

**Author(s):** Cruciani F, De Crescenzo F, Vecchi S, Saulle R, Mitrova Z, Amato L, Davoli M.

**Question:** Should Monoclonal antibodies compared to Standard treatment be used for COVID-19 patients?

**Setting:** Inpatient

Certainty assessment							№ of patients		Effect		Certainty
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Monoclonal antibodies	Standard treatment	Relative (95% CI)	Absolute (95% CI)	
<b>All-cause mortality</b>											
18 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	randomised trials	serious <sup>a</sup>	not serious	not serious	not serious	none	1013/4873 (20.8%)	1093/4421 (24.7%)	<b>RR 0.88</b> (0.80 to 0.97)	<b>30 fewer per 1.000</b> (from 49 fewer to 7 fewer)	⊕⊕⊕○ MODERATE
<b>Number of patients with any adverse event</b>											
13 1,2,3,5,6,7,8,10,11,14,15,17,19	randomised trials	not serious	serious <sup>b</sup>	not serious	not serious	none	1035/2101 (49.3%)	762/1721 (44.3%)	<b>RR 1.03</b> (0.93 to 1.15)	<b>13 more per 1.000</b> (from 31 fewer to 66 more)	⊕⊕⊕○ MODERATE
<b>Number of patients with serious adverse events</b>											
15 <sup>2,6,7,8,9,10,11,12,13,14,15,16,17,18,19</sup>	randomised trials	serious <sup>c</sup>	not serious	not serious	not serious	none	501/2467 (20.3%)	375/1926 (19.5%)	<b>RR 0.94</b> (0.84 to 1.05)	<b>12 fewer per 1.000</b> (from 31 fewer to 10 more)	⊕⊕⊕○ MODERATE
<b>SARS-CoV-2 clearance</b>											
1 <sup>6</sup>	randomised trials	not serious	not serious	not serious	not serious	none	93/101 (92.1%)	86/103 (83.5%)	<b>RR 1.10</b> (0.99 to 1.22)	<b>83 more per 1.000</b> (from 8 fewer to 184 more)	⊕⊕⊕⊕ HIGH
<b>Number of patients discharged</b>											
4 <sup>4,11,12,16</sup>	randomised trials	serious <sup>d</sup>	very serious <sup>e</sup>	not serious	not serious	none	1435/2412 (59.5%)	1254/2395 (52.4%)	<b>RR 1.04</b> (0.94 to 1.15)	<b>21 more per 1.000</b> (from 31 fewer to 79 more)	⊕○○○ VERY LOW
<b>Duration of hospitalization in intensive care</b>											

Certainty assessment							No of patients		Effect		Certainty
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Monoclonal antibodies	Standard treatment	Relative (95% CI)	Absolute (95% CI)	
1 <sup>9</sup>	randomised trials	serious <sup>f</sup>	not serious	not serious	not serious	none	The study reports the length of hospitalization expressed as time to discharge: HR 1.42 [95% CI (1.18; 1.71) in favour of tolicuzumab HR: 1.64 [95% CI (1.2; 2.45)] in favour of sarilumab				⊕⊕⊕○ MODERATE

#### Length of stay in hospital

3 <sup>9,14,15</sup>	randomised trials	not serious	not serious	not serious	not serious	none	The studies report a length of hospitalization expressed as time to discharge as follows: Tocilizumab cumulatively HR: 1.32 (95% CI [1.16 - 1.50]), thus reported in the studies REMAP-CAP HR: 1.41 (95% CI [1.18 - 1.68]) Rosas et al 2020 HR: 1.35 (95% CI [1.02 - 1.79]) Salama et al 2020 HR: 1.16 (95% CI [0.91 - 1.48]) Sarilumab REMAP-CAP HR: 1.60 (95% CI [1.17 - 2.19])				⊕⊕⊕⊕ HIGH
----------------------	-------------------	-------------	-------------	-------------	-------------	------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--	--	--------------

#### Number of patients with progression / exacerbation of disease

8 <sup>4,5,6,8,12,14,16,17</sup>	randomised trials	serious <sup>g</sup>	not serious	not serious	not serious	none	335/2591 (12.9%)	391/2472 (15.8%)	<b>RR 0.79</b> (0.69 to 0.91)	<b>33 fewer per 1.000</b> (from 49 fewer to 14 fewer)	⊕⊕⊕○ MODERATE
----------------------------------	-------------------	----------------------	-------------	-------------	-------------	------	------------------	------------------	----------------------------------	----------------------------------------------------------	------------------

#### Length of stay in hospital (mean days)

1 <sup>10</sup>	randomised trials	serious <sup>h</sup>	not serious	not serious	serious <sup>i</sup>	none	65	64	-	<b>SMD 0.42 lower</b> (0.77 lower to 0.07 lower)	⊕⊕○○ LOW
-----------------	-------------------	----------------------	-------------	-------------	----------------------	------	----	----	---	-----------------------------------------------------	-------------

#### Number of patients with respiratory failure and respiratory distress syndrome

2 <sup>5,8</sup>	randomised trials	serious <sup>j</sup>	not serious	not serious	not serious	none	23/265 (8.7%)	21/268 (7.8%)	<b>RR 1.12</b> (0.63 to 1.96)	<b>9 more per 1.000</b> (from 29 fewer to 75 more)	⊕⊕⊕○ MODERATE
------------------	-------------------	----------------------	-------------	-------------	-------------	------	---------------	---------------	----------------------------------	-------------------------------------------------------	------------------

#### Explanations

- a. Downgraded of one level for unclear risk of selection bias in 7 studies, performance bias at high risk in 7 studies and unclear in 4 studies, 5 studies at unclear risk of detection bias, one study at high risk and 5 at unclear risk of attrition bias, 3 studies at unclear risk of reporting bias
- b. Downgraded of one level for heterogeneity  $I^2=47\%$
- c. Downgraded of one level for high risk of performance bias in 6 studies, for attrition bias one study at high risk and 5 at unclear risk
- d. Downgraded of one level for performance bias at high risk in 2 studies and at unclear risk in one study, one study at unclear risk of selection bias
- e. Downgraded of two levels for high heterogeneity  $I^2=80\%$
- f. Downgraded of one level for high risk of performance bias
- g. Downgraded of one level for 3 studies at unclear risk of selection bias, performance bias at high risk in 3 studies and at unclear risk in 3 studies, 2 studies at unclear risk of detection bias, attrition bias at high risk in one study and at unclear risk in 2 studies, and 2 studies at unclear risk of reporting bias
- h. Downgraded of one level for high risk of performance bias and unclear risk of detection bias
- i. Downgraded of one level for small sample size
- j. High risk of performance bias in one study and one study at unclear risk for all considered bias

## References

1. Temesgen Z, Burger CD, Baker J, Polk C, Libertin C, Kelley C, et al. Lenzilumab efficacy and safety in newly hospitalized covid-19 subjects: results from the live-air phase 3 randomized double-blind placebo-controlled trial. medRxiv [Preprint]. 2021 May 5:2021.05.01.21256470. doi: 10.1101/2021.05.01.21256470.
2. Patel J, Beishuizen A, Ruiz XB, Boughanmi H, Cahn A, Criner GJ, et al. A Randomized Trial of Otilimab in Severe COVID-19 Pneumonia (OSCAR). medRxiv. 2021:2021.04.14.21255475.
3. Kumar S, De Souza R, Nadkar M, Guleria R, Trikha A, Joshi SR, et al. A two-arm, randomized, controlled, multi-centric, open-label phase-2 study to evaluate the efficacy and safety of Itolizumab in moderate to severe ARDS patients due to COVID-19. Expert Opin Biol Ther. 2021 May;21(5):675-686. doi: 10.1080/14712598.2021.1905794.
4. RECOVERY Collaborative Group. Horby PW, Pessoa-Amorim G, Peto L, Brightling CE, Sarkar R, Thomas K, et al. RECOVERY Collaborative Group. Tocilizumab in patients admitted to hospital with COVID-19 (RECOVERY): a randomised, controlled, open-label, platform trial. Lancet. 2021 May 1;397(10285):1637-1645. doi: 10.1016/S0140-6736(21)00676-0.
5. Rutgers A, Westerweel PE, van der Holt B, Postma S, van Vonderen MGA, Piersma DP, et al. Timely Administration of Tocilizumab Improves Survival of Hospitalized COVID-19 Patients. Available at SSRN: <https://ssrn.com/abstract=3834311> or <http://dx.doi.org/10.2139/ssrn.3834311>
6. Joong Sik E, Michael I, Anca S-C, Oana S, Liliana-Lucia P, Yeon-Sook K, et al. Efficacy and safety of CT-P59 plus standard of care: a phase 2/3 randomized, double-blind, placebo-controlled trial in outpatients with mild-to-moderate SARS-CoV-2 infection. PREPRINT (Version 1) available at Research Square; 2021. DOI:10.21203/rs.3.rs-296518/v1
7. Lescure F-X, Honda H, Fowler RA, Lazar JS, Shi G, Wung P, et al. Sarilumab in patients admitted to hospital with severe or critical COVID-19: a randomised, double-blind, placebo-controlled, phase 3 trial. The Lancet Respiratory Medicine.
8. Soin AS, Kumar K, Choudhary NS, Sharma P, Mehta Y, Kataria S, et al. Tocilizumab plus standard care versus standard care in patients in India with moderate to severe COVID-19-associated cytokine release syndrome (COVINTOC): an open-label, multicentre, randomised, controlled, phase 3 trial. Lancet Respir Med. 2021 Mar 4:S2213-2600(21)00081-3. doi: 10.1016/S2213-2600(21)00081-3. Epub ahead of print.
9. Gordon AC, Mouncey PR, Al-Beidh F, Rowan KM, Nichol AD, Arabi YM, et al. Interleukin-6 Receptor Antagonists in Critically Ill Patients with Covid-19. N Engl J Med. 2021 Feb 25. doi: 10.1056/NEJMoa2100433. Epub ahead of print. PMID: 336310654.
10. Veiga VC, Prats JAGG, Farias DLC, Rosa RG, Dourado LK, Zampieri FG, et al. Effect of tocilizumab on clinical outcomes at 15 days in patients with severe or critical coronavirus disease 2019: randomised controlled trial. BMJ. 2021;372:n84
11. ACTIV-3/TICO LY-CoV555 Study Group, Lundgren JD, Grund B, Barkauskas CE, Holland TL, Gottlieb RL, Sandkovsky U, et al. A Neutralizing Monoclonal Antibody for Hospitalized Patients with Covid-19. N Engl J Med. 2020 Dec 22:NEJMoa2033130. doi: 10.1056/NEJMoa2033130. Epub ahead of print.
12. Stone JH, Frigault MJ, Serling-Boyd NJ, Fernandes AD, Harvey L, Foulkes AS, et al; BACC Bay Tocilizumab Trial Investigators. Efficacy of Tocilizumab in Patients Hospitalized with Covid-19. N Engl J Med. 2020 Oct 21:NEJMoa2028836. doi: 10.1056/NEJMoa2028836. Epub ahead of print.
13. Vlaar APJ, de Bruin S, Busch M, Timmermans SAMEG, van Zeggeren IE, Koning R, et al. Anti-C5a antibody IFX-1 (vilobelimab) treatment versus best supportive care for patients with severe COVID-19 (PANAMO): an exploratory, open-label, phase 2 randomised controlled trial. Lancet Rheumatol. 2020 Dec;2(12):e764-e773. doi: 10.1016/S2665-9913(20)30341-6. Epub 2020 Sep 28.
14. Rosas I, Bräu N, Waters M, et al. Tocilizumab in Hospitalized Patients With COVID-19 Pneumonia. medRxiv 2020.08.27.20183442; 2020.
15. Salama C, Han J, Yau L, Reiss WG, Kramer B, Neidhart JD, et al. Tocilizumab in nonventilated patients hospitalized with Covid-19 pneumonia. medRxiv. 2020:2020.10.21.20210203.
16. Salvarani C, Dolci G, Massari M, Merlo DF, Cavuto S, Savoldi L, et al; RCT-TCZ-COVID-19 Study Group. Effect of Tocilizumab vs Standard Care on Clinical Worsening in Patients Hospitalized With COVID-19 Pneumonia: A Randomized Clinical Trial. JAMA Intern Med. 2020 Oct 20:e206615. doi: 10.1001/jamainternmed.2020.6615. Epub ahead of print.

17. Hermine O, Mariette X, Tharaux PL, Resche-Rigon M, Porcher R, Ravaud P; CORIMUNO-19 Collaborative Group. Effect of Tocilizumab vs Usual Care in Adults Hospitalized With COVID-19 and Moderate or Severe Pneumonia: A Randomized Clinical Trial. *JAMA Intern Med.* 2020 Oct 20:e206820. doi: 10.1001/jamainternmed.2020.6820. Epub ahead of print.
18. Sivapalasingam S, Lederer DJ, Bhore R, Hajizadeh N, Criner G, Hossain R, et al. A Randomized Placebo-Controlled Trial of Sarilumab in Hospitalized Patients with Covid-19. medRxiv. DOI: 10.1101/2021.05.13.21256973
19. Wang D, Fu B, Peng Z, Yang D, Han M, Li M, et al. Tocilizumab in patients with moderate or severe COVID-19: a randomized, controlled, open-label, multicenter trial. *Front Med.* 2021 Mar 9:1–9. doi: 10.1007/s11684-020-0824-3. Epub ahead of print.