



Azithromycin and hydroxychloroquine in hospitalised patients with confirmed COVID-19: a randomised double-blinded placebo-controlled trial

Pradeesh Sivapalan¹, Charlotte Suppli Ulrik ^{©2}, Therese Sophie Lapperre ^{©3}, Rasmus Dahlin Bojesen^{4,5}, Josefin Eklöf ^{©1}, Andrea Browatzki⁶, Jon Torgny Wilcke¹, Vibeke Gottlieb¹, Kjell Erik Julius Håkansson², Casper Tidemandsen², Oliver Tupper², Howraman Meteran ^{©1}, Christina Bergsøe ^{©2}, Eva Brøndum², Uffe Bødtger^{5,7}, Daniel Bech Rasmussen⁴, Sidse Graff Jensen¹, Lars Pedersen ^{©3}, Alexander Jordan¹, Helene Priemé⁸, Christian Søborg ^{©8}, Ida E. Steffensen⁸, Dorthe Høgsberg¹, Tobias Wirenfeldt Klausen⁸, Martin Steen Frydland ^{©2}, Peter Lange^{8,9}, Asger Sverrild³, Muhzda Ghanizada³, Filip K. Knop^{10,11}, Tor Biering-Sørensen¹², Jens D. Lundgren¹³ and Jens-Ulrik Stæhr Jensen ^{©1,11}, the ProPAC-COVID writing group on behalf of the ProPAC-COVID Study Group¹⁴

¹Dept of Internal Medicine, Pulmonary Medicine Section, Gentofte University Hospital, Hellerup, Denmark. ²Dept of Respiratory Medicine, Respiratory Research Unit, Hvidovre and Amager University Hospital, Hvidovre, Denmark. ³Dept of Respiratory Medicine, Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark. ⁴Dept of Surgery, Slagelse Hospital, Slagelse, Denmark. ⁵Dept of Respiratory Medicine, Næstved Hospital, Næstved, Denmark. ⁶Dept of Respiratory and Infectious Diseases, Nordsjællands Hospital, Hillerød, Denmark. ⁷Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark. ⁸Dept of Medicine, Section of Respiratory Medicine, Herlev Hospital, Herlev, Denmark. ⁹Institute of Public Health, Section of Epidemiology, University of Copenhagen, Copenhagen, Denmark. ¹⁰Center for Clinical Metabolic Research, Gentofte University Hospital, Hellerup, Denmark. ¹¹Dept of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark. ¹²Dept of Cardiology, Gentofte University Hospital, Hellerup, Denmark. ¹³Dept of Infectious Medicine, Rigshospitalet, Copenhagen, Denmark. ¹⁴A complete list of members of the Proactive Protection with Azithromycin and hydroxyChloroquine in Hospitalised Patients With COVID-19 (ProPAC-COVID) Study Group is provided in supplementary appendix 3.

Corresponding author: Jens-Ulrik Stæhr Jensen (jens.ulrik.jensen@regionh.dk)



Shareable abstract (@ERSpublications)

There are no beneficial or harmful effects from the combined intervention of hydroxychloroquine and azithromycin for hospitalised patients with confirmed coronavirus disease 2019 (COVID-19) https://bit.ly/3c0s6XG

Cite this article as: Sivapalan P, Ulrik CS, Lapperre TS, *et al.* Azithromycin and hydroxychloroquine in hospitalised patients with confirmed COVID-19: a randomised double-blinded placebo-controlled trial. *Eur Respir J* 2022; 59: 2100752 [DOI: 10.1183/13993003.00752-2021].

This single-page version can be shared freely online.

Copyright ©The authors 2022.

This version is distributed under the terms of the Creative Commons Attribution Non-Commercial Licence 4.0. For commercial reproduction rights and permissions contact permissions@ersnet.org

This article has supplementary material available from erj.ersjournals.com

This article has an editorial commentary: https://doi.org/10.1183/13993003.02002-2021

Abstract

Background Combining the antibiotic azithromycin and hydroxychloroquine induces airway immunomodulatory effects, with the latter also having *in vitro* antiviral properties. This may improve outcomes in patients hospitalised for coronavirus disease 2019 (COVID-19).

Methods Placebo-controlled double-blind randomised multicentre trial. Patients aged ≥18 years, admitted to hospital for ≤48 h (not intensive care) with a positive severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) reverse transcription PCR test were recruited. The intervention was 500 mg daily azithromycin for 3 days followed by 250 mg daily azithromycin for 12 days combined with 200 mg twice-daily hydroxychloroquine for all 15 days. The control group received placebo/placebo. The primary outcome was days alive and discharged from hospital within 14 days (DAOH14).

Results After randomisation of 117 patients, at the first planned interim analysis, the data and safety monitoring board recommended stopping enrolment due to futility, based on pre-specified criteria. Consequently, the trial was terminated on 1 February 2021. 61 patients received the combined intervention and 56 patients received placebo. In the intervention group, patients had a median (interquartile range) 9.0 (3–11) DAOH14 *versus* 9.0 (7–10) DAOH14 in the placebo group (p=0.90). The primary safety outcome,

Received: 15 March 2021 Accepted: 22 May 2021





death from all causes on day 30, occurred for one patient in the intervention group *versus* two patients receiving placebo (p=0.52), and readmittance or death within 30 days occurred for nine patients in the intervention group *versus* six patients receiving placebo (p=0.57).

Conclusions The combination of azithromycin and hydroxychloroquine did not improve survival or length of hospitalisation in patients with COVID-19.