Cardiovascular Disease and the Public Health Impact by COVID-19: An Evidence Summary

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# Evidence Summary

The evidence is clear that cardiovascular disease is a key risk factor for poorer outcomes (severer illness and death) in COVID-19**.** The evidence is less clear regarding CVD as a risk factor for infection

**Evidence Quality**

* The evidence is not high quality – there are systematic reviews, meta-analysis, pooled analysis etc. within the results, but it’s hard to verify their quality without full appraisal.
* The evidence is clinically focused - based in secondary/acute care – and much of that is either analysis of, based upon findings from patients from the initial Wuhan outbreak.
* There is emerging evidence from European/Western nations, but again clinically focused, and is outweighed by Chinese-based evidence.

**Key Messages**

* COVID-19 patients with pre-existing CVD (hypertension, CHD, history of heart attacks/MI etc.) are seen in severe cases, ICU settings and in deceased patients (Aghaoli et al 2020, Driggin et al 2020, )
* Emami et al (2020) undertook a systematic review, whilst Wang et al (2020) and Yang et al (2020) both undertook meta-analysis examining COVID-19 comorbidities finding hypertension, diabetes, CVD to be major risk factors for patients with COVID-19.
* Chen R (et al 2020) found that 48% of deceased patients within the study had chronic hypertension vs. 24% in survivors (**small sample size in Wuhan hospital**), whilst in Guo (et al 2020) 35.3% of patients had CVD, though the paper argues that “the prognosis of patients with underlying CVD but without myocardial injury is relatively favourable.” (**month long retrospective single-centre case series in Wuhan hospital**)
* Other Comorbidities linked to CVD & COVID within the evidence include cerebrovascular disease, dyspnoea, chronic respiratory disease & COPD, and chronic kidney disease, and diabetes alongside other characteristic factors such as smoking history, older age and male gender. (Chen T et al 2020, , Shahid et al 2020).
* Aside from Chen T (et al 2020) recommending early identification and more intensive surveillance of at risk patients, the is very little in terms of preventative or population approaches to reduce the risk to CVD patients on COVID-19 beyond the social distancing and shielding guidance already in place.
* From a public health perspective, it may be worthwhile examining leading risk factors for cardiovascular issues and examining their role/relationship with COVID-19. For example, if smoking is a major risk factor for CVD, can we measure the potential impact of how much the reduction in smokers in Bolton over past ten years have influenced our severe cases and mortality rates? Or use it as a driver for the healthy weight declaration/active travel etc.?

# Literature Search Results - Highlights

Aggarwal, G., Lippi, G. & Michael Henry, B. 2020. **Cerebrovascular disease is associated with an increased disease severity in patients with Coronavirus Disease 2019 (COVID-19): A pooled analysis of published literature**. *International Journal of Stroke* 1747493020921664.

INTRODUCTION: There is an urgent need to identify patients at high risk during the ongoing coronavirus disease (COVID-19) pandemic. Whether a history of stroke is associated with increased severity of disease or mortality is unknown.

METHOD: We pooled studies from published literature to assess the association of a history of stroke with outcomes in patients with COVID-19.

RESULTS: A pooled analysis of 4 studies showed a ~2.5-fold increase in odds of severe COVID-19. While a trend was observed, there was no statistically significant association of stroke with mortality in patients with COVID-19 infection.

DISCUSSION: Our findings are limited by a small number of studies and sample size.

CONCLUSION: There is a ~2.5-fold increase in odds of severe COVID-19 illness with a history of cerebrovascular disease.

Aghagoli, G., Gallo Marin, B., Soliman, L. B., et al. 2020. **Cardiac involvement in COVID-19 patients: Risk factors, predictors, and complications: A review**. *Journal of Cardiac Surgery* 19 19.

BACKGROUND: Respiratory complications have been well remarked in the novel coronavirus disease (SARS-CoV-2/COVID-19), yet an emerging body of research indicates that cardiac involvement may be implicated in poor outcomes for these patients.

AIMS: This review seeks to gather and distill the existing body of literature that describes the cardiac implications of COVID-19.

MATERIALS AND METHODS: The English literature was reviewed for papers dealing with the cardiac effects of COVID-19.

RESULTS: Notably, COVID-19 patients with pre-existing cardiovascular disease are counted in greater frequency in intensive care unit settings, and ultimately suffer greater rates of mortality. Other studies have noted cardiac presentations for COVID-19, rather than respiratory, such as acute pericarditis and left ventricular dysfunction. In some patients there has been evidence of acute myocardial injury, with correspondingly increased serum troponin I levels. With regard to surgical interventions, there is a dearth of data describing myocardial protection during cardiac surgery for COVID-19 patients. Although some insights have been garnered in the study of cardiovascular diseases for these patients, these insights remain fragmented and have yet to cement clear guidelines for actionable clinical practice.

CONCLUSION: While some information is available, further studies are imperative for a more cohesive understanding of the cardiac pathophysiology in COVID-19 patients to promote more informed treatment and, ultimately, better clinical outcomes.

Bansal, M. 2020. **Cardiovascular disease and COVID-19**. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews* 14(3) 247-250.

Background and aims: Many patients with coronavirus disease 2019 (COVID-19) have underlying cardiovascular (CV) disease or develop acute cardiac injury during the course of the illness. Adequate understanding of the interplay between COVID-19 and CV disease is required for optimum management of these patients. Method(s): A literature search was done using PubMed and Google search engines to prepare a narrative review on this topic. Result(s): Respiratory illness is the dominant clinical manifestation of COVID-19; CV involvement occurs much less commonly. Acute cardiac injury, defined as significant elevation of cardiac troponins, is the most commonly reported cardiac abnormality in COVID-19. It occurs in approximately 8-12% of all patients. Direct myocardial injury due to viral involvement of cardiomyocytes and the effect of systemic inflammation appear to be the most common mechanisms responsible for cardiac injury. The information about other CV manifestations in COVID-19 is very limited at present. Nonetheless, it has been consistently shown that the presence of pre-existing CV disease and/or development of acute cardiac injury are associated with significantly worse outcome in these patients. Conclusion(s): Most of the current reports on COVID-19 have only briefly described CV manifestations in these patients. Given the enormous burden posed by this illness and the significant adverse prognostic impact of cardiac involvement, further research is required to understand the incidence, mechanisms, clinical presentation and outcomes of various CV manifestations in COVID-19 patients. Copyright © 2020 Diabetes India

Bonow, R. O., Fonarow, G. C., O'Gara, P. T., et al. 2020. **Association of Coronavirus Disease 2019 (COVID-19) with Myocardial Injury and Mortality**. *JAMA Cardiology.*

Buckley, L. F., Cheng, J. W. M. & Desai, A. 2020. **Cardiovascular Pharmacology in the Time of COVID-19: A Focus on Angiotensin Converting Enzyme 2**. *Journal of Cardiovascular Pharmacology* 13 13.

Coronavirus disease-2019 (COVID-19) has emerged as a pandemic affecting millions of adults. Severe acute respiratory syndrome coronavirus-2019 (SARS-CoV-2), the causative virus of COVID-19, infects host cells through angiotensin converting enzyme 2 (ACE2). Pre-clinical models suggest that ACE2 upregulation confers protective effects in acute lung injury. Additionally, renin-angiotensin aldosterone system inhibitors reduce adverse atherosclerotic cardiovascular disease, heart failure and chronic kidney disease outcomes, but may increase ACE2 levels. We review current knowledge of the role of ACE2 in cardiovascular physiology and SARS-CoV-2 virology as well as clinical data to inform the management of patients with or at risk for COVID-19 who require renin-angiotensin-aldosterone system inhibitor therapy.

Chen, R., Liang, W., Jiang, M., et al. 2020. **Risk factors of fatal outcome in hospitalized subjects with coronavirus disease 2019 from a nationwide analysis in China**. *Chest* 15 15.

BACKGROUND: The novel coronavirus disease 2019 (COVID-19) has become a global health emergency. Cumulative number of new confirmed case and death are still increasing out of China. However, the independent predicted factors associated with the fatal outcome remain uncertain.

METHODS: A retrospective cohort of 1590 hospitalized subjects with COVID-19 throughout China was established. The prognostic effects of variables, including clinical features and laboratory findings, were analyzed using Kapla-Meier method and Cox proportional hazard model. A prognostic nomogram was formulated to predict the survival of patient with COVID-19.

RESULTS: In this nationwide cohort, non-survivors showed higher incidence of elderly people, subjects with co-existing chronic illness, dyspnea and laboratory abnormalities on admission, compared with survivors. Multivariate Cox regression analysis showed that age>=75 (HR: 7.86, 95% CI: 2.44-25.35), age between 65-74 years (HR:3.43, 95%CI: 1.24-9.5), coronary heart disease (HR:4.28, 95%CI:1.14-16.13), cerebrovascular disease(HR:3.1, 95%CI:1.07-8.94), dyspnea (HR: 3.96, 95%CI:1.42-11), procalcitonin>0.5ng/ml(HR:8.72, 95%CI:3.42-22.28), aspartate aminotransferase>40U/liter (HR: 2.2, 95% CI: 1.1- 6.73) were independent risk factors associated with fatal outcome. A nomogram was established based on the results of multivariate analysis. The internal bootstrap resampling approach suggested the nomogram has sufficient discriminatory power with the C-index of 0.91 (95%CI 0.85-0.97). The calibration plots also demonstrated good consistence between the prediction and the observation.

CONCLUSIONS: The proposed nomogram accurately predict clinical outcomes of patients with COVID-19 based on individual characteristics. Earlier identification, more intensive surveillance and appropriate therapy should be considered in patients with high risk.

Chen, T., Wu, D., Chen, H., et al. 2020. **Clinical characteristics of 113 deceased patients with coronavirus disease 2019: retrospective study**. *BMJ (Clinical research ed.)* 368 m1091.

OBJECTIVE: To delineate the clinical characteristics of patients with coronavirus disease 2019 (covid-19) who died. DESIGN: Retrospective case series. SETTING: Tongji Hospital in Wuhan, China. PARTICIPANTS: Among a cohort of 799 patients, 113 who died and 161 who recovered with a diagnosis of covid-19 were analysed. Data were collected until 28 February 2020. MAIN OUTCOME MEASURES: Clinical characteristics and laboratory findings were obtained from electronic medical records with data collection forms. RESULT(S): The median age of deceased patients (68 years) was significantly older than recovered patients (51 years). Male sex was more predominant in deceased patients (83; 73%) than in recovered patients (88; 55%). Chronic hypertension and other cardiovascular comorbidities were more frequent among deceased patients (54 (48%) and 16 (14%)) than recovered patients (39 (24%) and 7 (4%)). Dyspnoea, chest tightness, and disorder of consciousness were more common in deceased patients (70 (62%), 55 (49%), and 25 (22%)) than in recovered patients (50 (31%), 48 (30%), and 1 (1%)). The median time from disease onset to death in deceased patients was 16 (interquartile range 12.0-20.0) days. Leukocytosis was present in 56 (50%) patients who died and 6 (4%) who recovered, and lymphopenia was present in 103 (91%) and 76 (47%) respectively. Concentrations of alanine aminotransferase, aspartate aminotransferase, creatinine, creatine kinase, lactate dehydrogenase, cardiac troponin I, N-terminal pro-brain natriuretic peptide, and D-dimer were markedly higher in deceased patients than in recovered patients. Common complications observed more frequently in deceased patients included acute respiratory distress syndrome (113; 100%), type I respiratory failure (18/35; 51%), sepsis (113; 100%), acute cardiac injury (72/94; 77%), heart failure (41/83; 49%), alkalosis (14/35; 40%), hyperkalaemia (42; 37%), acute kidney injury (28; 25%), and hypoxic encephalopathy (23; 20%). Patients with cardiovascular comorbidity were more likely to develop cardiac complications. Regardless of history of cardiovascular disease, acute cardiac injury and heart failure were more common in deceased patients. CONCLUSION(S): Severe acute respiratory syndrome coronavirus 2 infection can cause both pulmonary and systemic inflammation, leading to multi-organ dysfunction in patients at high risk. Acute respiratory distress syndrome and respiratory failure, sepsis, acute cardiac injury, and heart failure were the most common critical complications during exacerbation of covid-19. Copyright © Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Clerkin, K. J., Fried, J. A., Raikhelkar, J., et al. 2020. **Coronavirus Disease 2019 (COVID-19) and Cardiovascular Disease**. *Circulation.* 21.

Conti, P. & Younes, A. 2020. **Coronavirus COV-19/SARS-CoV-2 affects women less than men: clinical response to viral infection**. *Journal of Biological Regulators & Homeostatic Agents* 34(2) 07.

CoV-19/SARS-CoV-2 is a highly pathogenic virus that causes coronavirus-19 disease (COVID-19) an acute respiratory distress syndrome which provokes serious problems for global health. Studies suggest that there are many differences between men and women in the immune response to CoV-19 infection and inflammatory diseases. Women, compared to men, are less susceptible to viral infections based on a different innate immunity, steroid hormones and factors related to sex chromosomes. The presence of two X chromosomes in women emphasize the immune system even if one is inactive. The immune regulatory genes encoded by X chromosome in female gender causes lower viral load levels, and less inflammation than in man, while CD4+ T cells are higher with better immune response. In addition, women generally produce higher levels of antibodies which remain in the circulation longer. The levels of activation of the immune cells are higher in women than in men, and it is correlated with the trigger of TLR7 and the production of IFN. TLR7 is higher in women than in men and its biallelic expression leads to higher immune responses and increases the resistance to viral infections. TLR7 is expressed in innate immune cells which recognizes single strand RNA virus by promoting the production of antibodies against the virus and the generation of pro-inflammatory cytokines including IL-6 and IL-1 family members. Moreover, in women the production of inflammatory IL-6 after viral infection is lower than in males and is often correlated with a better longevity. In addition, on the X chromosome there are loci that code for the genes involved in the regulation of immune cells such as FOXP3, and transcription factor for Treg involved in virus pathogenesis. The X chromosome influences the immune system by acting on many other proteins, including TLR8, CD40L and CXCR3 which can be over-expressed in women, and influence the response to viral infections and vaccinations. However, the biallelic expression of the X-linked genes can promote harmful autoimmune and inflammatory responses. Cardiovascular diseases are more frequent in males and subjects without cardiovascular dysfunctions infected by CoV-19 have a better prognosis, but these effects are still under study. It is hoped that certain drugs, such as CoV-19 receptor blockers, anti-inflammatories (against rheumatic diseases), monoclonal antibodies, anti-IL-1 and anti-IL-6, the remdesevir drug (analogue adenosine, effective against ebola), hydroxychloroquine (for the treatment of malaria) and vaccines, will open up new strategies and new therapeutic ways to combat this terrible virus.

Dixon, D. L., Van Tassell, B. W., Vecchie, A., et al. 2020. **Cardiovascular Considerations in Treating Patients with Coronavirus (COVID-19)**. *Journal of Cardiovascular Pharmacology* 02 02.

A novel betacoronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has spread rapidly across the globe since December 2019. Coronavirus disease 2019 (COVID-19) has a significantly higher mortality rate than seasonal influenza and has disproportionately affected older adults, especially those with cardiovascular disease and related risk factors. Adverse cardiovascular sequalae, such has myocarditis, acute myocardial infarction, and heart failure, have been reported in patients with COVID-19. No established treatment is currently available; however, several therapies, including remdesivir, hydroxychloroquine and chloroquine, and interleukin (IL)-6 inhibitors, are being used off-label and evaluated in ongoing clinical trials. Considering these therapies are not familiar to cardiovascular clinicians managing these patients, this review describes the pharmacology of these therapies in the context of their use in patients with cardiovascular-related conditions.

Driggin, E., Madhavan, M. V., Bikdeli, B., et al. 2020. **Cardiovascular Considerations for Patients, Health Care Workers, and Health Systems During the Coronavirus Disease 2019 (COVID-19) Pandemic**. *Journal of the American College of Cardiology.* 18.

The coronavirus disease-2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 that has significant implications for the cardiovascular care of patients. First, those with COVID-19 and preexisting cardiovascular disease (CVD) have an increased risk of severe disease and death. Second, infection has been associated with multiple direct and indirect cardiovascular complications including acute myocardial injury, myocarditis, arrhythmias and venous thromboembolism. Third, therapies under investigation for COVID-19 may have cardiovascular side effects. Fourth, the response to COVID-19 can compromise the rapid triage of non-COVID-19 patients with cardiovascular conditions. Finally, the provision of cardiovascular care may place health care workers in a position of vulnerability as they become host or vectors of virus transmission. We hereby review the peer-reviewed and preprint literature pertaining to cardiovascular considerations related to COVID-19 and highlight gaps in knowledge that require further study pertinent to patients, health care workers, and health systems. Copyright © 2020. Published by Elsevier Inc.

Du, Y., Tu, L., Zhu, P., et al. 2020. **Clinical Features of 85 Fatal Cases of COVID-19 from Wuhan: A Retrospective Observational Study**. *American journal of respiratory and critical care medicine.* 03.

BACKGROUND: The global death toll from COVID-19 virus exceeds 21000. The risk factors for death were attributed to advanced age and co-morbidities, but haven't been accurately defined. OBJECTIVE(S): To report the clinical features of 85 fatal cases with COVID-19 in two hospitals in Wuhan. METHOD(S): Medical records of 85 fatal cases of COVID-19 between January 9 and February 15, 2020 were collected. Information recorded included medical history, exposure history, comorbidities, symptoms, laboratory findings, CT scans and clinical management. MEASUREMENTS AND MAIN RESULTS: The median age of the patients was 65.8 years and 72.9% were male. Common symptoms were fever (78 [91.8%]), shortness of breath (50 [58.8%]), fatigue (50 [58.8%]), dyspnea (60 [70.6%]). Hypertension, diabetes and coronary heart disease were the most common comorbidities. Notably, 81.2% patients had very low eosinophil counts at admission. Complications included respiratory failure (80 [94.1%]), shock (69 [81.2%]), ARDS (63 [74.1%]), arrhythmia (51 [60%]), etc. Most patients received antibiotic (77 [90.6%]), antiviral (78 [91.8%]) and glucocorticoids (65 [76.5%]) treatments. 38 patients [44.7%] and 33 [38.8%] received intravenous immunoglobulin and interferon alpha2b respectively. CONCLUSION(S): In this depictive study of 85 fatal cases of COVID-19, most cases were male aged over 50 years old with noncommunicable chronic diseases. The majority of the patients died of multiple organ failure. Early onset of shortness of breath may be used as an observational symptom for COVID-19 exacerbations. Eosinophilopenia may indicate a poor prognosis. The combination of anti-microbial drugs did not offer considerable benefit to the outcome of this group of patients. This article is open access and distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives License 4.0 (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Emami, A., Javanmardi, F., Pirbonyeh, N., et al. 2020. **Prevalence of Underlying Diseases in Hospitalized Patients with COVID-19: a Systematic Review and Meta-Analysis**. *Archives of Academic Emergency Medicine* 8(1) e35.

Introduction: In the beginning of 2020, an unexpected outbreak due to a new corona virus made the headlines all over the world. Exponential growth in the number of those affected makes this virus such a threat. The current meta-analysis aimed to estimate the prevalence of underlying disorders in hospitalized COVID-19 patients.

Methods: A comprehensive systematic search was performed on PubMed, Scopus, Web of science, and Google scholar, to find articles published until 15 February 2020. All relevant articles that reported clinical characteristics and epidemiological information of hospitalized COVID-19 patients were included in the analysis.

Results: The data of 76993 patients presented in 10 articles were included in this study. According to the meta-analysis, the pooled prevalence of hypertension, cardiovascular disease, smoking history and diabetes in people infected with SARS-CoV-2 were estimated as 16.37% (95%CI: 10.15%-23.65%), 12.11% (95%CI 4.40%-22.75%), 7.63% (95%CI 3.83%-12.43%) and 7.87% (95%CI 6.57%-9.28%), respectively.

Conclusion: According to the findings of the present study, hypertension, cardiovascular diseases, diabetes mellitus, smoking, chronic obstructive pulmonary disease (COPD), malignancy, and chronic kidney disease were among the most prevalent underlying diseases among hospitalized COVID-19 patients, respectively.

Fang, L., Karakiulakis, G. & Roth, M. 2020. **Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection?** *The Lancet Respiratory Medicine* 8(4) e21.

Ferrari, R., Di Pasquale, G. & Rapezzi, C. 2020. **Commentary: What is the relationship between Covid-19 and cardiovascular disease?** *International Journal of Cardiology.*

Garg, S., Kim, L., Whitaker, M., et al. 2020. **Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 - COVID-NET, 14 States, March 1-30, 2020**. *MMWR - Morbidity & Mortality Weekly Report* 69(15) 458-464.

Since SARS-CoV-2, the novel coronavirus that causes coronavirus disease 2019 (COVID-19), was first detected in December 2019 (1), approximately 1.3 million cases have been reported worldwide (2), including approximately 330,000 in the United States (3). To conduct population-based surveillance for laboratory-confirmed COVID-19-associated hospitalizations in the United States, the COVID-19-Associated Hospitalization Surveillance Network (COVID-NET) was created using the existing infrastructure of the Influenza Hospitalization Surveillance Network (FluSurv-NET) (4) and the Respiratory Syncytial Virus Hospitalization Surveillance Network (RSV-NET). This report presents age-stratified COVID-19-associated hospitalization rates for patients admitted during March 1-28, 2020, and clinical data on patients admitted during March 1-30, 2020, the first month of U.S. surveillance. Among 1,482 patients hospitalized with COVID-19, 74.5% were aged >=50 years, and 54.4% were male. The hospitalization rate among patients identified through COVID-NET during this 4-week period was 4.6 per 100,000 population. Rates were highest (13.8) among adults aged >=65 years. Among 178 (12%) adult patients with data on underlying conditions as of March 30, 2020, 89.3% had one or more underlying conditions; the most common were hypertension (49.7%), obesity (48.3%), chronic lung disease (34.6%), diabetes mellitus (28.3%), and cardiovascular disease (27.8%). These findings suggest that older adults have elevated rates of COVID-19-associated hospitalization and the majority of persons hospitalized with COVID-19 have underlying medical conditions. These findings underscore the importance of preventive measures (e.g., social distancing, respiratory hygiene, and wearing face coverings in public settings where social distancing measures are difficult to maintain)<sup> </sup> to protect older adults and persons with underlying medical conditions, as well as the general public. In addition, older adults and persons with serious underlying medical conditions should avoid contact with persons who are ill and immediately contact their health care provider(s) if they have symptoms consistent with COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) (5). Ongoing monitoring of hospitalization rates, clinical characteristics, and outcomes of hospitalized patients will be important to better understand the evolving epidemiology of COVID-19 in the United States and the clinical spectrum of disease, and to help guide planning and prioritization of health care system resources.

Guo, T., Fan, Y., Chen, M., et al. 2020. **Cardiovascular Implications of Fatal Outcomes of Patients with Coronavirus Disease 2019 (COVID-19)**. *JAMA Cardiology.*

Importance: Increasing numbers of confirmed cases and mortality rates of coronavirus disease 2019 (COVID-19) are occurring in several countries and continents. Information regarding the impact of cardiovascular complication on fatal outcome is scarce. Objective(s): To evaluate the association of underlying cardiovascular disease (CVD) and myocardial injury with fatal outcomes in patients with COVID-19. Design, Setting, and Participant(s): This retrospective single-center case series analyzed patients with COVID-19 at the Seventh Hospital of Wuhan City, China, from January 23, 2020, to February 23, 2020. Analysis began February 25, 2020. Main Outcomes and Measures: Demographic data, laboratory findings, comorbidities, and treatments were collected and analyzed in patients with and without elevation of troponin T (TnT) levels. Result(s): Among 187 patients with confirmed COVID-19, 144 patients (77%) were discharged and 43 patients (23%) died. The mean (SD) age was 58.50 (14.66) years. Overall, 66 (35.3%) had underlying CVD including hypertension, coronary heart disease, and cardiomyopathy, and 52 (27.8%) exhibited myocardial injury as indicated by elevated TnT levels. The mortality during hospitalization was 7.62% (8 of 105) for patients without underlying CVD and normal TnT levels, 13.33% (4 of 30) for those with underlying CVD and normal TnT levels, 37.50% (6 of 16) for those without underlying CVD but elevated TnT levels, and 69.44% (25 of 36) for those with underlying CVD and elevated TnTs. Patients with underlying CVD were more likely to exhibit elevation of TnT levels compared with the patients without CVD (36 [54.5%] vs 16 [13.2%]). Plasma TnT levels demonstrated a high and significantly positive linear correlation with plasma high-sensitivity C-reactive protein levels (beta = 0.530, P <.001) and N-terminal pro-brain natriuretic peptide (NT-proBNP) levels (beta = 0.613, P <.001). Plasma TnT and NT-proBNP levels during hospitalization (median [interquartile range (IQR)], 0.307 [0.094-0.600]; 1902.00 [728.35-8100.00]) and impending death (median [IQR], 0.141 [0.058-0.860]; 5375 [1179.50-25695.25]) increased significantly compared with admission values (median [IQR], 0.0355 [0.015-0.102]; 796.90 [401.93-1742.25]) in patients who died (P =.001; P <.001), while no significant dynamic changes of TnT (median [IQR], 0.010 [0.007-0.019]; 0.013 [0.007-0.022]; 0.011 [0.007-0.016]) and NT-proBNP (median [IQR], 352.20 [174.70-636.70]; 433.80 [155.80-1272.60]; 145.40 [63.4-526.50]) was observed in survivors (P =.96; P =.16). During hospitalization, patients with elevated TnT levels had more frequent malignant arrhythmias, and the use of glucocorticoid therapy (37 [71.2%] vs 69 [51.1%]) and mechanical ventilation (41 [59.6%] vs 14 [10.4%]) were higher compared with patients with normal TnT levels. The mortality rates of patients with and without use of angiotensin-converting enzyme inhibitors/angiotensin receptor blockers was 36.8% (7 of 19) and 25.6% (43 of 168). Conclusions and Relevance: Myocardial injury is significantly associated with fatal outcome of COVID-19, while the prognosis of patients with underlying CVD but without myocardial injury is relatively favorable. Myocardial injury is associated with cardiac dysfunction and arrhythmias. Inflammation may be a potential mechanism for myocardial injury. Aggressive treatment may be considered for patients at high risk of myocardial injury.. Copyright © 2020 Cambridge University Press. All rights reserved.

Han, H., Xie, L., Liu, R., et al. 2020. **Analysis of heart injury laboratory parameters in 273 COVID-19 patients in one hospital in Wuhan, China**. *Journal of medical virology.* 31.

An outbreak of SARS-CoV-2 epidemic spreads rapidly worldwide. SARS-CoV-2 infection caused mildly to seriously and fatally respiratory, enteric, cardiovascular, and neurological diseases. In this study, we detected and analyzed the main laboratory indicators related to heart injury, CK-MB, MYO, ultra-TnI and NT-proBNP, in 273 COVID-19 patients and investigated the correlation between heart injury and severity of the disease. It was found that higher concentration in venous blood of CK-MB, MYO, ultra-TnI and NT-proBNP were associated with the severity and case-fatality rate of COVID-19. Careful monitoring of the myocardiac enzyme profiles is of great importance in reducing the complications and mortality in COVID-19 patients. This article is protected by copyright. All rights reserved.

He, H., Zhao, S., Han, L., et al. 2020. **Anesthetic Management of Patients Undergoing Aortic Dissection Repair With Suspected Severe Acute Respiratory Syndrome Coronavirus-2 Infection**. *Journal of Cardiothoracic and Vascular Anesthesia.*

Severe acute respiratory syndrome coronavirus-2 is still active in Wuhan, China, and is spreading to the rest of the world. Recently, perioperative anesthetic management in patients with suspected or confirmed coronavirus-2 has been reported. However, little has been reported on the anesthetic management of patients undergoing aortic dissection repair in patients with suspected severe acute respiratory syndrome coronavirus-2 infection. During the outbreak in Wuhan, the authors' team completed 4 cases of aortic dissection repair successfully in patients with suspected severe acute respiratory syndrome coronavirus-2 infection. The purpose of the present report is to summarize current knowledge and experiences on anesthetic management in this patient population and to provide clinical practice guidelines on anesthetic management and infection prevention and control in these critically ill patients. Copyright © 2020 Elsevier Inc.

Hendren, N. S., Drazner, M. H., Bozkurt, B., et al. 2020. **Description and Proposed Management of the Acute COVID-19 Cardiovascular Syndrome**. *Circulation* 16 16.

Coronavirus Disease 2019 (COVID-19) is a rapidly expanding global pandemic due to Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) resulting in significant morbidity and mortality. A substantial minority of patients hospitalized develop an Acute COVID-19 Cardiovascular Syndrome (ACovCS) that can manifest with a variety of clinical presentations, but often presents as an acute cardiac injury with cardiomyopathy, ventricular arrhythmias and hemodynamic instability in the absence of obstructive coronary artery disease. The etiology of this injury is uncertain, but is suspected to be related to myocarditis, microvascular injury, systemic cytokine-mediated injury or stress-related cardiomyopathy. Although histologically unproven, SARS-CoV-2 has the potential to directly replicate within cardiomyocytes and pericytes leading to viral myocarditis. Systemically elevated cytokines are also known to be cardiotoxic and have the potential to result in profound myocardial injury. Prior experience with Severe Acute Respiratory Syndrome Coronavirus-1 (SARS-CoV-1) has helped expedite the evaluation of several promising therapies including anti-viral agents, interleukin-6 inhibitors, and convalescent serum. Management of ACovCS should involve a multidisciplinary team including intensive care specialists, infectious disease specialists and cardiologists. Priorities for managing ACovCS include balancing the goals of minimizing healthcare staff exposure for testing that will not change clinical management with early recognition of the syndrome at a time point where intervention may be most effective. The aim of this paper is to review the best available data on ACovCS epidemiology, pathogenesis, diagnosis and treatment. From these data, we propose a surveillance, diagnostic and management strategy that balances potential patient risks and healthcare staff exposure with improvement in meaningful clinical outcomes.

Hulot, J. S. 2020. **COVID-19 in patients with cardiovascular diseases**. *Archives of Cardiovascular Diseases.*

Inciardi, R. M., Lupi, L., Zaccone, G., et al. 2020. **Cardiac Involvement in a Patient with Coronavirus Disease 2019 (COVID-19)**. *JAMA Cardiology.*

Importance: Virus infection has been widely described as one of the most common causes of myocarditis. However, less is known about the cardiac involvement as a complication of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Objective(s): To describe the presentation of acute myocardial inflammation in a patient with coronavirus disease 2019 (COVID-19) who recovered from the influenzalike syndrome and developed fatigue and signs and symptoms of heart failure a week after upper respiratory tract symptoms. Design, Setting, and Participant(s): This case report describes an otherwise healthy 53-year-old woman who tested positive for COVID-19 and was admitted to the cardiac care unit in March 2020 for acute myopericarditis with systolic dysfunction, confirmed on cardiac magnetic resonance imaging, the week after onset of fever and dry cough due to COVID-19. The patient did not show any respiratory involvement during the clinical course. Exposure: Cardiac involvement with COVID-19. Main Outcomes and Measures: Detection of cardiac involvement with an increase in levels of N-terminal pro-brain natriuretic peptide (NT-proBNP) and high-sensitivity troponin T, echocardiography changes, and diffuse biventricular myocardial edema and late gadolinium enhancement on cardiac magnetic resonance imaging. Result(s): An otherwise healthy 53-year-old white woman presented to the emergency department with severe fatigue. She described fever and dry cough the week before. She was afebrile but hypotensive; electrocardiography showed diffuse ST elevation, and elevated high-sensitivity troponin T and NT-proBNP levels were detected. Findings on chest radiography were normal. There was no evidence of obstructive coronary disease on coronary angiography. Based on the COVID-19 outbreak, a nasopharyngeal swab was performed, with a positive result for SARS-CoV-2 on real-time reverse transcriptase-polymerase chain reaction assay. Cardiac magnetic resonance imaging showed increased wall thickness with diffuse biventricular hypokinesis, especially in the apical segments, and severe left ventricular dysfunction (left ventricular ejection fraction of 35%). Short tau inversion recovery and T2-mapping sequences showed marked biventricular myocardial interstitial edema, and there was also diffuse late gadolinium enhancement involving the entire biventricular wall. There was a circumferential pericardial effusion that was most notable around the right cardiac chambers. These findings were all consistent with acute myopericarditis. She was treated with dobutamine, antiviral drugs (lopinavir/ritonavir), steroids, chloroquine, and medical treatment for heart failure, with progressive clinical and instrumental stabilization. Conclusions and Relevance: This case highlights cardiac involvement as a complication associated with COVID-19, even without symptoms and signs of interstitial pneumonia.. Copyright © 2020 Cambridge University Press. All rights reserved.

Ji, H. L., Zhao, R., Matalon, S., et al. 2020. **Elevated plasmin(ogen) as a common risk factor for COVID-19 susceptibility**. *Physiological reviews.* 27.

Patients with hypertension, diabetes, coronary heart disease, cerebrovascular illness, COPD, and kidney dysfunction have worse clinical outcomes when infected with SARS-CoV-2, for unknown reasons. The purpose of this review is to summarize the evidence for the existence of elevated plasmin(ogen) in COVID-19 patients with these comorbid conditions. Plasmin, and other proteases, may cleave a newly inserted furin site in the S protein of SARS-CoV-2, extracellularly, which increases its infectivity and virulence. Hyper-fibrinolysis associated with plasmin leads to elevated D-dimer in severe patients. The plasmin(ogen) system may prove a promising therapeutic target for combating COVID-19.

Kang, Y. J. 2020. **Mortality rate of infection with COVID-19 in Korea from the perspective of underlying disease**. *Disaster medicine and public health preparedness* 1-6.

On December 31st, 2019 the China National Health Commission (NHC) reported that an unknown cause of pneumonia had been detected in Wuhan in Hubei province. On February 12th, the disease caused by novel coronavirus (2019-nCoV) has a formal name, COVID-19. On January 20th, 2020, the first case of COVID-19 was confirmed in Korea. Among the deaths, age-specific death rate was the highest among cases over 70's, with underlying diseases in their circulatory system, such as myocardial infraction, cerebral infraction, arrythmia, and hypertension. Patients with underlying disease who are 70 years of age or older should recognize that there is a high possibility of developing a serious disease in case of viral infection and follow strict precautions.

Khot, W. Y. & Nadkar, M. Y. 2020. **The 2019 Novel Coronavirus Outbreak - A Global Threat**. *The Journal of the Association of Physicians of India* 68(3) 67-71.

The 2019 Novel Corona virus infection (COVID 19) is an ongoing public health emergency of international significance. There are significant knowledge gaps in the epidemiology, transmission dynamics, investigation tools and management. In this article, we review the available evidence about this disease. Every decade has witnessed the evolution of a new coronavirus epidemic since the last three decades. The varying transmission patterns, namely, nosocomial transmission and spread through mildly symptomatic cases is an area of concern. There is a spectrum of clinical features from mild to severe life threatening disease with major complications like severe pneumonia, ARDS, acute cardiac injury and septic shock. Presence of bilateral ground glass opacity and consolidation on imaging in appropriate clinical background should raise a suspicion about COVID 19. Poor prognostic factors include Multilobular infiltration on chest imaging, Lymphopenia, Bacterial co-infection, Smoking history, Chronic medical conditions like Hypertension and age >60 years (MuLBSTA score). Diagnosis is confirmed with PCR based testing of appropriate respiratory samples. Management is primarily supportive, with newer antivirals (lopinavir ritonavir and Remdesivir) under investigation. Role of steroids is still inconclusive. Standard infection control and prevention techniques should be followed. Vigilant screening of suspected cases and their contacts is important. Isolation of symptomatic cases and home quarantine of asymptomatic contacts is recommended. To conclude, controlling this highly transmissible disease requires international co-ordination. Copyright © Journal of the Association of Physicians of India 2011.

Kreutz, R., Algharably, E. A. E., Azizi, M., et al. 2020. **Hypertension, the renin-angiotensin system, and the risk of lower respiratory tract infections and lung injury: implications for COVID-19**. *Cardiovascular Research* 04 15.

Systemic arterial hypertension (referred to as hypertension herein) is a major risk factor of mortality worldwide, and its importance is further emphasized in the context of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection referred to as COVID-19. Patients with severe COVID-19 infections commonly are older and have a history of hypertension. Almost 75% of patients who have died in the pandemic in Italy had hypertension. This raised multiple questions regarding a more severe course of COVID-19 in relation to hypertension itself as well as its treatment with renin-angiotensin system (RAS) blockers, e.g. angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs). We provide a critical review on the relationship of hypertension, RAS, and risk of lung injury. We demonstrate lack of sound evidence that hypertension per se is an independent risk factor for COVID-19. Interestingly, ACEIs and ARBs may be associated with lower incidence and/or improved outcome in patients with lower respiratory tract infections. We also review in detail the molecular mechanisms linking the RAS to lung damage and the potential clinical impact of treatment with RAS blockers in patients with COVID-19 and a high cardiovascular and renal risk. This is related to the role of angiotensin-converting enzyme 2 (ACE2) for SARS-CoV-2 entry into cells, and expression of ACE2 in the lung, cardiovascular system, kidney, and other tissues. In summary, a critical review of available evidence does not support a deleterious effect of RAS blockers in COVID-19 infections. Therefore, there is currently no reason to discontinue RAS blockers in stable patients facing the COVID-19 pandemic.

Lai, C. C., Shih, T. P., Ko, W. C., et al. 2020. **Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges**. *International Journal of Antimicrobial Agents* 55 (3) (no pagination)(105924).

The emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; previously provisionally named 2019 novel coronavirus or 2019-nCoV) disease (COVID-19) in China at the end of 2019 has caused a large global outbreak and is a major public health issue. As of 11 February 2020, data from the World Health Organization (WHO) have shown that more than 43 000 confirmed cases have been identified in 28 countries/regions, with >99% of cases being detected in China. On 30 January 2020, the WHO declared COVID-19 as the sixth public health emergency of international concern. SARS-CoV-2 is closely related to two bat-derived severe acute respiratory syndrome-like coronaviruses, bat-SL-CoVZC45 and bat-SL-CoVZXC21. It is spread by human-to-human transmission via droplets or direct contact, and infection has been estimated to have mean incubation period of 6.4 days and a basic reproduction number of 2.24-3.58. Among patients with pneumonia caused by SARS-CoV-2 (novel coronavirus pneumonia or Wuhan pneumonia), fever was the most common symptom, followed by cough. Bilateral lung involvement with ground-glass opacity was the most common finding from computed tomography images of the chest. The one case of SARS-CoV-2 pneumonia in the USA is responding well to remdesivir, which is now undergoing a clinical trial in China. Currently, controlling infection to prevent the spread of SARS-CoV-2 is the primary intervention being used. However, public health authorities should keep monitoring the situation closely, as the more we can learn about this novel virus and its associated outbreak, the better we can respond. Copyright © 2020 Elsevier Ltd

Leung, C. 2020. **Clinical features of deaths in the novel coronavirus epidemic in China**. *Reviews in Medical Virology.*

In response to the recent novel coronavirus outbreak originating in Wuhan, Hubei province, China, observations concerning novel coronavirus mortality are of urgent public health importance. The present work presents the first review of the fatal novel coronavirus cases in China. Clinical data of fatal cases published by the Chinese Government were studied. As of 2 February 2020, the clinical data of 46 fatal cases were identified. The case fatality rate was significantly higher in Hubei province than the rest of China. While 67% of all deceased patients were male, gender was unlikely to be associated with mortality. Diabetes was likely to be associated with mortality. There is, however, not yet sufficient evidence to support the association between hypertension and mortality as similar prevalence of hypertension was also observed in the Hubei population. Copyright © 2020 John Wiley & Sons, Ltd

Li, B., Yang, J., Zhao, F., et al. 2020. **Prevalence and impact of cardiovascular metabolic diseases on COVID-19 in China**. *Clinical Research in Cardiology.*

Background: Studies have reminded that cardiovascular metabolic comorbidities made patients more susceptible to suffer 2019 novel corona virus (2019-nCoV) disease (COVID-19), and exacerbated the infection. The aim of this analysis is to determine the association of cardiovascular metabolic diseases with the development of COVID-19. Method(s): A meta-analysis of eligible studies that summarized the prevalence of cardiovascular metabolic diseases in COVID-19 and compared the incidences of the comorbidities in ICU/severe and non-ICU/severe patients was performed. Embase and PubMed were searched for relevant studies. Result(s): A total of six studies with 1527 patients were included in this analysis. The proportions of hypertension, cardia-cerebrovascular disease and diabetes in patients with COVID-19 were 17.1%, 16.4% and 9.7%, respectively. The incidences of hypertension, cardia-cerebrovascular diseases and diabetes were about twofolds, threefolds and twofolds, respectively, higher in ICU/severe cases than in their non-ICU/severe counterparts. At least 8.0% patients with COVID-19 suffered the acute cardiac injury. The incidence of acute cardiac injury was about 13 folds higher in ICU/severe patients compared with the non-ICU/severe patients. Conclusion(s): Patients with previous cardiovascular metabolic diseases may face a greater risk of developing into the severe condition and the comorbidities can also greatly affect the prognosis of the COVID-19. On the other hand, COVID-19 can, in turn, aggravate the damage to the heart. Copyright © 2020, Springer-Verlag GmbH Germany, part of Springer Nature.

Li, J. W., Han, T. W., Woodward, M., et al. 2020. **The impact of 2019 novel coronavirus on heart injury: A systemic review and Meta-analysis**. *Progress in Cardiovascular Diseases* 16 16.

BACKGROUND: Evidence about COVID-19 on cardiac injury is inconsistent.

OBJECTIVES: We aimed to summarize available data on severity differences in acute cardiac injury and acute cardiac injury with mortality during the COVID-19 outbreak.

METHODS: We performed a systematic literature search across Pubmed, Embase and pre-print from December 1, 2019 to March 27, 2020, to identify all observational studies that reported cardiac specific biomarkers (troponin, creatine kinase-MB fraction, myoglobin, or NT-proBNP) during COVID-19 infection. We extracted data on patient demographics, infection severity, comorbidity history, and biomarkers during COVID-19 infection. Where possible, data were pooled for meta-analysis with standard (SMD) or weighted (WMD) mean difference and corresponding 95% confidence intervals (CI).

RESULTS: We included 4189 confirmed COVID-19 infected patients from 28 studies. More severe COVID-19 infection is associated with higher mean troponin (SMD 0.53, 95% CI 0.30 to 0.75, p<0.001), with a similar trend for creatine kinase-MB, myoglobin, and NT-proBNP. Acute cardiac injury was more frequent in those with severe, compared to milder, disease (risk ratio 5.99, 3.04 to 11.80; p<0.001). Meta regression suggested that cardiac injury biomarker differences of severity are related to history of hypertension (p=0.030). Also COVID19-related cardiac injury is associated with higher mortality (summary risk ratio 3.85, 2.13 to 6.96; p<0.001). hsTnI and NT-proBNP levels increased during the course of hospitalization only in non-survivors.

CONCLUSION: The severity of COVID-19 is associated with acute cardiac injury, and acute cardiac injury is associated with death. Cardiac injury biomarkers mainly increase in non-survivors. This highlights the need to effectively monitor heart health to prevent myocarditis in patients infected with COVID-19.

Li, X., Xu, S., Yu, M., et al. 2020. **Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan**. *Journal of Allergy & Clinical Immunology* 12 12.

BACKGROUND: In December 2019, COVID-19 outbreak occurred in Wuhan. Data on the clinical characteristics and outcomes of patients with severe COVID-19 are limited.

OBJECTIVE: The severity on admission, complications, treatment, and outcomes of COVID-19 patients were evaluated.

METHODS: Patients with COVID-19 admitted to Tongji Hospital from January 26, 2020 to February 5, 2020 were retrospectively enrolled and followed-up until March 3, 2020. Potential risk factors for severe COVID-19 were analyzed by a multivariable binary logistic model. Cox proportional hazard regression model was used for survival analysis in severe patients.

RESULTS: We identified 269 (49.1%) of 548 patients as severe cases on admission. Elder age, underlying hypertension, high cytokine levels (IL-2R, IL-6, IL-10, and TNF-a), and high LDH level were significantly associated with severe COVID-19 on admission. The prevalence of asthma in COVID-19 patients was 0.9%, markedly lower than that in the adult population of Wuhan. The estimated mortality was 1.1% in nonsevere patients and 32.5% in severe cases during the average 32 days of follow-up period. Survival analysis revealed that male, elder age, leukocytosis, high LDH level, cardiac injury, hyperglycemia, and high-dose corticosteroid use were associated with death in patients with severe COVID-19.

CONCLUSIONS: Patients with elder age, hypertension, and high LDH level need careful observation and early intervention to prevent the potential development of severe COVID-19. Severe male patients with heart injury, hyperglycemia, and high-dose corticosteroid use may have high risk of death.

Lippi, G., Wong, J. & Henry, B. M. 2020. **Hypertension and its severity or mortality in Coronavirus Disease 2019 (COVID-19): a pooled analysis**. *Polish archives of internal medicine.* 31.

INTRODUCTION: As the coronavirus disease 2019 (COVID-19) outbreak, identification of clinical predictors of severe or fatal disease are necessary to enable risk stratification and optimize allocation of limited resources. Hypertension has been widely reported to be associated with increase disease severity, however, other studies have reported different findings. OBJECTIVE(S): To evaluate the association of hypertension and severe and fatal COVID-19. PATIENTS AND METHODS: Scopus, Medline, and Web of Science was performed to identify studies reporting the rate of hypertension in COVID-19 patients with severe or non-severe disease or among survivors and non-survivors. The obtained data was pooled into a meta-analysis to calculate odds ratio (OR) with 95% confidence intervals (95%CI). RESULT(S): Hypertension was associated with a nearly 2.5-fold significantly increased risk of severe COVID-19 disease (OR: 2.49 [95%CI: 1.98-3.12] I2=24%), as well as with a similarly significant higher risk of mortality (OR: 2.42 [95%CI: 1.51-3.90] I2=0%). In meta-regression, a significant correlation was observed with an increase in mean age of patients with severe COVID-19 associated with increased log odds of hypertension and severity (p=0.03). CONCLUSION(S): The results of this pooled analysis of the current scientific literature would suggest that hypertension may be associated with an up to 2.5-fold higher risk of severe and fatal COVID-19, especially among older individuals.

Liu, P. P., Blet, A., Smyth, D., et al. 2020. **The Science Underlying COVID-19: Implications for the Cardiovascular System**. *Circulation* 15 15.

Corona Virus Disease 2019 (COVID-19) pandemic has impacted health and economy worldwide on an unprecedented scale. Patients have diverse clinical outcomes, but those with pre-existing cardiovascular (CV) disease, hypertension, and related conditions incur disproportionately worse outcome. The high infectivity of the SARS-CoV-2 virus is in part related to new mutations in the receptor binding domain, and acquisition of a furin cleavage site in the S spike protein. The continued viral shedding in the asymptomatic and pre-symptomatic individuals enhances its community transmission. The virus uses the ACE2 receptor for internalization, aided by TMPRSS2 protease. The tissue localization of the receptors correlates with COVDI-19 presenting symptoms and organ dysfunction. Virus-induced ACE2 down regulation may attenuate its function, diminish its anti-inflammatory role, and heightened angiotensin II effects in the predisposed patients. Lymphopenia occurs early and is prognostic, potentially associated with reduction of the CD4+ and some CD8+ T cells. This leads to imbalance of the innate/acquired immune response, delayed viral clearance, and hyper stimulated macrophages and neutrophils. Appropriate type I interferon pathway activation is critical for virus attenuation, and balanced immune response. Persistent immune activation in predisposed patients, such as the elderly and those with CV risk, can lead to hemophagocytosis like syndrome, with uncontrolled amplification of cytokine production, leading to multi-organ failure and death. In addition to the airways and lungs, the cardiovascular system is often involved in COVID-19 early, reflected in the release of highly sensitive troponin and natriuretic peptides, which are all extremely prognostic, particularly in those showing continued rise, along with cytokines such as IL-6. Inflammation in the vascular system can result in diffuse microangiopathy with thrombosis. Inflammation in the myocardium can result in myocarditis, heart failure, cardiac arrhythmias, acute coronary syndrome, rapid deterioration and sudden death. Aggressive support based on early prognostic indicators with expectant management can potentially improve recovery. Appropriate treatment for heart failure, arrhythmias, acute coronary syndrome and thrombosis remain important. Specific evidence based treatment strategies for COVID-19 will emerge with ongoing global collaboration on multiple approaches being evaluated. To protect the wider population, antibody testing and effective vaccine will be needed to make COVID-19 history.

Lovato, A. & de Filippis, C. 2020. **Clinical Presentation of COVID-19: A Systematic Review Focusing on Upper Airway Symptoms**. *Ear, Nose, & Throat Journal* 145561320920762.

AIM: Pharyngodynia, nasal congestion, rhinorrhea, smell, and taste dysfunctions could be the presenting symptoms of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2. The aim was to perform a systematic review of current evidences on clinical presentation of COVID-19, focusing on upper airway symptoms in order to help otolaryngologists identifying suspected cases.

METHODS: We searched PubMed and Web of Science electronic databases.

RESULTS: We included 5 retrospective clinical studies for a total of 1556 hospitalized patients with COVID-19, 57.5% were male and mean age was 49.1 years. Pooled data revealed that pharyngodynia was present in 12.4% of patients, nasal congestion in 3.7%, and rhinorrhea was rare. No reports on COVID-19 and olfactory/gustative disorders matched inclusion criteria but preliminary evidences suggested they could be present. Common symptoms were fever (85.6%), cough (68.7%), and fatigue (39.4%). Frequent comorbidities were hypertension (17.4%), diabetes (3.8%), and coronary heart disease (3.8%); 83% of patients had alterations on chest computed tomography that were bilateral in 89.5% of cases. Ground-glass opacity was the most common finding (50%). Lymphopenia (77.2%) and leucopenia (30.1%) were common. Critical cases with complications were 9%, intensive care unit admission was required in 7.3%, invasive ventilation in 3.4%, and mortality was 2.4%.

CONCLUSION: Otolaryngologists should know that pharyngodynia, nasal congestion, olfactory, and gustative disorders could be the presenting symptoms of COVID-19. Clinical presentation together with radiological and laboratory findings could help to identify suspected cases.

Lupia, T., Scabini, S., Mornese Pinna, S., et al. 2020. **2019 novel coronavirus (2019-nCoV) outbreak: A new challenge**. *Journal of Global Antimicrobial Resistance* 21 22-27.

Objectives: Following the public-health emergency of international concern (PHEIC) declared by the World Health Organization (WHO) on 30 January 2020 and the recent outbreak caused by 2019 novel coronavirus (2019-nCoV) [officially renamed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)] in China and 29 other countries, we aimed to summarise the clinical aspects of the novelBetacoronavirus disease (COVID-19) and its possible clinical presentations together with suggested therapeutic algorithms for patients who may require antimicrobial treatment. Method(s): The currently available literature was reviewed for microbiologically confirmed infections by 2019-nCoV or COVID-19 at the time of writing (13 February 2020). A literature search was performed using the PubMed database and Cochrane Library. Search terms included 'novel coronavirus' or '2019-nCoV' or 'COVID-19'. Result(s): Published cases occurred mostly in males (age range, 8-92 years). Cardiovascular, digestive and endocrine system diseases were commonly reported, except previous chronic pulmonary diseases [e.g. chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis] that were surprisingly underreported. Fever was present in all of the case series available, flanked by cough, dyspnoea, myalgia and fatigue. Multiple bilateral lobular and subsegmental areas of consolidation or bilateral ground-glass opacities were the main reported radiological features of 2019-nCoV infection, at least in the early phases of the disease. Conclusion(s): The new 2019-nCoV epidemic is mainly associated with respiratory disease and few extrapulmonary signs. However, there is a low rate of associated pre-existing respiratory co-morbidities. Copyright © 2020

Madjid, M., Safavi-Naeini, P., Solomon, S. D., et al. 2020. **Potential Effects of Coronaviruses on the Cardiovascular System: A Review**. *JAMA Cardiology.*

Importance: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19) has reached a pandemic level. Coronaviruses are known to affect the cardiovascular system. We review the basics of coronaviruses, with a focus on COVID-19, along with their effects on the cardiovascular system. Observations: Coronavirus disease 2019 can cause a viral pneumonia with additional extrapulmonary manifestations and complications. A large proportion of patients have underlying cardiovascular disease and/or cardiac risk factors. Factors associated with mortality include male sex, advanced age, and presence of comorbidities including hypertension, diabetes mellitus, cardiovascular diseases, and cerebrovascular diseases. Acute cardiac injury determined by elevated high-sensitivity troponin levels is commonly observed in severe cases and is strongly associated with mortality. Acute respiratory distress syndrome is also strongly associated with mortality. Conclusions and Relevance: Coronavirus disease 2019 is associated with a high inflammatory burden that can induce vascular inflammation, myocarditis, and cardiac arrhythmias. Extensive efforts are underway to find specific vaccines and antivirals against SARS-CoV-2. Meanwhile, cardiovascular risk factors and conditions should be judiciously controlled per evidence-based guidelines.. Copyright © 2020 Cambridge University Press. All rights reserved.

Misra, D. P., Agarwal, V., Gasparyan, A. Y., et al. 2020. **Rheumatologists' perspective on coronavirus disease 19 (COVID-19) and potential therapeutic targets**. *Clinical Rheumatology* 10 10.

The ongoing pandemic coronavirus disease 19 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a matter of global concern. Environmental factors such as air pollution and smoking and comorbid conditions (hypertension, diabetes mellitus and underlying cardio-respiratory illness) likely increase the severity of COVID-19. Rheumatic manifestations such as arthralgias and arthritis may be prevalent in about a seventh of individuals. COVID-19 can result in acute interstitial pneumonia, myocarditis, leucopenia (with lymphopenia) and thrombocytopenia, also seen in rheumatic diseases like lupus and Sjogren's syndrome. Severe disease in a subset of patients may be driven by cytokine storm, possibly due to secondary hemophagocytic lymphohistiocytosis (HLH), akin to that in systemic onset juvenile idiopathic arthritis or adult-onset Still's disease. In the absence of high-quality evidence in this emerging disease, understanding of pathogenesis may help postulate potential therapies. Angiotensin converting enzyme 2 (ACE2) appears important for viral entry into pneumocytes; dysbalance in ACE2 as caused by ACE inhibitors or ibuprofen may predispose to severe disease. Preliminary evidence suggests potential benefit with chloroquine or hydroxychloroquine. Antiviral drugs like lopinavir/ritonavir, favipiravir and remdesivir are also being explored. Cytokine storm and secondary HLH might require heightened immunosuppressive regimens. Current international society recommendations suggest that patients with rheumatic diseases on immunosuppressive therapy should not stop glucocorticoids during COVID-19 infection, although minimum possible doses may be used. Disease-modifying drugs should be continued; cessation may be considered during infection episodes as per standard practices. Development of a vaccine may be the only effective long-term protection against this disease.Key Points\* Patients with coronavirus disease 19 (COVID-19) may have features mimicking rheumatic diseases, such as arthralgias, acute interstitial pneumonia, myocarditis, leucopenia, lymphopenia, thrombocytopenia and cytokine storm with features akin to secondary hemophagocytic lymphohistiocytosis.\* Although preliminary results may be encouraging, high-quality clinical trials are needed to better understand the role of drugs commonly used in rheumatology like hydroxychloroquine and tocilizumab in COVID-19.\* Until further evidence emerges, it may be cautiously recommended to continue glucocorticoids and other disease-modifying antirheumatic drugs (DMARDs) in patients receiving these therapies, with discontinuation of DMARDs during infections as per standard practice.

Rizzo, P., Vieceli Dalla Sega, F., Fortini, F., et al. 2020. **COVID-19 in the heart and the lungs: could we "Notch" the inflammatory storm?** *Basic Research in Cardiology* 115(3) 31.

From January 2020, coronavirus disease (COVID-19) originated in China has spread around the world. The disease is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The presence of myocarditis, cardiac arrest, and acute heart failure in COVID-19 patients suggests the existence of a relationship between SARS-CoV-2 infection and cardiac disease. The Notch signalling is a major regulator of cardiovascular function and it is also implicated in several biological processes mediating viral infections. In this report we discuss the possibility to target Notch signalling to prevent SARS-CoV-2 infection and interfere with the progression of COVID-19- associated heart and lungs disease.

Rubino, S., Kelvin, N., Bermejo-Martin, J. F., et al. 2020. **As COVID-19 cases, deaths and fatality rates surge in Italy, underlying causes require investigation**. *Journal of Infection in Developing Countries* 14(3) 265-267.

COVID-19 case fatalities surged during the month of March 2020 in Italy, reaching over 10,000 by 28 March 2020. This number exceeds the number of fatalities in China (3,301) recorded from January to March, even though the number of diagnosed cases was similar (85,000 Italy vs. 80,000 China). Case Fatality Rates (CFR) could be somewhat unreliable because the estimation of total case numbers is limited by several factors, including insufficient testing and limitations in test kits and materials, such as NP swabs and PPE for testers. Sero prevalence of SARSCoV-2 antibodies may help in more accurate estimations of the total number of cases. Nevertheless, the disparity in the differences in the total number of fatalities between Italy and China suggests that investigation into several factors, such as demographics, sociological interactions, availability of medical equipment (ICU beds and PPE), variants in immune proteins (e.g., HLA, IFNs), past immunity to related CoVs, and mutations in SARS-CoV-2, could impact survival of severe COVID-19 illness survival and the number of case fatalities. Copyright © 2020 Rubino et al.

Salehi, S., Abedi, A., Balakrishnan, S., et al. 2020. **Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients**. *Ajr* American journal of roentgenology. 1-7.

OBJECTIVE. Available information on CT features of the 2019 novel coronavirus disease (COVID-19) is scattered in different publications, and a cohesive literature review has yet to be compiled. MATERIALS AND METHODS. This article includes a systematic literature search of PubMed, Embase (Elsevier), Google Scholar, and the World Health Organization database. RESULTS. Known features of COVID-19 on initial CT include bilateral multilobar ground-glass opacification (GGO) with a peripheral or posterior distribution, mainly in the lower lobes and less frequently within the right middle lobe. Atypical initial imaging presentation of consolidative opacities superimposed on GGO may be found in a smaller number of cases, mainly in the elderly population. Septal thickening, bronchiectasis, pleural thickening, and subpleural involvement are some of the less common findings, mainly in the later stages of the disease. Pleural effusion, pericardial effusion, lymphadenopathy, cavitation, CT halo sign, and pneumothorax are uncommon but may be seen with disease progression. Follow-up CT in the intermediate stage of disease shows an increase in the number and size of GGOs and progressive transformation of GGO into multifocal consolidative opacities, septal thickening, and development of a crazy paving pattern, with the greatest severity of CT findings visible around day 10 after the symptom onset. Acute respiratory distress syndrome is the most common indication for transferring patients with COVID-19 to the ICU and the major cause of death in this patient population. Imaging patterns corresponding to clinical improvement usually occur after week 2 of the disease and include gradual resolution of consolidative opacities and decrease in the number of lesions and involved lobes. CONCLUSION. This systematic review of current literature on COVID-19 provides insight into the initial and follow-up CT characteristics of the disease.

Schiffrin, E. L., Flack, J., Ito, S., et al. 2020. **Hypertension and COVID-19**. *American journal of hypertension.* 06.

Shahid, Z., Kalayanamitra, R., McClafferty, B., et al. 2020. **COVID-19 And Older Adults: What We Know**. *Journal of the American Geriatrics Society* 07 07.

SARS-CoV-2, a novel virus that causes COVID-19 infection, has recently emerged and caused a deadly pandemic. Studies have shown that this virus causes worse outcomes and a higher mortality rate in older adults and those with comorbidities such as hypertension, cardiovascular disease, diabetes, chronic respiratory disease, and chronic kidney disease. A significant percentage of older American adults have these diseases, putting them at a higher risk of infection. Additionally, many adults with hypertension, diabetes, and chronic kidney disease are placed on angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs). Studies have shown that these medications upregulate the ACE-2 receptor, the very receptor which the SARS-CoV-2 virus uses to enter host cells, which puts older adults at a further increased risk of infection. In this review, we discuss the transmission, symptomatology, mortality, and possible treatments for this infection, as they relate to older adults. This article is protected by copyright. All rights reserved.

Singh, A. K., Gupta, R. & Misra, A. 2020. **Comorbidities in COVID-19: Outcomes in hypertensive cohort and controversies with renin angiotensin system blockers**. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews* 14(4) 283-287.

Background and aims: COVID-19 is already a pandemic. Emerging data suggest an increased association and a heightened mortality in patients of COVID-19 with comorbidities. We aimed to evaluate the outcome in hypertensive patients with COVID-19 and its relation to the use of renin-angiotensin system blockers (RASB). Method(s): We have systematically searched the medical database up to March 27, 2020 and retrieved all the published articles in English language related to our topic using MeSH key words. Result(s): From the pooled data of all ten available Chinese studies (n = 2209) that have reported the characteristics of comorbidities in patients with COVID-19, hypertension was present in nearly 21%, followed by diabetes in nearly 11%, and established cardiovascular disease (CVD) in approximately 7% of patients. Although the emerging data hints to an increase in mortality in COVID-19 patients with known hypertension, diabetes and CVD, it should be noted that it was not adjusted for multiple confounding factors. Harm or benefit in COVID-19 patients receiving RASB has not been typically assessed in these studies yet, although mechanistically and plausibly both, benefit and harm is possible with these agents, given that COVID-19 expresses to tissues through the receptor of angiotensin converting enzyme-2. Conclusion(s): Special attention is definitely required in patients with COVID-19 with associated comorbidities including hypertension, diabetes and established CVD. Although the role of RASB has a mechanistic equipoise, patients with COVID-19 should not stop these drugs at this point of time, as recommended by various world organizations and without the advice of health care provider. Copyright © 2020 Diabetes India

Sommerstein, R., Kochen, M. M., Messerli, F. H., et al. 2020. **Coronavirus Disease 2019 (COVID-19): Do Angiotensin-Converting Enzyme Inhibitors/Angiotensin Receptor Blockers Have a Biphasic Effect?** *Journal of the American Heart Association* 9(7) e016509.

Stoian, A. P., Banerjee, Y., Rizvi, A. A., et al. 2020. **Diabetes and the COVID-19 Pandemic: How Insights from Recent Experience Might Guide Future Management**. *Metabolic syndrome and related disorders.* 08.

Tan, W. & Aboulhosn, J. 2020. **The cardiovascular burden of coronavirus disease 2019 (COVID-19) with a focus on congenital heart disease**. *International Journal of Cardiology.*

Coronavirus disease 2019 (COVID-19), caused by a novel betacoronavirus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first described in a cluster of patients presenting with pneumonia symptoms in Wuhan, China, in December of 2019. Over the past few months, COVID-19 has developed into a worldwide pandemic, with over 400,000 documented cases globally as of March 24, 2020. The SARS-CoV-2 virus is most likely of zoonotic origin, but has been shown to have effective human-to-human transmission. COVID-19 results in mild symptoms in the majority of infected patients, but can cause severe lung injury, cardiac injury, and death. Given the novel nature of COVID-19, no established treatment beyond supportive care exists currently, but extensive public-health measures to reduce person-to-person transmission of COVID-19 have been implemented globally to curb the spread of disease, reduce the burden on healthcare systems, and protect vulnerable populations, including the elderly and those with underlying medical comorbidities. Since this is an emerging infectious disease, there is, as of yet, limited data on the effects of this infection on patients with cardiovascular disease, particularly so for those with congenital heart disease. We summarize herewith the early experience with COVID-19 and consider the potential applicability to and implications for patients with cardiovascular disease in general and congenital heart disease in particular. Copyright © 2020 Elsevier B.V.

Wang, B., Li, R., Lu, Z., et al. 2020. **Does comorbidity increase the risk of patients with COVID-19: evidence from meta-analysis**. *Aging* 12(no pagination).

Currently, the number of patients with coronavirus disease 2019 (COVID-19) has increased rapidly, but relationship between comorbidity and patients with COVID-19 still not clear. The aim was to explore whether the presence of common comorbidities increases COVID-19 patients' risk. A literature search was performed using the electronic platforms (PubMed, Cochrane Library, Embase, and other databases) to obtain relevant research studies published up to March 1, 2020. Relevant data of research endpoints in each study were extracted and merged. All data analysis was performed using Stata12.0 software. A total of 1558 patients with COVID-19 in 6 studies were enrolled in our meta-analysis eventually. Hypertension (OR: 2.29, P<0.001), diabetes (OR: 2.47, P<0.001), chronic obstructive pulmonary disease (COPD) (OR: 5.97, P<0.001), cardiovascular disease (OR: 2.93, P<0.001), and cerebrovascular disease (OR:3.89, P=0.002)were independent risk factors associated with COVID-19 patients. The meta-analysis revealed no correlation between increased risk of COVID-19 and liver disease, malignancy, or renal disease. Hypertension, diabetes, COPD, cardiovascular disease, and cerebrovascular disease are major risk factors for patients with COVID-19. Knowledge of these risk factors can be a resource for clinicians in the early appropriate medical management of patients with COVID-19.

Wu, C., Chen, X., Cai, Y., et al. 2020. **Risk Factors Associated with Acute Respiratory Distress Syndrome and Death in Patients with Coronavirus Disease 2019 Pneumonia in Wuhan, China**. *JAMA Internal Medicine.*

Importance: Coronavirus disease 2019 (COVID-19) is an emerging infectious disease that was first reported in Wuhan, China, and has subsequently spread worldwide. Risk factors for the clinical outcomes of COVID-19 pneumonia have not yet been well delineated. Objective(s): To describe the clinical characteristics and outcomes in patients with COVID-19 pneumonia who developed acute respiratory distress syndrome (ARDS) or died. Design, Setting, and Participant(s): Retrospective cohort study of 201 patients with confirmed COVID-19 pneumonia admitted to Wuhan Jinyintan Hospital in China between December 25, 2019, and January 26, 2020. The final date of follow-up was February 13, 2020. Exposures: Confirmed COVID-19 pneumonia. Main Outcomes and Measures: The development of ARDS and death. Epidemiological, demographic, clinical, laboratory, management, treatment, and outcome data were also collected and analyzed. Result(s): Of 201 patients, the median age was 51 years (interquartile range, 43-60 years), and 128 (63.7%) patients were men. Eighty-four patients (41.8%) developed ARDS, and of those 84 patients, 44 (52.4%) died. In those who developed ARDS, compared with those who did not, more patients presented with dyspnea (50 of 84 [59.5%] patients and 30 of 117 [25.6%] patients, respectively [difference, 33.9%; 95% CI, 19.7%-48.1%]) and had comorbidities such as hypertension (23 of 84 [27.4%] patients and 16 of 117 [13.7%] patients, respectively [difference, 13.7%; 95% CI, 1.3%-26.1%]) and diabetes (16 of 84 [19.0%] patients and 6 of 117 [5.1%] patients, respectively [difference, 13.9%; 95% CI, 3.6%-24.2%]). In bivariate Cox regression analysis, risk factors associated with the development of ARDS and progression from ARDS to death included older age (hazard ratio [HR], 3.26; 95% CI 2.08-5.11; and HR, 6.17; 95% CI, 3.26-11.67, respectively), neutrophilia (HR, 1.14; 95% CI, 1.09-1.19; and HR, 1.08; 95% CI, 1.01-1.17, respectively), and organ and coagulation dysfunction (eg, higher lactate dehydrogenase [HR, 1.61; 95% CI, 1.44-1.79; and HR, 1.30; 95% CI, 1.11-1.52, respectively] and D-dimer [HR, 1.03; 95% CI, 1.01-1.04; and HR, 1.02; 95% CI, 1.01-1.04, respectively]). High fever (>=39 degreeC) was associated with higher likelihood of ARDS development (HR, 1.77; 95% CI, 1.11-2.84) and lower likelihood of death (HR, 0.41; 95% CI, 0.21-0.82). Among patients with ARDS, treatment with methylprednisolone decreased the risk of death (HR, 0.38; 95% CI, 0.20-0.72). Conclusions and Relevance: Older age was associated with greater risk of development of ARDS and death likely owing to less rigorous immune response. Although high fever was associated with the development of ARDS, it was also associated with better outcomes among patients with ARDS. Moreover, treatment with methylprednisolone may be beneficial for patients who develop ARDS. Copyright © 2020 American Medical Association. All rights reserved.

Yang, J., Zheng, Y., Gou, X., et al. 2020. **Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis**. *International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases.* 12.

BACKGROUND: An outbreak of Novel Coronavirus (COVID -19) in Wuhan, China, the epidemic is more widespread than initially estimated, with cases now confirmed in multiple countries. AIMS: The aim of the meta-analysis was to assess the prevalence of comorbidities in the COVID-19 infection patients and the risk of underlying diseases in severe patients compared to non-severe patients. METHOD(S): A literature search was conducted using the databases PubMed, EMBASE, and Web of sciences until February 25, 2020. Risk ratio (OR) and 95% confidence intervals (CIs) were pooled using random-effects models. RESULT(S): Eight studies were included in the meta- analysis, including 46248 infected patients. The result showed the most prevalent clinical symptom was fever ( 91+/-3, 95% CI 86-97% ), followed by cough (67+/-7, 95% CI 59-76%), fatigue ( 51+/-0, 95% CI 34-68% ) and dyspnea ( 30+/-4, 95% CI 21-40%). The most prevalent comorbidity were hypertension (17+/-7, 95% CI 14-22%) and diabetes ( 8+/-6, 95% CI 6-11% ), followed by cardiovascular diseases ( 5+/-4, 95% CI 4-7% ) and respiratory system disease( 2+/-0, 95% CI 1-3% ). Compared with the Non-severe patient, the pooled odds ratio of hypertension, respiratory system disease, cardiovascular disease in severe patients were (OR 2.36, 95% CI: 1.46-3.83), (OR 2.46, 95% CI: 1.76-3.44) and (OR 3.42, 95% CI: 1.88-6.22)respectively. CONCLUSION(S): We assessed the prevalence of comorbidities in the COVID-19 infection patients and found underlying disease, including hypertension, respiratory system disease and cardiovascular, may be a risk factor for severe patients compared with Non-severe patients. Copyright © 2020. Published by Elsevier Ltd.

Yu, H., Li, F., Hu, Y., et al. 2020. **Improving the metabolic and mental health of children with obesity: a school-based nutrition education and physical activity intervention in Wuhan, China**. *Nutrients* 12(1).

This study aimed to evaluate the effectiveness of a school-based nutrition education and physical activity intervention on cardiovascular risk profile and mental health outcomes among Chinese children with obesity. Two primary schools were randomly allocated to the control group (CG) and the intervention group (IG). We selected children with obesity from 1340 students in the third and fourth grades as participants. The IG received 8 months of nutrition education and physical activity intervention, while the CG was waitlisted. A generalized estimating equation model was applied to assess repeated variables over time. A total of 171 children with obesity (99 IG and 72 CG) aged 9.8+or-0.7 years completed the post-intervention stage. Compared with baseline, significant reductions were observed within the IG for depression and fasting plasma glucose at post-intervention. After adjusting for confounders, group and time interaction effects showed that the IG achieved improvements in the risk of poor well-being (p=0.051) and social anxiety (p=0.029), had decreased diastolic blood pressure (p=0.020) and fasting plasma glucose (p<0.001), and had significantly increased high-density lipoprotein (p<0.001) from baseline to post-intervention relative to the CG. The effects of school-based nutrition education and physical activity intervention on children with obesity are diverse, including not only the improvement of metabolic health but also mental health promotion.

Zheng, F., Tang, W., Li, H., et al. 2020. **Clinical characteristics of 161 cases of corona virus disease 2019 (COVID-19) in Changsha**. *European Review for Medical and Pharmacological Sciences* 24(6) 3404-3410.

OBJECTIVE: In December 2019, a new type of coronavirus-infected pneumonia broke out in Wuhan and spread rapidly to other parts of the country. The purpose of this study was to investigate the clinical features of coronavirus disease 2019 (COVID-19). MATERIALS AND METHODS: A retrospective analysis was performed on the confirmed cases of COVID-19, who were admitted to the North Hospital of Changsha first Hospital (Changsha Public Health treatment Center) from January 17 to February 7, 2020. RESULT(S): The median age of COVID-19 patients was 45 years (range 33.5-57). The male patients accounted for 49.7%, 64.6% of the patients had a history of exposure in Wuhan, and 31.7% had family aggregation. The median days of onset were six, and the incidence of severe illness was 18.6%. Compared with the non-severe group, the severe group showed statistical significance in older age, hypertension, bilateral lung plaque shadow, decrease in lymphocyte count, increase in C-reactive protein (CRP), aspartate aminotransferase (AST), lactate dehydrogenase, and creatine kinase. CONCLUSION(S): Age, combined hypertension, oxygenation index, double lung patch, decreased lymphocyte count, and elevated levels of C-reactive protein, aspartate aminotransferase, lactate dehydrogenase, and creatine kinase can be used as predictors of the disease severity. Copyright © 2020 Verduci Editore s.r.l. All rights reserved.

Zheng, Y., Xu, H., Yang, M., et al. 2020. **Epidemiological characteristics and clinical features of 32 critical and 67 noncritical cases of COVID-19 in Chengdu**. *Journal of Clinical Virology* 127 104366.

BACKGROUND: In December 2019, Wuhan, China, experienced an outbreak of coronavirus (COVID-19). The number of cases has increased rapidly, but information on the clinical characteristics remains limited.

OBJECTIVES: This paper describes the epidemiological and clinical characteristics of COVID-19. Early detection and identification of critically ill patients is necessary to facilitate scientific classification and treatment.

STUDY DESIGN: This study included a retrospective, single-center case series of 99 consecutively hospitalized patients with confirmed COVID-19 at Chengdu Public Health Clinical Medical Center in Chengdu, China, from January 16 to February 20, 2020. The final date of follow-up was February 23, 2020. We collected and analyzed epidemiological, demographic, clinical, laboratory, radiological, and treatment data. We compared outcomes of critically ill patients and noncritically ill patients.

RESULTS: Of the 99 hospitalized patients with COVID-19, the median age was 49 years (minimum, 3 months; maximum, 87 years) and 51 (52 %) were men; 42 (42 %) had traveled to or lived in Wuhan and 48 (49 %) had come into close contact with patients with new coronavirus pneumonia; 41 (41 %) patients had underlying disease. Common symptoms included fever (85 [86 %]), dry cough (84 [85 %]), and fatigue (72 [73 %]). We analyzed the clinical characteristics of patients. We expressed the measurement data as mean+/-standard deviation. We collected data for age (49.39+/-18.45 years), number of hospital days (12.32+/-6.70 days), and laboratory indicators. We compared critically ill and noncritically ill patients: p-values for age, C-reactive protein, high-sensitivity troponin T, prothrombin time, fibrin degradation products, D-Dimer, and CD4+ count were p<0.001; and p-values for hospital days, white blood cell, neutrophil, lymphocyte, creatine kinase isoenzyme, myoglobin, N-terminal brain natriuretic peptide, and CD8+ count were p<0.05.

CONCLUSIONS: We collected data from a single-center case series of 32 hospitalized patients who were critically ill with confirmed COVID-19 in Chengdu, China, and compared data with 67 noncritically ill patients. Elderly patients had chronic underlying diseases, notably cardiovascular disease. Higher C-reactive protein levels, higher levels of myocardial damage, and higher brain natriuretic peptide levels; lower white blood cells, neutrophils, and lymphocytes; and lower CD4 and CD8 counts could be used for early detection and identification of critically ill patients, and dynamic Data observation was more important than at a single moment.

# Sample Literature Search Strategy

1. exp coronavirus/ (
2. exp Coronavirus Infections/
3. (coronavirus\* or coronovirus\* or coronavirinae\* or Coronavirus\* or Coronovirus\* or Wuhan\* or Hubei\* or Huanan or "2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or CoV or "2019 novel\*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona\* or Ncorono\* or NcovWuhan\* or NcovHubei\* or NcovChina\* or NcovChinese\*).ti,ab.
4. (SARSCoV2 or SARS-CoV2 or SARSCov19 or SARS-Cov19 or SARSCov-19 or SARS-Cov-19 or Ncovor\* or Ncorona\*or Ncorono\* or NcovWuhan\* or NcovHubei\* or NcovChina\* or NcovChinese\* or SARS2 or SARS-2 or SARScoronavirus2 or SARS-coronavirus-2 or SARScoronavirus 2 or SARScoronovirus2 or SARS-coronovirus-2 or SARScoronovirus 2 or (SARS adj2 coronavirus2)).ab,ti.
5. (((((respirat\* adj2 (symptom\* or disease\* or illness\* or condition\*)) or (seafood or food or outdoor\*)) adj2 Market\*) or pneumon\*) adj10 (Wuhan\* or Hubei\* or China\* or Chinese\* or Huanan\*)).ab,ti.
6. Middle East Respiratory Syndrome Coronavirus/
7. ("middle east respiratory syndrome\*" or "middle eastern respiratory syndrome\*" or MERSCoV or "MERS-CoV" or MERS).ti,ab.
8. ("severe acute respiratory syndrome" or SARS).ti,ab.
9. ("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARScoronavirus1 or "SARS-coronavirus-1" or "SARScoronavirus 1" or "SARS coronavirus1" or SARScoronovirus1 or "SARS-coronovirus-1" or "SARScoronovirus 1" or "SARS coronovirus1").ti,ab.
10. ((outbreak\* or wildlife\* or pandemic\* or epidemic\*) adj1 (Wuhan\* or Hubei or China\* or Chinese\* or Huanan\*)).ti,ab.
11. (coronavirus\* or coronovirus\* or coronavirinae\* or CoV or HCoV\*).ti,ab. (
12. ((corona\* or corono\*) adj1 (virus\* or viral\* or virinae\*)).ab,ti.
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. exp Hypertension/ or exp Cardiovascular Diseases/
15. exp Coronary Disease/ or exp Cerebrovascular Disorders/
16. ((heart or Cerebrovascular or cardiovascular or coronar\*) adj3 disease\*).ab,kf,kw,ti
17. (CVD or CHD).ab,kf,kw,ti.
18. Hypertension.ab,kf,kw,ti. (
19. 14 or 15 or 16 or 17 or 18
20. 13 and 19