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## POISON ALERT: Serious Toxicity from Chloroquine and Hydroxychloroquine

Chloroquine (CQ) and hydroxychloroquine (HCQ) have historically been used to treat malaria, lupus and rheumatoid arthritis. A recent publication<sup>(1)</sup> has shown activity of HCQ and CQ against the SARS-CoV-2 (CoVID-19) virus in cell cultures. This laboratory finding has led to hoarding and stockpiling of CQ and HCQ by the general public.

**CQ and HCQ can cause severe toxicity and death in an overdose.** One or two tablets of CQ or HCQ can be fatal for a small child<sup>(2)</sup>. Two to three times the usual therapeutic dose can be fatal in a child. Ingestion of >5 grams in an adult is almost universally fatal<sup>(3)</sup>. Toxicity and death occur rapidly, usually within 30 minutes to 3 hours after ingestion of CQ or HCQ. Additionally, both drugs have a very narrow therapeutic window.

**Clinical Effects:** CQ and HCQ cause severe cardiac toxicity because of their similarity to quinidine, the class Ia anti-arrhythmic medication. Severe hypotension is the result of impaired cardiac contractility and impaired cardiac conduction and excitability. EKG manifestations include prolongation of the QRS and QTc intervals. Other signs of CQ and HCQ toxicity include apnea, seizures and ventricular arrhythmias. Hypokalemia occurs because of potassium shifting into cells and can contribute to the cardiotoxicity.

**Management:** CQ and HCQ toxicity requires prompt recognition, close monitoring and aggressive treatment, including early intubation. The use of activated charcoal must be decided on a case-by-case basis, realizing that (a) these patients rapidly develop serious cardiac and CNS toxicity and (b) activated charcoal has never been proven to improve outcomes. Hypotension from poor contractility seems to respond better to epinephrine rather than norepinephrine. Additionally, high dose IV diazepam (2 mg/kg) is thought to act on peripheral benzodiazepine receptors in the heart to help increase cardiac contractility. Cautious potassium replacement should be used to prevent the serum potassium from falling below 2 mEq/L. Sodium channel blockade, evidenced by widening of the QRS, should be treated with sodium bicarbonate. Note: alkalization with bicarbonate can worsen hypokalemia. Seizures should be treated with high dose benzodiazepines. Use of barbiturates is questionable as the use of thiopental has immediately preceded cardiac arrest in numerous chloroquine overdose patients.

As CQ and HCQ are being revitalized for the treatment of CoVID-19, it is important to remember the severe toxicity associated with its use. Ensure that patients are locking up these medications and not stockpiling, as even one tablet can be very toxic or fatal to a child. **Contact the Iowa Poison Control Center at 1-800-222-1222 as soon as a CQ or HCQ exposure is suspected.**

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(1) Clin Infect Dis. 2020 Mar 9. pii: ciaa237. doi: 10.1093/cid/ciaa237  
(2) J Emerg Med, 2005, May; 28(4):437-43  
(3) NEJM, 1988, Jan 7; 318(1):1-6.