



# Persistence of coronavirus disease 2019 (COVID-19) in patients with end-stage renal disease; an unrecognized phenomenon?

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## ABSTRACT

Since the global coronavirus disease 2019 (COVID-19) pandemic hit most parts of the world, the nephrology community has primarily focused on the associated incidence of often severe acute kidney injury (AKI) with the disease pandemic. For patients on maintenance in-center outpatient hemodialysis, the primary concern has been on prevention of the spread of COVID-19 among this vulnerable patient group. Our recent experience with one end-stage renal disease (ESRD) patient early in the Spring of 2020 has led us to speculate that ESRD patients may well exhibit an unusually prolonged period of persistence of COVID-19. This may explain the recent report of the unanticipated demonstration of a high rate of positive COVID-19 antibody testing among the staff of a Pediatric Outpatient Hemodialysis Unit in New York. Further studies are mandated as these investigations would help guide the implications of preventative measures against the spread of COVID-19 among both patients and staff of hemodialysis units around the world.

### *Implication for health policy/practice/research/medical education:*

Since the emergence of the global pandemic of coronavirus disease 2019 (COVID-19), the attention of nephrologists and critical care physicians has centered around the associated incidence of acute kidney injury, sometimes requiring renal replacement therapy, and the devastating impact on ICU admissions and patient mortality. Generally, the duration of positive reverse transcription polymerase chain reaction (RT-PCR) tests of nasopharyngeal swabs among patients with COVID-19 is usually less than 14 days. Our recent experience with one ESRD patient early in the Spring of 2020 has led us to speculate that ESRD patients may well exhibit an unusually prolonged period of persistence of COVID-19. If confirmed, this would lead to major paradigm shifts in continued vigilance to mitigate COVID-19 spread within hemodialysis units around the world.

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## Introduction

Since the emergence of the global pandemic of coronavirus disease 2019 (COVID-19), a lot of attention has centered around the incidence of acute kidney injury (AKI), sometimes requiring renal replacement therapy, and the devastating impact of AKI on patient mortality (1). In a recent report from China, in a cohort of 66 patients who recovered after treatment, 28 (42.4%) women and 38 (57.6%) men, median age of 44.0 (34.0-62.0) years, the median time from the onset of symptoms to first negative RT-PCR results for oropharyngeal swabs in convalescent patients was 9.5 (6.0-11.0) days (2). Our recent experience with one anuric end-stage renal disease (ESRD) patient

early in the Spring of 2020 has led us to speculate that ESRD patients may well exhibit an unusually prolonged period of persistence of COVID-19. If confirmed, this would lead to major paradigm shifts in continued vigilance to mitigate COVID-19 spread within hemodialysis units around the world.

## Case Report

In the Spring of 2020, one of our ESRD patients on thrice-weekly in-center outpatient chronic maintenance hemodialysis contracted COVID-19 infection following person-to-person transmission while a resident of a local nursing and rehabilitation center. His vascular

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access for hemodialysis is a left upper arm AV fistula. Another resident of the center had developed symptoms of COVID-19, was diagnosed promptly and was admitted to the hospital. As a preventative measure, all the other residents of the nursing and rehabilitation center were consequently screened after counseling and education by a multi-disciplinary team led by the attending physician of the nursing and rehabilitation center.

Our patient is a 79-year old obese male patient with multiple comorbidities including ischemic cardiomyopathy, atrial fibrillation on warfarin and sleep apnea on CPAP (continuous positive airway pressure). He only had a non-productive cough, no fever, no sore-throat, no headache, no difficulty breathing and no other systemic symptoms. His screening nasopharyngeal swab RT-PCR (reverse transcription polymerase chain reaction) test was positive for COVID-19 in late March 2020. Initially, as an outpatient, he had continued his hemodialysis in an isolated secure COVID-19-cohort hemodialysis subunit. All the staff who had contact with the patient donned non-reusable fitted N95 masks, face shields, gowns and gloves. These personal protective equipment (PPE) protocols are based on United States Centers for Diseases Control guidelines for Transmission-Based Precautions for patients with COVID-19 (3).

He was soon admitted to hospital due to the need for a negative-pressure room for safe CPAP management. During the hospital admission, he exhibited fevers (38.4°C) and myalgias. He also completed a course of hydroxychloroquine and doxycycline during this hospitalization while he continued thrice-weekly hemodialysis in the isolated hospital room. A repeat nasopharyngeal RT-PCR test, the second such test, 22 days after the first positive test, while he was still an inpatient in the hospital, remained positive. He was discharged after 24 days in the hospital. He then continued outpatient hemodialysis in the isolated secure COVID-19-cohort hemodialysis subunit. A third nasopharyngeal RT-PCR test carried out 32 days from the first positive COVID-19 test, now as an outpatient, returned negative. A fourth test, repeated the day after, remained negative. He thereafter returned to the regular outpatient in-center hemodialysis unit while still wearing a mask during his hemodialysis treatments. This practice strictly followed the guidelines of the US CDC guidance of two negative RT-PCR tests, >24 hours apart, for re-entry to the regular hemodialysis unit (4). Ordinarily, it must be acknowledged that all our in-center outpatient hemodialysis patients wear surgical masks all the time from the time of arrival at the unit until they depart from the unit after hemodialysis; this again according to US CDC guidelines.

### Conclusion

COVID-19 RNA has been demonstrated in human urine samples, a clear evidence of the urine being a probable

means of excretion of viral particles in infected patients (2,5). In the study by Ling et al from Shanghai, China, even though viral nucleic acid was found in urine in only four (6.9%) patients out of 58 cases, furthermore viral RNA was present in urine specimens after throat swabs were negative (2). Indeed, in another publication, a case report, a 15-year old asymptomatic female patient exhibited a negative throat swab RT-PCR test whereas the urine RT-PCR test was positive (6). Given these premises, it is only intuitive to posit that especially anuric ESRD patients would arguably excrete less viral RNA in the urine and therefore could potentially retain COVID-19 RNA for longer.

Our knowledge base regarding COVID-19 continues to evolve. Our patient had persistently demonstrated positive nasopharyngeal RT-PCR tests for at least 22 days. This is about double the previously reported duration of such positive test results in a large cohort of inpatients from Shanghai, China (2). Finally, we surmise that the persistence of COVID-19 RNA in our patient may represent the syndrome of prolonged viral non-clearance which may be peculiar to especially anuric ESRD patients on maintenance hemodialysis. This may explain the recent report of the surprising and unanticipated demonstration of a high rate of positive COVID-19 antibody testing among the staff of a Pediatric Outpatient Hemodialysis Unit in New York (7). Further studies are mandated as these investigations would help guide the implications of preventative measures against the spread of COVID-19 among both patients and staff of hemodialysis units around the world. If confirmed, this would lead to major paradigm shifts in the need for continued vigilance and infectious disease preventative measures to mitigate the spread of COVID-19 to both patients and staff within hemodialysis units around the world.

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### Author's contribution

MACO is the single author of the manuscript.

### Conflicts of interest

The author declares that he has no conflict of interest.

### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

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