



# Dehydration and nephrolithiasis in a 67-year-old distance runner: a case study on medical nutrition therapy and the transtheoretical model

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## Introduction and Background

- Distance running linked to acute kidney injury (AKI)<sup>[1-3]</sup>
- Damage likely due to combination of dehydration, increased body temperature, NSAID use, etc<sup>[2]</sup>
- Rhabdomyolysis can cause AKI brought about by heavy exertion and/or dehydration.<sup>[4]</sup>
- Dehydration also common risk factor for nephrolithiasis (kidney stones)<sup>[5]</sup>
- Calcium oxalate in foods (EX: spinach, beets, nuts, potato chips) can cause kidney stones if patient also has high urine oxalate<sup>[6-7]</sup>

## Initial Case Presentation

- R.M. is a 67-year-old male with chronic kidney disease (CKD) Stage I/II resulting from extreme distance running

Figure 1: Timeline of case

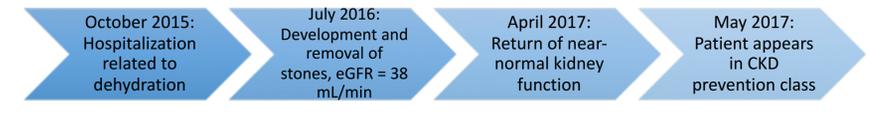
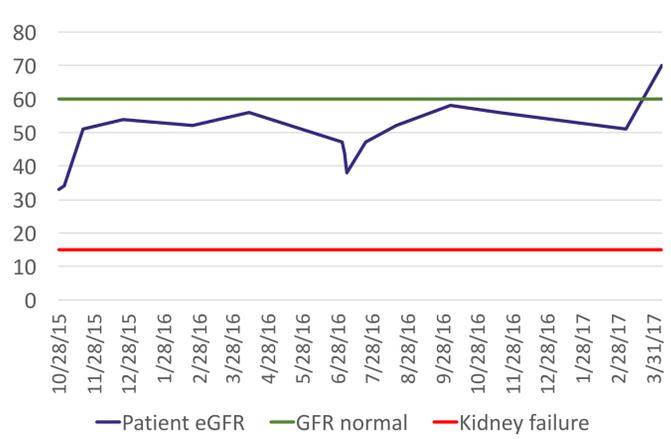


Figure 2: GFR



Graph 1: eGFR 10/2015 – 3/2017



## Clinical Course

### Assessment

- Highly active distance trail runner and ultramarathoner attended CKD class with wife
- Estimated drinking 3L of fluid per day, does not adjust intake to match effort during exercise
- Stated he brings two 20 oz. bottles of a 50-50 mix of water and sports drink and refills with snowpack or stream water (40-50% of estimated fluid needs)
- Hesitant to increase fluid intake due to burden of carrying excess weight
- Avoided high oxalate foods and wondered whether or not to cut them from his diet

### Diagnosis

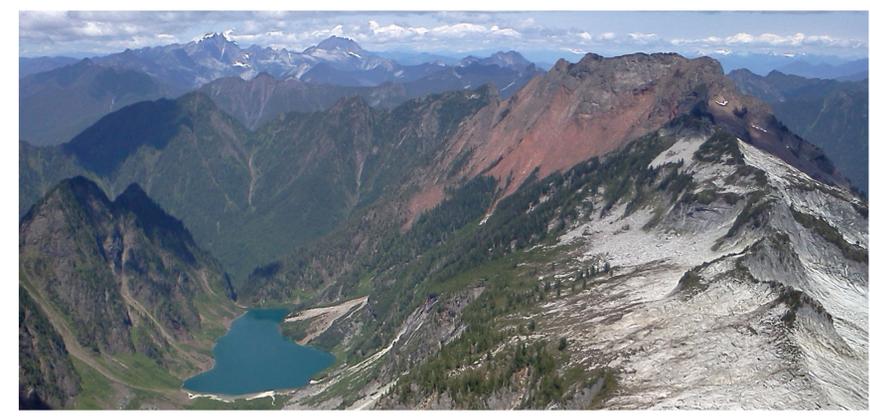
**Inadequate fluid intake related to history of AKI and renal stones as evidenced by elevated BUN and creatinine, reduced eGFR, and fluid intake not meeting calculated needs.**

### Intervention

- Drink ≥ 3L of fluid per day, increasing to ≥6L on the day before, day of, and day following a long run
- Limit sodium intake to 2g/d
- Avoided sugary beverages aside from the Gatorade mixed 1:1 with water for electrolyte replenishment on runs
- Reintroduce oxalate-rich foods into diet, request a urinary oxalate test during next MD appointment
- Brainstorm methods of increasing fluid intake on long xruns

### Monitoring and Evaluation

- First follow up:** Seemed more interested in running than in trying to increase fluid intake
- Second follow up:** No effort to change behavior
- Third follow up:** Increased number of times he stopped along trail to fill water bottles, noted improvement in hydration status



## Discussion

- Per transtheoretical model, change-making behavior happens in a cycle of six stages: pre-contemplation, contemplation, preparation, action, maintenance, and termination.<sup>[8]</sup>
- R.M. came to the CKD class in contemplation, but found intervention in conflict with lifestyle
- Despite knowing likeliest cause of hospitalizations and kidney damage was dehydration, R.M. initially uninterested in changing usual practices - sought out other possible causes for condition
- By final class, R.M. in preparation stage, actively making changes to fit lifestyle

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