

A Guideline for the Management of Renal Stones in Astronauts

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Introduction

There are no specific guidelines for the management of renal stones in astronauts. Given the increased risk for bone loss, hypercalcuria, and stone formation due to microgravity, a clinical practice guideline is needed.

Methods

An extensive review of the literature and current aeromedical standards for the management of renal stones was done. The NASA Flight Medicine Clinic's electronic medical record and Longitudinal Survey of Astronaut Health were also reviewed. This information was used to create an algorithm for the management of renal stones in astronauts.

Results

Guidelines are proposed based on accepted standards of care, with consideration to the environment of spaceflight. In a usual medical setting, asymptomatic, small stones less than 7 mm are often observed over time. Given the constraints of schedule, and the risks to crew health and mission, this approach is too liberal. An upper limit of 3 mm stone diameter was adopted before requiring intervention, because this is the largest size that has a significant chance of spontaneous passage on its own. Other specific guidelines were also created.

Discussion

The spaceflight environment requires more aggressive treatment than would otherwise be found with the usual practice of medicine. A small stone can become a major problem because it may ultimately require medical evacuation from orbit. Thus renal stones are a significant mission threat and should be managed in a systematic way to mitigate risks to crew health and mission success.