# Evidence Search Service Results of your search request

## Adverse outcomes in patients with glucose 6 phosphate dehydrogenase deficiency with COVID 19

**ID of request:** 23234  
**Date of request:** 14th May, 2020  
**Date of completion:** 14th May, 2020

If you would like to request any articles or any further help, please contact:  Tom Roper at [tom.roper@nhs.net](mailto:tom.roper@nhs.net)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: Adverse outcomes in patients with glucose 6 phosphate dehydrogenase deficiency with COVID 19. Tom Roper. (14th May, 2020). BRIGHTON, UK: Brighton and Sussex Library and Knowledge Service.

**Sources searched**  
CEBM: Oxford COVID-19 Evidence Service (0)  
Cochrane Library (0)  
Google Scholar (1)  
MEDLINE (9)  
NICE Evidence Search (0)  
TRIP Database (0)  
UpToDate (1)  
bioRxiv (0)  
medRxiv (0)

**Date range used** (5 years, 10 years): No restrictions   
**Limits used** (gender, article/study type, etc.): None   
**Search terms and notes** (full search strategy for database searches below):

Relevant natural language and controlled vocabulary terms were selected and combined. Thesaurus terms were adapted for different databases. Final result sets were de-duplicated and reviewed for relevance by the searcher, irrelevant results being discarded.

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9. [The friendly use of chloroquine in the COVID-19 disease: a warning for the G6PD-deficient males and for the unaware carriers of pathogenic alterations of the G6PD gene.](#Research647592)
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### [C. Search History](#SearchHistory)

## A. Synopses or Summaries

#### UpToDate

**Diagnosis and management of glucose-6-phosphate dehydrogenase (G6PD) deficiency** (2020)

Glader B.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=bda5d4068d9edd7c08c8ea8876d908bb)

With the emergence of the 2019 novel coronavirus (SARS-CoV-2) and coronavirus disease (COVID-19) there has been a resurgence of interest in the antimalarial chloroquine and its analog hydroxychloroquine. Both of these drugs have appeared on some lists of "drugs to avoid" in G6PD deficiency. However, many experts consider these drugs to be probably safe when used in normal therapeutic doses. However, the additional risk of chloroquine is unknown in a G6PD-deficient individual with a severe viral infection such as COVID-19 who is also receiving other medications.

## B. Original Research

1. **Acute hemolysis by hydroxycloroquine was observed in G6PD-deficient patient with severe COVD-19 related lung injury**  
   De Franceschi European Journal of Internal Medicine 2020;:doi.org/10.1016/j.ejim.2020.04.020.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=3e5e3964b157a48aad2357090c314cca)

1. **Chloroquine and the potential adverse outcome in undiagnosed G6PD-deficient cases infected with COVID-19.**  
   Khneisser Issam Journal of medical screening 2020;:969141320924452.

1. **COVID-19 infection and treatment with hydroxychloroquine cause severe haemolysis crisis in a patient with glucose-6-phosphate dehydrogenase deficiency.**  
   Beauverd Yan European journal of haematology 2020;:No page numbers.

Glucose-6-phosphate dehydrogenase (G6PD) deficiency is an inherited genetic disorder caused by red cell enzymatic defects and is associated with haemolytic crisis when patients are exposed to oxidative agents (fava beans, drugs, infections). Hydroxychloroquine is suspected to trigger haemolytic crisis in G6PD-deficient patients, and off-label administration of this drug to patients infected with the novel coronavirus (SARS-CoV-2) could cause concern. We report here the first case of severe haemolytic crisis in a patient with G6PD deficiency, initiated by severe COVID-19 infection and hydroxychloroquine use. With worldwide spread of COVID-19, especially in regions with a high prevalence of G6PD deficiency, our case should alert physicians to this possible correlation.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=7780f2ce2a0b93ec1505db379b4a1f0a)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=1f10408600749953c465e48c5ad3a9ee)

1. **G6PD and chloroquine: Selecting the treatment against SARS-CoV-2?**  
   Kassi Eva N. Journal of cellular and molecular medicine 2020;24(9):4913-4914.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=0ce24af1c34c473a1a75d8709671d7bf)

1. **G6PD deficiency in the COVID-19 pandemic: Ghost within Ghost.**  
   Al-Abdi Sameer Hematology/oncology and stem cell therapy 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=172f3b2724b49b1dd3bf15fca792b838)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=72bd06f90df4808dddf1282cbda0b9be)

1. **G6PD deficiency-associated hemolysis and methemoglobinemia in a COVID-19 patient treated with chloroquine.**  
   Kuipers M. T American journal of hematology 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=184b8337b5f1ef29ea0c5a0f22e488f9)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=aba20adca14c5cf4f00104980163e31d)

1. **Geographical Accessibility to Glucose-6-Phosphate Dioxygenase Deficiency Point-of-Care Testing for Antenatal Care in Ghana.**  
   Kuupiel Desmond Diagnostics (Basel, Switzerland) 2020;10(4):No page numbers.

BACKGROUNDGlucose-6-Phosphate Dehydrogenase (G6PD) deficiency screening test is essential for malaria treatment, control, and elimination programs. G6PD deficient individuals are at high risk of severe hemolysis when given anti-malarial drugs such as primaquine, quinine, other sulphonamide-containing medicines, and chloroquine, which has recently been shown to be potent for the treatment of coronavirus disease (COVID-19). We evaluated the geographical accessibility to POC testing for G6PD deficiency in Ghana, a malaria-endemic country.METHODSWe obtained the geographic information of 100 randomly sampled clinics previously included in a cross-sectional survey. We also obtained the geolocated data of all public hospitals providing G6PD deficiency testing services in the region. Using ArcGIS 10.5, we quantified geographical access to G6PD deficiency screening test and identified clinics as well as visualize locations with poor access for targeted improvement. The travel time was estimated using an assumed speed of 20 km per hour.FINDINGSOf the 100 clinics, 58% were Community-based Health Planning and Services facilities, and 42% were sub-district health centers. The majority (92%) were Ghana Health Service facilities, and the remaining 8% were Christian Health Association of Ghana facilities. Access to G6PD deficiency screening test was varied across the districts, and G6PD deficiency screening test was available in all eight public hospitals. This implies that the health facility-to-population ratio for G6PD deficiency testing service was approximately 1:159,210 (8/1,273,677) population. The spatial analysis quantified the current mean distance to a G6PD deficiency testing service from all locations in the region to be 34 ± 14 km, and travel time (68 ± 27 min). The estimated mean distance from a clinic to a district hospital for G6PD deficiency testing services was 15 ± 11 km, and travel time (46 ± 33 min).CONCLUSIONAccess to POC testing for G6PD deficiency in Ghana was poor. Given the challenges associated with G6PD deficiency, it would be essential to improve access to G6PD deficiency POC testing to facilitate administration of sulphadoxine-pyrimethamine to pregnant women, full implementation of the malaria control program in Ghana, and treatment of COVID-19 patients with chloroquine in malaria-endemic countries. To enable the World Health Organization include appropriate G6PD POC diagnostic tests in its list of essential in-vitro diagnostics for use in resource-limited settings, we recommend a wider evaluation of available POC diagnostic tests for G6PD deficiency, particularly in malaria-endemic countries.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ac8f2250842ef7f81453db005682c13a)

1. **Is glucose-6-phosphate dehydrogenase enzyme deficiency a factor in Coronavirus-19 (COVID-19) infections and deaths?**  
   Aydemir Duygu Pathogens and global health 2020;114(3):109-110.

1. **The friendly use of chloroquine in the COVID-19 disease: a warning for the G6PD-deficient males and for the unaware carriers of pathogenic alterations of the G6PD gene.**  
   Capoluongo Ettore D. Clinical chemistry and laboratory medicine 2020;:No page numbers.

1. **Glucose-6-phosphate dehydrogenase deficiency enhances human coronavirus 229E infection.**  
   Wu Yi-Hsuan The Journal of infectious diseases 2008;197(6):812-816.

The host cellular environment is a key determinant of pathogen infectivity. Viral gene expression and viral particle production of glucose-6-phosphate dehydrogenase (G6PD)-deficient and G6PD-knockdown cells were much higher than their counterparts when human coronavirus (HCoV) 229E was applied at 0.1 multiplicity of infection. These phenomena were correlated with increased oxidant production. Accordingly, ectopic expression of G6PD in G6PD-deficient cells or addition of antioxidant (such as alpha-lipoic acid) to G6PD-knockdown cells attenuated the increased susceptibility to HCoV 229E infection. All experimental data indicated that oxidative stress in host cells is an important factor in HCoV 229E infectivity.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=37c10296ebcd0614ea4f012b9ff1fccf)

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**Portable Document Format / pdf / Adobe**  
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**Word documents**  
Select Edit from the menu, the Find and type in your term in the search box which is presented. The search function will locate the first use of the term in the document. By pressing 'next' you will jump to further references.

## C. Search History

|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 1. | Medline | exp \*BETACORONAVIRUS/ | 5564 |
| 2. | Medline | exp \*"CORONAVIRUS INFECTIONS"/ | 8917 |
| 3. | Medline | ("2019-nCoV" OR 2019nCoV OR nCoV2019 OR "nCoV-2019" OR "COVID-19" OR COVID19 OR "WN-CoV" OR WNCoV OR "HCoV-19" OR HCoV19 OR CoV OR "2019 novel\*" OR Ncov OR "n-cov" OR "SARS-CoV-2" OR "SARSCoV-2" OR "SARSCoV2" OR "SARS-CoV2" OR SARSCov19 OR "SARS-Cov19" OR "SARSCov-19" OR "SARS-Cov-19").ti,ab | 9363 |
| 4. | Medline | ((new OR novel OR wuhan OR chinese) ADJ coronavir\*).ti,ab | 1541 |
| 5. | Medline | (1 OR 2 OR 3 OR 4) | 24717 |
| 6. | Medline | \*"GLUCOSEPHOSPHATE DEHYDROGENASE DEFICIENCY"/ | 3412 |
| 7. | Medline | (glucose-6-phosphate dehydrogenase deficiency OR G6PDd OR glucosephosphate dehydrogenase deficiency OR G-6-PD deficiency OR G6PD deficiency OR glucose-6-phosphate dehydrogenase OR G6PD OR G-6-PD).ti,ab | 14560 |
| 8. | Medline | (6 OR 7) | 14963 |
| 9. | Medline | (5 AND 8) | 9 |
| 10. | EMBASE | exp \*BETACORONAVIRUS/ | 4433 |
| 11. | EMBASE | exp \*"CORONAVIRUS INFECTION"/ | 7526 |
| 12. | EMBASE | ("2019-nCoV" OR 2019nCoV OR nCoV2019 OR "nCoV-2019" OR "COVID-19" OR COVID19 OR "WN-CoV" OR WNCoV OR "HCoV-19" OR HCoV19 OR CoV OR "2019 novel\*" OR Ncov OR "n-cov" OR "SARS-CoV-2" OR "SARSCoV-2" OR "SARSCoV2" OR "SARS-CoV2" OR SARSCov19 OR "SARS-Cov19" OR "SARSCov-19" OR "SARS-Cov-19").ti,ab | 14926 |
| 13. | EMBASE | ((new OR novel OR wuhan OR chinese) ADJ coronavir\*).ti,ab | 2029 |
| 14. | EMBASE | (10 OR 11 OR 12 OR 13) | 20554 |
| 15. | EMBASE | \*"GLUCOSE 6 PHOSPHATE DEHYDROGENASE DEFICIENCY"/ | 2607 |
| 16. | EMBASE | (glucose-6-phosphate dehydrogenase deficiency OR G6PDd OR glucosephosphate dehydrogenase deficiency OR G-6-PD deficiency OR G6PD deficiency OR glucose-6-phosphate dehydrogenase OR G6PD OR G-6-PD).ti,ab | 14873 |
| 17. | EMBASE | (15 OR 16) | 15066 |
| 18. | EMBASE | (14 AND 17) | 6 |

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