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Review – Stone Disease

## Burden of Urolithiasis: Trends in Prevalence, Treatments, and Costs

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### Abstract

**Context:** The recent evolution of management options for urolithiasis has presented a unique dilemma for the modern urologist. A comprehensive understanding of epidemiological trends along with current provider preferences in treating urinary stones would be beneficial.

**Objective:** To review trends in the prevalence, treatments, and costs of urolithiasis worldwide.

**Evidence acquisition:** A literature review was performed using the MEDLINE database, the Cochrane Library Central search facility, Web of Science, and Google Scholar between 1986 and 2016. Keywords used for the search were “urolithiasis” and “prevalence; treatment; and cost”.

**Evidence synthesis:** The incidence and prevalence of urinary stones are rising around the world, including regions that have historically had low rates of urolithiasis. Common theories explaining this trend involve climate warming, dietary changes, and obesity. Shockwave lithotripsy (SWL) has been the preferred mode of treatment since its introduction in the 1980s. However, ureteroscopy (URS) has become increasingly popular for small stones regardless of location because of lower recurrence rates and costs. Developing countries have been slower to adopt URS technology and continue to use percutaneous nephrolithotomy at a steady rate.

**Conclusions:** URS has recently challenged SWL as the treatment modality preferred for small upper urinary tract stones. In some cases it is less expensive but still highly effective. As the burden of stone disease increases worldwide, appropriate selection of stone removal therapies will continue to play an important role and will thus require further investigation.

**Patient summary:** Urinary stones are becoming more prevalent. Recent advances in technology have improved the management of this disease and have decreased costs.

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### 1. Introduction

Urolithiasis is a common urologic problem and constitutes a significant burden on the health care system in the USA. The National Health and Nutrition Examination Survey

(NHANES) indicates that the prevalence of urolithiasis has increased over the last three decades in the USA [1]. This translates into a significant projected economic burden, with an additional \$1.24 billion/year estimated by 2030 [2].

The increasing global prevalence of urolithiasis necessitates safe, efficacious, and affordable treatment. The three most common procedures performed to remove upper urinary tract stones are shockwave lithotripsy (SWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PCNL). In the ambulatory surgery setting, SWL has historically been the preferred treatment modality [2]. However, recent studies in the Medicare population in the USA have shown that the use of URS is increasing because of patient and provider preferences, differing stone-free rates (SFRs), and the overall cost of each treatment [3–5].

The objective of this review was to evaluate current global trends in the prevalence, treatments, and costs for management of urolithiasis.

## 2. Evidence acquisition

A detailed, comprehensive literature review was performed to identify all peer-reviewed articles published in the English language describing the prevalence, treatments, and costs for management of urolithiasis from 1986 to 2016. The search was performed via the MEDLINE database, the Cochrane Library Central search facility, Web of Science, and Google Scholar. Initial search terms were “urolithiasis” and “prevalence, treatment and cost”. The phrases “urolithiasis global trends in”, “urinary stones”, “nephrolithiasis”, “pediatrics”, “Europe”, “North America”, “Africa”, and “Asia” were added to the initial search terms when relevant.

The search results were screened for appropriateness, with emphasis placed on clinical studies and review articles. Referenced articles were screened to maximize inclusion of pertinent data, and only English language publications were considered. Articles were included if they presented quantitative analysis of the prevalence, treatment, or cost of urolithiasis. Only descriptive studies with relevance to the three topics were included. Papers using the same or similar data sets were excluded, as well as research before 1986. When possible, statistical data were taken directly from raw tables. The Preferred Reporting Items for Systematic Reviews and Meta-analysis statement guidelines were utilized (Fig. 1).

## 3. Evidence synthesis

### 3.1. Trends in the prevalence of urolithiasis

As the development and composition of stones are significantly influenced by diet, lifestyle, and comorbidities such as obesity, the prevalence of urolithiasis tends to vary among different cultures and geographies [2]. Although constantly changing, the risk of stone formation was found to be approximately 12% in North America, 5–9% in Europe, and 1–5% in Asia during the 1990s [6]. Although we reviewed the literature from Australia, Africa, and Latin America, data on prevalence in other parts of the world are limited. All studies evaluated are further described in Table 1.

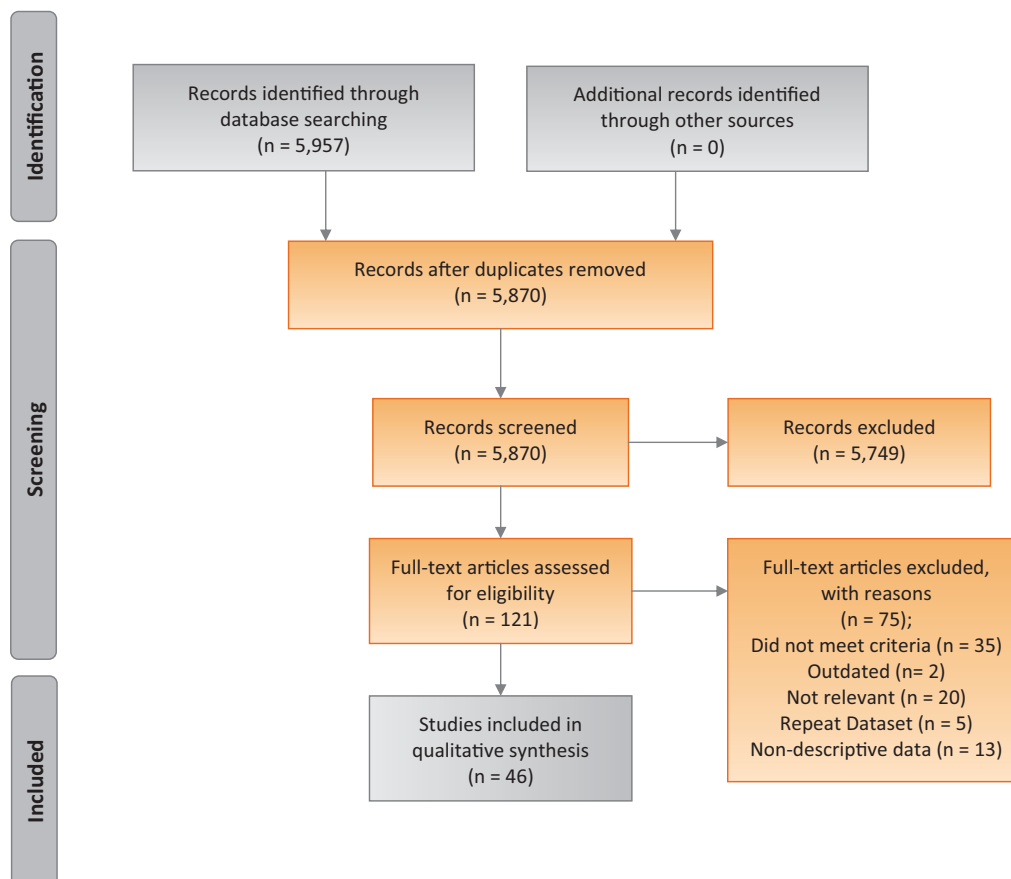


Fig. 1 – Preferred Reporting Items for Systematic Reviews and Meta-analysis flowchart.

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