

DOI : 10.1111/(ISSN)1365-2125
ISSN (print) : 0306-5251
ISSN (electronic) : 1365-2125
ID (product) : BCP
Title (main) : British Journal of Clinical Pharmacology
Title (short) : Br J Clin Pharmacol
DOI : 10.1111/bcp.2020.9999.issue-9999
Copyright (thirdParty) : © 2020 The British Pharmacological Society
Numbering (journalVolume) : 9999
Numbering (journalIssue) : 9999
CoverDate : 2020
DOI : 10.1111/bcp.14358
ID (unit) : BCP14358
ID (society) : LET-00408-20
Count (pageTotal) : 1
Title (articleCategory) : LETTER TO THE EDITOR
Title (tocHeading1) : LETTER TO THE EDITOR
Copyright (thirdParty) : © 2020 The Authors. British Journal of Clinical Pharmacology
published by John Wiley & Sons Ltd on behalf of British
Pharmacological Society

LegalStatement : This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](#) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

Event (manuscriptReceived) : 2020-04-29
Event (manuscriptAccepted) : 2020-05-04
Event (xmlCreated) : 2020-05-11 (SPi Global)
Numbering (pageFirst) : n/a
Numbering (pageLast) : n/a
Link (toTypesetVersion) : <file:bcp14358.pdf>
Link (toAuthorManuscriptVersion) : file:bcp14358_am.pdf

Short Authors: LETTER TO THE EDITOR

COVID-19 treatment in patients with comorbidities: Awareness of drug-drug interactions

David Back^{*1}, Catia Marzolini^{1,2,3}, Catherine Hodge¹, Fiona Marra⁴, Alison Boyle⁴, Sara Gibbons¹, David Burger⁵, Saye Khoo^{1,6}

¹ Department of Molecular and Clinical Pharmacology, Institute of Translational Medicine, University of Liverpool, Liverpool, UK

² Division of Infectious Diseases and Hospital Epidemiology, Departments of Medicine and Clinical Research, University Hospital of Basel, Basel, Switzerland

³ University of Basel, Basel, Switzerland

⁴ Department of Pharmacy, NHS Greater Glasgow and Clyde, Glasgow, UK

⁵ Radboud University Medical Centre, Nijmegen, The Netherlands

⁶ Royal Liverpool University Hospital, Liverpool, UK

David Query ID="Q1" Text="AUTHOR: Please verify that the linked ORCID identifiers are correct for each author." Query ID="Q2" Text="AUTHOR: Please confirm that forenames/given names (blue) and surnames/family names (vermilion) have been identified correctly." Back: ✉ daveback@liverpool.ac.uk

*Correspondence to:

Correspondence

David Back, Department of Molecular and Clinical Pharmacology, Institute of Translational Medicine, University of Liverpool, Liverpool, UK.

Email: daveback@liverpool.ac.uk

FundRef Name	FundRef Organization Name	Funding Number
Abbvie	AbbVie	
Novartis	Novartis	

Arising from: Smith PF et al *Br J Clin Pharmacol* 2020; Apr 17. doi: 10.1111/bcp.14314

In a recent issue of *Br J Clin Pharmacol*, Smith et al.¹ published an outstanding commentary titled “Dosing will be a key success factor in repurposing antivirals for Covid-19.” They highlighted that the success in our repurposing efforts will be dependent on “getting the dose right” for drugs which have been developed for different indications and stressed some of the unique challenges of treating this particular disease. They pointed the reader to lopinavir/ritonavir (LPV/r) as an example of a repurposed antiviral and the limited experience of this drug regimen (and other treatments) in the elderly population with comorbidities—that is, those most at risk from Covid-19. It is on the issue of comorbidities, polypharmacy, and drug-drug interactions (DDIs) that we wish to comment.

Age-related comorbidities result in complex polypharmacy and an increased risk of DDIs.² Furthermore, physiological changes related to ageing may affect both pharmacokinetics (PK) and pharmacodynamics (PD) thereby putting elderly patients at risk of inappropriate prescribing and adverse drug reactions. In the case of LPV/r, particular attention needs to be focussed on PK interactions involving inhibition of CYP3A4 and some transporters.² To aid health care professionals managing LPV/r (and other antiretroviral) DDIs in HIV patients, we developed the online resource www.hiv-druginteractions.org,³ which is extensively cited in national and international treatment guidelines. However, in addition to PK interactions, LPV/r is known to cause QT prolongation and is on the CredibleMeds listing⁴ for drugs with a possible risk of torsades de pointes (TdP). Indeed, the drug label for LPV/r includes the warning to “avoid use with QT-prolonging drugs” because of DDIs and effects on PR and QTc.⁵

Possibly of greater topicality at present is the risk of QT prolongation and TdP in Covid-19 patients given the repurposed drugs chloroquine and hydroxychloroquine. This has been highlighted in recent cohort studies^{6,7} and in warnings from the EMEA⁸ and FDA.⁹

Patients given experimental COVID-19 therapies will often be clinically unstable with organ dysfunction, and the development of toxicities from DDIs must be carefully considered. These very ill patients may not only be receiving an experimental COVID drug with a known or possible risk of TdP as single agents or combined (LPV/r, chloroquine, hydroxychloroquine, and azithromycin)⁴ but can have other risk factors for TdP such as hypokalaemia, female gender, age > 70 years, and concomitant (e.g., some anaesthetics, muscle relaxants, analgesics, antiarrhythmics, antibacterials, antipsychotics, and gastrointestinal agents) thereby potentially increasing the risk of TdP.¹⁰ The CredibleMeds website classifies drugs into those with a known risk, a possible risk, and a conditional risk of TdP. However, there is still the challenge of giving appropriate clinical advice to guide the safe use of a COVID therapy and one or more co-medications in individual patients. Having established prescribing resources for managing DDIs in other viral infections (with a database of commentaries on >30 000 DDIs, with data systematically collected from medical and scientific literature, information from drug regulatory authorities or expert opinion), to meet the challenge of the COVID pandemic a similar resource is now available at www.covid19-druginteractions.org.¹¹ DDIs are graded into four levels and colour coded: (i) no clinically significant interaction expected (green); (ii) potential interaction likely of weak relevance (yellow); (iii) potential interaction that may require close monitoring, alteration of drug dosage or timing of administration (amber); and (iv) drugs should not be co-administered (red). It is made clear that the decision to give or not give drugs is always the responsibility of the prescriber with many other factors having to be considered such as age and electrolyte imbalance. In addition, since chloroquine and hydroxychloroquine have very long half-lives (30–60 days), DDIs may occur even after discontinuing treatment.⁹ Systematic medication review should aim at discontinuing unnecessary QT prolonging drugs or finding alternatives devoid of QT risk. The use of decision support systems is important in effective management of drug therapies in COVID patients.

COMPETING INTERESTS

D.Ba. and S.K. received educational grant funding for www.covid19-druginteractions.org from Novartis and Abbvie.

CONTRIBUTORS

D.Ba., C.M., C.H., F.M., A.B., S.G., D.Bu., and S.K. have all been involved in the development of the web resource www.covid19-druginteractions.org. D.Ba., C.M., and D.Bu. wrote this manuscript.

REFERENCES

- [1] Smith PF, Dodds M, Bentley D, Yeo K. Dosing will be a key success factor in repurposing antivirals for COVID-19. *Br J Clin Pharmacol*. 2020Apr 17. <https://doi.org/10.1111/bcp.14314>
- [2] Back DJ, Marzolini C. The challenge of HIV treatment in an era of polypharmacy. *J Int AIDS Soc*. 2020;**23**:e25449.
- [3] <http://www.hiv-druginteractions.org> (2020). Accessed April 28th 2020

[4] <http://www.CredibleMeds.org> (2020). Accessed April 28th 2020.

[5] Kaletra® prescribing information (April 2020). Accessed April 28th 2020

[6] Borba MGS, Val FFA, Sampaio VS, et al. Effect of high vs low dose chloroquine diphosphate as adjunctive therapy for patients hospitalised with severe respiratory syndrome coronavirus 2 (Sars-Cov-2) infection: a randomised clinical trial. *JAMA Netw Open*. 2020 April 1;3(4):e208857.

[7] Chorin E, Dai M, Shulman E, et al. The QT interval in patients with COVID-19 treated with hydroxychloroquine and azithromycin. *Nat Med*. 2020. <https://doi.org/10.1038/s41591-020-0888-2>

[8] EMEA news release April 23rd 2020. <http://www.ema.europa.eu>.

[9] FDA drug safety communication. April 24th 2020. <http://www.fda.gov/safety>

[10] <http://www.medsafetyscan.org>. Accessed April 28th 2020.

[11] <http://www.covid19-druginteractions.org>. Accessed April 28th 2020.