



## Article Appraisal

**Article:** Ultrasonography versus Computed Tomography for Suspected Nephrolithiasis  
Smith-Bindman R, Aubin C, Bailitz J, Bengiamin R, Camargo C, et al. Ultrasonography versus Computed Tomography for Suspected Nephrolithiasis. *New England Journal of Medicine*. 2014 Sep 18; 371:1100-1110.

**Date of Journal Club:** February 12, 2015

**Resident Reviewer Name(s) and Residency Affiliation:** Dr. Simon Jones, CFPC Residency Program

**Faculty Methodology/Bio-statistics Resource Person:** Dr. Rob Stenstrom

---

### Background and Study Objective(s):

To identify if ultrasound (vs CT scan) can be used safely as the first imaging choice in patients with symptoms suggestive of nephrolithiasis and whom a serious alternative diagnosis was considered unlikely.

### Study Design:

- Patients were recruited in 15 geographically diverse emergency departments from October 2011- February 2013
- Patients with suspected nephrolithiasis were randomly assigned, in a 1:1:1 ratio, to one of three imaging groups: U/S performed by an emergency physician (point-of-care ultrasonography), U/S performed by a radiologist, or abdominal CT
- 2759 pts were included in the study; 908 were randomized to the POCUS group, 893 to the radiology U/S group, and 958 to the CT group
- Point-of-care ultrasound was performed by emergency physicians who had training as recommended by the American College of Emergency Physicians
- Diagnostic accuracy for nephrolithiasis was assessed by comparing the baseline diagnosis at the time of discharge from the emergency department with the reference standard of confirmed stone diagnosis, with confirmation either by the patient's observation of the passage of the stone or by the patient's report that the stone had been removed surgically

### Inclusion Criteria:

- Patients 18-76 presenting to the ED with flank or abdominal pain were eligible if the ERP decided to order imaging to establish or rule out a primary diagnosis of kidney stones

### Exclusion Criteria:

- Patients whom the ERP considered to be high risk for serious alternative diagnosis (cholecystitis, appendicitis, AAA, bowel disorders)
- Pregnant women
- Men >285lbs (129kg)
- Women > 250lbs (113kg)

- Patients with a single kidney
- Patients who had undergone renal transplantation
- Patients on dialysis

## Results:

- Primary:
  - o The 30-day incidence of high-risk diagnoses with complications was low (0.4%) and did not vary according to imaging method.
  - o The 6-month cumulative radiation exposure was significantly lower in the U/S groups than in the CT group.
- Secondary:
  - o Serious adverse events occurred in 12.4% of pts in the point-of-care U/S group, 10.8% in the radiology U/S group, and 11.2% in the CT group.
  - o Related adverse events were infrequent (0.4% incidence) and similar across groups. By day 7, the average pain score was 2 in each group.
  - o Return ED visits, hospitalizations, and diagnostic accuracy did not differ significantly across the groups.

## Validity of Results:

Overall the validity of this trial was mixed. The validity was challenged in regards to the study objective itself. This study was aimed at utilizing ultrasound as an initial imaging technique in patients who presented with symptoms suggestive of nephrolithiasis. However, only between 32 and 35% of patients studies ended up having a confirmed kidney stone. Therefore, this study may not be ideally representative of patients with suspected nephrolithiasis where ultrasound may be feasible and serious alternative diagnoses were considered unlikely. The rest of the study was designed well with minimal room for bias from randomization and allocation concealment.

## Generalizability of Results:

Limitation of study is that most emergency physicians are not trained in POCUS. However, as POCUS becomes more integrated into emergency physician practice, this should not be a limitation. Furthermore, not all emergency departments have easy access to urgent definitive ultrasonography, especially after hours. This could impact the ease of use in the community.

## The Bottom Line:

Despite the study problems of unclear inclusion criteria and poor detection rates, there is a valid take home in favor of US, but further research is required and ultimately it is for you to figure out.