## Supplementary information:

## Association of diabetes and severe COVID-19 outcomes; a rapid review and meta-analysis

### Search strategies

**MEDLINE**

1. exp Coronavirus/
2. exp Coronavirus Infections/
3. (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*).mp.
4. (or/1-3) and ((20191* or 202*).dp. or 20190101:20301231.(ep).)
5. 4 not (SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*).mp.
6. ((pneumonia or covid* or coronavirus* or corona virus* or ncov* or 2019-ncov or sars*).mp. or exp pneumonia/) and Wuhan
7. (2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19 or covid 2019 or ((novel or new or nouveau) adj2 (CoV on nCoV or covid or coronavirus* or corona virus or Pandemi*2)) or ((covid or covid19 or covid-19) and pandemic*2) or (coronavirus* and pneumonia)).mp.
8. COVID-19.rx,px,ox. or severe acute respiratory syndrome coronavirus 2.os.
9. ("32240632" or "32236488" or "32268021" or "32267941" or "32169616" or "32267649" or "32267499" or "32267344" or "32248853" or "32246156" or "32243118" or "32240583" or "32237674" or "32234725" or "32173381" or "32227595" or "32185863" or "32221979" or "32213260" or "32205350" or "32202721" or "32197097" or "32196032" or "32188729" or "32176889" or "32088947" or "32277065" or "32273472" or "32273444" or "32145185" or "31917786" or "32267384" or "32265186" or "32253187" or "32265567" or "32231286" or "32105468" or "32179788" or "32152361" or "32152148" or "32140676" or "32053580" or "32029604" or "32127714" or "32047315" or "32020111" or "32267950" or "32249952" or "32172715").ui.
10. or/6-9
11. 5 or 10
12. 11 and 20191201:20301231.(dt).
13. exp Diabetes Mellitus/
14. diabetes.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. MODY.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16. NIDDM.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17. T2DM.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
18. T2D.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
19. T1DM.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
20. T1D.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

21. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20
22. 12 and 21
23. exp Epidemiology/
24. epidemiology.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
25. prevalence.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
26. exp Prevalence/
27. sever*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
28. excess risk.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
29. mortality.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
30. exp Mortality/
31. exp Intensive Care Units/
32. ICU.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
33. intensive care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
34. exp Hospitalization/
35. hospitali*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
36. exp Death/
37. death.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
38. 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37
39. 22 and 38
40. limit 39 to english language

**EMBASE**

1. exp Coronavirus/
2. exp Coronavirus Infections/
3. (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*).mp.
4. (or/1-3) and 20190101:20301231.(dc).
5. 4 not (SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*).
6. ((pneumonia or covid* or coronavirus* or corona virus* or ncov* or 2019-ncov or sars*).mp. or exp pneumonia/) and Wuhan.mp.
7. (coronavirus disease 2019 or 2019-ncov or 2019nCoV or ncov2019 or ncov19 or ncov-19 or HCoV-19 or 2019-novel CoV or severe acute respiratory syndrome coronavirus 2 or sars2 or sars 2 or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-CoV-19 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19 or covid 2019 or ((novel or new or nouveau) adj2 (CoV or nCoV or covid or coronavirus* or corona virus or Pandemi*2)) or ((covid or covid19 or covid-19) and pandemic*2) or (coronavirus* and pneumonia)).mp.

8. (coronavirus disease 2019 or severe acute respiratory syndrome coronavirus 2).sh,dj.
9. ("630575119" or "630830186" or "630941329" or "631043694" or "631260659" or "631272428" or "631272880" or "631286076" or "631290163" or "631308782" or "631324397" or "631352500" or "631416440" or "631431802" or "631452886" or "631456079" or "631457551" or "631462438" or "631462876" or "631465538" or "631465685" or "631469310" or "2004499662" or "2004505338" or "2005280837" or "2005387675" or "2005408544" or "2005484987" or "2005549151").an.
10. (or/6-9) and 20191201:20301231.(dc).
11. 5 or 10
12. exp diabetes mellitus/
13. diabetes.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
14. MODY.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
15. NIDDM.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
16. T2DM.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
17. T2D.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
18. T1DM.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
19. T1D.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
20. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
21. 11 and 20
22. exp epidemiology/
23. epidemiology.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
24. prevalence.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
25. exp prevalence/
26. sever*.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
27. excess risk.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
28. mortality.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
29. exp mortality/
30. exp intensive care unit/
31. ICU.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
32. intensive care.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
33. exp hospitalization/
34. hospitali*.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
35. exp death/
36. death.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
37. 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36
38. 21 and 37
39. limit 38 to english language

**Table S1: Table of excluded studies**

| | **Reason for exclusion** |
|---|---|
| Ruan Q, Yang K, Wang W, Jiang L, Song J. Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China. *Intensive care medicine.* 2020:1–3 | Excluded. Not peer reviewed (letter to the editor). |
| Shi Y, Yu X, Zhao H, Wang H, Zhao R, Sheng J. Host susceptibility to severe COVID-19 and establishment of a host risk score: findings of 487 cases outside Wuhan. *Crit Care.* 2020;24(1):108 | Excluded. Not peer reviewed (research letter) |
| CDC Covid-19 Response Team. Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019 - United States, February 12-March 28, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(13):382–386 | Not peer reviewed. |
| Liu J, Liu Y, Xiang P, Pu L, Xiong H, Li C, et al. Neutrophil-to-lymphocyte ratio predicts severe illness patients with 2019 novel coronavirus in the early stage. *MedRxiv.* 2020 | Excluded as there are no appropriate outcomes. |
| Shen L, Li S, Zhu Y, Zhao J, Tang X, Li H, et al. Clinical and laboratory-derived parameters of 119 hospitalized patients with coronavirus disease 2019 in Xiangyang, Hubei Province, China. *J Infect.* 2020 | Excluded. Not peer reviewed. Letter to the editor. |
| Wei YY, Wang RR, Zhang DW, Tu YH, Chen CS, Ji S, et al. Risk factors for severe COVID-19: Evidence from 167 hospitalized patients in Anhui, China. *J Infect.* 2020 | Excluded. Not peer reviewed. Letter to the editor. |
| Goyal P, Choi JJ, Pinheiro LC, Schenck EJ, Chen R, Jabri A, et al. Clinical Characteristics of Covid-19 in New York City. *N Engl J Med.* 2020 | Excluded. Not peer reviewed. Letter to the editor. |
| Covid-19 National Emergency Response Center E, Case Management Team KCfDC, Prevention. Coronavirus Disease-19: The First 7,755 Cases in the Republic of Korea. *Osong Public Health Res Perspect.* 2020;11(2):85–90 | Excluded as there are no appropriate outcomes. |
| Du Y, Tu L, Zhu P, Mu M, Wang R, Yang P, et al. Clinical Features of 85 Fatal Cases of COVID-19 from Wuhan: A Retrospective Observational Study. *Am J Respir Crit Care Med.* 2020 | Excluded as there are no appropriate outcomes. |
| Gémes K, Talbäck M, Modig K, Ahlbom A, Berglund A, Feychting M, et al. Burden and prevalence of prognostic factors for severe COVID-19 in Sweden. *European Journal of Epidemiology.* 2020:1–9 | Excluded as wrong population - no COVID-19 patients in this study |
| Iacobellis G, Penaherrera CA, Bermudez LE, Bernal Mizrachi E. Admission hyperglycemia and radiological findings of SARS-CoV2 in patients with and without diabetes. *Diabetes Res Clin Pract.* 2020;164:108185 | Excluded as there are no appropriate outcomes. |
| Li T, Zhang Y, Gong C, et al. Prevalence of malnutrition and analysis of related factors in elderly patients with COVID-19 in Wuhan, China. *Eur J Clin Nutr.* 2020 | Excluded as there are no appropriate outcomes. |
| Li X, Wang L, Yan S, Yang F, Xiang L, Zhu J, et al. Clinical characteristics of 25 death cases with COVID-19: A retrospective review of medical records in a single medical center, Wuhan, China. *Int J Infect Dis.* 2020;94:128-132 | Excluded as there are no appropriate outcomes. All patients died there is no good clinical course for comparison |
| Lian J, Jin X, Hao S, et al. Analysis of Epidemiological and Clinical features in older patients with Corona Virus Disease 2019 (COVID-19) out of Wuhan. *Clin Infect Dis.* 2020 | Excluded as there are no appropriate outcomes. |
| Lian J, Jin X, Hao S, Jia H, Cai H, Zhang X, et al. Epidemiological, clinical, and virological characteristics of 465 hospitalized cases of coronavirus disease 2019 (COVID-19) from Zhejiang province in China. *Influenza Other Respir Viruses.* 2020 | Excluded as there are no appropriate outcomes. |
| Liu K, Fang YY, Deng Y, Liu W, Wang MF, Ma JP, et al. Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. *Chin Med J (Engl).* 2020;133(9):1025–1031 | Excluded as there are no appropriate outcomes. |
| Nikpouraghdam M, Jalali Farahani A, Alishiri G, Heydari S, Ebrahimnia M, Samadinia H, et al. Epidemiological characteristics of coronavirus disease 2019 (COVID-19) patients in IRAN: A single center study. *J Clin Virol.* 2020;127:104378 | Excluded as there are no appropriate outcomes. |
| Wang F, Yang Y, Dong K, et al. Clinical Characteristics of 28 Patients with Diabetes and Covid-19 in Wuhan, China. *Endocr Pract.* 2020 | Excluded as no comparator group. |

| | |
|---|---|
| Zheng Y, Xiong C, Liu Y, et al. Epidemiological and clinical characteristics analysis of COVID-19 in the surrounding areas of Wuhan, Hubei Province in 2020. *Pharmacol Res.* 2020;157:104821 | Excluded as there are no appropriate outcomes. |

**Table S2: Table of potentially overlapping study populations**

| | **Description of potential overlapping study population** |
|---|---|
| Bode, B. et. al. | Possible with Chicago study (Hur, K. et al.) |
| Cao, J. et al. | Highly likely with Zhu, L. et al. Zhu study was approved by Zhongan hospital Ethics committee. |
| Chen, Q. et al. | Highly likely overlap with Targher, G. et al and Zhang, X. et al. Targer study January/February, while Chen end 11 March – possibly overlap as Taizhou Public hospital is affiliated with Whenzou. Zhang X et al study 17 Jan - 20 Feb data from Health Commission of Zheihang, various hospitals. There is possibly some overlap between. Although Chen study longer period so some patient would not be included. |
| Chen, T. et al. | Highly likely with Zhu, L. et al. |
| Chen, Y. et al. | Highly likely with Zhu, L. et al. Chen Y. says 'The patients included in this study have not, to our knowledge, been reported previously.' However, it was submitted for publication (20 March) before Zhu et al. (20 April) |
| Deng, Y. et al. | Highly likely with Zhu, L. et al. And possibly Chen T – patient cohort also from Tongji Hospital |
| Du, R. et al. | Highly likely with Zhu, L. et al. Also Zhou et al. |
| Feng, Y et al. | Highly likely with Zhu, L. et al. Two of the hospitals (300 patients) were not in Wuhan and would not overlap with Zhu et al study). However, not possible to separate. |
| Guan, W.J, Ni, Z.Y. et al. | Highly likely to overlap with Guan, W.J., Liang, W. et al. National Health commission data used for outside Hubei. Raw data Wuhan Jinyintan Hospital. Same approach as Guan WJ Liang, W. et al. |
| Guo, W et al. | Highly likely with Zhu, L. et al. |
| Hu, L. et al. | Highly likely with Zhu, L. et al. |
| Huang, C. et al. | Highly likely with Zhu, L. et al. also Jang et al |
| Li, X. et al. | Highly likely with Zhu, L. et al. |
| Mao, L. et al. | Highly likely with Zhu, L. et al. |
| Mo, P. et al. | Highly likely with Zhu, L. et al. |
| Ren, H. et al. | Highly likely with Zhu, L. et al. |
| Shi, Q. et al. | Highly likely with Zhu, L. et al. |
| Targher, G. et al. | possible overlap with Chen Q et al and Zhang, X. et al. |
| Wan, S. Yi, Q. et al. | Highly likely with Wan, S. Xiang, Y. et al. Seems likely that it is same population given that Wan S, Xiang, Y both recognise small sample size compared to Wuhan |
| Wang, D. et al. | Highly likely with Zhu, L. et al. |
| Wang, L. He, W.et al. | Highly likely with Zhu, L. et al. |
| Wang, L. Li, X. et al. | Highly likely with Zhu, L. et al. |
| Wang, X. et al. | Critical patients were moved from temporary Fangcang hospital to other designated hospitals – possibly picked up by Zhu et al. |
| Wang, Y. et al. | Highly likely with Zhu, L. et al. |
| Wu, C. et al. | Highly likely with Zhu, L. et al. |
| Yan, Y. et al. | Highly likely with Zhu, L. et al. |
| Yang, X. et al. | Highly likely with Zhu, L. et al. some of these patients could've have been in Wu study (same period) but not mentioned. Earlier start date than Zhu so may include some cases not detected in Zhu. |
| Yuan, M. et al. | Highly likely with Zhu, L. et al. |
| Zhang, G. et al. | Highly likely with Zhu, L. et al. |
| Zhang, J. et al. | Highly likely with Zhu, L. et al. |
| Zhang, J.J. et al. | Highly likely with Zhu, L. et al. |
| Zhang, R. et al. | Highly likely with Zhu, L. et al. |
| Zhang, Y. et al. | Highly likely with Zhu, L. et al. |
| Zhou, F. et al. | Highly likely with Zhu, L. et al. |

**Table S3: Characteristics of included studies**

| **Study ID** | **Total patients analysed** | **Setting** | **Timeframe** | **Exposure** | **Outcome** | **Adjustment** |
|---|---|---|---|---|---|---|
| Bode, B. et. al. | 570 | 88 hospitals distributed across 10 USA states | 1 March – 6 April 2020 | Medical records | Mortality versus discharged alive from hospital | None |
| Cai, Q. et al. | 298 | Third People's Hospital of Shenzhen, | 11 January – 6 February 2020 with follow-up | Patient history | Severe versus non-severe disease | None |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Guangdong Province, China | till 6 March 2020 | | | |
| Cao, J. et al. | 102 | Wuhan University Zhongnan Hospital in Wuhan, Hubei Province, China | 3 January – 1 February 2020 follow up till 15 Feb 2020 | Patient history | Mortality versus discharged alive from hospital | None |
| Cariou, B. et al. | 1317 | 53 hospitals in France | 10 – 31 March 2020 | Medical records | Composite endpoint (ICU, IMV or death) versus not admitted to ICU | Age and sex |
| Chen, Q. et al. | 145 | Taizhou Public Health Medical Center, Zhejiang, China | 1 January – 11 Mar 2020 | Medical records | Severe versus non-severe disease | none |
| Chen, T. et al. | 274 | Tongji Hospital, Wuhan, Hubei Province, China | 13 Jan – 12 Feb 2020 with follow-up till 28 Feb 2020. | Medical records | Mortality versus discharged alive from hospital | None |
| Chen, Y. et al. | 904 | Central Hospital of Wuhan, Hubei Province, China | 1 Jan – 17 March 2020 | Medical records | Mortality versus discharged alive from hospital | Use of glucose-lowering medication, age, albumin, creatinine, glucose, CRP and specific medicines |
| Deng, Y. et al. | 225 | Hankou and Caidian branch of Tongji Hospital, Tongji Medical College, Huazhong University of Science & Technology, and Hankou branch of The Central Hospital of Wuhan, Hubei, China | 1 January – 21 February 2020 | Medical records | Mortality versus discharged alive from hospital | None |
| Du, R. et al. | 179 | Wuhan Pulmonary Hospital, Wuhan, Hubei Province, China | 25 December 2019 – 7 February 2020 | Patient history | Mortality versus discharged alive from hospital | None |
| Feng, Y et al. | 476 | Jinyintan Hospital in Wuhan, Shanghai Public Health Clinical Center in Shanghai and Tongling People's Hospital in Anhui Province, China | 1 January – 15 February 2020 | Medical records | Severe or critical disease versus moderate disease | none |
| Guan, W.J, Ni, Z.Y. et al. | 1099 | 552 hospitals in 30 provinces, autonomous regions, and municipalities in mainland China | 11 December 2019 – 29 January 2020 with follow up till 31 January 2020 | Medical records | Composite endpoint (admission to ICU, IMV or mortality) versus no composite endpoint | none |
| Guo, W et al. | 174 | Wuhan Union Hospital, Wuhan, Hubei Province, China | 10 February 2020 – 29 February 2020 | Medical history | Mortality versus no mortality | None |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | follow up till 3rd March 2020 | | | |
| Hong, K.S. et al. | 98 | Yeungnam University Medical Center in Daegu, South Korea | Up to 29 March 2020 (unknown start date) | Medical history | Admittance to ICU versus not admitted to ICU | None |
| Huang, C. et al. | 41 | Jin Yin- tan Hospital, Wuhan, Hubei Province, China | 16 Dec 2019 – 2 Jan 2020 | Medical history | Admittance to ICU versus not admitted to ICU | None |
| Li, X. et al. | 548 | Sino-French New City Branch of Tongji Hospital, Huazhong University of Science and Technology in Wuhan, Wuhan, China | 26 January – 5 February 2020 with follow-up till 3 March 2020 | Patient history | Severe versus non-severe disease | Age, sex, source of infection, underlying comorbidity, number of hospital visit, time from onset to hospitalization, days of fever pre-admission, abnormal laboratory findings |
| Mao, L. et al. | 214 | Main District, West Branch, and Tumor Center of Union Hospital of Huazhong University of Science and Technology, Wuhan, Hubei Province, China | 16 January –19 February 2020 | Medical records | Severe versus non-severe disease. | None |
| Ren, H. et al. | 151 | Tongji Hospital, Wuhan, Hubei Province, China | 12 Jan – 13 Feb 2020 | Self-report | Composite endpoint (severe disease or mortality) versus no composite endpoint (moderate disease) | None |
| Wan, S. Xiang, Y. et al. | 135 | Chongqing University Three Gorges Hospital, Northeast Chongqing, China | 23 January – 8 February 2020 | Medical records | Severe versus mild disease | None |
| Wan, S. Yi, Q. et al. | 123 | Chongqing Three Gorges Central Hospital, Chongqing, China | 26 January – 4 February 2020 | Medical history | Severe or critical versus mild disease | None |
| Wang, D. et al. | 138 | Zhongnan Hospital, Wuhan, Hubei Province, China | 1 January – 28 January 2020 with follow-up till 3 February 2020 | Medical history | Admittance to ICU versus not admitted to ICU | None |
| Wang, L. Li, X. et al. | 116 | Renmin Hospital of Wuhan University, Wuhan, Hubei Province, China | 14 January – 13 February 2020 | Medical history | Severe or critical versus mild disease | None |
| Wang, X. et al. | 1012 | Dongxihu Fangcang Hospital in | 7 – 12 February 2020 with follow-up till 22 February 2020 | Medical records | Severe disease versus discharge from hospital alive | None |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Wuhan, Hubei Province, China | | | | |
| Wang, Y. et al. | 344 | Tongji Hospital, Wuhan, Hubei Province, China | 25 January – 25 February 2020 | Medical records | Mortality versus discharged alive from hospital | None |
| Yan, Y. et al. | 193 | Tongji Hospital, Wuhan, Hubei Province, China | 10 January – 24 February 2020 | Self-report or newly diagnosed with fasting plasma glucose, random plasma glucose. | Mortality versus discharged alive from hospital | None |
| Yang, X. et al. | 52 | Wuhan Jin Yin-tan hospital, Wuhan, Hubei Province, China | 24 December 2019 – 26 January 2020 with follow-up till 9 February 2020 | medical history | Mortality versus none after 28 days in ICU admission | None |
| Yuan, M. et al. | 27 | Hubei Public Health Clinical Center, the central Hospital of Wuhan, Wuhan, Hubei Province, China | 1 – 25 January 2020 | No description | Mortality versus discharged alive from hospital | None |
| Zhang, G. et al. | 221 | Zhongnan Hospital of Wuhan University, Wuhan, Hubei Province, China | 2 January 2020 – 10 February 2020 with follow-up till 15 February 2020 | Medical history | Severe versus non-severe disease | None |
| Zhang, J. et al. | 111 | Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei Province, China | 13 January – 16 February 2020 | Medical history | Composite endpoint (admission to ICU or mortality) versus discharge alive from hospital | None |
| Zhang, J.J. et al. | 140 | No.7 hospital of Wuhan, Wuhan, Hubei Province, China | 16 January – 3 February 2020 | Medical history | Severe versus non-severe disease | None |
| Zhang, R. et al. | 120 | Renmin Hospital of Wuhan University, Wuhan, Hubei Province, China | 1 January – 10 February 2020 | Medical history | Severe versus non-severe disease | None |
| Zheng, F. et al. | 161 | North Hospital of Changsha First Hospital (Changsha Public Health Center), Changsha, Hunan Province, China | 17 January – 7 February 2020 | Medical history | Severe versus non-severe disease | None |

**Table S4: Characteristics of included patients**

| **Study ID** | **All patient analysed** | **Age in years** | **Males** | **Patients with Diabetes** | **Outcome** | **All patients with outcome** |
|---|---|---|---|---|---|---|
| | **n** | **Median (IQR) [Mean ± SD]** | **n (%)** | **n (%)** | | **n (%)** |
| Bode, B. et. al. | 570 | Exposure 65 (24-95) & comparator 61 (18-101) | Exposure 268 (59.4) & comparator 356 (53.1) | 184 (32.3%) | Mortality versus discharged alive from hospital | 77 (13.5%) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Cai, Q. et al. | 298 | 47 (33-61) | 145 (48.66%) | 18 (6%) | Severe versus non-severe disease | 58 (19.5%) |
| Cao, J. et al. | 102 | 54 (37-67) | 53 (52%) | 11 (10.8%) | Mortality versus discharged alive from hospital | 17 (16.7) |
| Cariou, B. et al. | 1317 | [69·8±13·0] | 855 (64.9%) | 1317 (100%) | Composite endpoint (ICU, IMV or death) versus not admitted to ICU | 382 (29%) |
| Chen, Q. et al. | 145 | [47.4±14.6] | 79 (54%) | 14 (9.7%) | Severe versus non-severe disease | 43 (29.7%) |
| Chen, T. et al. | 274 | 62 (44-70) | 171 (62%) | 47 (17·2%) | Mortality versus discharged alive from hospital | 113 (41.2%) |
| Chen, Y. et al. | 904 | 56 (39-67) | 421 (53.43%) | 136 (15%) | Mortality versus discharged alive from hospital | 812 (89.8%) |
| Deng, Y. et al. | 225 | Dead group 69 (62-74) versus recovered group 40 (33-57) | Dead group 73 (67.0%) versus recovered group 51 (44.0%) | 199 (88.4%) | Mortality versus discharged alive from hospital | 116 (51.6%) |
| Du, R. et al. | 179 | [57.6±13.7] | 97 (54·2%) | 33 (18.4%) | Mortality versus discharged alive from hospital | 21 (11.7%) |
| Feng, Y et al. | 476 | 53 (40-64) | 271 (56.9%) | 49 (10.3%) | Mortality versus discharged alive from hospital | 124 (29%) |
| Guan, W.J., Liang, W. et al. | 1590 | [48.9±16.3] | 904 (57.3%) | 130 (8%) | Composite endpoint (admission to ICU, IMV or mortality) versus no composite endpoint | 131 (8.2%) |
| Guan, W.J, Ni, Z.Y. et al. | 1099 | 47·0 (35.0–58.0) | 637 (58.1%) | 81 (7%) | Composite endpoint (admission to ICU, IMV or mortality) versus no composite endpoint | 67 (6.1%) |
| Guo, W et al. | 174 | 59 (49-67) | 76 (43.7%) | 37 (21.3%) | Mortality versus no mortality | 9 (5.2%) |
| Hong, K.S. et al. | 98 | [55.4±17.1] | 38 (38.8%) | 9 (9.2%) | Admittance to ICU versus not admitted to ICU | 13 (13.3%) |
| Hu, L. et al. | 323 | 61 (23-91) | 166 (51.4%) | 47 (14.76%) | Progressive disease versus non-progressive disease of patients classified as non-severe, severe, and critical at baseline | 63 (19.5%) |
| Huang, C. et al. | 41 | 49 (41–58) | 30 (73%) | 8 (19.5) | Admittance to ICU versus not admitted to ICU | 13 (31.7%) |
| Huang, R. et al. | 202 | 44·0 (33.0-54.0) | 116 (57.4%) | 19 (9.4%) | severe versus Non-severe disease | 23 (11.4%) |
| Hur, K. et al. | 486 | 59 (47-69) | 271 (55.8%) | 160 (32.9%) | Invasive mechanical ventilation or discharge from hospital | 138 (28.4%) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Li, X. et al. | 548 | 60 (48-69) | 279 (50.9%) | 83 (15.1%) | Severe versus non-severe disease | 269 (49.1%) |
| Mao, L. et al. | 214 | [52.7±15.5] | 87 (40.7%) | 30 (14%) | Severe versus non-severe disease | 88 (41.1%) |
| Mo, P. et al. | 155 | 54 (42-66) | 86 (55.5%) | 15 (9.7%) | Refractory disease versus no refractory disease | 85 (54.8%) |
| Ren, H. et al. | 151 | [59·5±15.9] | 78 (51.7%) | 39 (25.8%) | Composite endpoint (severe disease or mortality) versus no composite endpoint | 112 (74.2%) |
| Shi, Q. et al. | 306 | in cases 64.0 (56.0–72.0) and in controls 65.0 (56.0–72.0) | 75 (50%) in cases and 75 (50%) in controls | 153 (50%) | Mortality versus discharged alive from hospital | 47 (15.4%) |
| Simonnet, A. et al. | 124 | 60 (51-70) | 90 (73%) | 28 (22.6%) | Invasive mechanical ventilation versus no invasive mechanical ventilation | 85 (68.5%) |
| Targher, G. et al. | 339 | [With diabetes 57.0 ± 11.7 without diabetes 46.5 ± 15.7] | With diabetes 52.5% without diabetes 46.1% | 59 (17.4%) | Severe and critical disease versus mild and moderate disease | Numbers not reported. With diabetes 28.8% severe and 10.2% critical without diabetes 11.4% severe and 2.9% critical |
| Wan, S. Xiang, Y. et al. | 135 | 47 (36-55) | 72 (53.3%) | 12 (8.9%) | Severe versus mild disease | 40 (29.6%) |
| Wan, S. Yi, Q. et al. | 123 | Mild COVID cases 43.05 (13.12) in severe COVID cases 61.29 (15.55) | Mild COVID cases 55 (44.7%) in severe COVID cases 11 (8.9%) | 8 (6·5) | Severe or critical versus mild disease | 21 (17.1%) |
| Wang, D. et al. | 138 | 56 (42-68) | 75 (54.3) | 14 (10.1%) | Admittance to ICU versus not admitted to ICU | 36 (26.1%) |
| Wang, L. He, W.et al. | 339 | 69 (65–76) | 192 (56.6%) | 54 (15.9%) | Mortality versus discharged alive from hospital (4 weeks follow up) | 65 (19.2%) |
| Wang, L. Li, X. et al. | 116 | 54 (38–69) | 67 (57.8) | 18 (15.5%) | Severe or critical versus mild disease | 57 (50.9%) |
| Wang, X. et al. | 1012 | 50 (39-58) | 524 (51.8%) | 27 (2.7%) | Severe disease versus discharge from hospital alive | 100 (9.9%) |
| Wang, Y. et al. | 344 | 64 (52-72) | 179 (52.0) | 64 (18.6%) | Mortality versus discharged alive from hospital | 211 (61.3%) |
| Wu, C. et al. | 201 | 51 (43-60) | 128 (63.7%) | 22 (10.9%) | Mortality versus discharged alive from hospital | 44 (21.9%) |
| Yan, Y. et al. | 193 | 64 (49-73) | 114 (59.1%) | 48 (24.9%) | Mortality versus discharged alive from hospital | 108 (56%) |
| Yang, X. et al. | 52 | [59.7 ± 13.3] | 35 (67%) | 9 (17.3%) | Mortality versus none after 28 days in ICU admission | 20 (38.5%) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Yuan, M. et al. | 27 | 60 (47–69) | 12 (45%) | 6 (22.2%) | Mortality versus discharged alive from hospital | 10 (37%) |
| Zhang, G. et al. | 221 | 55.0 (39.0–66.5) | 108 (48.9%) | 22 (10%) | Severe versus non-severe disease | 55 (24.9%) |
| Zhang, J. et al. | 111 | 38.0 (32·0-57·0) | 46 (41.4%) | 14 (12.6%) | Composite endpoint (admission to ICU or mortality) versus discharge alive from hospital | 18 (16.2%) |
| Zhang, J.J. et al. | 140 | 57 (25-87) | 71 (50.7%) | 17 (12.1%) | Severe versus non-severe disease | 58 (41.4%) |
| Zhang, R. et al. | 120 | [45.4±15.6] | 43 (36%) | 7 (5.8%) | Severe versus non-severe disease | 30 (25%) |
| Zhang, X. et al. | 645 | Not reported | Not reported | 48 (7.4%) | Severe versus non-severe disease | 64 (9.9%) |
| Zhang, Y. et al. | 145 | [62.7±14.2] | 85 (51.2%) | 61 (42.1%) | Composite endpoint (admission to ICU, IMV or mortality) versus no composite endpoint | 142 (97.9%) |
| Zheng, F. et al. | 161 | 45 (33·5-57) | 80 (49.7%) | 7 (4.4%) | Severe versus non-severe disease | 30 (18.6%) |
| Zhou, F. et al. | 191 | 56.0 (46.0–67.0) | 119 (62%) | 36 (18.8%) | Mortality versus discharged alive from hospital | 137 (71.7%) |
| Zhu, L. et al. | 7,337 | 54 (42-64) | 3477 (47.4%) | 952 (13%) | Mortality versus discharged alive from hospital | 248 (3.4%) |

**Table S5: Table of risk of bias assessment using the Newcastle–Ottawa quality assessment scale criteria**

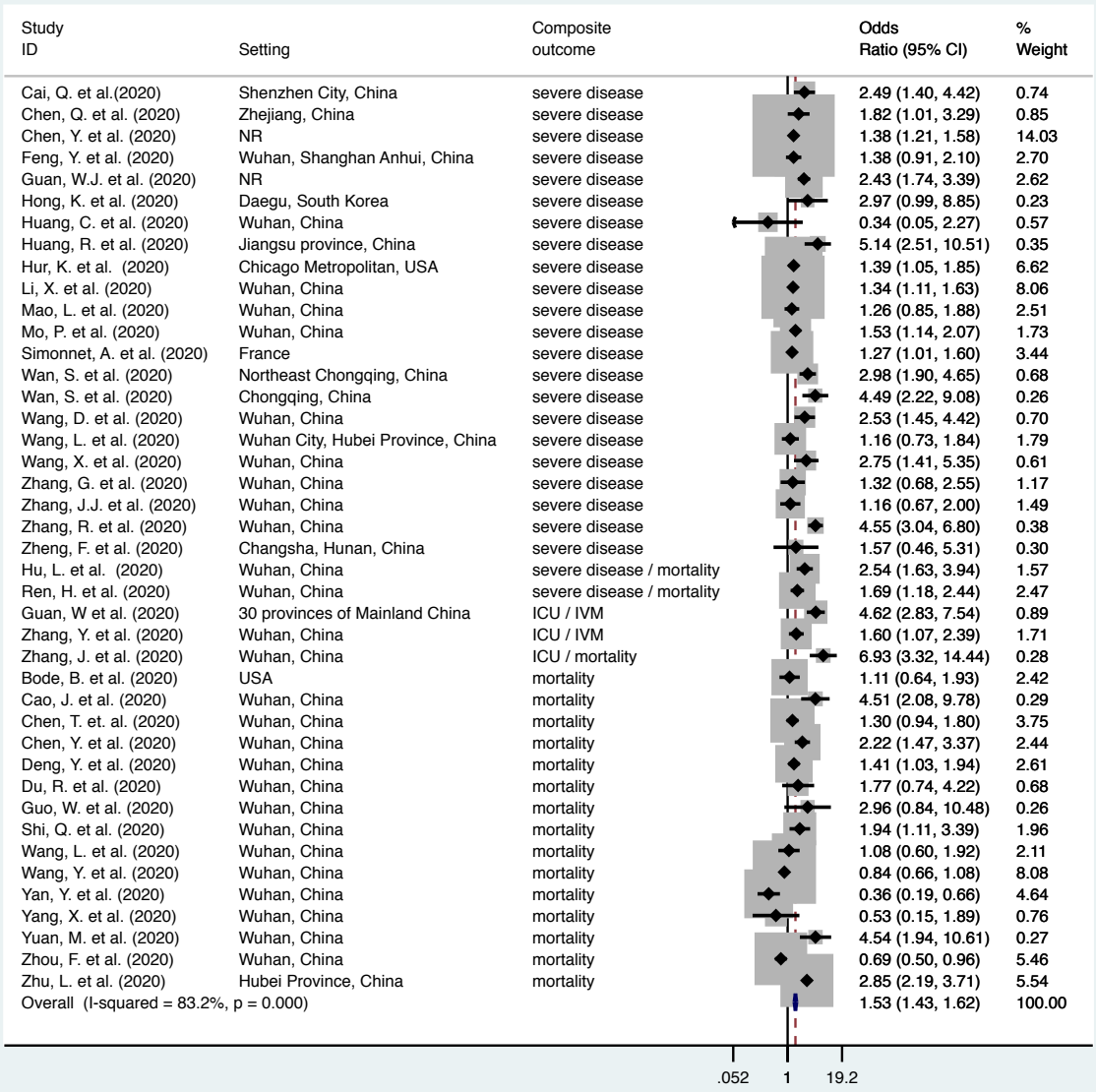
| **Cohort Study ID** | **Selection** | | | | **Comparability** | **Outcome** | | | **Quality** |
|---|---|---|---|---|---|---|---|---|---|
| | Representativeness of Exposed Cohort | Selection of the Non-Exposed Cohort from Same Source as Exposed Cohort | Ascertainment of exposure | Outcome of Interest Was Not Present at Start of Study | Comparability of Cohorts on basis of design or analysis (awarded for control for up to two factors) | Assessment of Outcome | Follow-Up Long Enough for Outcome to Occur | Adequacy of Follow-Up of Cohorts | |
| **Bode, B. et al.** | * | * | * | * | 0 | 0 | * | * | Fair |
| **Cai, Q. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Cao, J. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Cariou, B. et al.** | * | * | * | * | ** | 0 | * | * | Good |
| **Chen, Q. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Chen, T. et al.** | * | * | 0 | * | 0 | * | * | * | Fair |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Chen, Y. et al.** | * | * | * | * | ** | 0 | * | * | Good |
| **Deng, Y. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Du, R. et al.** | * | * | * | * | 0 | * | * | * | Good |
| **Feng, Y et al.** | * | 0 | * | * | 0 | * | * | * | Fair |
| **Guan, WJ, Liang, W. et al.** | * | * | 0 | * | ** | * | * | * | Good |
| **Guan, WJ, Ni, ZY et al.** | * | * | 0 | * | 0 | * | * | * | Fair |
| **Guo, W et al.** | * | * | * | * | 0 | * | 0 | * | Fair |
| **Hong, KS et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Hu, L. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Huang, C. et al.** | * | * | 0 | * | 0 | * | * | * | Fair |
| **Huang, R. et al.** | * | * | 0 | * | ** | * | * | * | Good |
| **Hur, K. et al.** | * | * | 0 | * | ** | 0 | * | * | Good |
| **Li, X. et al.** | * | * | 0 | * | ** | * | * | * | Good |
| **Mao, L. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |
| **Mo, P. et al.** | * | * | 0 | * | * | 0 | * | * | Fair |
| **Ren, H. et al.** | * | * | 0 | * | 0 | * | * | * | Fair |
| **Simonnet, A. et al.** | * | * | 0 | * | ** | 0 | * | * | Good |
| **Targher, G. et al.** | * | * | * | * | ** | 0 | * | * | Good |
| **Wan, S. Xiang, Y. et al.** | * | * | 0 | * | 0 | 0 | * | * | Fair |

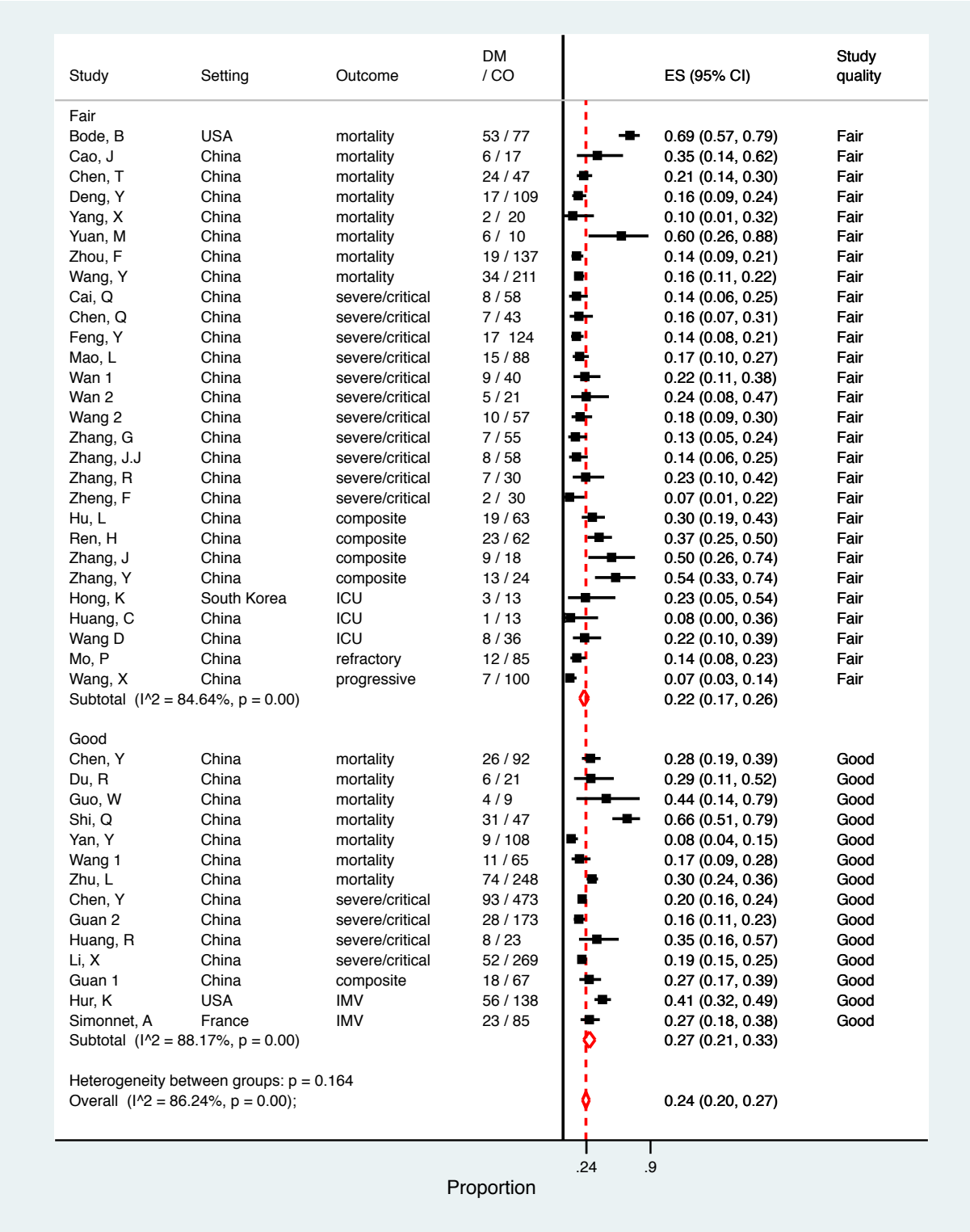
**Table S6: Table of GRADE summary of findings**

| **Quality assessment** | | | | | | | **No. of patients** | | **Effects** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No. of studies** | Design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Patients with diabetes | Patients without diabetes | Relative (95% CI) | **Quality of evidence** | **Importance** |
| **Outcome: Composite endpoint of COVID-19** | | | | | | | | | | | |
| **13** | Retrospective cohort | Not serious | [1]No serious inconsistency | [2]No serious indirectness | [3]No serious imprecision | [4]Fairly strong association | 1,737 | 10,323 | 1.73 (1.47–2.04) | □□□□ Moderate | Critical |

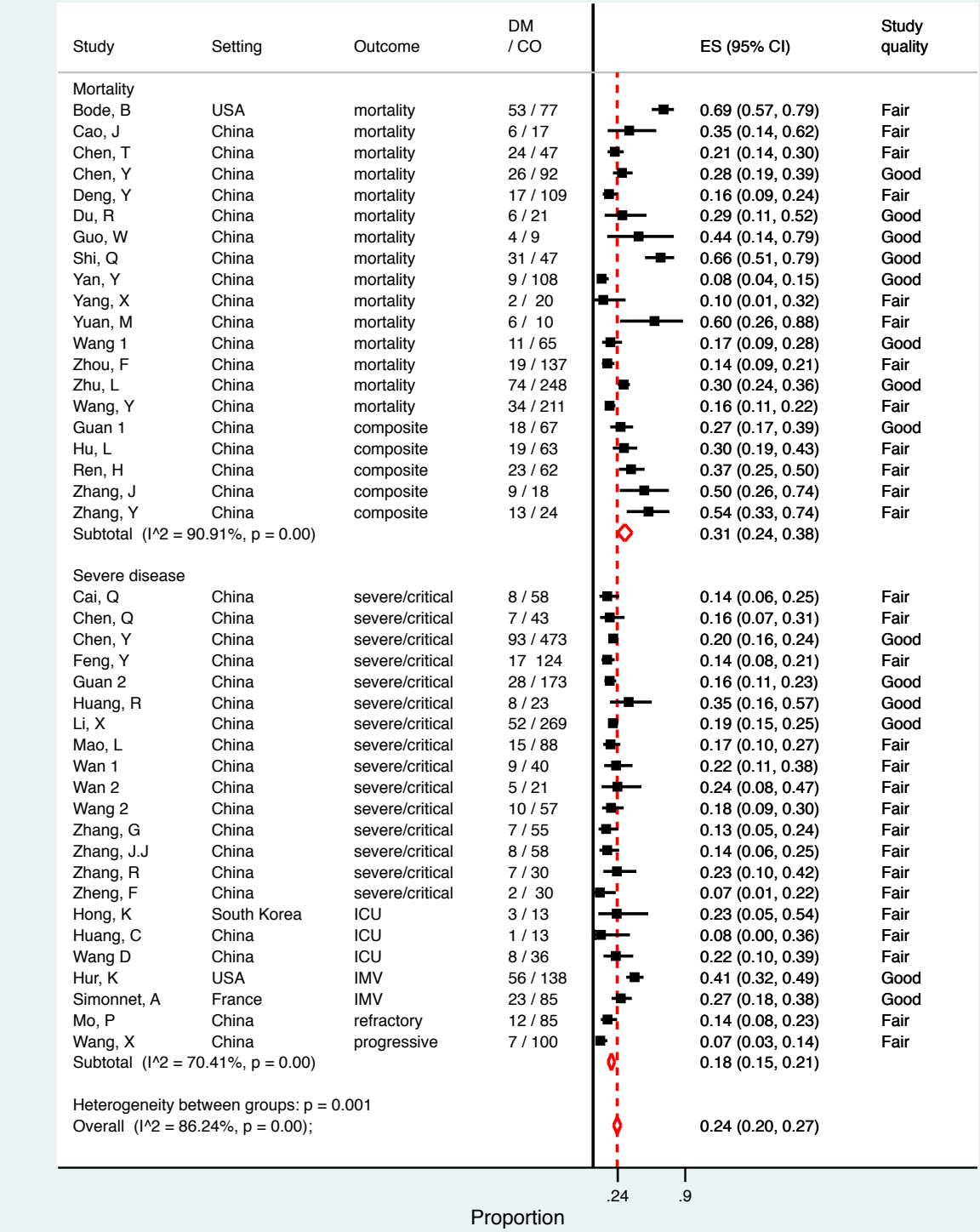
**[1]Consistent point estimates among included studies.[2] No proxy outcome measures used in the computation of measure of association. Direct comparison of diabetic vs non-diabetic patients. [3] Overall I-squared statistic of 0.0%. [4] Moderate strength of association 1·73.**



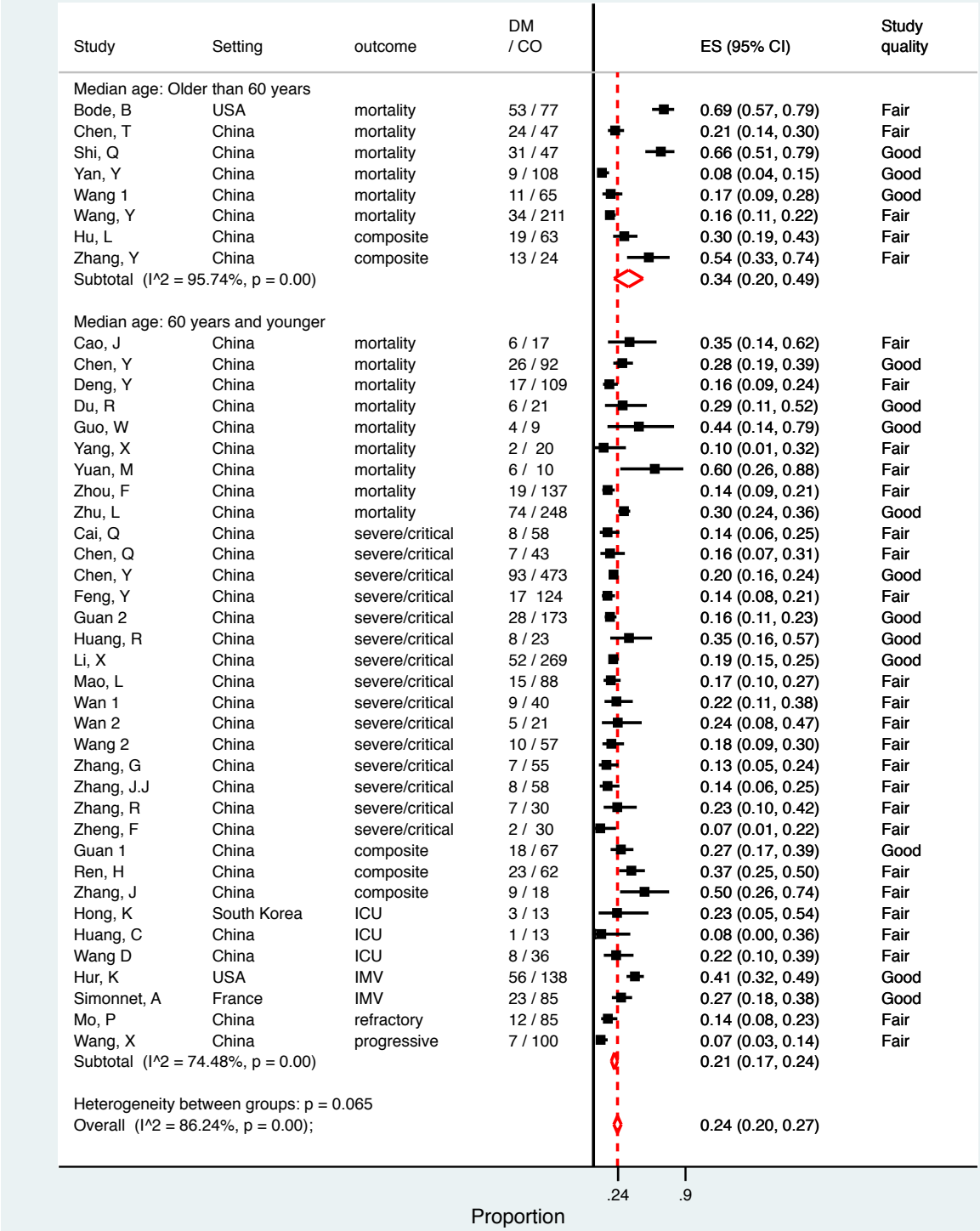

Supplementary Figure S1: Post hoc analysis reported as a forest plot showing pooled crude/unadjusted odds ratio of diabetes associated with composite endpoint of patients hospitalised for COVID-19.



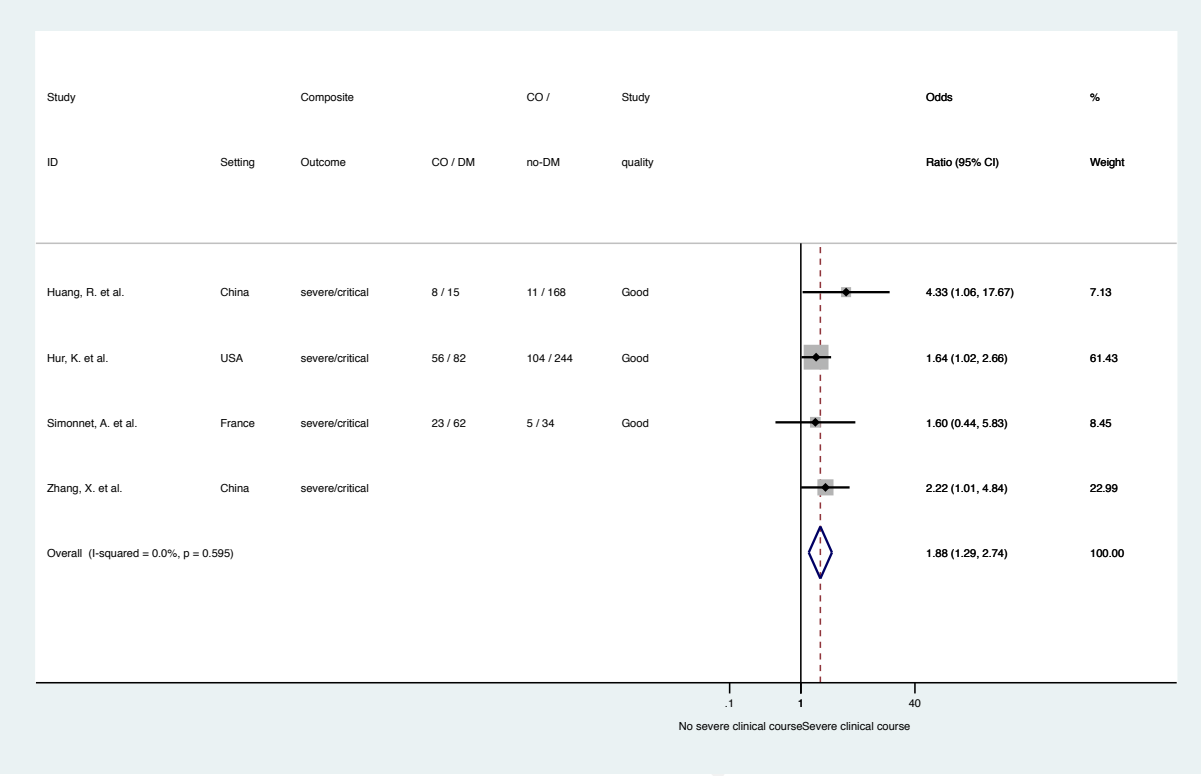

Supplementary Figure S2: Pooled proportion of prevalence of diabetes in those hospitalised COVID-19 patients who experienced composite endpoint (severe disease, admittance to ICU, invasive mechanical ventilation, or death), sub-grouped into studies rated fair or good quality.



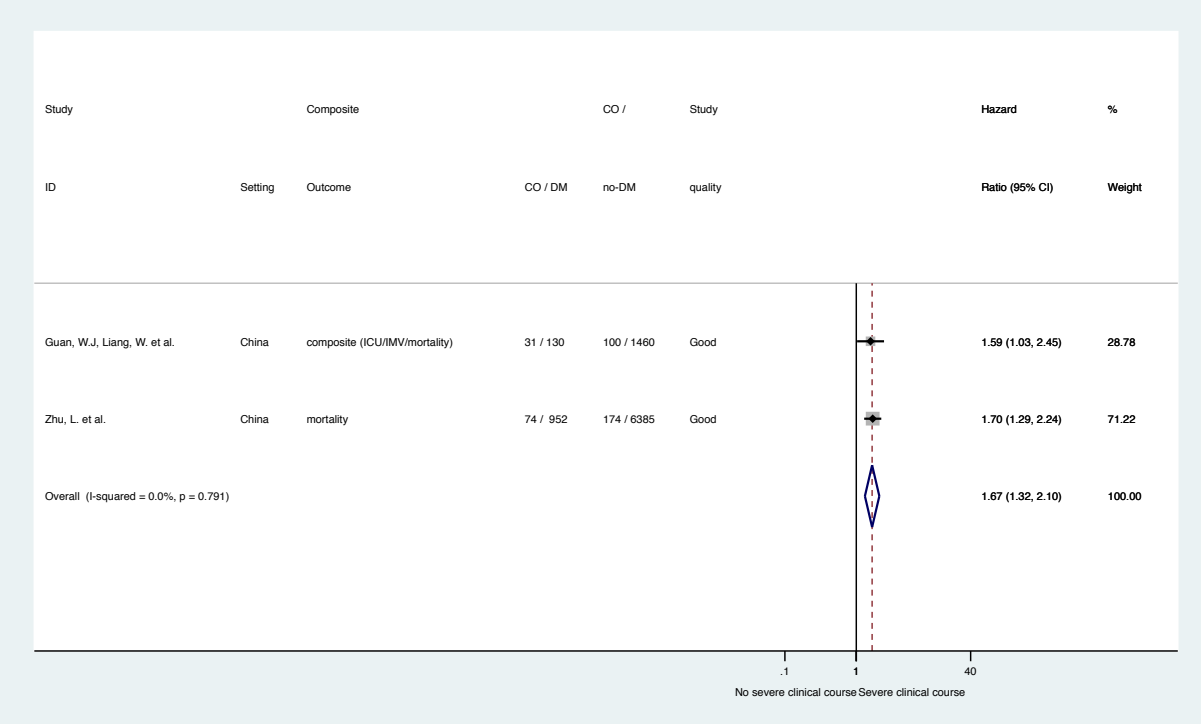

Supplementary Figure S3: Pooled proportion of prevalence of diabetes in those hospitalised COVID-19 patients who experienced composite endpoint (severe disease, admittance to ICU, invasive mechanical ventilation, or death), sub-grouped into studies where outcome was mortality as compared with no mortality.




Supplementary Figure S4: Pooled proportion of prevalence of diabetes in those hospitalised COVID-19 patients who experienced composite endpoint (severe disease, admittance to ICU, invasive mechanical ventilation, or death), sub-grouped into studies where the median age of included patients was over age 60 or age 60 and below.




Supplementary Figure S5: Post hoc analysis following exclusion of any studies with potentially overlapping study population reported as forest plot showing pooled adjusted odds ratio of diabetes associated with composite outcome of patients hospitalised for COVID-19.




Supplementary Figure S6: Post hoc analysis following exclusion of any studies with potentially overlapping study population reported as forest plot showing pooled adjusted hazard ratio of diabetes associated with composite outcome of patients hospitalised for COVID-19.