

## Supplementary Materials

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Supplementary Figure 3. Diagnostic plots showing significant and influential studies by analyses of externally studentized residuals, difference in fits values, Cook's distances, covariance ratios,  $\tau^2$ , and Q-test of leave-one-out heterogeneity, hat values, and weights.

Supplementary Figure 4. Funnel plots showing proportional meta-analysis publication bias by testing for the funnel plot asymmetry using the Egger's regression test. The Z and P values are shown.

**Supplementary Table 1. PRISMA 2009 Checklist**

Section/topic	#	Checklist item	Reported on page #
<b>TITLE</b>			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary including, as applicable: background, objectives, data sources, study eligibility criteria, participants, and interventions, study appraisal and synthesis methods, results, limitations, conclusions and implications of key findings, systematic review registration number.	2-3
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
<b>METHODS</b>			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	-
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3-5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3-5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3-5

Section/topic	#	Checklist item	Reported on page #
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	4-5
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I <sup>2</sup> ) for each meta-analysis.	4-5
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	5
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4-5
<b>RESULTS</b>			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	6-7
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	6-7
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	6-7
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	5
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	-
<b>DISCUSSION</b>			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome, consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	7-9
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	9

Section/topic	#	Checklist item	Reported on page #
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	8-9
<b>FUNDING</b>			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data), role of funders for the systematic review.	9

**Supplementary Table 2. Characteristics of the 136 studies included in the meta-analysis.**

Treatment	Study design	Origin	Number of cases	Study
antivirals, corticosteroids	retrospective	China	32	Minhua Yu et al. <sup>1</sup>
antivirals, corticosteroids	retrospective	China	113	Kaijin Xu et al. <sup>2</sup>
antivirals, corticosteroids, RRT	retrospective, single- center case series	China	138	Dawei Wang et al. <sup>3</sup>
RRT	case series	USA	5,700	Safiya Richardson et al. <sup>4</sup>
antivirals, corticosteroids, traditional Chinese medicine	retrospective	China	11	Yabo Ouyang et al. <sup>5</sup>
corticosteroids	letter	USA	377	Laura C. Myers et al. <sup>6</sup>
antivirals, corticosteroids, hydroxychloroquine, interferon, immune enhancer, thymalfasin, immunoglobulin	retrospective	China	155	Pingzheng Mo et al. <sup>7</sup>
antivirals, corticosteroids, immunoglobulin	prospective	China	12	Yingxia Liu et al. <sup>8</sup>
antivirals, interferon, corticosteroids, immunoglobulin	retrospective	China	788	Jiangshan Lian et al. <sup>9</sup>
anticoagulation, anti-IL6 monoclonal antibodies, antivirals, hydroxychloroquine, corticosteroids	cohort	USA	32	Jeffery P. Jacobs et al. <sup>10</sup>
remdesivir	cohort	USA	61	J. Grein et al. <sup>11</sup>
vasopressors, antivirals, hydroxychloroquine	case series	USA	24	Pavan K. Bhatraju et al. <sup>12</sup>
lopinavir/ritonavir, chloroquine	application note	China	22	Mingxing Huang et al. <sup>13</sup>
remdesivir, interferon, lopinavir/ritonavir, antibiotics, corticosteroids	randomized trials	China	237	Yeming Wang et al. <sup>14</sup>
antivirals, hydroxychloroquine	randomized trials	China	150	Wei Tang et al. <sup>15</sup>
tocilizumab, antivirals, hydroxychloroquine, cap-1002	case series	USA	34	Siddharth Singh et al. <sup>16</sup>
umifenovir, corticosteroids, antibiotics	retrospective	China	81	Ningfang Lian et al. <sup>17</sup>
antibiotics, corticosteroids, antivirals, interferon	randomized trials	China	127	Ivan Fan-Ngai Hung et al. <sup>18</sup>
lianhuaqingwen, antivirals, antibiotics, immunomodulator, corticosteroids	randomized trial	China	284	Ke Hu et al. <sup>19</sup>
hydroxychloroquine, tocilizumab, remdesivir	observational	USA	1,376	Joshua Geleris et al. <sup>20</sup>

hydroxychloroquine, azithromycin	non-randomized trial	France	36	Philippe Gautret et al. <sup>21</sup>
arbidol, lopinavir/ritonavir	cohort	China	33	Lisi Deng et al. <sup>22</sup>
tocilizumab, hydroxychloroquine, azithromycin, heparin, corticosteroids	retrospective	Italy	112	Marta Colaneri et al. <sup>23</sup>
hydroxychloroquine	pilot	China	30	CHEN Jun et al. <sup>24</sup>
immunoglobulin, corticosteroids, antibiotics, antivirals	cohort	China	96	Shufa Zheng et al. <sup>25</sup>
antivirals, antibiotics, immunoglobulin, RRT	retrospective	China	91	Xin-Ying Zhao et al. <sup>26</sup>
antivirals, antibiotics, corticosteroids, immunoglobulin	retrospective	China	111	Jun Zhang et al. <sup>27</sup>
antivirals, antibiotics, immunoglobulin, corticosteroids	observational	China	226	Yuan Yu et al. <sup>28</sup>
vasoconstrictive, antivirals, RRT, antibiotics, corticosteroids, immunoglobulin	observational	China	52	Xiaobo Yang et al. <sup>29</sup>
antivirals (lopinavir/ritonavir), antibiotics, corticosteroids vasopressor	randomized trial	China	199	B. Cao et al. <sup>30</sup>
antivirals, corticosteroids, immunoglobulin, RRT	cohort	China	191	Fei Zhou et al. <sup>31</sup>
antivirals, interferon, arbidol, antibiotics, corticosteroids, immunoglobulin	retrospective case series	China	62	Xiao-Wei Xu et al. <sup>32</sup>
antibiotics, antivirals, immunoglobulin, traditional Chinese medicine	descriptive	China	80	Jian Wu et al. <sup>33</sup>
antibiotics, antivirals, immunomodulators, antioxidant	cohort	China	201	ChaominWu et al. <sup>34</sup>
antivirals, antibiotics, antifungal, corticosteroids, arbidol	retrospective	China	69	Zhongliang Wang et al. <sup>35</sup>
antivirals, antibiotics, corticosteroids	retrospective case series	China	107	Dawei Wang et al. <sup>36</sup>
hydroxychloroquine, azithromycin, antivirals, tocilizumab	cross-sectional	USA	48	Lara S. Shekerdemian et al. <sup>37</sup>
chloroquine, hydroxychloroquine	observational	USA	201	Moussa Saleh et al. <sup>38</sup>
antibiotics, hydroxychloroquine, corticosteroids, antivirals, tocilizumab, vasopressors,	observational cohort	Italy	33	Simone Piva et al. <sup>39</sup>

RRT				
antibiotics, antivirals, antifungal, corticosteroids, interferon, immunoglobulin,	cross-sectional	China	204	Lei Pan et al. <sup>40</sup>
antivirals, interferon, corticosteroids, antibiotics	retrospective	Macau	10	Iek Long Lo et al. <sup>41</sup>
antivirals, antibiotics, immunoglobulin, thymosin, corticosteroids	retrospective	China	78	Wei Liu et al. <sup>42</sup>
antivirals, antibiotics, corticosteroids, immunoglobulin	retrospective	China	137	Kui Liu et al. <sup>43</sup>
antivirals, antibiotics, corticosteroids, immunoglobulin	retrospective	China	60	Yongpo Jiang et al. <sup>44</sup>
antivirals, antibiotics, corticosteroids, RRT	prospective	China	41	Chaolin Huang et al. <sup>45</sup>
antivirals, antibiotics, corticosteroids, RRT	retrospective	China	323	Ling Hu et al. <sup>46</sup>
antivirals, antibiotics, corticosteroids, RRT, hydroxychloroquine	descriptive	Korea	98	Kyung Soo Hong et al. <sup>47</sup>
antivirals, antibiotics, corticosteroids, RRT, antifungal, immunoglobulin	descriptive	China	99	Nanshan Chen et al. <sup>48</sup>
antivirals, antibiotics, corticosteroids	retrospective	China	9	Huijun Chen et al. <sup>49</sup>
RRT	cohort	China	102	Jianlei Cao et al. <sup>50</sup>
antibiotics	case series	China	10	Cai Jiehao et al. <sup>51</sup>
remdesivir	report	Denmark, UK, Greece, Germany, Korea, Mexico, Spain, Japan, and Singapore	1,063	J.H. Beigel et al. <sup>52</sup>
antibiotics	retrospective cohort	USA	89	Mohammud M. Alam et al. <sup>53</sup>
Antibiotics, antivirals, hydroxychloroquine	retrospective cohort	Kuwait	1,096	Sulaiman Almazeedi et al. <sup>54</sup>
corticosteroids, antibiotics, hydroxychloroquine, immunoglobulins	short communication	Japan	92	Nobuhiro Asai et al. <sup>55</sup>
hydroxychloroquine, antibiotics, tocilizumab,	retrospective observational	Turkey	109	Nijad Bakhshaliyev et al. <sup>56</sup>
corticosteroids, antivirals	Retrospective observational	Spain	4,035	Juan Berenguer et al. <sup>57</sup>
hydroxychloroquine, antivirals	retrospective	India	522	Sudhir Bhandari et al. <sup>58</sup>
hydroxychloroquine	randomized trial	Canada	821	D.R. Boulware et al. <sup>59</sup>
corticosteroids, antivirals, antibiotics, hydroxychloroquine	retrospective	USA	105	Frederick S. et al. <sup>60</sup>

tocilizumab	retrospective	Italy	65	Corrado, Campochiaro et al. <sup>61</sup>
hydroxychloroquine, antibiotics	retrospective	USA	102	Stephen Capone et al. <sup>62</sup>
hydroxychloroquine, antivirals, antibiotics, corticosteroids, immunoglobulins	retrospective	Spain	15,111	J.M. Casas-Rojo et al. <sup>63</sup>
hydroxychloroquine, antivirals, tocilizumab	retrospective	Belgium	8,910	Lucy Catteau et al. <sup>64</sup>
interferons, antivirals, corticosteroids	cohort	China	175	Dong Chen et al. <sup>65</sup>
corticosteroids, antivirals, antibiotics, chloroquine	retrospective	China	267	Xudan Chen et al. <sup>66</sup>
antivirals, hydroxychloroquine, tocilizumab	randomized trial	France	149	Pierre-François et al. <sup>67</sup>
corticosteroids, antivirals, antibiotics, hydroxychloroquine	retrospective	Italy	72	Giuseppe Di Lorenzo et al. <sup>68</sup>
corticosteroids, antivirals, antibiotics, chloroquine	retrospective	France	1,240	Charles Fauvel et al. <sup>69</sup>
corticosteroids	prospective, multicenter, cohort	Spain	663	C. Ferrando et al. <sup>70</sup>
hydroxychloroquine, antivirals	observational cohort	USA	11,721	Michael W. Fried et al. <sup>71</sup>
hydroxychloroquine, antivirals, antibiotics, corticosteroids, immunoglobulins, tocilizumab	observational	Spain	7	Alberto García-Salido et al. <sup>72</sup>
hydroxychloroquine, antivirals, antibiotics	retrospective	France	99	Christophe Guervilly et al. <sup>73</sup>
corticosteroids	cohort study	USA	2,215	Shruti Gupta et al. <sup>74</sup>
antivirals, hydroxychloroquine	case series	Korea	91	Mi Seon Han et al. <sup>75</sup>
hydroxychloroquine, tocilizumab, corticosteroids, antibiotics, antivirals	letter	Italy	26	Enrico Heffler et al. <sup>76</sup>
tocilizumab, corticosteroids, antibiotics, antivirals, immunoglobulins, interferons	retrospective cohort study	China	60	Mao Huang et al. <sup>77</sup>
antibiotics, hydroxychloroquine, antivirals	retrospective observational	USA	486	Kevin Hur et al. <sup>78</sup>
hydrocortisone	randomized trial	Multiple countries	403	the writing Committee for the REMAP-CAP Investigators <sup>79</sup>
hydroxychloroquine, antivirals	cohort	Austria	156	Mario Karolyi et al. <sup>80</sup>
hydroxychloroquine,	case series	USA	33	Shubhi Kaushik et al. <sup>81</sup>



antivirals, corticosteroids, tocilizumab				
hydroxychloroquine, antivirals, corticosteroids, tocilizumab, interferons	cohort	Oman	63	Faryal Khamis et al. <sup>82</sup>
hydroxychloroquine, antivirals, antibiotics,	report	USA	576	Lindsay Kim et al. <sup>83</sup>
RRT	observational	Korea	1,082	Mi Kyung Kim et al. <sup>84</sup>
hydroxychloroquine, antibiotics, antivirals, corticosteroids	retrospective case-control	USA	135	Issam Koleilat et al. <sup>85</sup>
corticosteroids	correspondence	USA	152	Sandeep Krishna et al. <sup>86</sup>
hydroxychloroquine, antivirals	report	France	80	Marie Lecronier et al. <sup>87</sup>
Antivirals, hydroxychloroquine, corticosteroids	retrospective	Korea	98	Ji Yeon Lee et al. <sup>88</sup>
antivirals, interferons, hydroxychloroquine	cohort	Singapore	201	Pei Hua Lee et al. <sup>89</sup>
RRT	retrospective	North Zealand, Denmark	115	Maria Elisabeth Lendorf et al. <sup>90</sup>
antivirals, antibiotics, corticosteroids, interferons, antifungal, immunoglobulins	cohort	China	3,375	Liyang Li et al. <sup>91</sup>
antivirals, corticosteroids	randomized trial	China	86	Yueping Li et al. <sup>92</sup>
corticosteroids	retrospective observational	France	268	Sophie Liabeuf et al. <sup>93</sup>
corticosteroids, RRT	report	China	65	fangfang Liu et al. <sup>94</sup>
antivirals, antibiotics hydroxychloroquine,	retrospective	USA	46	Erica M. Lokken et al. <sup>95</sup>
hydroxychloroquine, corticosteroids	letter	Italy	121	Andrea Lovato et al. <sup>96</sup>
hydroxychloroquine, antibiotics, corticosteroids, tocilizumab	retrospective	USA	224	Tetsuro Maeda et al. <sup>97</sup>
hydroxychloroquine, azithromycin	cohort	Iran	35	Shima Mahmoudi et al. <sup>98</sup>
dexamethasone	randomized trial	UK	11,303	The RECOVERY Collaborative Group <sup>99</sup>
hydroxychloroquine, antibiotics	retrospective cohort	USA	6,493	Takahisa Mikami et al. <sup>100</sup>
hydroxychloroquine, antivirals	observational	Iran	22	Ali Monfared et al. <sup>101</sup>
corticosteroids	letter	France	96	Francois Montastruc et al. <sup>102</sup>
hydroxychloroquine, antivirals, corticosteroids, antibiotics, tocilizumab	retrospective observational	Spain	62	Fernando Montero et al. <sup>103</sup>
tocilizumab, hydroxychloroquine, antivirals, antibiotics	prospective	Italy	51	Valentina Morena et al. <sup>104</sup>
tocilizumab	retrospective cohort	Spain	236	Oscar Moreno-Pérez et al. <sup>105</sup>

Tocilizumab, hydroxychloroquine, antivirals, corticosteroids, RRT	retrospective cohort	USA	81	Austin R. Morrison et al. <sup>106</sup>
corticosteroids	retrospective cohort	Spain	404	Jose M. Mostaza et al. <sup>107</sup>
tocilizumab, hydroxychloroquine, antivirals, antibiotics, corticosteroids	retrospective cohort	Paris	279	Yann Nguyen et al. <sup>108</sup>
RRT	retrospective	Poland	169	Błażej Nowak et al. <sup>109</sup>
antivirals, chloroquine, antibiotics, corticosteroids	retrospective cohort	USA	251	Alexis K. Okoh et al. <sup>110</sup>
antivirals, antibiotics, corticosteroids	report	Italy	3,032	Luigi Palmieri et al. <sup>111</sup>
antivirals, hydroxychloroquine, tocilizumab	cohort	Italy	51	Zeno Pasquini et al. <sup>112</sup>
corticosteroids, hydroxychloroquine, tocilizumab	retrospective cohort	USA	223	Jerald Pelayo et al. <sup>113</sup>
antivirals	retrospective	Switzerland	196	Pellaud Charlotte et al. <sup>114</sup>
corticosteroids, hydroxychloroquine, tocilizumab, antivirals	retrospective	Italy	10	Nicola Potere et al. <sup>115</sup>
hydroxychloroquine, corticosteroids, antivirals	observational	USA	239	Christina C. Price et al. <sup>60</sup>
hydroxychloroquine, antivirals antibiotics,	Prospective observational	Switzerland	129	Steve Primmaz et al. <sup>116</sup>
corticosteroids, hydroxychloroquine, tocilizumab, antivirals	retrospective	Italy	111	Luca Quartuccio et al. <sup>117</sup>
hydroxychloroquine, antibiotics	retrospective	USA	1,438	Eli S. Rosenberg et al. <sup>118</sup>
corticosteroids, hydroxychloroquine, tocilizumab	cohort	USA	242	Grace Salacup et al. <sup>119</sup>
hydroxychloroquine, antibiotics, antivirals, corticosteroids	retrospective	France	54	Loic Sentilhes et al. <sup>120</sup>
hydroxychloroquine, antibiotics, antivirals, corticosteroids	cohort	USA	186	Sachin J. Shah et al. <sup>121</sup>
antibiotics, antivirals, corticosteroids, immunoglobulin	retrospective	China	99	Ding Shi et al. et al. <sup>122</sup>
hydroxychloroquine	randomized trial	USA and Canada	491	Caleb P. Skipper et al. <sup>123</sup>
hydroxychloroquine, antibiotics, antivirals, corticosteroids, tocilizumab	randomized trial	US, Europe, and Asia	596	Christoph D. Spinner et al. <sup>124</sup>
antibiotics, RRT	Case series	USA	463	Geehan Suleyman et al. <sup>125</sup>
hydroxychloroquine, antibiotics, antivirals, corticosteroids	randomized trial	Brazil	299	Bruno M. Tomazini et al. <sup>126</sup>

tocilizumab	prospective series	Italy	100	Paola Toniati et al. <sup>127</sup>
hydroxychloroquine, antivirals	letter	USA	2,130	Farhaan S. Vahidy et al. <sup>128</sup>
corticosteroids	retrospective	China	1,514	Jianfeng Wu et al. <sup>129</sup>
antivirals	cohort	China	146	Ping Xu et al. <sup>130</sup>
antivirals, antibiotics, corticosteroids	retrospective	China	120	Dan Yan et al. <sup>131</sup>
antivirals, antibiotics, RRT, interferons, corticosteroids	retrospective	China	218	Xiquan Yan et al. <sup>132</sup>
hydroxychloroquine, antivirals, corticosteroids	retrospective	France	821	Lorène Zerah et al. <sup>133</sup>
RRT, corticosteroids, antibiotics	retrospective observational	China	74	Qianhui Zhang et al. <sup>134</sup>
corticosteroids, antibiotics, antivirals	retrospective	China	258	Yan Zhang et al. <sup>135</sup>
antivirals	retrospective	China	50	Zhen Zhu et al. <sup>136</sup>

Note: RRT, renal replacement therapy.

**Supplementary Table 3. Heterogeneity results from the proportional meta-analysis**

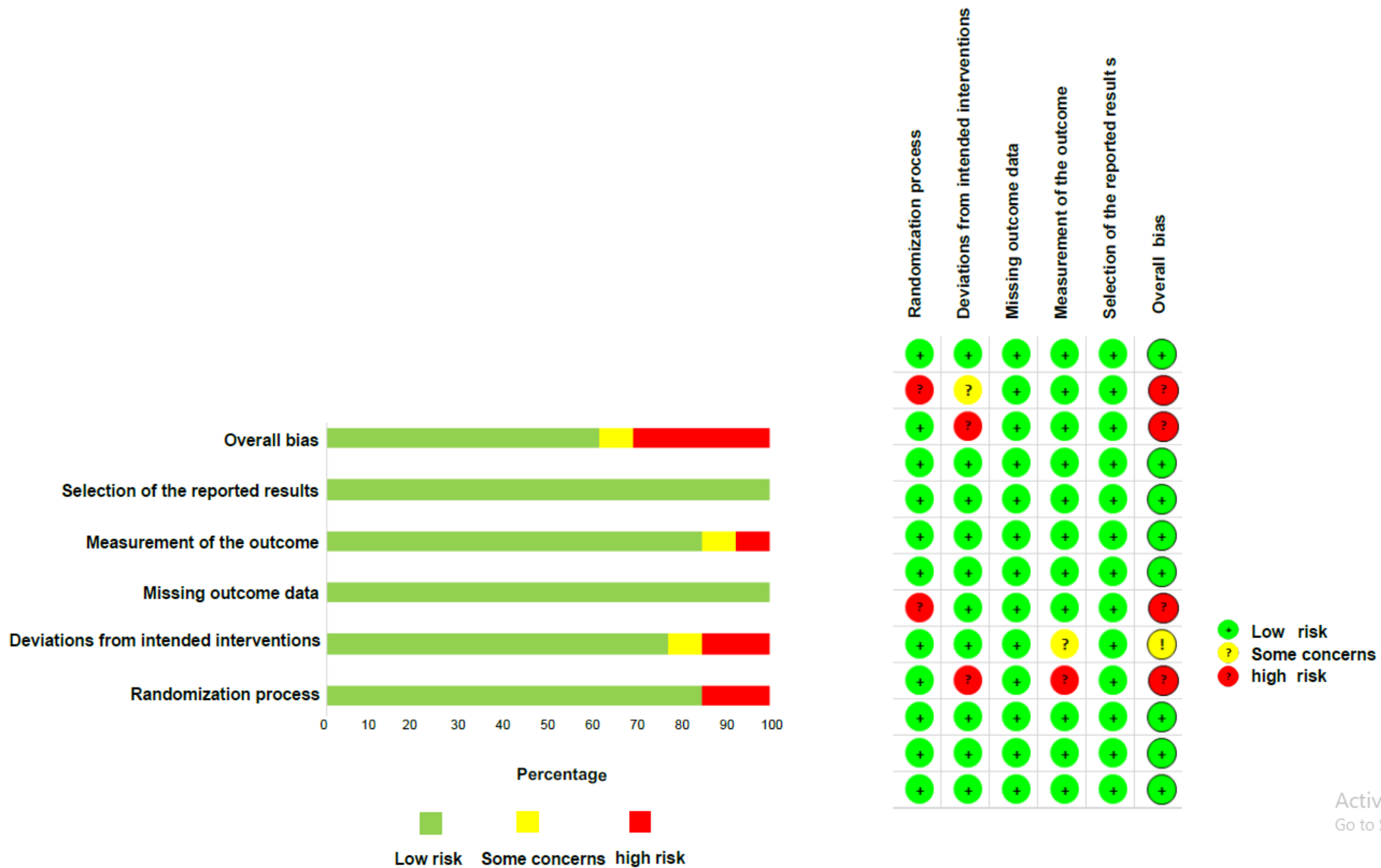
Treatment	$\tau^2$ [95% CI]	$I^2$ [95% CI]	$H^2$ [95% CI]	Q test (p-value)
antibiotics	0.15 [0.11, 0.22]	99.56 [99.39, 99.69]	225.5 [164.2, 328.9]	15812.98 ( $< 0.0001$ )
Corticosteroids	0.065 [0.047, 0.094]	99.26 [98.98, 99.49]	136.9 [98.43, 197.6]	6277.3 ( $< 0.0001$ )
antivirals	0.17 [0.13, 0.23]	99.69 [99.6, 99.77]	328.34 [250.86, 442.91]	30492.92 ( $< 0.0001$ )
chloroquine or hydroxychloroquine	0.15 [0.12, 0.22]	99.69 [99.56, 99.79]	323.80 [231.51, 478.91]	10863.67 ( $< 0.0001$ )
immunoglobulin	0.035 [0.019, 0.073]	96.61 [94.12, 98.36]	29.53 [17.00, 60.98]	604.05 ( $< 0.0001$ )
interferon	0.16 [0.087, 0.39]	99.53 [99.14, 99.8]	216.6 [116.59, 523.38]	2115.89 ( $< 0.0001$ )
RRT	0.021 [0.01, 0.05]	95.91 [92.99, 98.12]	24.5 [14.27, 53.36]	305.68 ( $< 0.0001$ )
tocilizumab	0.10 [0.06, 0.19]	99.72 [99.54, 99.84]	358.49 [220.29, 663.69]	3910.91 ( $< 0.0001$ )

Note:  $\tau^2$ , estimated amount of total heterogeneity,  $I^2$ , total heterogeneity / total variability,  $H^2$ , total variability / sampling variability, Q test, overall test of heterogeneity.

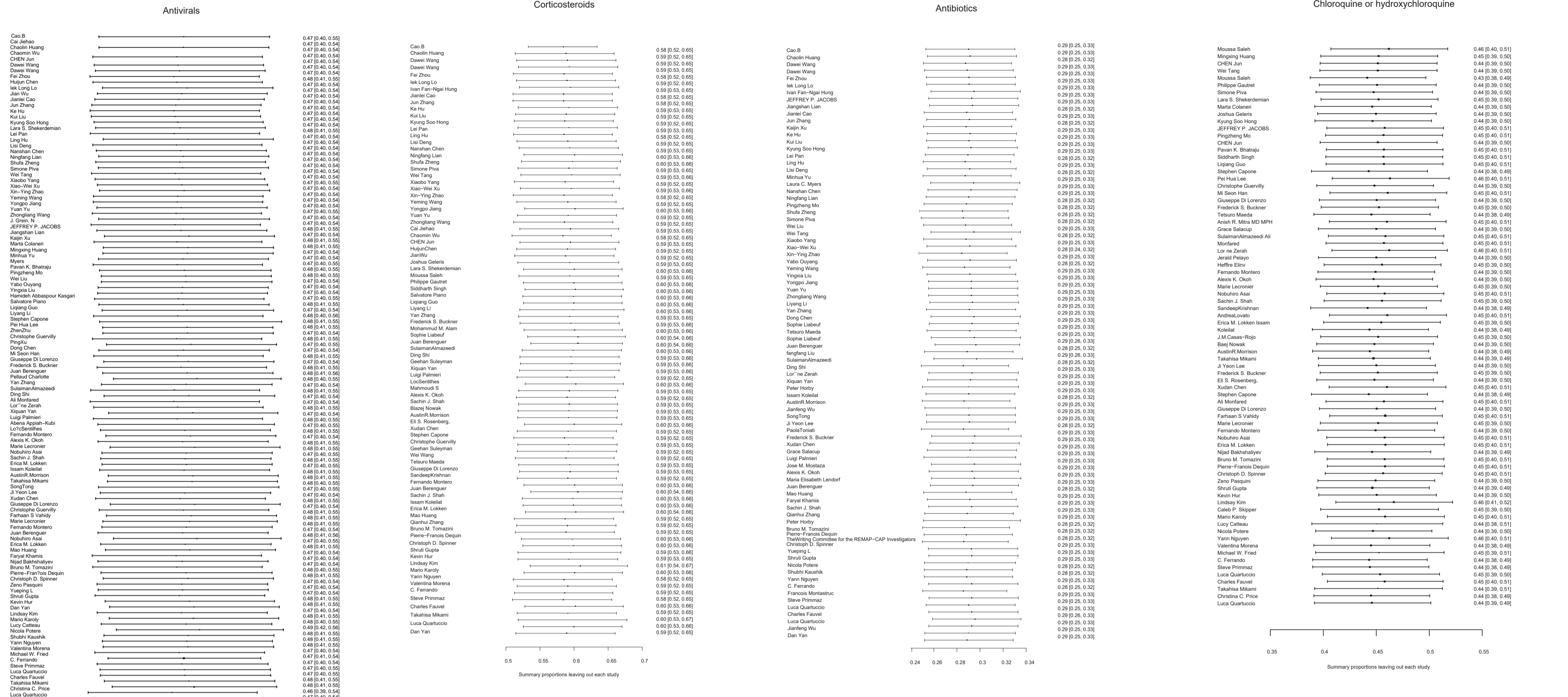
**Supplementary Table 4. A summary of the 20 studies included in the network meta-analysis**

<b>Experimental group</b>	<b>Control group</b>	<b>Study</b>
lopinavir/ritonavir	standard care	B. Cao et al. <sup>30</sup>
lopinavir/ritonavir + interferon	lopinavir/ritonavir	Ivan Fan-Ngai Hung et al. <sup>18</sup>
remdesivir	standard care	Yeming Wang et al. <sup>14</sup>
hydroxychloroquine	standard care	Wei Tang et al. <sup>15</sup>
hydroxychloroquine	standard care	Joshua Geleris et al. <sup>20</sup>
remdesivir	standard care	J.H. Beigel et al. <sup>52</sup>
arbidol+lopinavir/ritonavir	lopinavir/ritonavir	Lisi Deng et al. <sup>22</sup>
chloroquine	lopinavir/ritonavir	Mingxing Huang et al. <sup>13</sup>
hydroxychloroquine	standard care	Philippe Gautret et al. <sup>21</sup>
umifenovir	standard care	Ningfang Lian et al. <sup>17</sup>
lopinavir/ritonavir	arbidol	Zhen Zhu et al. <sup>136</sup>
hydroxychloroquine/chloroquine	lopinavir/ritonavir	Marie Lecronier et al. <sup>87</sup>
dexamethasone	standard care	The RECOVERY Collaborative Group <sup>99</sup>
dexamethasone	standard care	Bruno M. Tomazini et al. <sup>126</sup>
hydrocortisone	standard care	Pierre-Francois Dequin et al <sup>67</sup>
hydrocortisone	standard care	the writing Committee for the R EMAP-CAP Investigators <sup>79</sup>
remdesivir	standard care	Christoph D. Spinner et al <sup>124</sup>
hydroxychloroquine/chloroquine	standard care	Caleb P. Skipper et al. <sup>123</sup>

Hydroxychloroquine/ Chloroquine	Lopinavir/ritonavir	Mario Karolyi et al. <sup>80</sup>
Corticosteroids	standard care	Jianfeng Wu et al <sup>129</sup> .

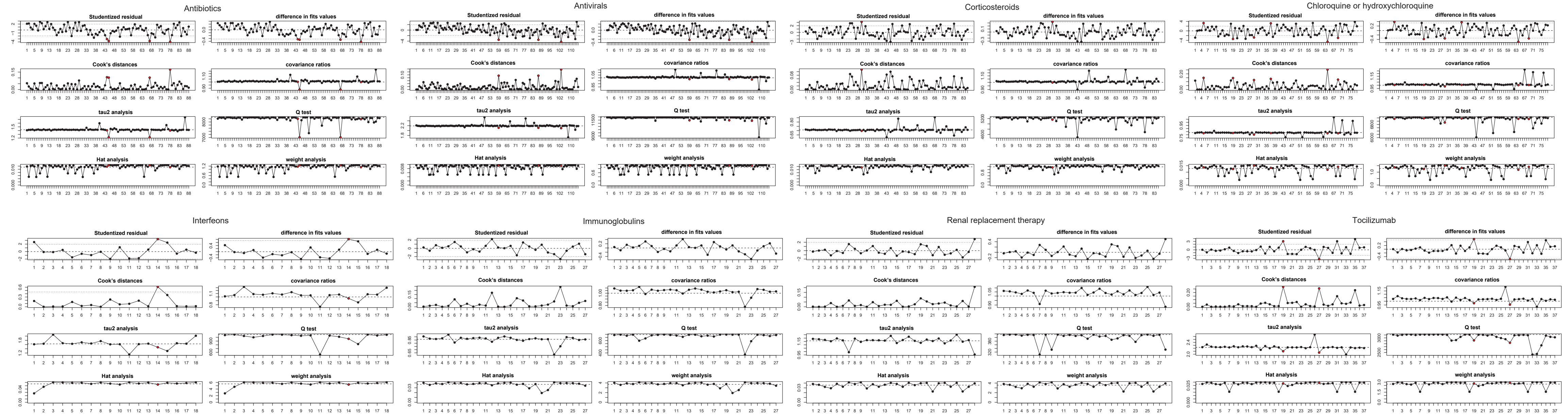


Supplementary Figure 1. Cochrane risk of bias analysis (ROB-2) of 13 randomized trial studies of COVID-19 treatment

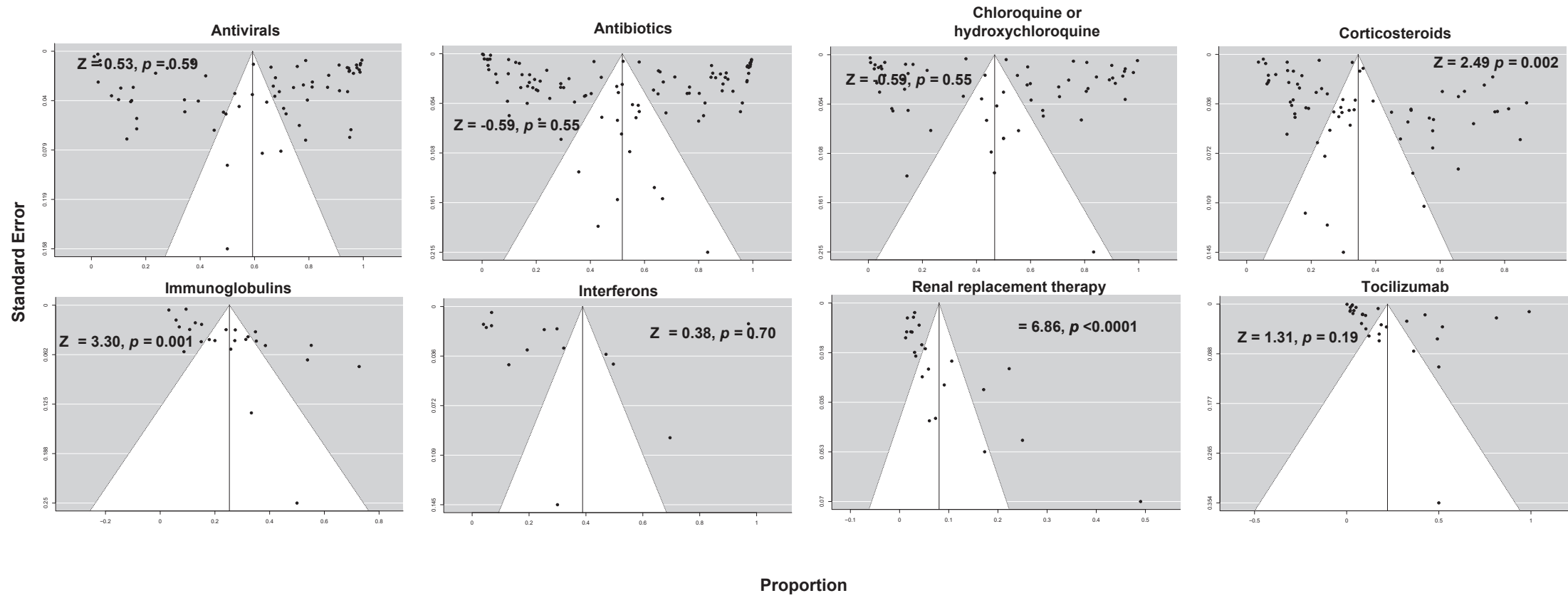


Supplementary Figure 2. Forest plots showing outlying and influential studies in eight treatments by externally studentized residuals analysis. Each box represents a summary proportion estimated by the leave-one-out study.





**Supplementary Figure 3. Diagnostic plots showing significant and influential studies by analyses of externally studentized residuals, difference in fits values, Cook's distances, covariance ratios, tau2 ,and Q-test of leave-one-out heterogeneity, hat values, and weights.**



**Supplementary Figure 4. Funnel plots showing proportional meta-analysis publication bias by testing for the funnel plot asymmetry using the Egger's regression test. The Z and P values are shown.**

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