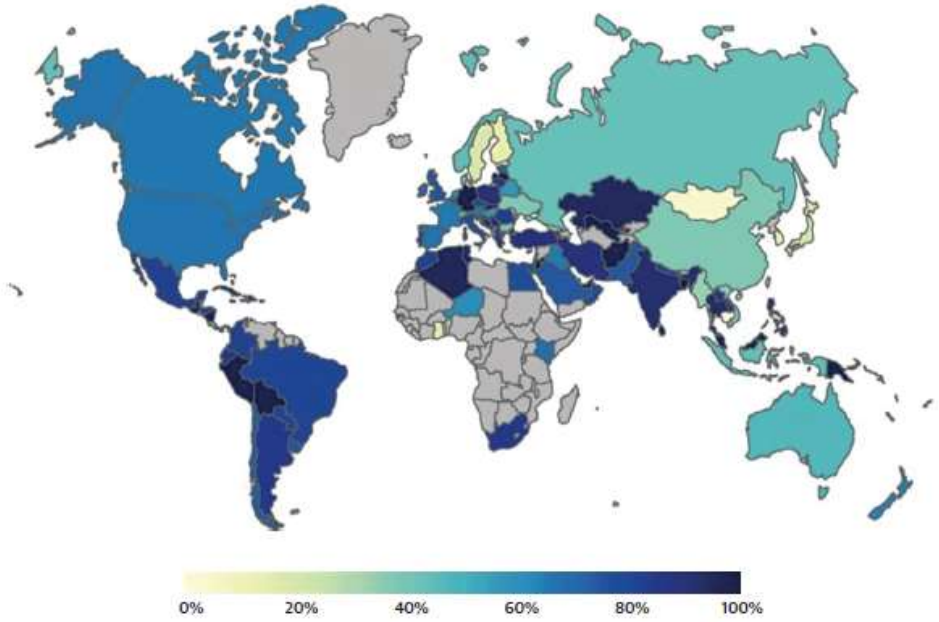
International Impact of COVID-19 on the Diagnosis of Heart Disease

Andrew J. Einstein, MD, PhD,[a,b,c] Leslee J. Shaw, PhD,[d] Cole Hirschfeld, MD,[b] Michelle C. Williams, MBChB, PhD,[e] Todd C. Villines, MD,[f] Nathan Better, MB, BS,[g] Joao V. Vitola, MD, PhD,[h] Rodrigo Cerci, MD,[h] Sharmila Dorbala, MD, MPH,[i] Paolo Raggi, MD, PhD,[j] Andrew D. Choi, MD,[k] Bin Lu, MD,[l] Valentin Sinitsyn, MD, PhD,[m] Vladimir Sergienko, MD, PhD,[n] Takashi Kudo, MD, PhD,[o] Bjarne Linde Nørgaard, MD, PhD,[p] Pál Maurovich-Horvat, MD, PhD, MPH,[q] Roxana Campisi, MD,[r] Elisa Milan, MD,[s] Lizette Louw, MD,[t] Adel H. Allam, MD,[u] Mona Bhatia, MD,[v] Eli Malkovskiy,[a,b,w] Benjamin Goebel, BA,[d] Yosef Cohen, BA,[x] Michael Randazzo, MD,[b] Jagat Narula, MD,[y] Thomas N.B. Pascual, MD, MHPEd,[z] Yaroslav Pynda, MSc,[aa] Maurizio Dondi, MD, PhD,[aa] Diana Paez, MD, MEd,[aa] on behalf of the INCAPS COVID Investigators Group

CONCLUSIONS COVID-19 was associated with a significant and abrupt reduction in cardiovascular diagnostic testing across the globe, especially affecting the world's economically challenged. Further study of cardiovascular outcomes and COVID-19–related changes in care delivery is warranted. (J Am Coll Cardiol 2021;77:173–85) © 2021 The Authors. Pub-

CENTRAL ILLUSTRATION Reduction in Worldwide Cardiovascular Disease Diagnostic Testing Volume in the Beginning of the Coronavirus Disease 2019 Pandemic (March and April 2020)





Einstein, A.J. et al. J Am Coll Cardiol. 2021;77(2):173-85.

OPEN ACCESS

ORIGINAL RESEARCH

Monitoring indirect impact of COVID-19 pandemic on services for cardiovascular diseases in the UK

Simon Ball,[1,2] Amitava Banerjee ,[3,4,5] Colin Berry ,[6,7] Jonathan R Boyle,[8,9] Benjamin Bray,[10] William Bradlow,[11] Afzal Chaudhry,[12] Rikki Crawley,[13] John Danesh,[8,12] Alastair Denniston,[1,2] Florian Falter,[14] Jonine D Figueroa,[15] Christopher Hall,[16] Harry Hemingway ,[3,5] Emily Jefferson,[17,18] Tom Johnson,[19] Graham King,[20] Kuan Ken Lee ,[21] Paul McKean,[20] Suzanne Mason,[22,23] Nicholas L Mills ,[15,18,24] Ewen Pearson,[17,18] Munir Pirmohamed,[22,25] Michael T C Poon ,[15,26] Rouven Priedon,[27] Anoop Shah,[28] Reecha Sofat,[4,29] Jonathan A C Sterne,[30] Fiona E Strachan,[31] Cathie L M Sudlow,[15,18,27] Zsolt Szarka,[16] William Whiteley,[32] Michael Wyatt,[19] CVD-COVID-UK Consortium

Ball S, *et al*. *Heart* 2020;**106**:1890–1897. doi:10.1136/heartjnl-2020-317870

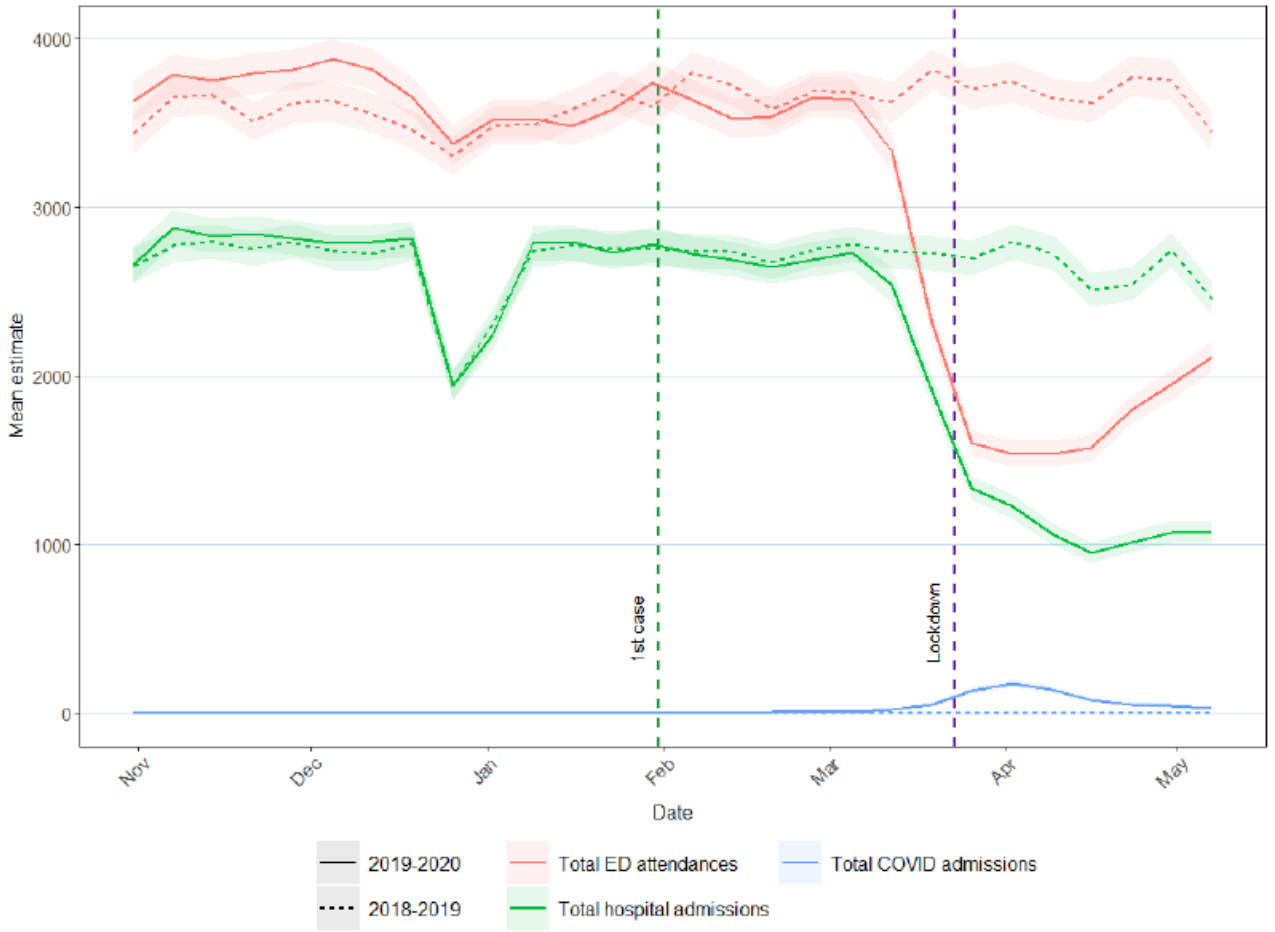


Figure 1 Overall hospital activity (admissions, ED attendances and COVID-19 admissions) between 31 October 2019 and 10 May 2020 compared with the same weeks from 2018 to 2019. Lines describe the mean hospital activities in 2019–2020 (solid) and 2018–2019 (dotted). Shading represents 95% CI of the respective hospital activity. The first case of COVID-19 was on 31 January 2020 and lockdown started on 23 March 2020. ED, emergency department.

Ball S, *et al*. *Heart* 2020;**106**:1890–1897. doi:10.1136/heartjnl-2020-317870

Neth Heart J
https://doi.org/10.1007/s12471-021-01554-x

Impact of COVID-19 outbreak on hospital admissions and outcome of acute coronary syndromes in a single high-volume centre in southeastern Europe

M. Petrović · A. Milovančev · M. Kovačević · T. Miljković · A. Ilić · A. Stojšić-Milosavljević · M. Golubović

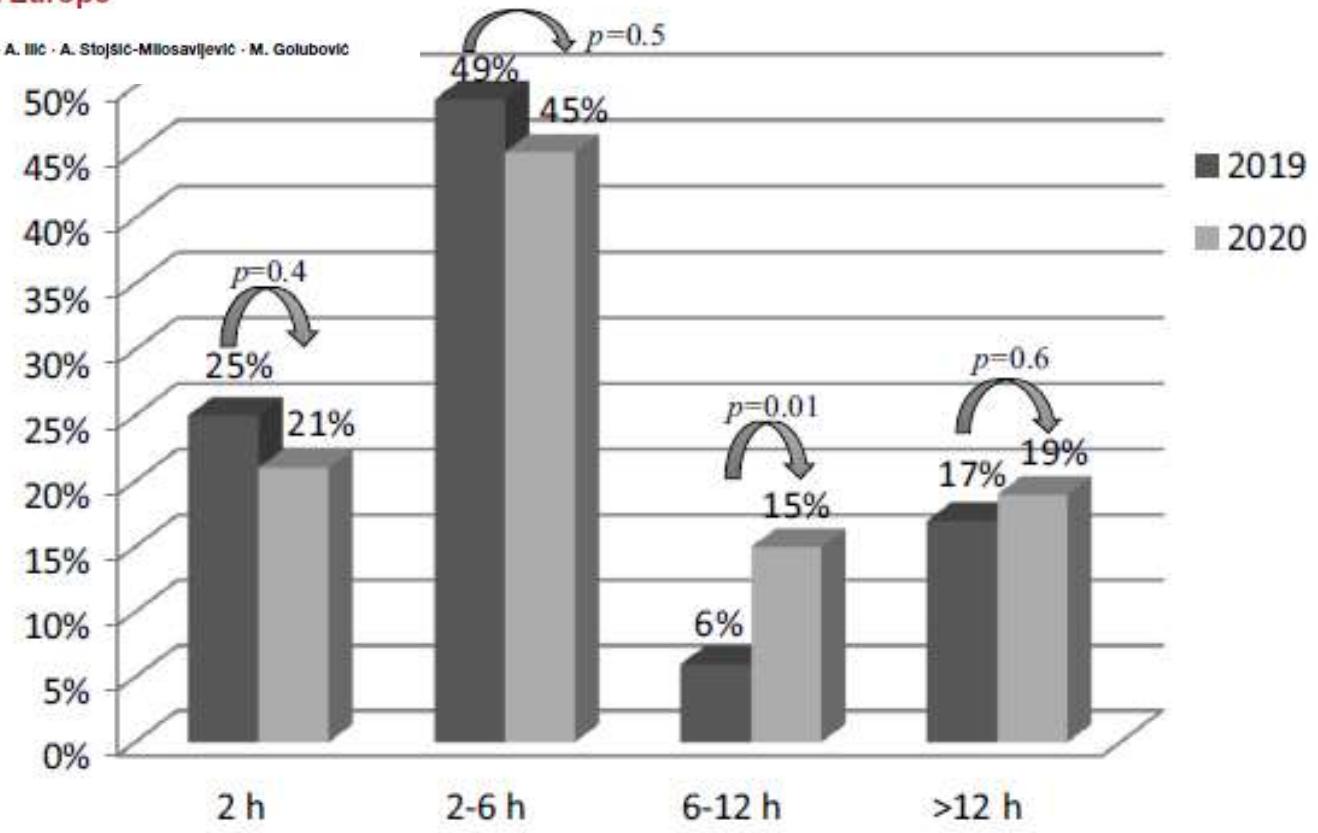


Fig. 1 Time from onset of symptoms until hospital admission for patients with ST-elevation myocardial infarction before (2019) and during (2020) the COVID-19 outbreak

Journal of the American Heart Association

ORIGINAL RESEARCH

Impact of Coronavirus Disease 2019 Pandemic on the Incidence and Management of Out-of-Hospital Cardiac Arrest in Patients Presenting With Acute Myocardial Infarction in England

Muhammad Rashid (Hons), PhD; Chris P. Gale (Hons), PhD; Nick Curzen (Hons), PhD; Peter Ludman (Hons), MD; Mark De Belder (Hons), MD; Adam Timmis (Hons), PhD; Mohamed O. Mohamed (Hons), MBChB; Thomas F. Lüscher (Hons), MD; Julian Hains (Hons), BA(Hons); Jianhua Wu, PhD; Ahmad Shoaib, MD; Evangelos Kontopantelis, PhD; Chris Roebuck, MSc; Tom Denwood, MSc; John Deanfield, FRCP; Mamas A. Mamas, DPhil

J Am Heart Assoc. 2020;9:e018379. DOI: 10.1161/JAHA.120.018379

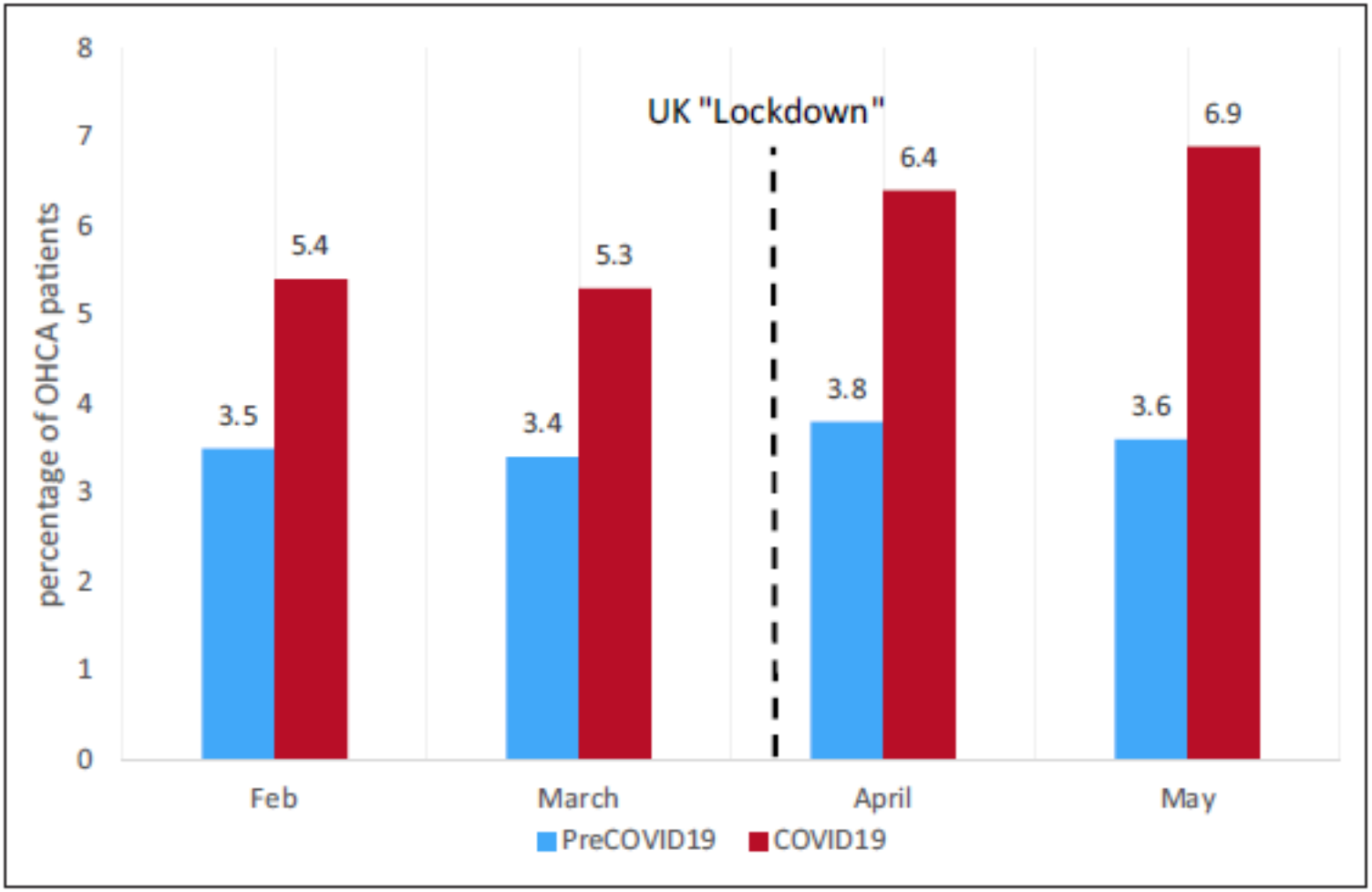


Figure 1. Temporal trends of monthly proportions of patients with acute myocardial infarction presenting with out-of-hospital cardiac arrest (OHCA) before and during coronavirus disease 2019 (COVID-19) pandemic in England.
COVID-19 period indicates February 1, 2020, to May 14, 2020; pre–COVID-19 period, February 1, 2019, to May 14, 2019; and UK lockdown, March 22, 2020.

J Am Heart Assoc. 2020;9:e018379. DOI: 10.1161/JAHA.120.018379

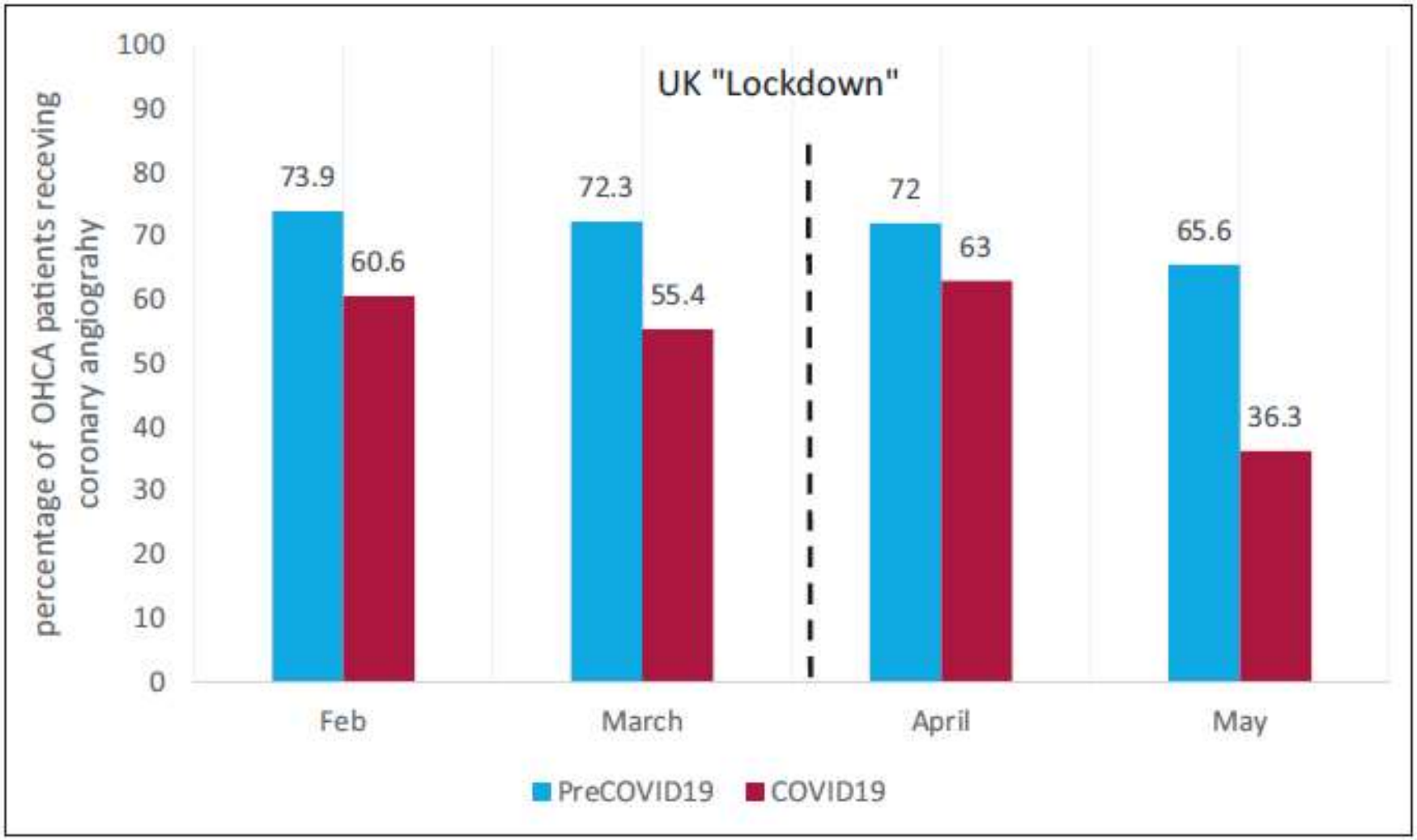


Figure 3. Temporal trends in rates of coronary angiography use in management of patients with out-of-hospital cardiac arrest (OHCA) before and during coronavirus disease 2019 (COVID-19) pandemic in England.

COVID-19 period indicates February 1, 2020, to May 14, 2020; pre–COVID-19 period, February 1, 2019, to May 14, 2019; and UK lockdown, March 22, 2020.

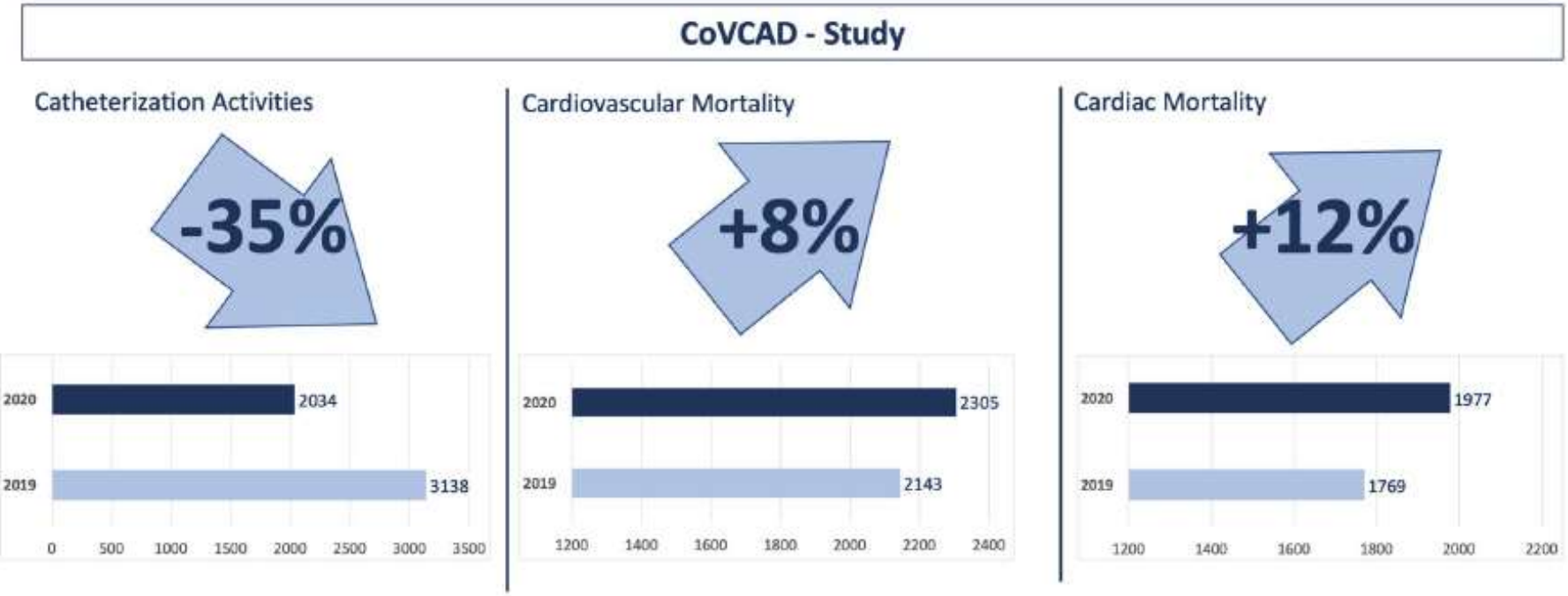
J Am Heart Assoc. 2020;9:e018379. DOI: 10.1161/JAHA.120.018379

Clinical Research in Cardiology (2021) 110:292–301
https://doi.org/10.1007/s00392-020-01780-0

ORIGINAL PAPER

Impact of the COVID-19 pandemic on cardiovascular mortality and catherization activity during the lockdown in central Germany: an observational study

Graphic abstract



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ISTITUTO AUXOLOGICO ITALIANO
Istituto di ricovero e cura a carattere scientifico

TELEMEDICINE
AT THE TIME OF COVID-19

- Need of maintaining continuous link with patients unable to come to Cardiology or Hypertension clinics for regular visits and checks

- Need to reassure on safety of ongoing antihypertensive and cardiovascular treatment

- Importance of counseling and empowerment through remote connection

- Importance of data teletransmission

- **-> Home BPM combined with telemonitoring and tele-consultations**
- **-> Role of Digital Health and Mobile Health**

"ESH-CARE" app

- Storage and graphs of BP and anthropometric data
- Link to Doctor
- Education
- Research
- ESH centres location

NEWS

VIDEO OPINION, PARLA CON IL MEDICO ANCHE DA CASA

Auxologico propone il nuovo servizio Video Opinion, uno spazio di confronto online con un medico specialista, per affrontare insieme dubbi e domande sulla propria salute. Scopri il servizio!

APPROFONDISCI

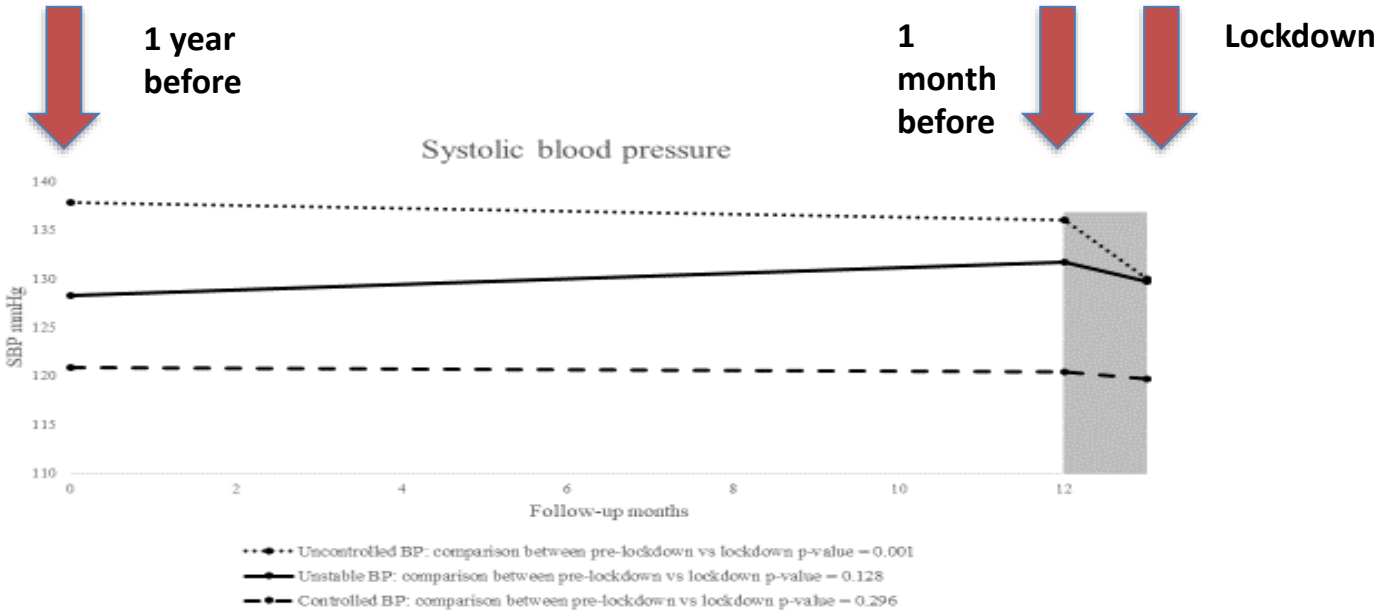
Come possiamo aiutarti?

- PRENOTA
- DISDICI
- PRENOTA VIDEO OPINION
- TARIFFE E TEMPI DI ATTESA
- CERCA UNA PRESTAZIONE
- CERCA UN MEDICO

Uncontrolled BP

Unstable BP

Controlled BP



HOME BLOOD PRESSURE DURING COVID-19 RELATED LOCKDOWN IN PATIENTS WITH HYPERTENSION

Pengo M, Parati G et al.

Eur.J.Prev.Cardiology 2021, in press

Moving back from lockdown darkness to light and health

Milano, Italy

Istituto Auxologico Italiano, IRCCS, Ospedale San Luca, Milano.

gianfranco.parati@unimib.it

Thank you for your attention