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## Early warning scores and COVID-19

**ID of request:** 23570  
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**Date range used** (5 years, 10 years): 2019-   
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**Search terms and notes** (full search strategy for database searches below):

HDAS (Embase, Medline and Pubmed)

("COVID-19" OR "coronavirus" OR "Corona virus" OR "2019-nCoV" OR "SARS-CoV" OR "MERS-CoV" OR "Severe Acute Respiratory Syndrome" OR "Middle East Respiratory Syndrome") AND "early warning score").ti,ab

(("COVID-19" OR "coronavirus" OR "Corona virus" OR "2019-nCoV" OR "SARS-CoV" OR "MERS-CoV" OR "Severe Acute Respiratory Syndrome" OR "Middle East Respiratory Syndrome") AND score).ti

medRxiv

"early warning score" and ("COVID-19" OR "coronavirus" OR "2019-nCoV" OR "SARS-CoV")

Advanced Google Search

allintitle: "COVID 19" OR COVID19 OR 2019nCoV OR "Corona Virus" OR Coronavirus OR "CoV 2 OR CoV2 OR COVID OR nCoV OR SARS2 OR SARSCoV" "early warning score"

WHO Covid-19 literature database

"early warning score"

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## Contents

[A. Original Research](#Content5)

1. [A clinical risk score to identify patients with COVID-19 at high risk of critical care admission or death: an observational cohort study.](#Research667720)
2. [A Risk Score to Predict Admission to Intensive Care Unit in Patients With COVID-19: The ABC-GOALS Score](#Research667760)
3. [Acute Physiology and Chronic Health Evaluation II Score as a Predictor of Hospital Mortality in Patients of Coronavirus Disease 2019.](#Research667721)
4. [Admission chest CT score predicts 5-day outcome in patients with COVID-19.](#Research667716)
5. [An Early Warning Score to predict ICU admission in COVID-19 positive patients.](#Research667517)
6. [ANDC: an early warning score to predict mortality risk for patients with Coronavirus Disease 2019](#Research667523)
7. [Applicability of the CURB-65 pneumonia severity score for outpatient treatment of COVID-19.](#Research667718)
8. [C-Reactive protein and SOFA score as early predictors of critical care requirement in patients with COVID-19 pneumonia in Spain.](#Research667761)
9. [Clinical features and outcomes of 98 patients hospitalized with sars-cov-2 infection in daegu, south korea: A brief descriptive study](#Research667520)
10. [Comparing Rapid Scoring Systems in Mortality Prediction of Critically Ill Patients With Novel Coronavirus Disease.](#Research667521)
11. [Compassionate remdesivir treatment of severe Covid-19 pneumonia in intensive care unit (ICU) and Non-ICU patients: Clinical outcome and differences in post-treatment hospitalisation status.](#Research667518)
12. [COVID-19 early warning score: a multi-parameter screening tool to identify highly suspected patients](#Research667522)
13. [COVID-19: Symptoms, course of illness and use of clinical scoring systems for the first 42 patients admitted to a Norwegian local hospital.](#Research667519)
14. [Development and Validation of a Clinical Risk Score to Predict the Occurrence of Critical Illness in Hospitalized Patients With COVID-19.](#Research667719)
15. [Development and Validation of a Diagnostic Nomogram to Predict COVID-19 Pneumonia](#Research667768)
16. [Development and validation of the COVID-19 severity index (CSI): a prognostic tool for early respiratory decompensation](#Research667762)
17. [Development of a Predictive Score for COVID-19 Diagnosis based on Demographics and Symptoms in Patients Attended at a Dedicated Screening Unit](#Research667766)
18. [Host susceptibility to severe COVID-19 and establishment of a host risk score: findings of 487 cases outside Wuhan.](#Research667712)
19. [Insights from Italy: the Novara-COVID score for rapid destination of COVID-19 patients at emergency department presentation.](#Research667717)
20. [Letter to the Editor: Variability but not admission or trends in NEWS2 score predicts clinical outcome in elderly hospitalised patients with COVID-19.](#Research667713)
21. [National Early Warning Score 2 (NEWS2) on admission predicts severe disease and in-hospital mortality from Covid-19 - A prospective cohort study](#Research667707)
22. [New Early Warning Score: off-label approach for Covid-19 outbreak patient deterioration in the community.](#Research667516)
23. [Pre-test probability for SARS-Cov-2-related Infection Score: the PARIS score](#Research667759)
24. [Predicting mortality due to SARS-CoV-2: A mechanistic score relating obesity and diabetes to COVID-19 outcomes in Mexico.](#Research667715)
25. [Prediction for Progression Risk in Patients with COVID-19 Pneumonia: the CALL Score.](#Research667722)
26. [Supplementing the National Early Warning Score (NEWS2) for anticipating early deterioration among patients with COVID-19 infection](#Research667706)
27. [The CALL score for predicting outcomes in patients with COVID-19.](#Research667714)
28. [THE LOW-HARM SCORE FOR PREDICTING MORTALITY IN PATIENTS DIAGNOSED WITH COVID-19: A MULTICENTRIC VALIDATION STUDY](#Research667767)
29. [TOWARD A COVID-19 SCORE-RISK ASSESSMENTS AND REGISTRY](#Research667764)
30. [Triage tool for suspected COVID-19 patients in the emergency room: AIFELL score](#Research667763)

## A. Original Research

1. **A clinical risk score to identify patients with COVID-19 at high risk of critical care admission or death: an observational cohort study.**  
   Galloway James B. The Journal of infection 2020;:No page numbers.

BACKGROUNDThe COVID-19 pandemic continues to escalate. There is urgent need to stratify patients. Understanding risk of deterioration will assist in admission and discharge decisions, and help selection for clinical studies to indicate where risk of therapy-related complications is justified.METHODSAn observational cohort of patients acutely admitted to two London hospitals with COVID-19 and positive SARS-CoV-2 swab results was assessed. Demographic details, clinical data, comorbidities, blood parameters and chest radiograph severity scores were collected from electronic health records. Endpoints assessed were critical care admission and death. A risk score was developed to predict outcomes.FINDINGSAnalyses included 1,157 patients. Older age, male sex, comorbidities, respiratory rate, oxygenation, radiographic severity, higher neutrophils, higher CRP and lower albumin at presentation predicted critical care admission and mortality. Non-white ethnicity predicted critical care admission but not death. Social deprivation was not predictive of outcome. A risk score was developed incorporating twelve characteristics: age>40, male, non-white ethnicity, oxygen saturations<93%, radiological severity score>3, neutrophil count>8.0 x109/L, CRP>40 mg/L, albumin<34 g/L, creatinine>100 µmol/L, diabetes mellitus, hypertension and chronic lung disease. Risk scores of 4 or higher corresponded to a 28-day cumulative incidence of critical care admission or death of 40.7% (95% CI: 37.1 to 44.4), versus 12.4% (95% CI: 8.2 to 16.7) for scores less than 4.INTERPRETATIONOur study identified predictors of critical care admission and death in people admitted to hospital with COVID-19. These predictors were incorporated into a risk score that will inform clinical care and stratify patients for clinical trials.

1. **A Risk Score to Predict Admission to Intensive Care Unit in Patients With COVID-19: The ABC-GOALS Score**  
   Anon. medRxiv 2020;:2020.05.12.20099416.

Background. COVID-19 pandemic poses a burden on hospital resources and intensive care unit (ICU) occupation. This study aimed to provide a scoring system that, assessed upon first-contact evaluation at the emergency department, predicts the need for ICU admission. Methods. We prospectively assessed patients admitted to a COVID-19 reference center in Mexico City between March 16th and May 21st, and split them into development and validation cohorts. Patients were segregated into a group that required admission to ICU, and a group that never required ICU admission and was discharged from hospitalization. By logistic regression, we constructed predictive models for ICU admission, including clinical, laboratory, and imaging findings from the emergency department evaluation. The ABC-GOALS score was created by assigning values to the weighted odd ratios. The score was compared to other COVID-19 and pneumonia scores through the area under the curve (AUC). Results. We included 569 patients divided into development (n=329) and validation (n=240) cohorts. One-hundred-fifteen patients from each cohort required admission to ICU. The clinical model (ABC-GOALSc) included sex, obesity, the Charlson comorbidity index, dyspnea, arterial pressure, and respiratory rate at triage evaluation. The clinical plus laboratory model (ABC-GOALScl) added serum albumin, glucose, lactate dehydrogenase, and S/F ratio to the clinical model. The model that included imaging (ABC-GOALSclx) added the CT scan finding of &amp;gt;50% lung involvement. The model AUC were 0.79 (95%CI 0.74-0.83) and 0.77 (95%CI 0.71-0.83), 0.86 (95%CI 0.82-0.90) and 0.87 (95%CI 0.83-0.92), 0.88 (95%CI 0.84-0.92) and 0.86 (95%CI 0.81-0.90) for the clinical, laboratory and imaging models in the development and validation cohorts, respectively. The ABC-GOALScl and ABC-GOALSclx scores outperformed other COVID-19 and pneumonia-specific scores. Conclusion. The ABC-GOALS score is a tool to evaluate patients with COVID-19 at admission to the emergency department, which allows to timely predict their risk of admission to an ICU.Competing Interest StatementNone.Funding StatementNone.Author DeclarationsI confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.YesThe details of the IRB/oversight body that provided approval or exemption for the research described are given below:Instituto Nacional de Ciencias Medicas y Nutricion Salvador Zubiran research and ethics boards.All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe data included into this manuscript has not yet been subject of peer review.

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1. **Acute Physiology and Chronic Health Evaluation II Score as a Predictor of Hospital Mortality in Patients of Coronavirus Disease 2019.**  
   Zou Xiaojing Critical care medicine 2020;:No page numbers.

OBJECTIVESCoronavirus disease 2019 has emerged as a major global health threat with a great number of deaths in China. We aimed to assess the association between Acute Physiology and Chronic Health Evaluation II score and hospital mortality in patients with coronavirus disease 2019, and to compare the predictive ability of Acute Physiology and Chronic Health Evaluation II score, with Sequential Organ Failure Assessment score and Confusion, Urea, Respiratory rate, Blood pressure, Age 65 (CURB65) score.DESIGNRetrospective observational cohort.SETTINGTongji Hospital in Wuhan, China.SUBJECTSConfirmed patients with coronavirus disease 2019 hospitalized in the ICU of Tongji hospital from January 10, 2020, to February 10, 2020.INTERVENTIONSNone.MEASUREMENTS AND MAIN RESULTSOf 178 potentially eligible patients with symptoms of coronavirus disease 2019, 23 patients (12.92%) were diagnosed as suspected cases, and one patient (0.56%) suffered from cardiac arrest immediately after admission. Ultimately, 154 patients were enrolled in the analysis and 52 patients (33.77%) died. Mean Acute Physiology and Chronic Health Evaluation II score (23.23 ± 6.05) was much higher in deaths compared with the mean Acute Physiology and Chronic Health Evaluation II score of 10.87 ± 4.40 in survivors (p < 0.001). Acute Physiology and Chronic Health Evaluation II score was independently associated with hospital mortality (adjusted hazard ratio, 1.07; 95% CI, 1.01-1.13). In predicting hospital mortality, Acute Physiology and Chronic Health Evaluation II score demonstrated better discriminative ability (area under the curve, 0.966; 95% CI, 0.942-0.990) than Sequential Organ Failure Assessment score (area under the curve, 0.867; 95% CI, 0.808-0.926) and CURB65 score (area under the curve, 0.844; 95% CI, 0.784-0.905). Based on the cut-off value of 17, Acute Physiology and Chronic Health Evaluation II score could predict the death of patients with coronavirus disease 2019 with a sensitivity of 96.15% and a specificity of 86.27%. Kaplan-Meier analysis showed that the survivor probability of patients with coronavirus disease 2019 with Acute Physiology and Chronic Health Evaluation II score less than 17 was notably higher than that of patients with Acute Physiology and Chronic Health Evaluation II score greater than or equal to 17 (p < 0.001).CONCLUSIONSAcute Physiology and Chronic Health Evaluation II score was an effective clinical tool to predict hospital mortality in patients with coronavirus disease 2019 compared with Sequential Organ Failure Assessment score and CURB65 score. Acute Physiology and Chronic Health Evaluation II score greater than or equal to 17 serves as an early warning indicator of death and may provide guidance to make further clinical decisions.

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1. **Admission chest CT score predicts 5-day outcome in patients with COVID-19.**  
   Mahdjoub E. Intensive care medicine 2020;:No page numbers.

Letter

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1. **An Early Warning Score to predict ICU admission in COVID-19 positive patients.**  
   Meylan S. The Journal of infection 2020;:No page numbers.

Letter The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes coronavirus disease 2019 (COVID-19) poses multiple challenges to our healthcare systems. A particular challenge is the surge of hospital admissions with a significant fraction requiring transfer to intensive care units (ICU) because of respiratory failure. 1 , 2 Early recognition of patients requiring ICU admission is a critical step in the management of COVID-19 patients. We read with interest the communication in this Journal from Su and colleagues who investigated the utility of clinical scoring systems to predict ICU requirement in patients with COVID-19. 3 Scoring at admission may however be fraught with heterogeneity due to the timing of presentation. Here, we asked whether a monitoring tool on the wards could help identify patients that would require intensive care up to 36 hours in advance. Early warning scores have been developed as composite scores to quantify patient's deterioration. 4 We reviewed data from 36 consecutive PCR-positive COVID-19 patients admitted to the medical wards of the Lausanne University Hospital between March 2, 2020 and March 17, 2020 and examined whether a modified version of the Early Warning Score (EWS) described by Prytherch et al. 4 could contribute to an early identification of COVID-19 patients requiring ICU admission. All variables described by Prytherch et al. were included except for the AVPU variable, which is only documented in a subset of departments at our hospital. Physiological variables were analyzed during a 12 to 36-hour period prior to ICU admission (ICU group) or prior to the most abnormal respiratory variables (i.e. FiO2 or respiratory rate) (non-ICU group) defined as t 0. EWS was calculated at 12-hour intervals prior t 0. Among the 36 patients, 9 were excluded for the following reasons: incomplete or single set of physiological variables (7 patients), pregnancy or immediate ICU admission (1 patient each). Nine required ICU admission and 17 did not. The median age (range) of patients was 74 yr (39-86) in the ICU group and 65.5 yr (26-83) in the non-ICU group ( p=0.793). Mean duration of symptoms prior to t 0 was 7.8 days in the ICU-group and 7.6 days in the ICU group. Risk factors 2 associated with severe COVID-19 were present in 80.8% of the patients (ICU group: 77.7% and non-ICU group: 82.3%). Fig. 1 shows the evolution of the EWS over a study period up to 36 hours prior t 0 in the two groups of patients. The median EWS was significantly higher in a time-dependent manner in ICU group than in the non-ICU group ( p<0.0001) as assessed by mixed effects model 5 . At t 0 or t -12 hours, an EWS greater than 7 predicted ICU admission with sensitivities and specificities of 87% and 93% and 94% and 78%, respectively (AUROC 0.98 and 0.88, respectively).

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1. **ANDC: an early warning score to predict mortality risk for patients with Coronavirus Disease 2019**  
   Weng Zhihong 2020;:No page numbers.

Background: Patients with severe Coronavirus Disease 2019 (COVID-19) will progress rapidly to acute respiratory failure or death. We aimed to develop a quantitative tool for early predicting mortality risk of patients with COVID-19. Methods: 301 patients with confirmed COVID-19 admitted to Main District and Tumor Center of the Union Hospital of Huazhong University of Science and Technology (Wuhan, China) between January 1, 2020 to February 15, 2020 were enrolled in this retrospective two-centers study. Data on patient demographic characteristics, laboratory findings and clinical outcomes was analyzed. A nomogram was constructed to predict the death probability of COVID-19 patients. Results: Age, neutrophil-to-lymphocyte ratio, D-dimer and C-reactive protein obtained on admission were identified by LASSO regression as predictors of mortality for COVID-19 patients. The nomogram demonstrated good calibration and discrimination with the area under the curve (AUC) of 0.921 and 0.975 for the derivation and validation cohort, respectively. An integrated score (named ANDC) with its corresponding death probability was derived. Using ANDC cut-off values of 59 and 101, COVID-19 patients were classified into three subgroups. The death probability of low risk group (ANDC < 59) was less than 5%, moderate risk group (59 ≤ ANDC ≤ 101) was 5% to 50%, and high risk group (ANDC > 101) was more than 50%, respectively. Conclusion: The prognostic nomogram exhibited good discrimination power in early identification of COVID-19 patients with high mortality risk, and ANDC score may help physicians to optimize patient stratification management.

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1. **Applicability of the CURB-65 pneumonia severity score for outpatient treatment of COVID-19.**  
   Nguyen Yann The Journal of infection 2020;:No page numbers.

Letter

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1. **C-Reactive protein and SOFA score as early predictors of critical care requirement in patients with COVID-19 pneumonia in Spain.**  
   Anon. medRxiv 2020;:2020.05.22.20110429.

Background: Some patients infected by SARS-CoV-2 in the recent pandemic have required critical care, becoming one of the main limitations of the health systems. Our objective has been to identify potential markers at admission predicting the need for critical care in patients with COVID-19 pneumonia Methods: We retrospectively collected and analyzed data from electronic medical records of patients with laboratory-confirmed SARS-CoV-19 infection by real-time RT-PCR. A comparison was made between patients staying in the hospitalization ward with those who required critical care. Univariable and multivariable logistic regression methods were used to identify risk factors predicting critical care need Findings: Between March 15 and April 15, 2020, 150 patients under the age of 75 were selected (all with laboratory confirmed SARS-CoV-19 infection), 75 patients requiring intensive care assistance and 75 remaining the regular hospitalization ward. Most patients requiring critical care were males, 76% compared with 60% in the non-critical care group (p&amp;lt;0,05). Multivariable regression showed increasing odds of in-hospital critical care associated with increased C-reactive protein (CRP) (odds ratio 1,052 (1,009-1,101); p=0,0043) and higher Sequential Organ Failure Assessment (SOFA) score (1,968 (1,389-2,590) p&amp;lt;0,0001) both at the time of hospital admission. The AUC-ROC for the combined model was 0,83 (0,76-0,90) (vs AUC-ROC SOFA p&amp;lt;0,05) Interpretation: Patients COVID-19 positive presenting at admission with high SOFA score ≥2 combined with CRP ≥ 9,1 mg/mL could help clinicians to identify them as a group that will more likely require critical care so further actions might be implemented to improve their prognosisCompeting Interest StatementThe authors have declared no competing interest.Funding Statement NO funding was received for this workAuthor DeclarationsI confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.YesThe details of the IRB/oversight body that provided approval or exemption for the research described are given below:This study was approved by the Research Ethics Commission of the clinical hospital of Salamanca (PI 2020 05 487)All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe authors confirm that the data supporting the findings are available within the article and its supplementary material

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1. **Clinical features and outcomes of 98 patients hospitalized with sars-cov-2 infection in daegu, south korea: A brief descriptive study**  
   Hong K.S. Yonsei Medical Journal 2020;61(5):431-437.

Although some information on the epidemiology of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and a few selected cases has been reported, data on the clinical characteristics and outcomes of patients hospitalized therewith in South Korea are lacking. We conducted a retrospective single-center study of 98 consecutive hospitalized patients with confirmed SARS-CoV-2 infection at Yeungnam University Medical Center in Daegu, South Korea. Sixty patients were women (61.2%), and the mean age was 55.4+/-17.1 years. Thirteen patients (13.3%) were treated in the intensive care unit (ICU). The mean interval from symptom onset to hospitalization was 7.7+/-4.5 days. Patients who received ICU care were significantly older and were more likely to have diabetes mellitus. The National Early Warning Score on the day of admission was significantly higher in patients requiring ICU care. Acute respiratory distress syndrome (13/13 patients; 100%), septic shock (9/13; 69.2%), acute cardiac injury (9/13; 69.2%), and acute kidney injury (8/13; 61.5%) were more common in patients who received ICU care. All patients received antibiotic therapy, and most (97/98 patients; 99.0%) received antiviral therapy (lopinavir/ritonavir). Hydroxychloroquine was used in 79 patients (80.6%), and glucocorticoid therapy was used in 18 patients (18.4%). In complete blood counts, lymphopenia was the most common finding (40/98 patients; 40.8%). Levels of all proinflammatory cytokines were significantly higher in ICU patients. As of March 29, 2020, the mortality rate was 5.1%. Here, we report the clinical characteristics and laboratory findings of SARS-CoV-2 patients in South Korea up to March 29, 2020.<br/>Copyright &#xa9; Yonsei University College of Medicine 2020.

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1. **Comparing Rapid Scoring Systems in Mortality Prediction of Critically Ill Patients With Novel Coronavirus Disease.**  
   Hu H. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 2020;:No page numbers.

<strong>OBJECTIVES:</strong> Rapid and early severity-of-illness assessment appears to be important for critically ill patients with novel coronavirus disease (COVID-19). This study aimed to evaluate the performance of the rapid scoring system on admission of these patients.<br /><strong>METHODS:</strong> A total of 138 medical records of critically ill patients with COVID-19 were included in the study. Demographic and clinical characteristics on admission used for calculating Modified Early Warning Score (MEWS) and Rapid Emergency Medicine Score (REMS) and outcomes (survival or death) were collected for each case and extracted for analysis. All patients were divided into two age subgroups (<65 years and ≥65 years). The receiver operating characteristic (ROC) curve analyses were performed for overall patients and both subgroups.<br /><strong>RESULTS:</strong> The median [25th quartile, 75th quartile] of MEWS of survivors versus nonsurvivors were 1 [1, 2] and 2 [1, 3] and those of REMS were 5 [2, 6] and 7 [6, 10], respectively. In overall analysis, the area under the ROC curve for the REMS in predicting mortality was 0.833 (95% confidence interval [CI] = 0.737 to 0.928), higher than that of MEWS (0.677, 95% CI = 0.541 to 0.813). An optimal cutoff of REMS (≥6) had a sensitivity of 89.5%, a specificity of 69.8%, a positive predictive value of 39.5%, and a negative predictive value of 96.8%. In the analysis of subgroup of patients aged <65 years, the area under the ROC curve for the REMS in predicting mortality was 0.863 (95% CI = 0.743 to 0.941), higher than that of MEWS (0.603, 95% CI = 0.462 to 0.732).<br /><strong>CONCLUSION:</strong> To our knowledge, this study was the first exploration on rapid scoring systems for critically ill patients with COVID-19. The REMS could provide emergency clinicians with an effective adjunct risk stratification tool for critically ill patients with COVID-19, especially for the patients aged <65 years. The effectiveness of REMS for screening these patients is attributed to its high negative predictive value.

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1. **Compassionate remdesivir treatment of severe Covid-19 pneumonia in intensive care unit (ICU) and Non-ICU patients: Clinical outcome and differences in post-treatment hospitalisation status.**  
   Antinori Spinello Pharmacological research 2020;158:104899.

SARS-CoV-2 is causing an increasing number of deaths worldwide because no effective treatment is currently available. Remdesivir has shown in vitro activity against coronaviruses and is a possible antiviral treatment for SARS-CoV-2 infection. This prospective (compassionate), open-label study of remdesivir, which was conducted at Luigi Sacco Hospital, Milan, Italy, between February 23 and March 20, 2020, involved patients with SARS-CoV-2 pneumonia aged ≥18 years undergoing mechanical ventilation or with an oxygen saturation level of ≤94 % in air or a National Early Warning Score 2 of ≥4. The primary outcome was the change in clinical status based on a 7-category ordinal scale (1 = not hospitalised, resuming normal daily activities; 7 = deceased). The 35 patients enrolled from February 23 to March 20, 2020, included 18 in intensive care unit (ICU), and 17 in our infectious diseases ward (IDW). The 10-day course of remdesivir was completed by 22 patients (63 %) and discontinued by 13, of whom eight (22.8 %) discontinued because of adverse events. The median follow-up was 39 days (IQR 25-44). At day 28, 14 (82.3 %) patients from IDW were discharged, two were still hospitalized and one died (5.9 %), whereas in ICU 6 (33.3 %) were discharged, 8 (44.4 %) patients died, three (16.7 %) were still mechanically ventilated and one (5.6 %) was improved but still hospitalized. Hypertransaminasemia and acute kidney injury were the most frequent severe adverse events observed (42.8 % and 22.8 % of the cases, respectively). Our data suggest that remdesivir can benefit patients with SARS-CoV-2 pneumonia hospitalised outside ICU where clinical outcome was better and adverse events are less frequently observed. Ongoing randomised controlled trials will clarify its real efficacy and safety, who to treat, and when.

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1. **COVID-19 early warning score: a multi-parameter screening tool to identify highly suspected patients**  
   Cong-Ying Song 2020;:https://doi.org/10.1101/2020.03.05.20031906.

BACKGROUND Corona Virus Disease 2019 (COVID-19) is spreading worldwide. Effective screening for patients is important to limit the epidemic. However, some defects make the currently applied diagnosis methods are still not very ideal for early warning of patients. We aimed to develop a diagnostic model that allows for the quick screening of highly suspected patients using easy-to-get variables. METHODS A total of 1,311 patients receiving severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) nucleicacid detection were included, whom with a positive result were classified into COVID-19 group. Multivariate logistic regression analyses were performed to construct the diagnostic model. Receiver operating characteristic (ROC) curve analysis were used for model validation. RESULTS After analysis, signs of pneumonia on CT, history of close contact, fever, neutrophil-to-lymphocyte ratio (NLR), Tmax and sex were included in the diagnostic model. Age and meaningful respiratory symptoms were enrolled into COVID-19 early warning score (COVID-19 EWS). The areas under the ROC curve (AUROC) indicated that both of the diagnostic model (training dataset 0.956 [95%CI 0.935-0.977, P < 0.001]; validation dataset 0.960 [95%CI 0.919-1.0, P < 0.001] ) and COVID-19 EWS (training dataset 0.956 [95%CI 0.934-0.978, P < 0.001] ; validate dataset 0.966 [95%CI 0.929-1, P < 0.001]) had good discrimination capacity. In addition, we also obtained the cut-off values of disease severity predictors, such as CT score, CD8+ T cell count, CD4+ T cell count, and so on. CONCLUSIONS The new developed COVID-19 EWS was a considerable tool for early and relatively accurately warning of SARS-CoV-2 infected patients.

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1. **COVID-19: Symptoms, course of illness and use of clinical scoring systems for the first 42 patients admitted to a Norwegian local hospital.**  
   Ihle-Hansen H.åkon Tidsskrift for den Norske laegeforening : tidsskrift for praktisk medicin, ny raekke 2020;140(7):No page numbers.

BACKGROUNDThe COVID-19 outbreak is presenting the health system with new challenges, and there is a great need for knowledge about symptoms, clinical findings and course of illness in patients admitted to Norwegian hospitals with COVID-19.MATERIAL AND METHODIn this observational qualitative study, all patients admitted to a Norwegian local hospital (Bærum Hospital) with proven COVID-19 infection were included consecutively from the start of the outbreak. We present here patient characteristics, symptoms, clinical findings, experience of using clinical scoring systems and course of illness based on data in medical records.RESULTSIn the period 9-31 March 2020, 42 patients, of whom 28 (67 %) were men, were admitted to hospital with COVID-19 infection. The median age was 72.5 years (range 30-95). Fever (79 %), reduced general condition (79 %), dyspnoea (69 %) and cough (67 %) were the most common symptoms. A total of nine patients (21 %) had a critical course of illness with treatment in the Intensive Care Department and/or death during their stay in hospital. Patients with a critical course had a higher average score on National Early Warning Score 2 (NEWS2) on admission (7.6 vs 3.3). Only one of the most severely ill patients scored ≥ 2 on the quick Sepsis-related Organ Failure Assessment (qSOFA) on admission.INTERPRETATIONMost patients admitted to our hospital with COVID-19 had a fever and respiratory tract symptoms. A high percentage of patients had a critical course of illness. A NEWS2 score of ≥ 5 on admission may be a useful aid in identifying patients at risk of a critical course of illness, while CRB-65 and qSOFA score ≥ 2 proved to be of little usefulness for this purpose in our material.

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1. **Development and Validation of a Clinical Risk Score to Predict the Occurrence of Critical Illness in Hospitalized Patients With COVID-19.**  
   Liang Wenhua JAMA internal medicine 2020;:No page numbers.

ImportanceEarly identification of patients with novel corona virus disease 2019 (COVID-19) who may develop critical illness is of great importance and may aid in delivering proper treatment and optimizing use of resources.ObjectiveTo develop and validate a clinical score at hospital admission for predicting which patients with COVID-19 will develop critical illness based on a nationwide cohort in China.Design, Setting, and ParticipantsCollaborating with the National Health Commission of China, we established a retrospective cohort of patients with COVID-19 from 575 hospitals in 31 provincial administrative regions as of January 31, 2020. Epidemiological, clinical, laboratory, and imaging variables ascertained at hospital admission were screened using Least Absolute Shrinkage and Selection Operator (LASSO) and logistic regression to construct a predictive risk score (COVID-GRAM). The score provides an estimate of the risk that a hospitalized patient with COVID-19 will develop critical illness. Accuracy of the score was measured by the area under the receiver operating characteristic curve (AUC). Data from 4 additional cohorts in China hospitalized with COVID-19 were used to validate the score. Data were analyzed between February 20, 2020 and March 17, 2020.Main Outcomes and MeasuresAmong patients with COVID-19 admitted to the hospital, critical illness was defined as the composite measure of admission to the intensive care unit, invasive ventilation, or death.ResultsThe development cohort included 1590 patients. the mean (SD) age of patients in the cohort was 48.9 (15.7) years; 904 (57.3%) were men. The validation cohort included 710 patients with a mean (SD) age of 48.2 (15.2) years, and 382 (53.8%) were men and 172 (24.2%). From 72 potential predictors, 10 variables were independent predictive factors and were included in the risk score: chest radiographic abnormality (OR, 3.39; 95% CI, 2.14-5.38), age (OR, 1.03; 95% CI, 1.01-1.05), hemoptysis (OR, 4.53; 95% CI, 1.36-15.15), dyspnea (OR, 1.88; 95% CI, 1.18-3.01), unconsciousness (OR, 4.71; 95% CI, 1.39-15.98), number of comorbidities (OR, 1.60; 95% CI, 1.27-2.00), cancer history (OR, 4.07; 95% CI, 1.23-13.43), neutrophil-to-lymphocyte ratio (OR, 1.06; 95% CI, 1.02-1.10), lactate dehydrogenase (OR, 1.002; 95% CI, 1.001-1.004) and direct bilirubin (OR, 1.15; 95% CI, 1.06-1.24). The mean AUC in the development cohort was 0.88 (95% CI, 0.85-0.91) and the AUC in the validation cohort was 0.88 (95% CI, 0.84-0.93). The score has been translated into an online risk calculator that is freely available to the public (http://118.126.104.170/).Conclusions and RelevanceIn this study, a risk score based on characteristics of COVID-19 patients at the time of admission to the hospital was developed that may help predict a patient's risk of developing critical illness.

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1. **Development and Validation of a Diagnostic Nomogram to Predict COVID-19 Pneumonia**  
   Anon. medRxiv 2020;:2020.04.03.20052068.

Background: The COVID-19 virus is an emerging virus rapidly spread worldwide This study aimed to establish an effective diagnostic nomogram for suspected COVID-19 pneumonia patients. METHODS: We used the LASSO aggression and multivariable logistic regression methods to explore the predictive factors associated with COVID-19 pneumonia, and established the diagnostic nomogram for COVID-19 pneumonia using multivariable regression. This diagnostic nomogram was assessed by the internal and external validation data set. Further, we plotted decision curves and clinical impact curve to evaluate the clinical usefulness of this diagnostic nomogram. RESULTS: The predictive factors including the epidemiological history, wedge-shaped or fan-shaped lesion parallel to or near the pleura, bilateral lower lobes, ground glass opacities, crazy paving pattern and white blood cell (WBC) count were contained in the nomogram. In the primary cohort, the C-statistic for predicting the probability of the COVID-19 pneumonia was 0.967, even higher than the C-statistic (0.961) in initial viral nucleic acid nomogram which was established using the univariable regression. The C-statistic was 0.848 in external validation cohort. Good calibration curves were observed for the prediction probability in the internal validation and external validation cohort. The nomogram both performed well in terms of discrimination and calibration. Moreover, decision curve and clinical impact curve were also beneficial for COVID-19 pneumonia patients. CONCLUSION: Our nomogram can be used to predict COVID-19 pneumonia accurately and favourably.Competing Interest StatementThe authors have declared no competing interest.Funding StatementNo fundingAuthor DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.Yes All data referred to in the manuscript is available.

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1. **Development and validation of the COVID-19 severity index (CSI): a prognostic tool for early respiratory decompensation**  
   Anon. medRxiv 2020;:2020.05.07.20094573.

Objective: The goal of this study was to create a predictive model of early hospital respiratory decompensation among patients with COVID-19. Design: Observational, retrospective cohort study. Setting: Nine-hospital health system within the Northeastern United States. Populations: Adult patients (≥ 18 years) admitted from the emergency department who tested positive for SARS-CoV-2 (COVID-19) up to 24 hours after initial presentation. Patients meeting criteria for critical respiratory illness within 4 hours of arrival were excluded. Main outcome and performance measures: We used a composite endpoint of respiratory critical illness as defined by oxygen requirement beyond low-flow nasal cannula (e.g., non-rebreather mask, high-flow nasal cannula, bi-level positive pressure ventilation), intubation, or death within the first 24 hours of hospitalization. We developed predictive models using patient demographic and clinical data collected during those first 4 hours. Eight hospitals were used for development and internal validation (n=932) and 1 hospital for model external validation (n=240). Predictive variables were identified using an ensemble approach that included univariate regression, random forest, logistic regression with LASSO, Chi-square testing, gradient boosting information gain, and gradient boosting Shapley additive explanation (SHAP) values prior to manual curation. We generated two predictive models, a quick COVID-19 severity index (qCSI) that uses only exam and vital sign measurements, and a COVID-19 severity index (CSI) machine learning model. Using area under receiver operating characteristic (AU-ROC), precision-recall curves (AU-PRC) and calibration metrics, we compare the qCSI and CSI to three illness scoring systems: Elixhauser mortality score, qSOFA, and CURB-65. We present performance of qCSI and CSI on an external validation cohort. Results: During the study period from March 1, 2020 to April 27, 2020, 1,792 patients were admitted with COVID-19. Six-hundred and twenty patients were excluded based on age or critical illness within the first 4 hours, yielding 1172 patients in the final cohort. Of these patients, 144 (12.3%) met the composite endpoint within the first 24 hours. The qCSI (AU-ROC: 0.90 [0.85-0.96]) comprised of nasal cannula flow rate, respiratory rate, and minimum documented pulse oximetry outperformed the baseline models (qSOFA: 0.76 [0.69-0.85]; Elixhauser: 0.70 [0.62-0.80]; CURB-65: AU-ROC 0.66 [0.58-0.77]) and was validated on an external cohort (AU-ROC: 0.82). The machine learning-based CSI had superior performance on the training cohort (AU-ROC: 0.91 [0.86-0.97]), but was unlikely to provide practical improvements in clinical settings. Conclusions: A significant proportion of admitted COVID-19 patients decompensate within 24 hours of hospital presentation and these events are accurately predicted using respiratory exam findings within a simple scoring system.Competing Interest StatementThe authors have declared no competing interest.Funding Statement FPW acknowledges R01DK113191 and P30DK079310.Author DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesDue to patient privacy concerns, the data in this study cannot be made publicly available.

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1. **Development of a Predictive Score for COVID-19 Diagnosis based on Demographics and Symptoms in Patients Attended at a Dedicated Screening Unit**  
   Anon. medRxiv 2020;:2020.05.14.20101931.

Background: The diagnosis of COVID-19 based on clinical evaluation is difficult because symptoms often overlap with other respiratory diseases. A clinical score predictive of COVID-19 based on readily assessed variables may be useful in settings with restricted or no access to molecular diagnostic tests. Methods: A score based on demographics and symptoms was developed in a cross-sectional study including patients attended in a dedicated COVID-19 screening unit. A backward stepwise logistic regression model was constructed and values for each variable were assigned according to their β coefficient values in the final model. Receiver operating characteristic (ROC) curve was constructed and its area under the curve (AUC) was calculated. Results: A total of 464 patients were included: 98 (21.1%) COVID-19 and 366 (78.9%) non-COVID-19 patients. The score included variables independently associated with COVID-19 in the final model: age equal or above 60 years (2 points), fever (2), dyspnea (1), fatigue (1 point) and coryza (-1). Score values were significantly higher in COVID-19 than non-COVID-19 patients: median (Interquartile Range), 3 (2-4), and 1 (0-2), respectively; P&amp;lt;0.001. The score had an AUC of 0.80 (95% Confidence Interval [CI], 0.76-0.86). The specificity of scores equal or greater than 4 and 5 points were 90.4 (95%CI, 87.0-93.3) and 96.2 (95%CI, 93.7-97.9), respectively. Conclusions: This preliminary score based on patients symptoms is a feasible tool that may be useful in setting with restricted or no access to molecular tests in a pandemic period, owing to the high specificity. Further studies are required to validate the score in other populations.Competing Interest StatementA. P. Z. received research grant not related to this study from Pfizer. D.R.F. has received payment for research grants, lectures and/or travel reimbursements not related to this study from Pfizer, United Medical, and Gilead Sciences. Other authors declare no conflict of interest.Funding StatementWe did not have any funding support for this study.Author DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesWe hereby choose to not share our dataset.

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1. **Host susceptibility to severe COVID-19 and establishment of a host risk score: findings of 487 cases outside Wuhan.**  
   Shi Y. Critical care (London, England) 2020;24(1):108.

Letter

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1. **Insights from Italy: the Novara-COVID score for rapid destination of COVID-19 patients at emergency department presentation.**  
   Gavelli F. Minerva medica 2020;:No page numbers.

1. **Letter to the Editor: Variability but not admission or trends in NEWS2 score predicts clinical outcome in elderly hospitalised patients with COVID-19.**  
   Sze S. The Journal of infection 2020;:No page numbers.

1. **National Early Warning Score 2 (NEWS2) on admission predicts severe disease and in-hospital mortality from Covid-19 - A prospective cohort study**  
   Myrstad Marius 2020;:No page numbers.

Background There is a need for validated clinical risk scores to identify patients at risk of severe disease and to guide decision-making during the covid-19 pandemic. The National Early Warning Score 2 (NEWS2) is widely used in emergency medicine, but so far, no studies have evaluated its use in patients with covid-19. We aimed to study the performance of NEWS2 and compare commonly used clinical risk stratification tools at admission to predict risk of severe disease and in-hospital mortality in patients with covid-19. Methods This was a prospective cohort study in a public non-university general hospital in the Oslo area, Norway, including a cohort of all 66 patients hospitalised with confirmed SARS-CoV-2 infection from the start of the pandemic; 13 who died during hospital stay and 53 who were discharged alive. Data were collected consecutively from March 9th to April 27th 2020. The main outcome was the ability of the NEWS2 score and other clinical risk scores at emergency department admission to predict severe disease and in-hospital mortality in covid-19 patients. We calculated sensitivity and specificity with 95% confidence intervals (CIs) for NEWS2 scores ≥ 5 and ≥ 6, quick Sequential Organ Failure Assessment (qSOFA) score ≥ 2, ≥2 Systemic Inflammatory Response Syndrome (SIRS) criteria, and CRB-65 score ≥ 2. Areas under the curve (AUCs) for the clinical risk scores were compared using DeLong’s test. Results In total, 66 patients (mean age 67.9 years) were included. Of these, 23% developed severe disease. In-hospital mortality was 20%. Tachypnoea, hypoxemia and confusion at admission were more common in patients developing severe disease. A NEWS2 score ≥ 6 at admission predicted severe disease with 80.0% sensitivity and 84.3% specificity (Area Under the Curve (AUC) 0.822, 95% confidence interval (CI) 0.690–0.953). NEWS2 was superior to qSOFA score ≥ 2 (AUC 0.624, 95% CI 0.446–0.810, p < 0.05) and other clinical risk scores for this purpose. Conclusion NEWS2 score at hospital admission predicted severe disease and in-hospital mortality, and was superior to other widely used clinical risk scores in patients with covid-19.

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1. **New Early Warning Score: off-label approach for Covid-19 outbreak patient deterioration in the community.**  
   Semeraro Federico Resuscitation 2020;151:24-25.

Letter The spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)emergedinChinaatthe end of2019is challenging most health systems worldwide1 . In Italy, the first “wave” hit Lombardia on February 20, 2020, with such a high proportion of patients to impact substantially both admission to emergency department and intensive care treatment, and arising new concerns2 . The Italian Ministry of Health and the National Health Service strongly recommended to all citizen to reduce access to healthcare facilities (e.g. emergency departments, ambulatory and elective surgery)for non-urgentreasons. Government also imposed several measures to contain the outbreak (e.g. closing of schools, limited access to public places, social isolation and preventive public health interventions). On April 9th, at about forty eight days from the beginning of outbreak in Italy, the total number of cases have been 143.626, with 96.877 positive tests, and 28.470 discharged in healthy condition3 . Unfortunately, the amount of death cases (18.279) has claimed Italy at the first place worldwide since the beginning of the outbreak. The Emilia Romagna is the second most affected Italian region after Lombardia. This condition leaded the local infectious disease task force to plan a change of paradigma basing prevention actions directly at home of the patients with infection. The aim is to assess patients at home to allow prescriptions of potential effective therapies (e.g. antiviral and chloroquine) when possible or intercepting those in borderline or warning conditions. Accordingly with thisnewapproach, aresearch projectwas started on voluntary basesby a multidisciplinary teams (e.g. healthcare professionals, software developers, engineers, social manager etc.) with the aim to develop a web app based system to monitor deterioration of patients directly at home. The idea is based on the National Early Warning Score (NEWS) applied to a home context: by the use of an experimental app for smartphones, the in-built features of the device can measure directly parameters included in NEWS (e.g. accelerometer for respiratory rate and photo camera for heartrate measurements). ThisNEWS“off-label” approach in community setting with “homemade” measurements could facilitate self-calculation of the score, thus helping pre evaluation by healthcare professionals and recognising deterioration of patients at risk especially in conditions of overwhelming requests as during a pandemic. Thehypothesisofearly interceptionofdeteriorationcould be useful to prevent potential increase in mortality that unfortunately did happen last month in Italy. We created a free open source platform called CovidUP194 ad hoc for citizens to increase awareness about potential deterioration in case of covid-19 infection. We invited all the international health system researchers to allocate time and resources on this innovative approach for potential“off label” application of NEWS in Covid-19 patients.

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1. **Pre-test probability for SARS-Cov-2-related Infection Score: the PARIS score**  
   Anon. medRxiv 2020;:2020.04.28.20081687.

Background: Diagnostic tests for SARS-CoV-2 infection (mostly RT-PCR and Computed Tomography) are not widely available in numerous countries, expensive and with imperfect performance Methods: This multicenter retrospective study aimed to determine a pre-test probability score for SARS-CoV-2 infection based on clinical and biological variables. Patients were recruited from emergency and infectious disease departments and were divided into a training and a validation cohort. Demographic characteristics, clinical symptoms, and results of blood tests (complete white blood cell count, serum electrolytes and CRP) were collected. The pre-test probability score was derived from univariate analyses between patients and controls, followed by multivariate binary logistic analysis to determine the independent variables associated with SARS-CoV-2 infection. Points were assigned to each variable to create the PARIS score. ROC curve analysis determined the area under the curve (AUC) Findings: One hundred subjects with clinical suspicion of SARS-CoV-2 infection were included in the training cohort, and 300 other consecutive individuals were included in the validation cohort. Low lymphocyte (&amp;lt;1.3 G/L), eosinophil (&amp;lt;0.06G/L), basophil (&amp;lt;0.04G/L) and neutrophil counts (&amp;lt;5G/L) were associated with a high probability of SARS-CoV-2 infection. No clinical variable was statistically significant. The score had a good performance in the validation cohort (AUC=0.889 (CI: [0.846-0.932]; STD=0.022) with a sensitivity and Positive Predictive Value of high-probability score of 80.3% and 92.3% respectively. Furthermore, a low-probability score excluded SARS-CoV-2 infection with a Negative Predictive Value of 99.5% Interpretation: The PARIS score based on complete white blood cell count has a good performance to categorize the pre-test probability of SARS-CoV-2 infection. It could help clinicians avoid diagnostic tests in patients with a low-probability score and conversely keep on testing individuals with high-probability score but negative RT-PCR or CT. It could prove helpful in countries with a low-availability of PCR and/or CT during the current period of pandemicCompeting Interest StatementThe authors have declared no competing interest.Funding StatementNo funding was receivedAuthor DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesAll data from this manuscript are available

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1. **Predicting mortality due to SARS-CoV-2: A mechanistic score relating obesity and diabetes to COVID-19 outcomes in Mexico.**  
   Bello-Chavolla OY The Journal of clinical endocrinology and metabolism 2020;:No page numbers.

<strong>BACKGROUND:</strong> The SARS-CoV-2 outbreak poses challenge to healthcare systems due to high complication rates in patients with cardiometabolic diseases. Here, we identify risk factors and propose a clinical score to predict COVID-19 lethality, including specific factors for diabetes and obesity and its role in improving risk prediction.<br /><strong>METHODS:</strong> We obtained data of confirmed and negative COVID-19 cases and their demographic and health characteristics from the General Directorate of Epidemiology of Mexican Ministry of Health. We investigated specific risk factors associated to COVID-19 positivity and mortality and explored the impact of diabetes and obesity on modifying COVID-19 related lethality. Finally, we built a clinical score to predict COVID-19 lethality.<br /><strong>RESULTS:</strong> Among 177,133 subjects at May 18th, 2020, we observed 51,633 subjects with SARS-CoV-2 and 5,332 deaths. Risk factors for lethality in COVID-19 include early-onset diabetes, obesity, COPD, advanced age, hypertension, immunosuppression, and CKD; we observed that obesity mediates 49.5% of the effect of diabetes on COVID-19 lethality. Early-onset diabetes conferred an increased risk of hospitalization and obesity conferred an increased risk for ICU admission and intubation. Our predictive score for COVID-19 lethality included age ≥65 years, diabetes, early-onset diabetes, obesity, age <40 years, CKD, hypertension, and immunosuppression and significantly discriminates lethal from non-lethal COVID-19 cases (c-statistic=0.823).<br /><strong>RESULTS:</strong> Here, we propose a mechanistic approach to evaluate risk for complications and lethality attributable to COVID-19 considering the effect of obesity and diabetes in Mexico. Our score offers a clinical tool for quick determination of high-risk susceptibility patients in a first contact scenario.

1. **Prediction for Progression Risk in Patients with COVID-19 Pneumonia: the CALL Score.**  
   Ji Dong Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2020;:No page numbers.

BACKGROUNDWe aimed to clarify the high-risk factors with multivariate analysis and establish a prediction of disease progression, so as to help clinicians to better choose therapeutic strategy.METHODSAll the consecutive patients with COVID-19 admitted to Fuyang second people's hospital or the fifth medical center of Chinese PLA general hospital between January 20 and February 22, 2020, were enrolled and their clinical data were retrospectively collected. Multivariate COX regression was used to identify the risk factors associated with progression, and then were incorporated into the nomogram to establish a novel prediction scoring model. ROC was used to assess the performance of the novel model.RESULTSOverall, 208 patients were divided into stable group (n=168, 80.8%) and progressive group (n=40,19.2%) based on whether their conditions worsened during the hospitalization Univariate and multivariate analysis showed that comorbidity, older age, lower lymphocyte and higher lactate dehydrogenase at presentation were independent high-risk factors for COVID-19 progression. Incorporating these 4 factors, the nomogram achieved good concordance indexes of 0.86 (95%CI 0.81 - 0.91), and had well-fitted calibration curves. A novel scoring model, named as CALL, was established, and its area under ROC was 0.91 (95% CI 0.86 to 0.94). Using a cutoff value of 6 points, the positive and negative predictive values were 50.7% (38.9% - 62.4%) and 98.5% (94.7% - 99.8%), respectively.CONCLUSIONUsing the CALL score model, clinicians can improve the therapeutic effect and reduce the mortality of COVID-19 with more accurate and reasonable resolutions on medical resources.

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1. **Supplementing the National Early Warning Score (NEWS2) for anticipating early deterioration among patients with COVID-19 infection**  
   Anon. medRxiv 2020;:2020.04.24.20078006.

Importance: An early minimally symptomatic phase is often followed by deterioration in patients with COVID-19 infection. This study shows that the addition of age and a minimal set of common blood tests taken in patients on admission to hospital significantly improves the National Early Warning Score (NEWS2) for risk-stratification of severe COVID disease. Objective: To supplement the NEWS2 score with a small number of easily obtained additional demographic, physiological and blood variables indicative of severity of COVID-19 infection. Design: Retrospective observational cohort with internal and temporal held-out external validation. Setting: Acute secondary care. Participants: 708 patients admitted to an acute multi-site UK NHS hospital with confirmed COVID-19 disease from 1st March to 5th April 2020. Intervention: Not applicable. Main outcome and measures: The primary outcome was patient status at 14 days after symptom onset categorised as severe disease (WHO-COVID-19 Outcomes Scales 6-8: i.e. transferred to intensive care unit or death). 218 of the 708 patients reached the primary end point. A range of physiological and blood biomarkers as well age, gender, ethnicity and comorbidities (hypertension, diabetes, heart, respiratory and kidney diseases) were assessed for their association with the primary outcome. Results: NEWS2 total score on admission was a weak predictor for severity of COVID-19 infection at 14 days (internally validated AUC = 0.628). The addition of age and common blood tests (CRP, neutrophil count, estimated GFR and albumin) provided substantial improvements to a risk stratification model but performance was still only moderate (AUC = 0.75). Common comorbidities hypertension, diabetes, heart, respiratory and kidney diseases have minor additional predictive value. Conclusions and relevance: Adding age and a minimal set of common blood parameters to NEWS2 improves the risk stratification of patients likely to develop severe COVID-19 outcomes. The addition of a few common parameters is likely to be much easier to implement in a short time-scale than a novel risk-scoring system.Competing Interest StatementJTHT received research support and funding from InnovateUK, Bristol-Myers-Squibb, iRhythm Technologies, and holds shares &amp;lt;£5,000 in Glaxo Smithkline and Biogen.Funding StatementDMB is funded by a UKRI Innovation Fellowship as part of Health Data Research UK MR/S00310X/1 (https://www.hdruk.ac.uk). RB is funded in part by grant MR/R016372/1 for the Kings College London MRC Skills Development Fellowship programme funded by the UK Medical Research Council (MRC, https://mrc.ukri.org) and by grant IS-BRC-1215-20018 for the National Institute for Health Research (NIHR, https://www.nihr.ac.uk) Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and Kings College London. RJBD is supported by: 1. Health Data Research UK, which is funded by the UK Medical Research Council, Engineering and Physical Sciences Research Council, Economic and Social Research Council, Department of Health and Social Care (England), Chief Scientist Office of the Scottish Government Health and Social Care Directorates, Health and Social Care Research and Development Division (Welsh Government), Public Health Agency (Northern Ireland), British Heart Foundation and Wellcome Trust. 2. The BigData@Heart Consortium, funded by the Innovative Medicines Initiative-2 Joint Undertaking under grant agreement No. 116074. This Joint Undertaking receives support from the European Unions Horizon 2020 research and innovation programme and EFPIA; it is chaired by DE Grobbee and SD Anker, partnering with 20 academic and industry partners and ESC. 3. The National Institute for Health Research University College London Hospitals Biomedical Research Centre. 4. National Institute for Health Research (NIHR) Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and Kings College London. KOG is supported by an MRC Clinical Training Fellowship. RZ is supported by a Kings Prize Fellowship. AS is supported by a Kings Medical Research Trust studentship. KO is supported by grant MR/R017751/1 AMS is supported by the British Heart Foundation (CH/1999001/11735), the National Institute for Health Research (NIHR) Biomedical Research Centre at Guys &amp;amp; St Thomas NHS Foundation Trust and Kings College London (IS-BRC-1215-20006), and the Fondation Leducq. AP is partially supported by NIHR NF-SI-0617-10120. This work was supported by the National Institute for Health Research (NIHR) University College London Hospitals (UCLH) Biomedical Research Centre (BRC) Clinical and Research Informatics Unit (CRIU), NIHR Health Informatics Collaborative (HIC), and by awards establishing the Institute of Health Informatics at University College London (UCL). This work was also supported by Health Data Research UK, which is funded by the UK Medical Research Council, Engineering and Physical Sciences Research Council, Economic and Social Research Council, Department of Health and Social Care (England), Chief Scientist Office of the Scottish Government Health and Social Care Directorates, Health and Social Care Research and Development Division (Welsh Government), Public Health Agency (Northern Ireland), British Heart Foundation and the Wellcome Trust. This paper represents independent research part funded by the National Institute for Health Research (NIHR) Biomedical Research Centres at South London and Maudsley NHS Foundation Trust, and Guys &amp;amp; St Thomas NHS Foundation Trust, both with Kings College London. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. We would also like to thank all the clinicians managing the patients, the patient experts of the KERRI committee, Professor Irene Higginson, Professor Alastair Baker, Professor Jules Wendon, Dan Persson and Damian Lewsley for their support. Author DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe data are not publicly available.

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1. **The CALL score for predicting outcomes in patients with COVID-19.**  
   Grifoni E. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2020;:No page numbers.

Letter

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1. **THE LOW-HARM SCORE FOR PREDICTING MORTALITY IN PATIENTS DIAGNOSED WITH COVID-19: A MULTICENTRIC VALIDATION STUDY**  
   Anon. medRxiv 2020;:2020.05.26.20111120.

ABSTRACT - Importance: Many COVID-19 prognostic factors for disease severity have been identified and many scores have already been proposed to predict death and other outcomes. However, hospitals in developing countries often cannot measure some of the variables that have been reported as useful. - Objective: To assess the sensitivity, specificity, and predictive values of the novel LOW-HARM score (Lymphopenia, Oxygen saturation, White blood cells, Hypertension, Age, Renal injury, and Myocardial injury). - Design: Demographic and clinical data from patients with known clinical outcomes (death or discharge) was obtained. Patients were grouped according to their outcome. The LOW-HARM score was calculated for each patient and its distribution, potential cut-off values and demographic data were compared. - Setting: Thirteen hospitals in ten different cities in Mexico. - Participants: Data from 438 patients was collected. A total of 400 (200 per group) was included in the analysis. - Exposure: All patients had an infection with SARS-CoV-2 confirmed by PCR. - Main Outcome: The sensitivity, specificity, and predictive values of different cut-offs of the LOW-HARM score to predict death. - Results: Mean scores at admission and their distributions were significantly lower in patients who were discharged compared to those who died during their hospitalization 10 (SD: 17) vs 71 (SD: 27). The overall AUC of the model was 95%. A cut-off &amp;gt; 65 points had a specificity of 98% and a positive predictive value of 96%. More than a third of the cases (34%) in the sample had a LOW-HARM score &amp;gt; 65 points. - Conclusions and relevance: The LOW-HARM score measured at admission is highly specific and useful for predicting mortality. It is easy to calculate and can be updated with individual clinical progression. The proposed cut-off can assist the decision-making process in more than a third of the hospital admissions.Competing Interest StatementThe authors have declared no competing interest.Clinical Protocolshttps://osf.io/qzunbFunding StatementThis project received no external funding.Author DeclarationsI confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.YesThe details of the IRB/oversight body that provided approval or exemption for the research described are given below:This study was assessed and approved by the Ethics Committee of the Instituto Nacional de Ciencias Medicas y Nutricion Salvador Zubiran on April 29th, 2020 (Reg. No. DMC-3369-20-20-1).All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesAnonymized data will be public.https://docs.google.com/spreadsheets/d/1jq9ePFaI9XNvVpuvmXyXUSTDoTELe7BPLNyTMjmo1XY/edit?usp=sharing

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1. **TOWARD A COVID-19 SCORE-RISK ASSESSMENTS AND REGISTRY**  
   Anon. medRxiv 2020;:2020.04.15.20066860.

ABSTRACT Importance Critical care resources like ventilators, used to manage the current COVID-19 pandemic, are potentially inadequate. Established triage standards and guidelines may not contain the most appropriate severity assessment and outcome prediction models. Objectives Develop a draft pandemic specific triage assessment score for the current COVID-19 pandemic. Design a website where initial Toward a COVID-19 Scores (TACS) can be quickly calculated and used to compare various treatment strategies. Create a TACS Registry where data and outcomes for suspected and confirmed COVID-19 patients can be recorded. Use the TACS Registry to develop an influenza epidemic specific database and score for use in future respiratory based epidemics. Design, Setting, Participants Retrospective analysis of 3,301 ICU admissions with respiratory failure admitted to 41 U.S. Intensive Care Units from 2015-19. Independent external validation on 1,175 similar ICU Admissions using identical entry criteria from Barnes Jewish Hospital (BJH), Washington University from 2016-2019. Main Outcomes TACS was created with 16 readily available predictive variables for risk assessment of hospital mortality 24 hours after ICU Admission and the need for prolonged assisted mechanical ventilation (PAMV) ( &amp;gt;&amp;gt;96 hours) at 24- and 48-hours post ICU admission. Results TACS achieved an Area Under the Curve (AUC) for hospital mortality after 24 hours of 0.80 in the development dataset; 0.81 in the internal validation dataset. At a probability of 50% hospital mortality, positive predictive value (PPV) was 0.55, negative predictive value (NPV) 0.89; sensitivity 22%, specificity 97%. For PAMV after 24 hours, the AUC was 0.84 in the development dataset, 0.81 in the validation dataset. For PAMV after 48 hours, the AUC was 0.82 in the development dataset, 0.78 in the validation dataset. In the external validation the AUC for TACS was 0.76 +/- 0.024. We launched a website that is scaled for mobile device use ( https://covid19score.azurewebsites.net/) that provides open access to a user-friendly TACS Calculator for all predictions. We also designed a voluntary TACS Registry for collection of data and outcomes on ICU Admissions with COVID-19. Conclusions and Relevance Toward a COVID-19 score is a starting point for an epidemic specific triage assessment that could be used to evaluate various approaches to treatment. The TACS Registry provides the ability to establish a respiratory specific outcomes database that can be used to create a triage approach for future such pandemics.Competing Interest StatementThe authors have declared no competing interest.Funding StatementSupported in part by The Gordon and Betty Moore Foundation and Washington UniversityAuthor DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe full equations are published in the manuscript. The accompanying website and registry are open to all users.https://covid19score.azurewebsites.net/

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1. **Triage tool for suspected COVID-19 patients in the emergency room: AIFELL score**  
   Anon. medRxiv 2020;:2020.05.09.20096834.

Clinical prediction scores support the assessment of patients in the emergency setting to determine the need for further diagnostic and therapeutic steps. During the current COVID-19 pandemic, physicians in emergency rooms (ER) of many hospitals have a considerably higher patient load and need to decide within a short time frame whom to hospitalize. Based on our clinical experiences in dealing with COVID-19 patients at the University Hospital Zurich, we created a triage score with the acronym AIFELL consisting of clinical, radiological and laboratory findings. The score was then evaluated in a retrospective analysis of 122 consecutive patients with suspected COVID-19 from March until mid-April 2020. Descriptive statistics, Student&#039;s t-test, ANOVA and Scheffe&#039;s post hoc analysis confirmed the diagnostic power of the score. The results suggest that the AIFELL score has potential as a triage tool in the ER setting intended to select probable COVID-19 cases for hospitalization in spontaneously presenting or referred patients with acute respiratory symptoms.Competing Interest StatementThe authors have declared no competing interest.Funding StatementNo funding was received.Author DeclarationsAll relevant ethical guidelines have been followed; any necessary IRB and/or ethics committee approvals have been obtained and details of the IRB/oversight body are included in the manuscript.YesAll necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.YesI understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).Yes I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.YesThe original raw data is password-protected and stored in protected folders on servers of the University Hospital Zurich and is only accessible by the study team as approved by the IRB. Anonymized data for statistical analysis is also on servers of the University Hospital Zurich.

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