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

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

| October 2015: Hospitalization related to dehydration | July 2016: Development and progression of AKI stage 3/4, eGFR = 38 mL/min  | April 2017: Return of near-normal kidney function | May 2017: Patient appears in CKD prevention class |

Figure 2: GFR

- 0:15: Kidney Failure
- 15:60: Kidney Disease
- 60:120: Normal Kidney Function

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 runs

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.[8]
- 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

References


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