NIHR | Applied Research Collaboration South London

Using applied informatics to investigate physical health and the Covid-19 response in mental health and hospital services in South London

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Multimorbidity: A challenge for our health care system

NICE National Institute for Health and Care Excellence

Multimorbidity: clinical assessment and management

NICE guideline [NG56] Published date: September 2016

NHS National Institute for Health Research

Highlight Notice

NIHR Theme: Complex Health and Care Needs in Older People

Multimorbidity: A challenge for our health care system

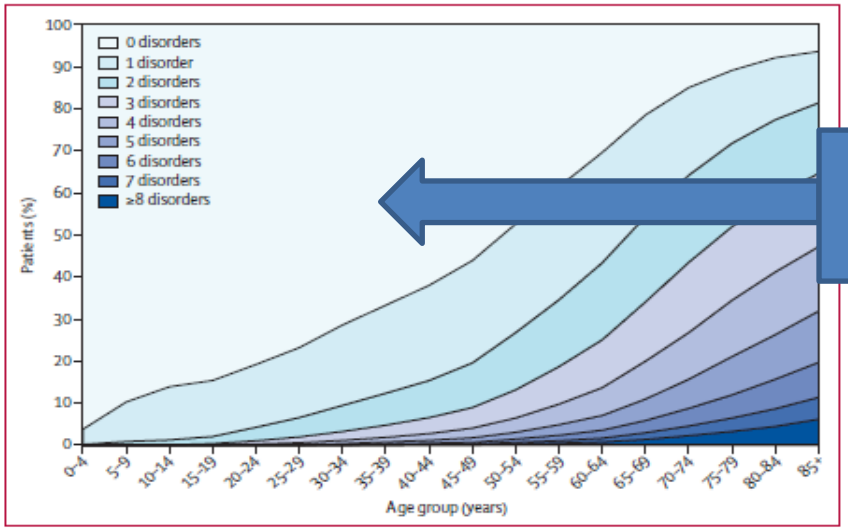


Figure 1: Number of chronic disorders by age-group

Socio-economic disadvantage

Ethnic minorities

TAKEN FROM: Barnet et al. (2012). *Lancet*

Research using healthcare data: Electronic Health Records (EHRs)

CogStack

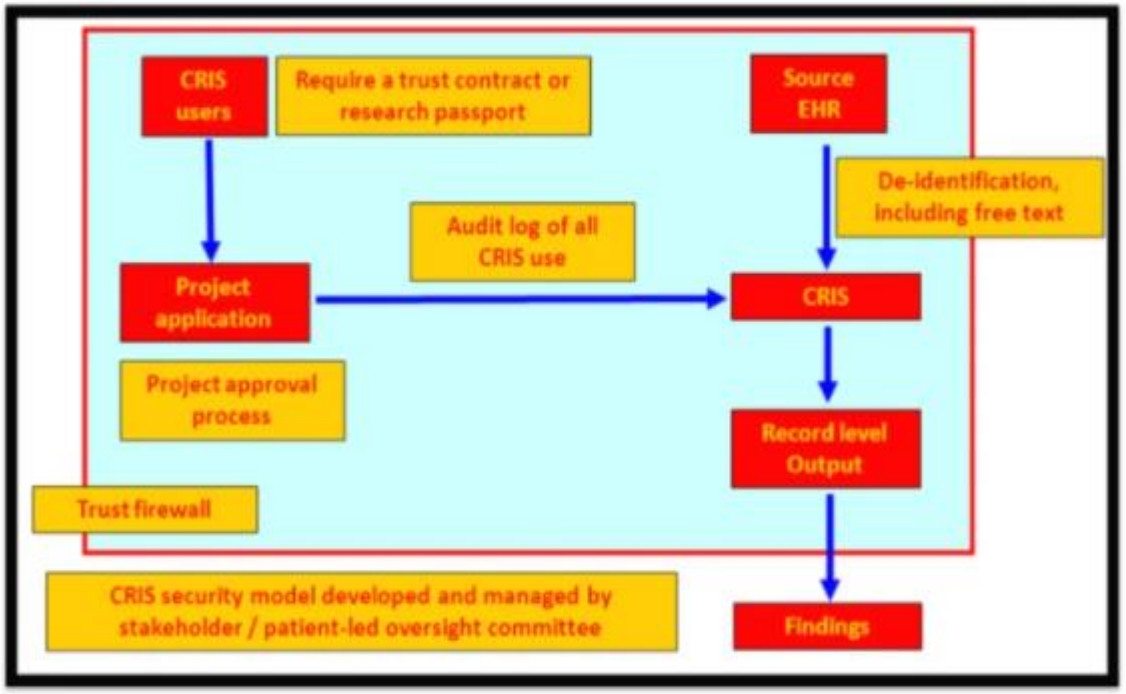
Patient´s data available for research to improve health care services

Patients and Public Involvement

Ethics Approvals

Research Passports

Research using healthcare data: Electronic Health Records (EHRs)



CRIS security model.

TAKEN FROM: Fernandes et al. Development and evaluation of a de-identification procedure for a case register sourced from mental health electronic records. *BMC Med Inform* (2013).

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Data extraction of 21 health conditions from clinical notes from patients with severe mental illness

BMJ Open

Mapping multimorbidity in individuals with schizophrenia and bipolar disorders: evidence from the South London and Maudsley NHS Foundation Trust Biomedical Research Centre (SLAM BRC) case register

Rebecca Bendayan [1,2] Zeljko Kraljevic,[1] Shaweena Shaari,[2] Jayati Das-Munshi,[3] Leona Leipold [2] Jaya Chaturvedi,[1] Luwaiza Mirza,[2] Sarah Aldelemi,[2] Thomas Searle,[1] Natalia Chance,[2] Aurelie Mascio,[1] Naoko Skiada,[1] Tao Wang,[1] Angus Roberts,[1,2] Robert Stewart,[2,3] Daniel Bean,[1,4] Richard Dobson[1,2,5]

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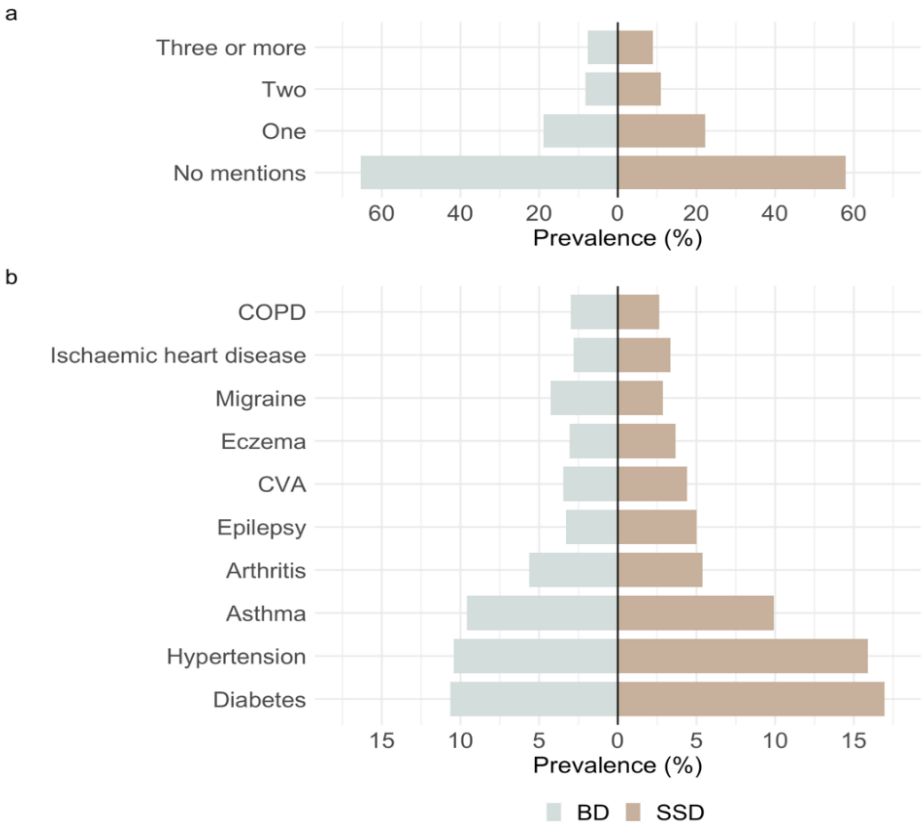

NIHR | Maudsley Biomedical Research Centre

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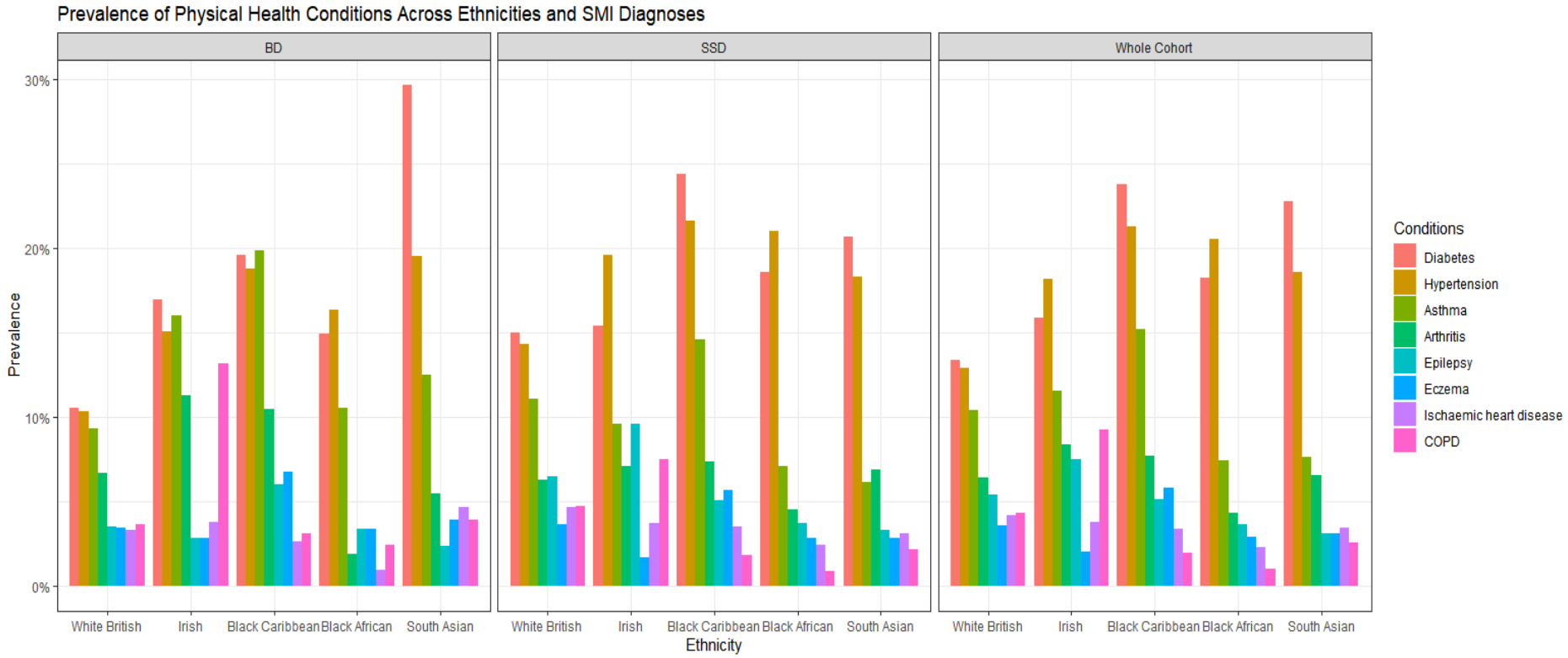

COPD

Asthma

Diabetes

COPD

Asthma

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2020

NEWS

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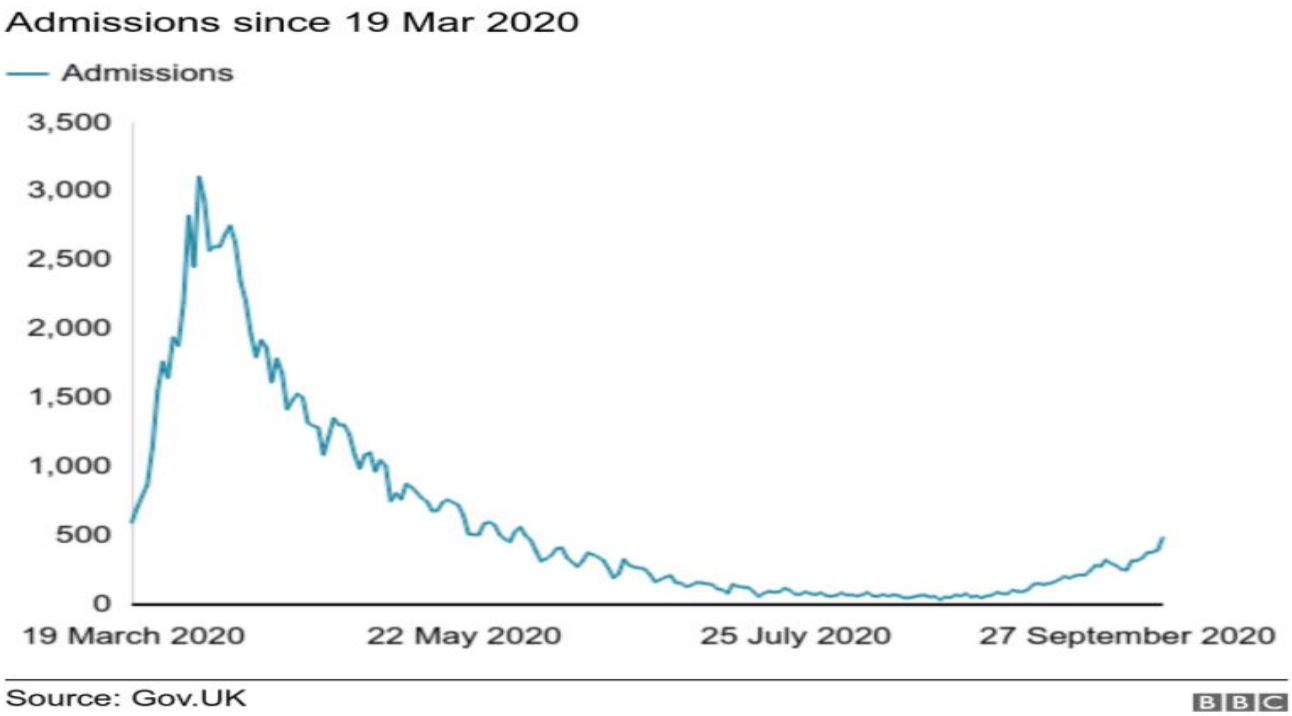
Stories

Coronavirus: The month everything changed

By Jon Kelly
BBC Stories

28 March

Coronavirus pandemi



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28 March

Coronavirus pandemic

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Real-world data in real-time!

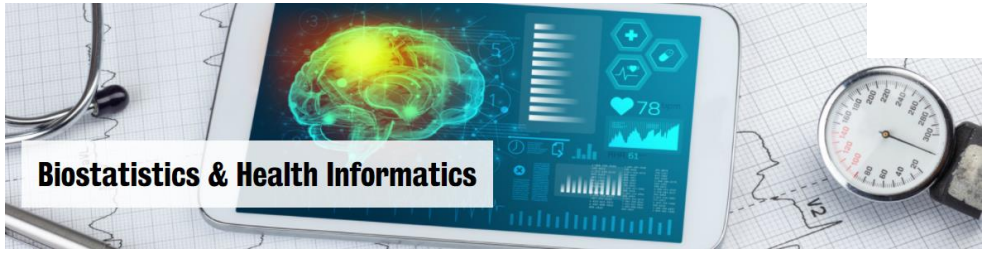
MedCAT - NLP

CogStack

CTI Centre for Translational Informatics

A unique research collaboration driving digital innovation in mental health

NIHR | Maudsley Biomedical Research Centre



KING'S HEALTH PARTNERS

Pioneering better health for all

Are antihypertensive drugs safe for COVID-19 patients?

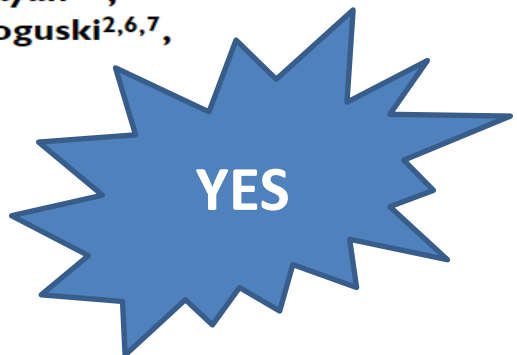
ESC European Society of Cardiology

European Journal of Heart Failure (2020) **22**, 967–974
doi:10.1002/ejhf.1924

RESEARCH ARTICLE

Angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers are not associated with severe COVID-19 infection in a multi-site UK acute hospital trust

Daniel M. Bean[1,2], Zeljko Kraljevic[1], Thomas Searle[1], Rebecca Bendayan[1,3], O'Gallagher Kevin[4,5], Andrew Pickles[1], Amos Folarin[1,2,6,7], Lukasz Roguski[2,6,7], Kawsar Noor[2,6,7], Anthony Shek[8], Rosita Zakeri[4,5], Ajay M. Shah[4,5,†], James T.H. Teo[4,8†], and Richard J.B. Dobson[1,2,3,6,7*†]



Are there any ethnic differences in COVID-19 hospital admission risk?

Contents lists available at ScienceDirect

EClinicalMedicine

journal homepage: https://www.journals.elsevier.com/eclinicalmedicine

A case-control and cohort study to determine the relationship between ethnic background and severe COVID-19

Rosita Zakeri[a], Rebecca Bendayan[b,c], Mark Ashworth[d], Daniel M. Bean[b], Hiten Dodhia[d], Stevo Durbaba[d], Kevin O'Gallagher[a], Claire Palmer[e], Vasa Curcin[d], Elizabeth Aitken[f], William Bernal[e], Richard D. Barker[e], Sam Norton[g], Martin Gulliford[d], James T.H. Teo[e], James Galloway[g], Richard J.B. Dobson[b,h], Ajay M. Shah[a,e,*]

YES

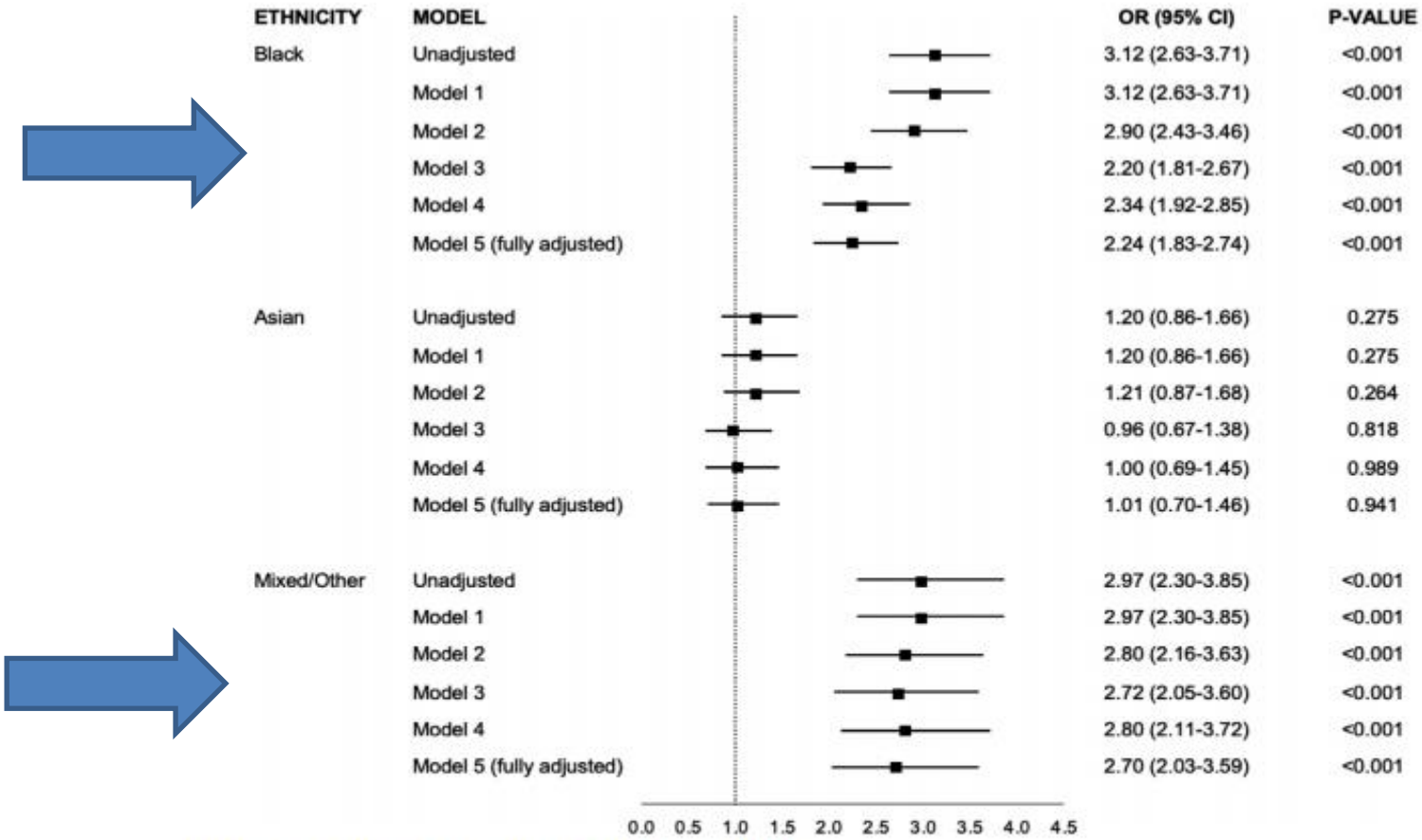


Fig. 2. Association between ethnicity and risk of hospital admission for COVID-19.

Odds ratios are compared to White ethnicity
Model 1 – adjusted for age and sex
Model 2 – adjusted for age, sex and index of multiple deprivation
Model 3 – adjusted for age, sex and cardiometabolic comorbidities*
Model 4 – adjusted for age, sex, and all comorbidities**
Model 5 (fully adjusted model) – adjusted for age, sex, index of multiple deprivation, and all comorbidities
*Cardiometabolic comorbidities include hypertension, coronary heart disease, heart failure, previous stroke/TIA, diabetes, chronic kidney disease.
**Cardiometabolic comorbidities, asthma, chronic obstructive pulmonary disease.

Hospital Admission

ETHNICITY	MODEL	HR (95% CI)	P-VALUE
Black	Unadjusted	0.74 (0.60-0.92)	0.007
	Model 1	1.13 (0.90-1.42)	0.292
	Model 2	1.08 (0.85-1.38)	0.528
	Model 3	1.06 (0.83-1.35)	0.641
	Model 4	1.10 (0.86-1.40)	0.460
	Model 5 (fully adjusted)	1.06 (0.82-1.37)	0.665
Asian	Unadjusted	1.03 (0.71-1.50)	0.872
	Model 1	1.73 (1.17-2.54)	0.006
	Model 2	1.69 (1.14-2.49)	0.008
	Model 3	1.71 (1.16-2.53)	0.007
	Model 4	1.75 (1.17-2.60)	0.006
	Model 5 (fully adjusted)	1.71 (1.15-2.56)	0.009
Mixed/Other	Unadjusted	0.49 (0.32-0.74)	0.001
	Model 1	0.72 (0.47-1.09)	0.122
	Model 2	0.70 (0.45-1.07)	0.095
	Model 3	0.73 (0.48-1.11)	0.143
	Model 4	0.74 (0.48-1.12)	0.155
	Model 5 (fully adjusted)	0.72 (0.47-1.10)	0.127

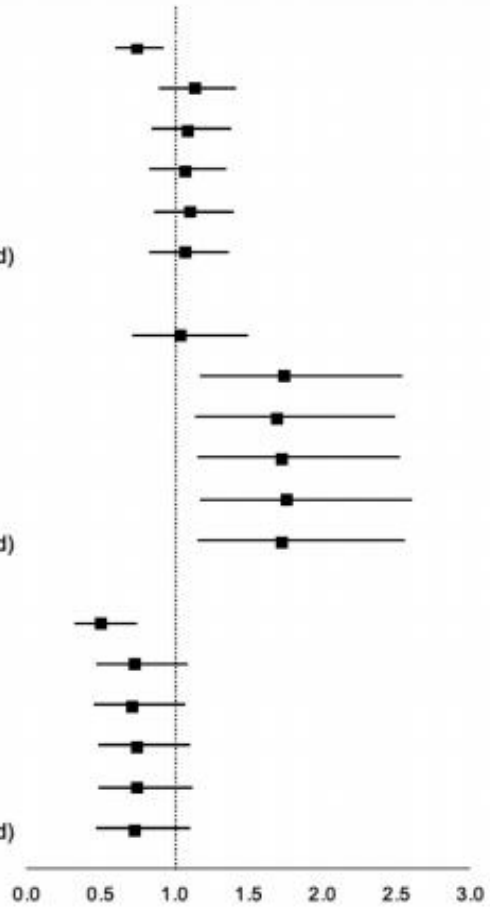


Fig. 3. Association between ethnicity and risk of in-hospital mortality with COVID-19.
Hazard ratios are compared to White ethnicity
Model 1 – adjusted for age and sex
Model 2 – adjusted for age, sex and index of multiple deprivation
Model 3 – adjusted for age, sex and cardiometabolic comorbidities*
Model 4 – adjusted for age, sex, and all comorbidities**
Model 5 (fully adjusted model) – adjusted for age, sex, index of multiple deprivation, and all comorbidities
*Cardiometabolic comorbidities include hypertension, coronary heart disease, heart failure, previous stroke/TIA, diabetes, chronic kidney disease.
**Cardiometabolic comorbidities, asthma, chronic obstructive pulmonary disease.

In-Hospital Mortality

*** Could we improve the current admission guidelines, NEWS2, and identify better individuals at greater risk, using blood biomarkers data?**

Carr *et al. BMC Medicine* (2021) 19:23
https://doi.org/10.1186/s12916-020-01893-3

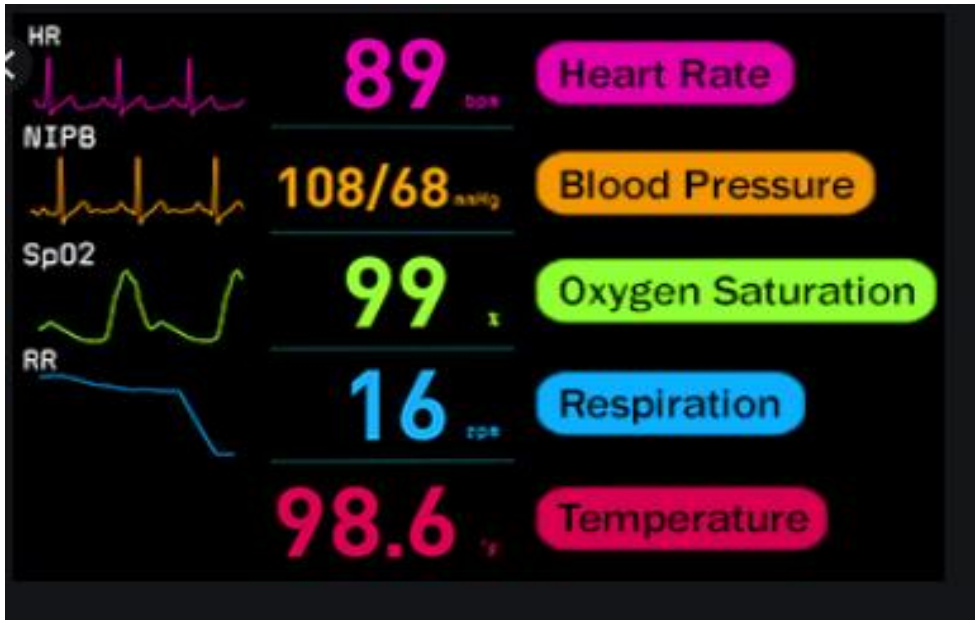
BMC Medicine

RESEARCH ARTICLE Open Access

Evaluation and improvement of the National Early Warning Score (NEWS2) for COVID-19: a multi-hospital study

Ewan Carr[1*†], Rebecca Bendayan[1,2†], Daniel Bean[1,3], Matt Stammers[4,5,6], Wenjuan Wang[7], Huayu Zhang[8], Thomas Searle[1,2], Zeljko Kraljevic[1], Anthony Shek[9], Hang T. T. Phan[4,5], Walter Muruet[7], Rishi K. Gupta[10], Anthony J. Shinton[6], Mike Wyatt[11], Ting Shi[8], Xin Zhang[12], Andrew Pickles[1,2], Daniel Stahl[1], Rosita Zakeri[13,14], Mahdad Noursadeghi[15], Kevin O'Gallagher[13,14], Matt Rogers[11], Amos Folarin[1,3,16,17], Andreas Karwath[18,19,20], Kristin E. Wickstrøm[21], Alvaro Köhn-Luque[22], Luke Slater[18,19,20], Victor Roth Cardoso[18,19,20], Christopher Bourdeaux[11], Aleksander Rygh Holten[23], Simon Ball[20,24], Chris McWilliams[25], Lukasz Roguski[3,16,19], Florina Borca[4,5,6], James Batchelor[4], Erik Koldberg Amundsen[21], Xiaodong Wu[26,27], Georgios V. Gkoutos[18,19,20,24], Jiaxing Sun[26], Ashwin Pinto[6], Bruce Guthrie[8], Cormac Breen[7], Abdel Douiri[7], Honghan Wu[3,16], Vasa Curcin[7], James T. Teo[9,13†], Ajay M. Shah[13,14†] and Richard J. B. Dobson[1,2,3,16,17†]

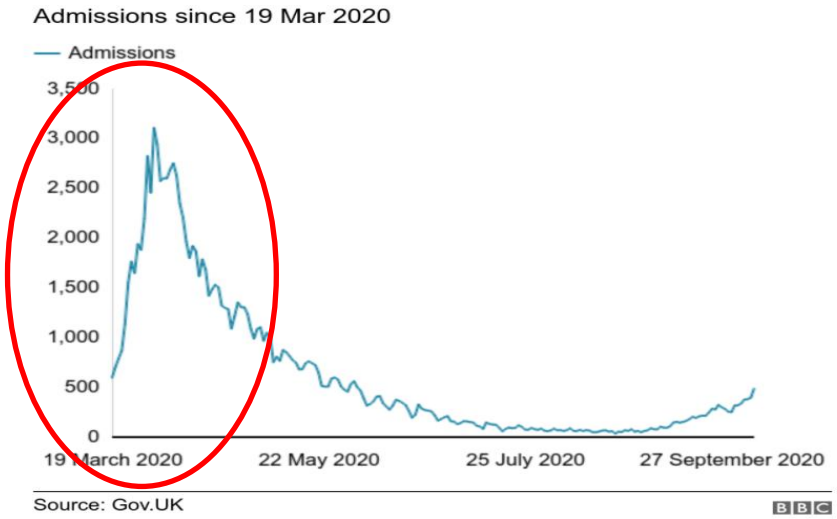
National Early Warning Score (NEWS2)



+ Blood Biomarkers

Study Cohorts:

KCH training cohort (n=1276): all adult inpatients testing positive for SARS-Cov2 by RT-PCR between 1st March to 31st April 2020 at King's College Hospital and Princess Royal University Hospital.



External Validation Cohorts

1.Guys and St Thomas' Hospital NHS Foundation Trust (GSTT) (n=988 -3rd March to 26th August)

2.University Hospitals Southampton NHS Foundation Trust (UHS) (n=633 -7th March to 6th June)

3. University Hospitals Bristol and Weston NHS Foundation Trust (UHBW) (n=190 -12th March to 11th June)

4. University College Hospital London (UCH) (n=411 -1st February to 30th April).

5. University Hospitals Birmingham (UHB) (n=1037).

6. Oslo University Hospital (OUH) (n=166 -6th March to 13th June)

7. Wuhan Sixth Hospital and Taikang Tongji Hospital (n=2815 -4th February to 30th March)

Outcome
Severe COVID disease (transfer to ICU/death (WHO-COVID-19 Outcomes Scales 6-8) at 14 days following hospital admission.

Demographics. Age, sex, self-defined ethnicity as White vs. non-White (Black, Asian, or other and minority ethnic).

Comorbidities: hypertension, diabetes, heart disease (heart failure and ischemic heart disease), respiratory disease (asthma and chronic obstructive pulmonary disease, COPD) and chronic kidney disease.

Blood parameters:

Albumin (g/L), C-reactive protein (CRP; mg/L), estimated Glomerular Filtration Rate (eGFR; mL/min), Haemoglobin (g/L), lymphocyte count (x 109/L), neutrophil count (x 109/L), and platelet count (PLT; x 109/L), neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-CRP ratio, and urea (mmol/L) (units).

Physiological parameters:

Respiratory rate (breaths per minute), oxygen saturation (%), supplemental oxygen flow rate (L/min), diastolic blood pressure (unitsmmHg), systolic blood pressure (mmHg), heart rate (beats/min), temperature (°C), and consciousness (Glasgow Coma Scale; GCS).

*For all parameters we used the first available measure up to 48 hours following hospital admission.

Principal findings:

1) The derived model for 14-day ICU transfer/death included nine parameters:

NEWS2 score +

age +

supplemental oxygen flow rate

urea

oxygen saturation

CRP

estimated GFR

neutrophil count

neutrophil/lymphocyte ratio

*** Could we stratify patients not only based on their baseline data on these biomarkers but also include their changes over time?**

Current Research in Translational Medicine 69 (2021) 103276

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

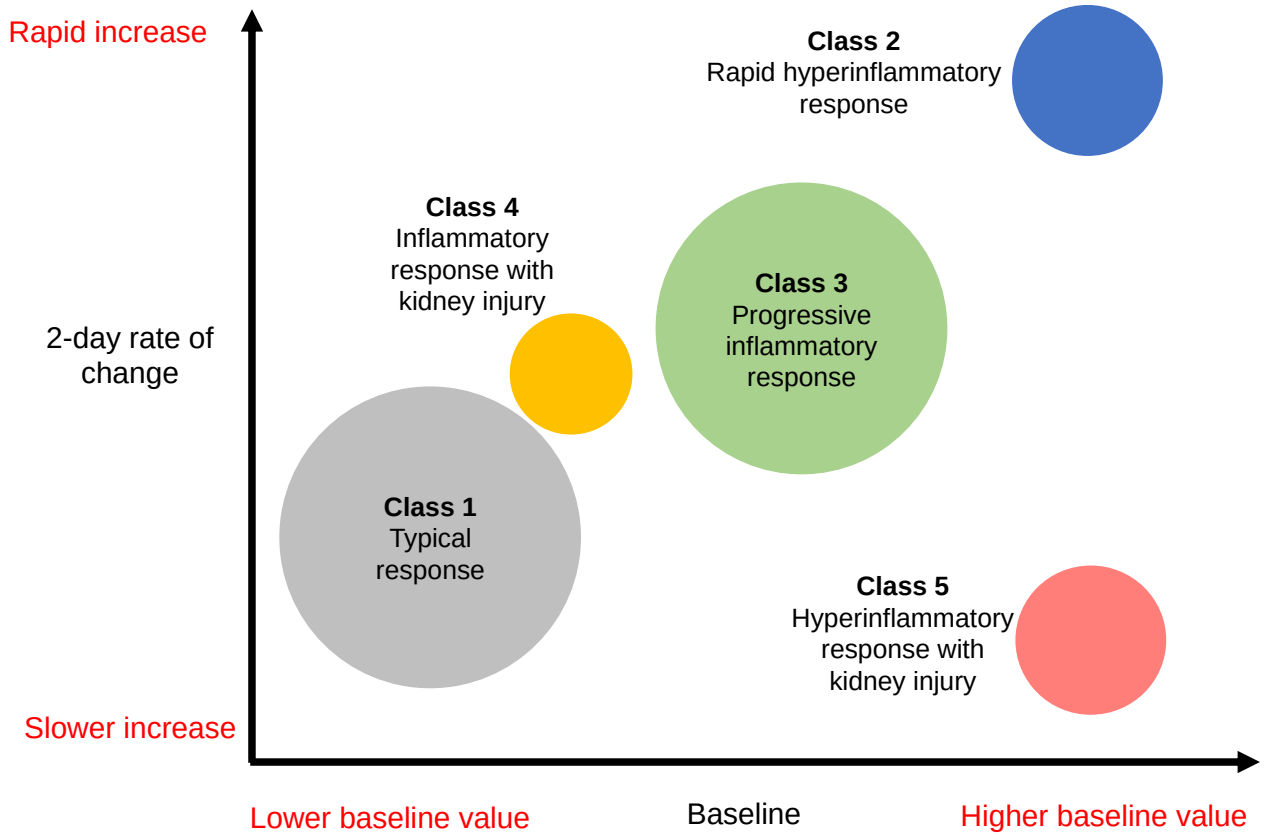
ELSEVIER

Original article

Biological responses to COVID-19: Insights from physiological and blood biomarker profiles

Rosita Zakeri[a,b,1], Andrew Pickles[c,d,1], Ewan Carr[c], Daniel M. Bean[c,e], Kevin O'Gallagher[a], Zeljko Kraljewic[c], Tom Searle[c,d], Anthony Shek[f], James B Galloway[g], James T.H. Teo[b,f], Ajay M. Shah[a,b], Richard J.B. Dobson[c,d,h,i], Rebecca Bendayan[c,d,*]

Biological responses to COVID-19: Insights from physiological and blood biomarker profiles



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CLASS 1: **Typical COVID-19 response** 38%

- 56% male, 36% non-White ethnicity.
- Most common comorbidities: hypertension (49%) and diabetes (33%).

CLASS 2: **Rapid hyperinflammatory response** 9%

- Older patients, predominantly White (76%), and with moderate prevalence of comorbidities (hypertension 52%, diabetes 30%).

Mortality risk

CLASS 3: **Progressive inflammatory response** 18%

- Similar to Class 1

Transfer to ICU risk

CLASS 4: **Inflammatory response with renal injury**

6%

- 68% male, **66% BAME descent.**
- Highest comorbidity burden among classes (hypertension 81%, IHD 21%, heart failure 19%, diabetes 64% and CKD 69%).

CLASS 5: **Hyperinflammatory response with renal injury**

9%

- 70% male, **61% White ethnicity.**

Mortality risk

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Thanks to

SLaM and KHP patients and clinicians, PPI groups, NIHR BRC SLaM/CRIS support services and funders (MRC, NIHR, ESRC, HDR UK)