

Prevention of covid-19: an expert opinion / recommendations on consensus

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“the Pulmocare Kolkata recommendation for chemoprevention of COVID-19”

The background:

The pandemic of covid-19 has already taken a huge toll as over three million confirmed death is recorded from 223 countries with over 1.4 billion confirmed cases. ⁽¹⁾ The scientific community reacted fast in response to the threat and a lot of the facts as regards the pathophysiology of the disease and management have been unravelled so far. Today, multiple antiviral drugs are already available in the market, ^(2, 3, 4) strategies are placed in clinical practice to curb the SARS-CoV-2 induced hyper-inflammatory response, ^(5, 6, 7) and directives are available to use anti-coagulants to treat and prevent endovascular coagulation especially in pulmonary vasculature ^(8, 9). On the other hand, multiple drugs with repurpose prospect has been placed under trial or in use to combat the virus.^(10, 11, 12, 13) The latter began with the claim of preventive potential of HCQS (hydroxychloroquine) which was subsequently discarded.⁽¹⁴⁾ Other agents as doxycycline, N-acetylcysteine (NAC), ivermectin, vitamin-C, vitamin-D, and some ayurvedic and homeopathic formulations have emerged as prescriptions for chemoprevention of the disease often without any published guideline or recommendations. We have found that their use has been widespread despite having inadequate or even conflicting evidence in favour for many of them.

The second wave of the disease has, by now, vastly spread all over world. The infection and the mortality figures are spiking high to higher keeping the scientists, the medical fraternity, and the policy makers somewhat baffled and helpless. ⁽¹⁾ In large part of the world mass vaccination is yet a long way from completion and the status of herd immunity is under question. ⁽¹⁵⁾ The condition of the Indian subcontinent is precarious and the situation may turn worse in near future as the disease is spreading like wild fire. Because of rampant mutations in the viral genome and infection with different single and even multiple-mutant strains, it is unlikely for Covid-19 to go soon; rather, multiple future surges are expected.⁽¹⁶⁾ At the present moment, it appears unlikely to ensure universal vaccination in a short span of time. Moreover, the prospect of vaccine efficacy is also under question in face of mutations and advent of new strains of the SARS-COV-2. ^(17, 18) The mutant strains can have high transmissibility, ^(19, 20) increased viral load, ⁽²¹⁾ greater severity of infection, ⁽²²⁾ and increased power to evade the immunity, ⁽²³⁾ threatening to influence the vaccine efficacy. ⁽²⁴⁾

Therefore, simultaneous to vaccine development and applications, the humanity demands to look for something that will act supplementary to vaccine and help reduce the spread and severity of

covid-19. Here, the chemoprevention of covid-19, if possible, can play a significant role. People have tried so right from the beginning of the pandemic. Many drugs are under development and investigation and a good number of them have been tried for their repurpose potential against covid-19. ^(10, 11, 12, 13) Of them, budesonide inhalation is the latest hot topic although it was listed as a repurpose drugs months ago. ⁽²⁵⁾

The formation of the expert opinion for chemoprevention of covid-19:

We, at the institute of Pulmocare and Research, Kolkata, tried a consensus draft for primary chemoprevention of covid-19 in 2020; but unfortunately, we could not publish it so far in any scientific journal. Meanwhile, with the second surge of the disease, the issue has turned relevant again. The situation is desperate, and we feel that whatever small but ethical should be explored and published for greater human interest. On tele-communication, we reached a common decision to publish our view of collective wisdom to help face the dreadful resurgence of covid-19 in the country. Our recommendations are essentially based on published scientific rationale with some evidences and concerns of safety for the users. We have chosen to pick up the agents that we considered for the initial consensus since we did literature search on them at that point of time (mid and late 2020) and had repeated interactions on internet. Despite a huge number of publications after that, the concept and the approach remains relevant to us and we feel that the agents been chosen are best suited for the low-to middle income countries like India. The Institute of Pulmocare and Research initiated the scheme and all the other consultants (clinicians, basic scientists, pharmacologists, micro-biologists, epidemiologists) were roped into the process of development of the consensus opinion. They all carry onus of the statements been made. The recommendations are just our consensus opinion or proposals, the concerned physicians are the best judge to take or discard or modify the scheme.

Agents primarily been considered are:

- a) N-acetylcysteine: it is an anti-oxidant and anti inflammatory agent with multi-prong function against covid-19 and ARDS. Of late, some members of our group have demonstrated a novel function of the agent to disintegrate the structure of the virus through the reduction of a disulfide bond that contributes in the structural architecture of spike protein. Incidentally again, it is not yet been publisher but the preprint of the manuscript is available in ChemRxiv. ⁽²⁶⁾ There have been several ongoing trials with the agent in covid-19. The drug, if tolerated by the stomach, (usually well tolerated) has hardly any side effect. ^(27, 28, 29, 30, 31)
- b) Ivermectin: it a FDA approved anthelmintic with very well tolerability and good repurpose prospect for covid-19. ^(32, 33, 34)

- c) Doxycycline: it is an antibiotic with prospective anti-covid-19 roles and long experience of long term use with excellent tolerability record. ^(35, 36)
- d) Famotidine: it is a histamine receptor blocker used widely for acid peptic disease with excellent long term safety. ^(37,38, 39, 40)
- e) Montileukast: it is an antihistaminic with excellent tolerability and safety on long term again. ^(41, 42)

Agents not considered but not discouraged:

- a) Vitamin-C and B complex
- b) Vitamin-D especially in with evidence or suspicion of deficiency
- c) Empirical Zinc supplementation
- d) Continuation of Inhaled budesonide or other inhaled-corticosteroids ^(43, 44) (if somebody has already been using it)
- e) Co-prescription of homeopathic and ayurvedic formulations

The expert opinion of recommendation:

The recommendation is based on three categories of subjects been decided mutually by the experts.

It goes as the following:

1. **Category 1: asymptomatic subjects with history of doubtful contact** [apparently normal and healthy subjects (with or without co-morbidities) with chance of exposure to covid-19]
 - a) **Ivermectin:** 12 mg weekly for 4 weeks and further decision shall be made reviewing the prevailing clinical and epidemiological situation.
 - b) **NAC:** 600 mg one tab twice daily to continue; it may be continued as long as the threat remains
(All elderly and high risk persons can be prescribed this combination. All such people should be monitored for development of symptoms of covid-19 and on appearance of so, the patient should be tested with RTPCR for SARS-CoV-2)
2. **Category 2: asymptomatic subjects with history of definite contact** [apparently normal healthy subjects (with or without co-morbidities but with history of definite contact) without covid-19 symptoms]
 - a) **Ivermectin:** 12 mg twice daily for 1 day and then weekly for 3-4 weeks and further decision shall be made reviewing the prevailing clinical and epidemiological situation.

- c) **NAC:** 600 mg one tab twice daily to continue ; it may be continued as long as the threat remains
- b) **Doxycycline:** 100 mg one cap / tab twice daily one hour after food for 7 to 10 days
(Monitor for development of covid-19 symptoms and test with RTPCR for SARS-CoV-2. If the RTPCR turns out to be positive, continue ivermectin 12 mg twice daily for 3 to 5 days and scale up the regimen with addition of famotidine and montelukast as suggested for category 3)
3. **Category 3: mild symptomatic of covid-19 pending confirmation** [subjects with mild covid-19 symptoms (with pending RTPCR test and with or without co-morbidities irrespective of history of definite contact)];
- Test with RTPCR for SARS-CoV-2 and please start the following -
- a) **Ivermectin:** 12 mg twice daily for 3 days
- b) **NAC:** 600 mg one tab twice daily to continue
- c) **Doxycycline:** 100 mg one cap / tab twice daily one hour after food for 5 to 7 days
- d) **Famotidine:** 40mg one tab twice a day one hour before meals to continue
- e) **Monteleukast:** 10 mg one tab a day to continue 15 days
- [Monitor the symptoms and investigate according to the recommendation given by AIIMS, New Delhi (in case the subject is proved RTPCR positive) ⁽⁴⁵⁾ In case of negative RTPCR result, the treating physician may start and continue the regimen if the index of suspicion is high. Further treatment, if the disease worsens moderate or severe, should be done according to the recommendations by AIIMS ⁽⁴⁵⁾]*

Some more recommendation:

- Appropriate covid-appropriate behaviour should be maintained by all to prevent the spread of the disease.
- Suspects of covid-19 without or with mild symptoms should be tested with RTPCR for SARS-CoV-2
- **All such chemo/pharmaco-prevention should be started only by a qualified medical practitioner**
- Regular monitoring of vitals [pulse, respiratory rate (if possible), SpO₂, and blood pressure] should be a must in all covid-contacts and patients. **Once a day 2-chair test may be enough for those who are stable without symptoms and with normal resting SpO₂.** Patients with some existing pulmonary and cardiac diseases (as advanced COPD, pulmonary hypertension,

interstitial lung disease, other extensive lung diseases, heart failure) can have significant desaturation in 2-chair test without being attacked by the SARS-CoV-2.`

- **Contacts and suspects of covid-19 without any existing pulmonary disease (see above) having mild symptoms and negative RTPCR (for SARS-CoV-2) should be subjected to 2-chair test. ⁽⁴⁶⁾ If a person without any pre-existing pulmonary disease or heart failure shows a desaturation over 2%, one should be cautious and need to repeat the test regularly every four to six hours and consult a doctor. If the desaturation goes up as $\geq 3\%$ one should contemplate for a HRCT chest examination and depending on the situation, the treating physician should recommend for arrangement of standby oxygen supplementation.**
- **All symptomatic (mild) patients of covid-19 should undergo 2-chair test at least twice a day to monitor the change in the degree of desaturation and pulse rate. A chart needs to be maintained to understand the change as worsening or improvement. Progressive increase in desaturation can give an early signal for the possible future need of oxygen supplementation and hospitalization.**
- **The 2-chair test can be performed in moderately sick patients even on oxygen supplementation under supervision. Change in the degree of desaturation and pulse rate should be noted on repeat tests with the same degree of oxygen supplementation to understand the course of the disease.**
- If any member of a household develops covid-19 symptoms or has high degree of suspicion of obvious or repeated contact with a covid-19 patient or has RTPCR positivity, the rest of members in the same household should be regarded as exposed and vulnerable to develop covid-19. Hence, we recommend prevention as per the 'category-1' to all such family members.
- Ivermectin and doxycycline should not be given in pregnancy and lactating state. No prophylactic agent should be tried in case of known intolerance to the drug.
- Kids below 13 years shall not be given with doxycycline.
- All paediatric contacts will be carefully monitored and may be given NAC 25mg/kg of body weight in two or three divided doses with other supports as prescribed by the paediatrician.
- Doxycycline and NAC combination can be given in renal failure and in existing cardiopulmonary diseases. Ivermectin and doxycycline should be avoided in liver failure and should be withdrawn in worsening liver function determined by repeated liver function tests
- Symptomatic treatment for fever and other situations shall be done accordingly

Investigations and monitoring should be decided by the treating physician. We do not wish to place any recommendation on this issue right now.

We appreciate that the job done by us may consist of lacunae and may even ignite criticism because the evidence in favour of the agents been considered is yet not absolutely conclusive although the existing literature supports their prospective preventive role. A good number of clinical trials have been undertaken in different parts of the world and we need to wait for the results. Considering the gravity and the desperate nature of the situation, we decided to publish our joint opinion with the hope that a) it may reduce the spread and severity of covid-19 and b) will stimulate research in our country where the problem is in a frightening dimension. Alongside the publication of this preventive strategy, we insist for universal vaccination. We feel that all prospective agents should be explored and tested for chemo preventive potential against covid-19.

References:

1. Coronavirus disease (covid-19)pandemic. WHO dashboard.
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
2. John H. Beigel J H, Tomashek K M, Dodd LE, Mehta A K, Zingman B S, Kalil A C, et al. for the ACTT-1 Study Group Members. Remdesivir for the Treatment of Covid-19 — Final Report. *N Engl J Med* 2020; 383:1813-1826 DOI: 10.1056/NEJMoa2007764
3. Sood S, Bhatia GK, Seth P, Kumar P, Kaur J, Gupta V, Punia S, Tuli HS. Efficacy and Safety of New and Emerging Drugs for COVID-19: Favipiravir and Dexamethasone. *CurrPharmacolRep.* 2021 Feb 18:1-6. doi: 10.1007/s40495-021-00253-w. Epub ahead of print. PMID: 33619447; PMCID: PMC7889701.
4. Chopra D, Boparai JK, Bhandari B, Srivastava A, Gupta R. Pharmacological strategies for COVID-19 - A review of the most promising repurposed antiviral drugs. *Infect Disord Drug Targets.* 2020 Dec 18. doi: 10.2174/1871526520666201218151841. Epub ahead of print. PMID: 33342420
5. Rumende CM, Susanto EC, Sitorus TP. The Management of Cytokine Storm in COVID-19. *Acta Med Indones.* 2020 Jul;52(3):306-313. PMID: 33020343.
6. Ye Q, Wang B, Mao J. The pathogenesis and treatment of the 'Cytokine Storm' in COVID-19. *J Infect.* 2020 Jun;80(6):607-613. doi: 10.1016/j.jinf.2020.03.037. Epub 2020 Apr 10. PMID: 32283152; PMCID: PMC7194613.
7. Yang Z, Liu J, Zhou Y, Zhao X, Zhao Q, Liu J. The effect of corticosteroid treatment on patients with coronavirus infection: a systematic review and meta-analysis. *J Infect.* 2020

8. Gąsecka, A., Borovac, J.A., Guerreiro, R.A. *et al.* Thrombotic Complications in Patients with COVID-19: Pathophysiological Mechanisms, Diagnosis, and Treatment. *Cardiovasc Drugs Ther* 35, 215–229 (2021). <https://doi.org/10.1007/s10557-020-07084-9>
9. Al Dorzi HM, Arab Y. Prevention of Thrombosis in Patients with Severe COVID-19. *Saudi Critical Care Journal*. 2020; 4: 2, 84-86
10. Revised advisory on the use of Hydroxychloroquine (HCQ) as prophylaxis for SARS-CoV-2 infection (in supersession of previous advisory dated 23rd March, 2020) on May 22, 2020 https://www.icmr.gov.in/pdf/covid/techdoc/V5_Revised_advisory_on_the_use_of_HCQ_SARS_CoV2iinfection.pdf (accessed on Aug 13, 2020)
11. Yates PA, Leone AM, Reichel E. A Proposed Randomized, Double Blind, Placebo Controlled Study Evaluating Doxycycline for the Prevention of COVID-19 Infection and Disease In Healthcare Workers with Ongoing High Risk Exposure to COVID-19. medRxiv : the preprint server for health sciences. 2020. doi:10.1101/2020.05.11.20098525
12. Efficacy of N-Acetylcysteine (NAC) in Preventing COVID-19 From Progressing to Severe Disease. 2020 [cited; Available from: <https://clinicaltrials.gov/ct2/show/NCT04419025>
13. Behera P, Patro BK, Singh AK, Chandanshive PD, S R R, Pradhan SK, Pentapati SSK, Batmanabane G, Mohapatra PR, Padhy BM, Bal SK, Singh SR, Mohanty RR. Role of ivermectin in the prevention of SARS-CoV-2 infection among healthcare workers in India: A matched case-control study. *PLoS One*. 2021 Feb 16;16(2):e0247163. doi: 10.1371/journal.pone.0247163. PMID: 33592050; PMCID: PMC7886121.
14. Shah RR. Chloroquine and hydroxychloroquine for COVID-19: Perspectives on their failure in repurposing. *J Clin Pharm Ther*. 2021 Feb;46(1):17-27. doi: 10.1111/jcpt.13267. Epub 2020 Sep 27. PMID: 32981089; PMCID: PMC7537228
15. [Skak L](#), [Frederiksen F](#), Zhang Y, [Foged C](#), and [Thakur A](#). The Long Road Toward COVID-19 Herd Immunity: Vaccine Platform Technologies and Mass Immunization Strategies. *Front Immunol*. 2020; 11: 1817 | <https://doi.org/10.3389/fimmu.2020.01817>
16. NEWS FEATURE, 05 AUGUST 2020. How the pandemic might play out in 2021 and beyond *Nature* **584**, 22-25 (2020). doi: <https://doi.org/10.1038/d41586-020-02278-5>
17. [Mercatelli D](#) and [Giorgi FM](#). Geographic and Genomic Distribution of SARS-CoV-2 Mutations. *Front. Microbiol.*, 22 July 2020 | <https://doi.org/10.3389/fmicb.2020.01800>
18. Biswas N, et al. "Genomic surveillance and phylodynamic analyses reveal emergence of novel mutation and co-mutation patterns within SARS-CoV2 variants prevalent in India" *bioRxiv*,

2021. doi: <https://doi.org/10.1101/2021.03.25.436930>, <https://www.biorxiv.org/content/10.1101/2021.03.25.436930v1>
19. Liu Y, et al. The N501Y spike substitution enhances SARS-CoV-2 transmission. *bioRxiv*, 2021. doi: <https://doi.org/10.1101/2021.03.08.434499>
20. Public Health England. [Investigation of novel SARS-CoV-2 variant, Variant of Concern 202012/01 Technical briefing 2](#)- 28 December 2020. PHE: London;2020
21. Golubchik, T. et al. (2021). Early analysis of a potential link between viral load and the N501Y mutation in the SARS-COV-2 spike protein. *medRxiv* preprint.
doi: <https://doi.org/10.1101/2021.01.12.20249080>. <https://www.medrxiv.org/content/10.1101/2021.01.12.20249080v1>
22. Volz E, Hill V, McCrone² JT, Price A, Jorgensen D, O'Toole A, et al. Evaluating the Effects of SARS-CoV-2 Spike Mutation D614G on Transmissibility and Pathogenicity. *Cell* [Volume 184, Issue 1](#), 7 January 2021, Pages 64-75.e11 <https://doi.org/10.1016/j.cell.2020.11.0120>
23. Agerer, B. et al. (2002). SARS-CoV-2 escapes CD8 T cell surveillance via mutations in MHC-I restricted epitopes. *bioRxiv* preprint.
doi: <https://doi.org/10.1101/2020.12.18.423507>doi: <https://doi.org/10.1101/2020.12.18.423507>,<https://www.biorxiv.org/content/10.1101/2020.12.18.423507v1>
24. Williams TC and Burgers WA SARS-CoV-2 evolution and vaccines: cause for concern? *The Lancet respiratory Medicine* 2020; 9:4, 333-335 DOI: [https://doi.org/10.1016/S2213-1600\(21\)00075](https://doi.org/10.1016/S2213-1600(21)00075)
25. Ramakrishnan S, Nicolau Jr DV, Longford B, Mahdi M, Jeffers H, Mwasuku C, et al. Inhaled budesonide in the treatment of early COVID-19 (STOIC): a phase-2, open label randomized control trial. DOI: [https://doi.org/10.1016/S2213-2600\(21\)00160-0](https://doi.org/10.1016/S2213-2600(21)00160-0)
26. : Debnath, Utsab; Mitra, Amrita; Dewaker, Varun; Prabhakar, Yenamandra S.; Tadala, Raghu; Krishnan, Kiran; et al. (2020): N-acetyl cysteine: A tool to perturb SARS-CoV-2 spike protein conformation. *ChemRxiv*. Preprint. DOI: <https://doi.org/10.26434/chemrxiv.12687923.v2>
27. Shi Z, Puyo CA. N-Acetylcysteine to Combat COVID-19: An Evidence Review. *Ther Clin Risk Manag.* 2020 Nov 2;16:1047-1055. doi: 10.2147/TCRM.S273700. PMID: 33177829; PMCID: PMC7649937.
28. Zhou N, Yang X, Huang A, Chen Z. The potential mechanism of N-acetylcysteine in treating COVID-19. *Curr Pharm Biotechnol.* 2020 Dec 28. doi: 10.2174/1389201021999201228212043. Epub ahead of print. PMID: 33371832.

29. De Flora S, Balansky R, La Maestra S. Rationale for the use of N-acetylcysteine in both prevention and adjuvant therapy of COVID-19. *FASEB J.* 2020 Oct;34(10):13185-13193. doi: 10.1096/fj.202001807. Epub 2020 Aug 11. PMID: 32780893; PMCID: PMC7436914.
30. Poe FL, Corn J. N-Acetylcysteine: A potential therapeutic agent for SARS-CoV-2. *Med Hypotheses.* 2020 Oct;143:109862. doi: 10.1016/j.mehy.2020.109862. Epub 2020 May 30. PMID: 32504923; PMCID: PMC7261085.
31. Atefi N, Behrangi E, Mozafarpour S, Seirafinpour F, Peighambari S, Goodarzi A. N-acetylcysteine and coronavirus disease 2019: it works as a beneficial preventive and adjuvant therapy? A comprehensive review study. *I Res Med Sci* 2020; 25: 109
32. Caly L, Druce JD, Catton MG, Jans DA, Wagstaff KM. The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro. *Antiviral Res.* 2020;178:104787. <https://doi.org/10.1016/j.antiviral.2020.104787>.
33. Gupta D, Sahoo AK, Singh A. Ivermectin: potential candidate for the treatment of Covid 19. *Braz J Infect Dis.* 2020;24(4):369–71. <https://doi.org/10.1016/j.bjid.2020.06.002>.
34. Ravikirti, Roy R, Pattadar C, Raj R, Agarwal N, Biswas B, Majhi PK, Rai DK, Shyama, Kumar A, Sarfaraz A. Ivermectin as a potential treatment for mild to moderate COVID-19 – A double blind randomized placebo-controlled trial. *medRxiv* January 09, 2021. doi: <https://doi.org/10.1101/2021.01.05.21249310>
35. Malek AE, Granwehr BP, Kontoyiannis DP. Doxycycline as a potential partner of COVID-19 therapies. *IDCases* Volume 21, 2020, e00864. DOI: <https://doi.org/10.1016/j.idcr.2020.e00864>
36. Gendrot M, Andreani J, Jardot P, Hutter S, Delandre O, Boxberger M, et al. In vitro antiviral activity of doxycycline against SARS-CoV-2. *Molecules.* 2020;25(21):5064. <https://doi.org/10.3390/molecules25215064>
37. Mather JF, Seip RL, McKay RG. Impact of Famotidine Use on Clinical Outcomes of Hospitalized Patients With COVID-19. *Am J Gastroenterol.* 2020 Oct;115(10):1617-1623. doi: 10.14309/ajg.0000000000000832. PMID: 32852338; PMCID: PMC7473796.
38. Freedberg DE, Conigliaro J, Wang TC, Tracey KJ, Callahan MV, Abrams JA; Famotidine Research Group. Famotidine Use Is Associated With Improved Clinical Outcomes in Hospitalized COVID-19 Patients: A Propensity Score Matched Retrospective Cohort Study. *Gastroenterology.* 2020 Sep;159(3):1129-1131.e3. doi: 10.1053/j.gastro.2020.05.053. Epub 2020 May 22. PMID: 32446698; PMCID: PMC7242191.
39. Cheung KS, Hung IFN, Leung WK. Association Between Famotidine Use and COVID-19 Severity in Hong Kong: A Territory-wide Study. *Gastroenterology.* 2021 Apr;160(5):1898-

1899. doi: 10.1053/j.gastro.2020.05.098. Epub 2020 Jul 16. PMID: 32682763; PMCID: PMC7365093.
40. Singh VP, El-Kurdi B, Rood C. What Underlies the Benefit of Famotidine Formulations Used During COVID-19? *Gastroenterology*. 2021 Apr;160(5):1899-1900. doi: 10.1053/j.gastro.2020.07.051. Epub 2020 Aug 7. PMID: 32777281; PMCID: PMC7411504.
41. Fidan C, Aydoğdu A. As a potential treatment of COVID-19: Montelukast. *Med Hypotheses*. 2020 Sep;142:109828. doi: 10.1016/j.mehy.2020.109828. Epub 2020 May 11. PMID: 32416408; PMCID: PMC7211747.
42. Barré J, Sabatier JM, Annweiler C. Montelukast Drug May Improve COVID-19 Prognosis: A Review of Evidence. *Front Pharmacol*. 2020 Sep 4;11:1344. doi: 10.3389/fphar.2020.01344. PMID: 33013375; PMCID: PMC7500361.
43. A trial of ciclesonide in adults with mild COVID-19. NCT04330586. <https://clinicaltrials.gov/ct2/show/NCT04330586> Date last updated: 1 April 2020; date last accessed: 15 April 2020.
44. Protective Role of Inhaled Steroids for Covid-19 Infection (INHASCO). NCT04331054. <https://clinicaltrials.gov/ct2/show/NCT04331054> Date last updated: 17 April 2020; date last accessed: 15 April 2020.
45. AIIMS/ ICMR-COVID-19 National Task Force/Joint. Monitoring Group (Dte.GHS). Ministry of Health & Family Welfare, Government of India. CLINICAL GUIDANCE FOR MANAGEMENT OF ADULT COVID-19 PATIENTS. 22nd April 2021. <https://www.mohfw.gov.in/pdf/COVID19ManagementAlgorithm22042021v1.pdf>
46. Bhattacharyya P, Saha D, Paul M, et al. Two chair test: a substitute of 6 min walk test appear cardiopulmonary reserve specific. *BMJ Open Res* 2020;7:e000447. doi:10.1136/bmjresp-2019-000447

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