# Evidence Search Service Results of your search request

## Higher incidence of venous thromboembolism, pulmonary embolism and deep vein thrombosis in hospital inpatients with Covid-19

**ID of request:** 22716  
**Date of request:** 15th April, 2020  
**Date of completion:** 16th April, 2020

If you would like to request any articles or any further help, please contact:  Tom Roper at [tom.roper@nhs.net](mailto:tom.roper@nhs.net)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: Higher incidence of venous thromboembolism, pulmonary embolism and deep vein thrombosis in hospital inpatients with Covid-19. Tom Roper. (16th April, 2020). BRIGHTON, UK: Brighton and Sussex Library and Knowledge Service.

**Sources searched**  
CEBM: Oxford COVID-19 Evidence Service (0)  
ClinicalTrials.gov (0)  
Cochrane Library (0)  
Custom COVID-19 Pre-Print Google Search (1)  
EMBASE (12)  
Google Scholar (1)  
LitCOVID (0)  
MEDLINE (6)  
NICE Evidence Search (0)  
UpToDate (1)  
WHO International Clinical Trials Registry Platform (0)

**Date range used** (5 years, 10 years): 2019 onwards   
**Limits used** (gender, article/study type, etc.): None   
**Search terms and notes** (full search strategy for database searches below):

Relevant natural language and controlled vocabulary terms were selected and combined. Thesaurus terms were adapted for different databases. Final result sets were de-duplicated and reviewed for relevance by the searcher, irrelevant results being discarded.

Note that in EMTREE, EMBASE's thesaurus, pulmonary embolism and deep vein thrombosis are both subordinate terms of venous thromboembolism/ so while these terms are all inlcuded in the MEDLINE strategy, this was not necessary in EMBASE.

Database: Embase <1974 to 2020 Week 15>

Search Strategy:

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1     exp \*betacoronavirus/ or exp \*Coronavirus infection/ (9136)

2     ((corona\* or corono\*) adj1 (virus\* or viral\* or virinae\*)).ti,ab. (533)

3     ((novel or new or nouveau or "2019") adj2 (coronavirus\* or "corona virus\*" or coronovirus\* or coronavirinae\*)).ti,ab. (1739)

4     (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. (13635)

5     (("seafood market\*" or "food market\*") adj10 (Wuhan\* or Hubei\* or China\* or Chinese\* or Huanan\*)).ti,ab. (47)

6     ((outbreak\* or wildlife\* or pandemic\* or epidemic\*) adj1 (China\* or Chinese\* or Huanan\*)).ti,ab. (82)

7     1 or 2 or 3 or 4 or 5 or 6 (19574)

8     exp \*venous thromboembolism/ (61760)

9     (thrombus\* or thrombotic\* or thrombolic\* or thromboemboli\* or thrombos\* or embol\* or prothrombotic).ti,ab. (477660)

10     (PE or DVT or VTE).ti,ab. (89366)

11     ((vein\* or ven\*) adj thromb\*).ti,ab. (102919)

12     (blood adj3 clot\*).ti,ab. (14384)

13     (pulmonary adj3 clot\*).ti,ab. (331)

14     (lung adj3 clot\*).ti,ab. (81)

15     8 or 9 or 10 or 11 or 12 or 13 or 14 (541649)

16     7 and 15 (120)

17     limit 16 to yr="2019 -Current" (13)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to April 14, 2020>

Search Strategy:

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1     exp \*BETACORONAVIRUS/ or exp \*CORONAVIRUS INFECTIONS/ (11765)

2     ((corona\* or corono\*) adj1 (virus\* or viral\* or virinae\*)).ti,ab. (457)

3     ((novel or new or nouveau or "2019") adj2 (coronavirus\* or "corona virus\*" or coronovirus\* or coronavirinae\*)).ti,ab. (2325)

4     (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. (13055)

5     (("seafood market\*" or "food market\*") adj10 (Wuhan\* or Hubei\* or China\* or Chinese\* or Huanan\*)).ti,ab. (52)

6     ((outbreak\* or wildlife\* or pandemic\* or epidemic\*) adj1 (China\* or Chinese\* or Huanan\*)).ti,ab. (79)

7     1 or 2 or 3 or 4 or 5 or 6 (21858)

8     venous thromboembolism/ (10393)

9     exp pulmonary embolism/ (38458)

10     exp Venous Thrombosis/ (54404)

11     (thrombus\* or thrombotic\* or thrombolic\* or thromboemboli\* or thrombos\* or embol\* or prothrombotic).ti,ab. (330127)

12     (PE or DVT or VTE).ti,ab. (60261)

13     ((vein\* or ven\*) adj thromb\*).ti,ab. (67586)

14     (blood adj3 clot\*).ti,ab. (10953)

15     (pulmonary adj3 clot\*).ti,ab. (211)

16     (lung adj3 clot\*).ti,ab. (49)

17     8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (403816)

18     7 and 17 (96)

19     limit 18 to yr="2019 -Current" (25)

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For more information about the resources please go to: <https://www.bsuh.nhs.uk/library/>.

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## A. Synopses or Summaries

#### UpToDate

**Coronavirus disease 2019 (COVID-19): Management in adults: Prevention of venous thromboembolism** (2020)

Kim AY, Ghandi RT

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=dcd461a8d003d0875bbfc2642df4916d)

Direct data on the thromboembolic risk with COVID-19 are limited. There have been case reports of pulmonary embolism in patients with COVID-19. Several cohorts have described elevated D-dimer levels and other markers of dysregulated coagulation among patients with COVID-19, suggesting a potentially increased risk for thrombosis. Additionally, many patients hospitalized with COVID-19 have advanced age or other comorbidities that are associated with an increased risk of thromboembolism and would otherwise warrant prophylactic anticoagulation

## B. Original Research

1. **Acute pulmonary embolism and COVID-19 pneumonia: a random association?.**  
   Danzi Gian Battista European heart journal 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=95208139afaf6a50ab3666c39270f7a7)

1. **Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy**  
   Tang N. Journal of thrombosis and haemostasis : JTH 2020;:No page numbers.

BACKGROUND: A relatively high mortality of severe coronavirus disease 2019 (COVID-19) is worrying, the application of heparin in COVID-19 has been recommended by some expert consensus due to the risk of disseminated intravascular coagulation and venous thromboembolism. However, its efficacy remains to be validated. METHOD(S): Coagulation results, medications and outcomes of consecutive patients being classified as severe COVID-19 in Tongji hospital were retrospectively analysed. The 28-day mortality between heparin users and nonusers were compared, also in different risk of coagulopaphy which was stratified by the sepsis-induced coagulopathy (SIC) score or D-dimer result. RESULT(S): There were 449 patients with severe COVID-19 enrolled into the study, 99 of them received heparin (mainly with low molecular weight heparin, LMWH) for 7 days or longer. The D-dimer, prothrombin time and age were positively, and platelet count was negatively, correlated with 28-day mortality in multivariate analysis. No difference on 28-day mortality was found between heparin users and nonusers (30.3% vs 29.7%, P=0.910). But the 28-day mortality of heparin users were lower than nonusers In patients with SIC score >=4 (40.0% vs 64.2%, P=0.029), or D-dimer > 6 fold of upper limit of normal (32.8% vs 52.4%, P=0.017). CONCLUSION(S): Anticoagulant therapy mainly with LMWH appears to be associated with better prognosis in severe COVID-19 patients meeting SIC criteria or with markedly elevated D-dimer.Copyright This article is protected by copyright. All rights reserved.

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1. **Attention should be paid to venous thromboembolism prophylaxis in the management of COVID-19.**  
   Wang Tao The Lancet. Haematology 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=108126fe31df5b7ef348f0d7eb2fd869)

1. **Cardiovascular Considerations for Patients, Health Care Workers, and Health Systems During the Coronavirus Disease 2019 (COVID-19) Pandemic**  
   Driggin E. Journal of the American College of Cardiology 2020;:No page numbers.

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.

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1. **Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV**  
   Peng Y.D. Zhonghua xin xue guan bing za zhi 2020;48:E004.

Objective: To explore the clinical characteristics and prognosis of the new coronavirus 2019-nCoV patients combined with cardiovascular disease (CVD). Method(s): A retrospective analysis was performed on 112 COVID-19 patients with CVD admitted to the western district of Union Hospital in Wuhan, from January 20, 2020 to February 15, 2020. They were divided into critical group (ICU, n=16) and general group (n=96) according to the severity of the disease and patients were followed up to the clinical endpoint. The observation indicators included total blood count, C-reactive protein (CRP), arterial blood gas analysis, myocardial injury markers, coagulation function, liver and kidney function, electrolyte, procalcitonin (PCT), B-type natriuretic peptide (BNP), blood lipid, pulmonary CT and pathogen detection. Result(s): Compared with the general group, the lymphocyte count (0.74x10(9) (0.34x10(9), 0.94x10(9))/L vs. 0.99x10(9) (0.71x10(9), 1.29x10(9))/L, P=0.03) was extremely lower in the critical group, CRP (106.98 (81.57, 135.76) mg/L vs. 34.34 (9.55,76.54) mg/L, P<0.001) and PCT (0.20 (0.15,0.48) mug/L vs. 0.11 (0.06,0.20)mug/L, P<0.001) were significantly higher in the critical group. The BMI of the critical group was significantly higher than that of the general group (25.5 (23.0, 27.5) kg/m(2) vs. 22.0 (20.0, 24.0) kg/m(2), P=0.003). Patients were further divided into non-survivor group (17, 15.18%) group and survivor group (95, 84.82%). Among the non-survivors, there were 88.24% (15/17) patients with BMI> 25 kg/m(2), which was significantly higher than that of survivors (18.95% (18/95), P<0.001). Compared with the survived patients, oxygenation index (130 (102, 415) vs. 434 (410, 444), P<0.001) was significantly lower and lactic acid (1.70 (1.30, 3.00) mmol/L vs. 1.20 (1.10, 1.60) mmol/L, P<0.001) was significantly higher in the non-survivors. There was no significant difference in the proportion of ACEI/ARB medication between the critical group and the general group or between non-survivors and survivors (all P>0.05). Conclusion(s): COVID-19 patients combined with CVD are associated with a higher risk of mortality. Critical patients are characterized with lower lymphocyte counts. Higher BMI are more often seen in critical patients and non-survivor. ACEI/ARB use does not affect the morbidity and mortality of COVID-19 combined with CVD. Aggravating causes of death include fulminant inflammation, lactic acid accumulation and thrombotic events.

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1. **COVID-19 and haemostasis: a position paper from Italian Society on Thrombosis and Haemostasis (SISET).**  
   Marietta Marco Blood transfusion = Trasfusione del sangue 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=612b036d3a51309500df873d8ce77ef0)

1. **COVID-19 Complicated by Acute Pulmonary Embolism**  
   Xie Y. et al Radiology: Cardiothoracic Imaging 2020;20(2):doi.org/10.1148/ryct.2020200067.

We report two cases from Wuhan, China, presenting with fever, cough, and dyspnea secondary to COVID-19 (formerly known as 2019 novel coronavirus [2019-nCoV]) pneumonia, confirmed with real-time fluorescence polymerase chain reaction test and presenting with typical findings at CT

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1. **Diagnostic evaluation of pulmonary embolism during the COVID-19 pandemic.**  
   Zuckier Lionel S. Journal of nuclear medicine : official publication, Society of Nuclear Medicine 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=dfa3cd5ccc28c4f1d714fa930b59edd7)

1. **DOACs and 'newer' haemophilia therapies in COVID-19.**  
   Thachil Jecko Journal of thrombosis and haemostasis : JTH 2020;:No page numbers.

We would like to thank the authors for their insightful thoughts on the consideration of anticoagulants and treatment for haemophilia A and B during the COVID-19 pandemic. They highlight some important practical points which certainly should be adopted by the thrombosis and haemostasis community in the current situation of restricted mobility, which reduces the possibility for patients to access general practitioners and hospitals. Copyright This article is protected by copyright. All rights reserved.

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1. **Hematological findings and complications of COVID-19.**  
   Terpos Evangelos American journal of hematology 2020;:No page numbers.

COVID-19 is a systemic infection with a significant impact on the hematopoietic system and hemostasis. Lymphopenia may be considered as a cardinal laboratory finding, with prognostic potential. Neutrophil/lymphocyte ratio and peak platelet/lymphocyte ratio may also have prognostic value in determining severe cases. During the disease course, longitudinal evaluation of lymphocyte count dynamics and inflammatory indices, including LDH, CRP and IL-6 may help to identify cases with dismal prognosis and prompt intervention in order to improve outcomes. Biomarkers, such high serum procalcitonin and ferritin have also emerged as poor prognostic factors. Furthermore, blood hypercoagulability is common among hospitalized COVID-19 patients. Elevated D-Dimer levels are consistently reported, whereas their gradual increase during disease course is particularly associated with disease worsening. Other coagulation abnormalities such as PT and aPTT prolongation, fibrin degradation products increase, with severe thrombocytopenia lead to life-threatening Disseminated intravascular coagulation (DIC) which necessitates continuous vigilance and prompt intervention. COVID-19 infected patients whatever hospitalized or ambulatory are at high risk for VTE and an early and prolonged pharmacological thromboprophylaxis with low molecular weight heparin is highly recommended. Last but not least, the need for assuring blood donations during the pandemic is also highlighted. Copyright This article is protected by copyright. All rights reserved.

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1. **Prevalence of venous thromboembolism in patients with severe novel coronavirus pneumonia.**  
   Cui Songping Journal of thrombosis and haemostasis : JTH 2020;:No page numbers.

BACKGROUND: Since 3 months ago, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) broke out in Wuhan, China, and spread rapidly around the world. Severe novel coronavirus pneumonia (NCP) patients have abnormal blood coagulation function, but their venous thromboembolism(VTE) prevalence is still rarely mentioned., OBJECTIVES: To determine the incidence of VTE in patients with severe NCP., METHODS: In this study, 81 severe NCP patients in the Intensive Care Unit (ICU) of Union Hospital (Wuhan, China) were enrolled. The results of conventional coagulation parameters and lower limb vein ultrasonography of these patients were retrospectively collected and analyzed., RESULTS: The incidence of VTE in these patients was 25%(20/81), of which 8 patients with VTE events died. VTE group was different from non-VTE group in age, lymphocytes counts, activated partial thromboplastin time (APTT), D-dimer, etc. If 1.5 micro g/mL was used as the D-dimer cut-off value to predicting VTE, the sensitivity was 85.0%, the specificity was 88.5% and the negative predictive value (NPV) was 94.7%., CONCLUSIONS: The incidence of VTE in patients with severe NCP is 25% (20/81), which may be related to poor prognosis. The significant increase of D-dimer in severe NCP patients is a good index for identifying high-risk groups of VTE. Copyright This article is protected by copyright. All rights reserved.

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1. **Risk assessment of venous thromboembolism and bleeding in COVID-19 patients,**  
   Xu JF et al Research Square 2020;:doi.org/10.21203/rs.3.rs-18340/v1.

Pre-print. Not peer reviewed. Critically ill patients with COVID-19 suffered both high risk of thrombosis and bleeding risks. More effective VTE prevention strategies based on an individual assessment of bleeding risks were necessary for critically ill patients with COVID-19.

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1. **Tissue Plasminogen Activator (tPA) Treatment for COVID-19 Associated Acute Respiratory Distress Syndrome (ARDS): A Case Series.**  
   Wang Janice Journal of thrombosis and haemostasis : JTH 2020;:No page numbers.

A hallmark of severe COVID-19 is coagulopathy, with 71.4% of patients who die of COVID-19 meeting ISTH criteria for disseminated intravascular coagulation (DIC) while only 0.6% of patients who survive meet these criteria (1). Additionally, it has become clear that this is not a bleeding diathesis but rather a predominantly pro-thrombotic DIC with high venous thromboembolism rates, elevated D-dimer levels, high fibrinogen levels in concert with low anti-thrombin levels, and pulmonary congestion with microvascular thrombosis and occlusion on pathology in addition to mounting experience with high rates of central line thrombosis and vascular occlusive events (e.g. ischemic limbs, strokes, etc.) observed by those who care for critically ill COVID-19 patients (1-7). There is evidence in both animals and humans that fibrinolytic therapy in Acute Lung Injury and ARDS improves survival, which also points to fibrin deposition in the pulmonary microvasculature as a contributory cause of ARDS and would be expected to be seen in patients with ARDS and concomitant diagnoses of DIC on their laboratory values such as what is observed in more than 70% of those who die of COVID-19 (8-10). Copyright This article is protected by copyright. All rights reserved.

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1. **Will Complement Inhibition be the New Target in Treating COVID-19 Related Systemic Thrombosis?.**  
   Campbell Courtney M. Circulation 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=430f4acf51991c7c23e93ffbf19812db)

1. **[A pathological report of three COVID-19 cases by minimally invasive autopsies].**  
   Yao X. H Zhonghua bing li xue za zhi = Chinese journal of pathology 2020;49(0):E009.

Objective: To investigate the pathological characteristics and the clinical significance of novel coronavirus (2019-nCoV)-infected pneumonia (termed by WHO as corona virus disease 2019, COVID-19). Methods: Minimally invasive autopsies from lung, heart, kidney, spleen, bone marrow, liver, pancreas, stomach, intestine, thyroid and skin were performed on three patients died of novel coronavirus pneumonia in Chongqing, China. Hematoxylin and eosin staining (HE) and histochemical staining were performed to investigate the pathological changes of indicated organs or tissues. Immunohistochemical staining was conducted to evaluate the infiltration of immune cells as well as the expression of 2019-nCoV proteins. Real time PCR was carried out to detect the RNA of 2019-nCoV. Results: Various damages were observed in the alveolar structure, with minor serous exudation and fibrin exudation. Hyaline membrane formation was observed in some alveoli. The infiltrated immune cells in alveoli were majorly macrophages and monocytes. Moderate multinucleated giant cells, minimal lymphocytes, eosinophils and neutrophils were also observed. Most of infiltrated lymphocytes were CD4-positive T cells. Significant proliferation of type II alveolar epithelia and focal desquamation of alveolar epithelia were also indicated. The blood vessels of alveolar septum were congested, edematous and widened, with modest infiltration of monocytes and lymphocytes. Hyaline thrombi were found in a minority of microvessels. Focal hemorrhage in lung tissue, organization of exudates in some alveolar cavities, and pulmonary interstitial fibrosiswere observed. Part of the bronchial epithelia were exfoliated. Coronavirus particles in bronchial mucosal epithelia and type II alveolar epithelia were observed under electron microscope. Immunohistochemical staining showed that part of the alveolar epithelia and macrophages were positive for 2019-nCoV antigen. Real time PCR analyses identified positive signals for 2019-nCoV nucleic acid. Decreased numbers of lymphocyte, cell degeneration and necrosis were observed in spleen. Furthermore, degeneration and necrosis of parenchymal cells, formation of hyaline thrombus in small vessels, and pathological changes of chronic diseases were observed in other organs and tissues, while no evidence of coronavirus infection was observed in these organs. Conclusion: s The lungs from novel coronavirus pneumonia patients manifest significant pathological lesions, including the alveolar exudative inflammation and interstitial inflammation, alveolar epithelium proliferation and hyaline membrane formation. While the 2019-nCoV is mainly distributed in lung, the infection also involves in the damages of heart, vessels, liver, kidney and other organs. Further studies are warranted to investigate the mechanism underlying pathological changes of this disease.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ae5073b65292c4987b61fc4ef3ea1f1c)

1. **[Clinical characteristics and influencing factors of patients with novel coronavirus pneumonia combined with liver injury in Shaanxi region].**  
   Yao N. Zhonghua gan zang bing za zhi = Zhonghua ganzangbing zazhi = Chinese journal of hepatology 2020;28(0):E003.

Objective: To understand the clinical characteristics, change of liver function, influencing factors and prognosis in hospitalized patients with coronavirus disease-19 (COVID-19) combined with liver injury. Methods: The general conditions, biochemical indicators of liver, blood clotting mechanism, routine blood test, UGT1A1 \* 28 gene polymorphism and other data of 40 cases with COVID-19 admitted to the isolation ward of Tangdu Hospital were retrospectively analyzed. The clinical characteristics, influencing factors and prognosis of liver injury in patients with liver injury group and those with normal liver function group were compared. The mean of two samples in univariate analysis was compared by t-test and analysis of variance. The counting data was measured by chi(2) tests. The non-normal distribution measurement data were described by the median, and the non-parametric test was used. Statistically significant influencing factors were used as the independent variables in univariate analysis. Multiple logistic regression analysis was used to analyze the main influencing factors of liver injury. Results: Of the 40 cases, 25 were male (62.5%) and 15 were female (37.5%), aged 22 to 83 (53.87 +/- 15.84) years. Liver injury was occurred in 22 cases (55%) during the course of the disease. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) level was initially increased (4.4 to 3.5 times of the normal value) along with decrease of albumin in the second week, and the difference was statistically significant (P < 0.001). Ten cases (43.5%) had highest abnormal total blood bilirubin (54.1 mumol/ L). There was no correlation between the increase in transaminase and the increase in total blood bilirubin (R = -0.006, P = 0.972). Three cases had prothrombin activity (PTA) of <= 50%, 10 cases had elevated FDP, and 13 cases had elevated D-dimer, all of whom were severe or critically ill. Liver function injury was more likely to occur in patients who used many types of drugs and large amounts of hormones (P = 0.002, P = 0.031), and there was no correlation with the TA6TA7 mutation in the UGT1A1 \* 28 gene locus. Multiple regression analysis showed that the occurrence of liver injury was only related to critical illness. The liver function of all patients had recovered within one week after conventional liver protection treatment. Conclusion: COVID-19 combined with liver function injury may be due to the slight elevation of transaminase, mostly around the second week of the disease course. Severe patients have a higher proportion of liver injury, and critical type is an independent risk factor for liver injury.

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1. **[Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV].**  
   Peng Y. D Zhonghua xin xue guan bing za zhi 2020;48(0):E004.

Objective: To explore the clinical characteristics and prognosis of the new coronavirus 2019-nCoV patients combined with cardiovascular disease (CVD). Methods: A retrospective analysis was performed on 112 COVID-19 patients with CVD admitted to the western district of Union Hospital in Wuhan, from January 20, 2020 to February 15, 2020. They were divided into critical group (ICU, n=16) and general group (n=96) according to the severity of the disease and patients were followed up to the clinical endpoint. The observation indicators included total blood count, C-reactive protein (CRP), arterial blood gas analysis, myocardial injury markers, coagulation function, liver and kidney function, electrolyte, procalcitonin (PCT), B-type natriuretic peptide (BNP), blood lipid, pulmonary CT and pathogen detection. Results: Compared with the general group, the lymphocyte count (0.74x10(9) (0.34x10(9), 0.94x10(9))/L vs. 0.99x10(9) (0.71x10(9), 1.29x10(9))/L, P=0.03) was extremely lower in the critical group, CRP (106.98 (81.57, 135.76) mg/L vs. 34.34 (9.55,76.54) mg/L, P<0.001) and PCT (0.20 (0.15,0.48) mug/L vs. 0.11 (0.06,0.20)mug/L, P<0.001) were significantly higher in the critical group. The BMI of the critical group was significantly higher than that of the general group (25.5 (23.0, 27.5) kg/m(2) vs. 22.0 (20.0, 24.0) kg/m(2), P=0.003). Patients were further divided into non-survivor group (17, 15.18%) group and survivor group (95, 84.82%). Among the non-survivors, there were 88.24% (15/17) patients with BMI> 25 kg/m(2), which was significantly higher than that of survivors (18.95% (18/95), P<0.001). Compared with the survived patients, oxygenation index (130 (102, 415) vs. 434 (410, 444), P<0.001) was significantly lower and lactic acid (1.70 (1.30, 3.00) mmol/L vs. 1.20 (1.10, 1.60) mmol/L, P<0.001) was significantly higher in the non-survivors. There was no significant difference in the proportion of ACEI/ARB medication between the critical group and the general group or between non-survivors and survivors (all P>0.05). Conclusion: COVID-19 patients combined with CVD are associated with a higher risk of mortality. Critical patients are characterized with lower lymphocyte counts. Higher BMI are more often seen in critical patients and non-survivor. ACEI/ARB use does not affect the morbidity and mortality of COVID-19 combined with CVD. Aggravating causes of death include fulminant inflammation, lactic acid accumulation and thrombotic events.

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1. **[Comparison of clinical and pathological features between severe acute respiratory syndrome and coronavirus disease 2019].**  
   Zhang T. Zhonghua jie he he hu xi za zhi = Zhonghua jiehe he huxi zazhi = Chinese journal of tuberculosis and respiratory diseases 2020;43(0):E040.

Severe acute respiratory syndrome (SARS) and coronavirus disease 2019 (COVID-19) shared similar pathogenetic, clinical and pathological features. Fever and cough were the most common symptoms of both diseases, while myalgia and diarrhea were less common in patients with COVID-19. Acute respiratory distress syndrome (ARDS) was the most severe pulmonary complication that caused high mortality rate. Histologically, diffuse alveolar damage (DAD) was the most characteristic finding in non-survivors with either SARS or COVID-19. Cases of patients died less than 10~14 days of disease duration demonstrated acute-phase DAD, while cases beyond 10~14 days of disease duration exhibited organizing-phase DAD in SARS. Meanwhile, organization and fibrosis were usually accompanied by exudation. Coronavirus was mostly detected in pneumocytes, while less in macrophages and bronchiolar epithelial cells. Hemorrhagic necrosis and lymphocytes depletion were found in lymph nodes and spleen in both SARS and COVID-19, indicating a pathological basis of lymphocytopenia. Thrombosis was commonly observed in small vessels and microvascular in lungs accompanying DAD. Microthrombosis was also found in extrapulmonary organs in COVID-19, that was less reported in SARS. Damages in multiple extrapulmonary organs were observed, but coronavirus was not detected in some of those organs, might indicating an alternative mechanism beyond viral infection, such as hypoxemia, ischemia and cytokine storm induced immunological injury. Diffuse alveolar damage due to viral infection and immunological injury, as well as multi-organ dysfunction and extensive microthrombus formation, brought huge challenge to the management of patients with severe SARS or COVID-19.

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1. **[The keypoints in treatment of the critical coronavirus disease 2019 patient].**  
   Li X. Y Zhonghua jie he he hu xi za zhi = Zhonghua jiehe he huxi zazhi = Chinese journal of tuberculosis and respiratory diseases 2020;43(0):E026.

The treatment of critically ill patients with coronavirus disease 2019(COVID-19) faces compelling challenges. In this issue, we'd like to share our first-line treatment experience in treating COVID-19. Hemodynamics need be closely monitored and different types of shock should be distinguished. Vasoconstrictor drugs should be used rationally and alerting of complications is of the same importance. The risk of venous thromboembolism (VTE) needs to be assessed, and effective prevention should be carried out for high-risk patients. It is necessary to consider the possibility of pulmonary thromboembolism (PTE) in patients with sudden onset of oxygenation deterioration, respiratory distress, reduced blood pressure. However, comprehensive analysis of disease state should be taken into the interpretation of abnormally elevated D-Dimer. Nutritional support is the basis of treatment. It's important to establish individual therapy regimens and to evaluate, monitor and adjust dynamically. Under the current epidemic situation, convalescent plasma can only be used empirically, indications need to be strictly screened, the blood transfusion process should be closely monitored and the curative effect should be dynamically evaluated.

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1. **[Treatment strategy for gastrointestinal tumor under the outbreak of novel coronavirus pneumonia in China].**  
   Chen Y. H Zhonghua wei chang wai ke za zhi = Chinese journal of gastrointestinal surgery 2020;23(2):I-IV.

The outbreak of the novel coronavirus pneumonia (NCP) has become a public health emergency in China. Chinese authorities and health agencies had devoted great efforts to control this disease. As surgeons specialized in the treatment of gastrointestinal tumors, we should always be aware of the prevention for NCP and incorporate this awareness into every detail of clinical practice. For the patients with gastrointestinal tumors, pre-admission screening should be done in order to rule out NCP. Real-time RT-PCR panel and chest CT scan should be conducted for patients with fever (>37.3), travel history to Hubei Province within 14 days, or contact history with residents from Wuhan district within 14 days. Prevention measures for both medical staffs and the screen-negative admitted patients should also be enhanced because false negative is possible. Medical instruments should be properly discarded or disinfected according to standardized procedures established by the local center for disease control and prevention (CDC). Surgical operation should be reduced at a minimal level to prevent cross infection in this special period.Surgical intervention for benign tumor should be postponed. For malignant tumor, multidisciplinary therapy (MDT) is recommended and non-surgical anti-tumor therapy should be selected with higher priority. Neoadjuvant therapy is highly recommended for gastrointestinal cancer at advanced stages that meet the indications of NCCN guideline (gastric cancer T stage >= 2/rectal cancer T stage >= 3/unresectable colon cancer). Gastric or esophagogastricjunction (EGJ) malignant tumor with obstruction can be managed with gastric tube decompression or stent placement to relieve the symptoms. Transnasal enteral feeding tube intubation/percutaneous endoscopic gastrostomy could be adopted to ensure enteral nutrition supply. For colorectal malignancy with simple intestinal obstruction, stent placement can achieve a high success rate, which not only helps avoid emergency surgery, but also creates a better condition for subsequent surgery. Transcatheter arterial embolization for hemostasis is an alternative choice for gastrointestinal tumor with bleeding. However, emergency operation still must be performed for patients with acute uncontrolled bleeding, obstruction or after other alternative treatment measures fail. All cases with suspicious or confirmed with NCP must be reported to the local CDC department. All invasive intervention must be performed in a designated isolation area. Tertiary prevention measure must be adopted for all anesthetists with additional face mask or medical goggle protection to prevent respiratory droplet transmission. Preventive enterostomy is preferable in lower digestive tract surgery. Thoroughly disinfecting the operating room after surgery is necessary. Fever after surgery must be carefully differentiated whether it's caused by post-surgery abdominal infection/inflammation or NCP. Single-room isolation and related examinations should be performed according to the standard procedures. We believe that with the unprecedentedly joint efforts of doctors and patients, we will eventually win this war against NCP.

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