

# The impact of unplanned postprocedure visits in the management of patients with urinary stones

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**Background.** Unplanned follow-up care is the focus of intense health policy interest, as evidenced by recent financial penalties imposed under the Affordable Care Act. To date, however, unplanned postoperative care remains poorly characterized, particularly for patients with kidney stones. Our objective was to describe the frequency, variation, and financial impact of unplanned, high-acuity, follow-up visits in the treatment of patients with urinary stone disease.

**Methods.** We identified privately insured patients undergoing percutaneous nephrostolithotomy, ureteroscopy, or shock-wave lithotripsy for stone disease. The primary outcome was occurrence of an emergency department visit or hospital admission within 30 days of the procedure. Multivariable models estimated the odds of an unplanned visit and the incremental cost of those visits, controlling for important covariates.

**Results.** We identified 93,523 initial procedures to fragment or remove stones. Overall, 1 in 7 patients had an unplanned postprocedural visit. Unplanned visits were least common after shock-wave lithotripsy (12%) and occurred with similar frequency after ureteroscopy and percutaneous nephrostolithotomy (15%). Procedures at high-volume facilities were substantially less likely to result in an unplanned visit (odds ratio 0.80, 95% confidence interval [95% CI] 0.74–0.87,  $P < .001$ ). When an unplanned visit occurred, adjusted incremental expenditures per episode were greater after shock-wave lithotripsy (\$32,156 [95% CI \$30,453–33,859]) than after ureteroscopy (\$23,436 [95% CI \$22,281–24,590]).

**Conclusion.** Patients not infrequently experience an unplanned, high-acuity visit after low-risk procedures to remove urinary stones, and the cost of these encounters is substantial. Interventions are indicated to identify and reduce preventable unplanned visits. (*Surgery* 2014;155:769-75.)

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KIDNEY STONES impose a substantial and increasing burden of disease in the United States. Their prevalence has nearly doubled in the past 15 years,<sup>1,2</sup> and they now affect almost 1 in 11 persons. Health care use for treating patients with urinary stone disease has increased in parallel.<sup>3,4</sup> Recent estimates from the Urologic Diseases in America project suggest that aggregate expenditures for treating patients with kidney stones exceed \$10 billion annually, making kidney stones one of the most expensive urologic conditions.<sup>4</sup> Little is known about what impels these expenditures, although charges appear to be greatest for ambulatory surgery and inpatient care.<sup>4</sup>

Driven by high costs, variability in hospital readmissions and incorporation into Medicare

payment policy under the Affordable Care Act, unplanned follow-up care has become an area of intense focus for hospitals, providers, and policy makers.<sup>5-9</sup> To date, however, few studies have examined the frequency and potential impact of readmissions or other unplanned care after urologic surgical procedures. After a complex procedure such as radical cystectomy, up to 1 in 4 patients experience hospital readmission within 30 days.<sup>10</sup> Immediate hospital admission after low-risk urologic office or ambulatory procedures appears much less common (<1%).<sup>11</sup> However, 30-day readmission rates and other unplanned care, such as postprocedure visits to the emergency department (ED), remain poorly characterized as a potential quality marker and health policy issue in the treatment of patients with kidney stones. Unplanned care within 30 days of a stone procedure may occur after either inpatient or ambulatory/outpatient interventions. Patients who undergo inpatient procedures, such as percutaneous nephrostolithotomy (PNL), may be readmitted to hospital or require ED visits for potential complications of operation. Likewise, patients who undergo ambulatory/outpatient procedures (ie, ureteroscopy [URS] or shock-wave lithotripsy [SWL]) may require hospital admission or ED care for potential complications in the postoperative period.

Given this context, we sought to determine the frequency of unplanned hospital admissions and ED visits after procedures to fragment or remove urinary stones. In addition, we sought to test the hypothesis that unplanned postprocedural care would vary importantly with clinical and nonclinical factors. Finally, we sought to estimate the potential financial impact of unplanned postprocedural encounters in the treatment of patients with urinary stones.

## METHODS

**Data source.** We analyzed data from MarketScan, which includes more than 170 million beneficiaries covered by private insurance in the United States. The dataset contains deidentified information regarding beneficiary demographics, diagnoses, health care services, physician and facility identifiers, and payments. The institutional review board at RAND determined that the study design was exempt from the review requirement.

**Study population.** The study population comprised individuals who underwent SWL, URS, or PNL for the fragmentation or removal of a renal or ureteral stone in 2003–2011. We identified diagnoses and procedures using established claims algorithms.<sup>12</sup> Exclusion criteria included age

younger than 18 years, less than 1 year of continuous enrollment before the initial procedure, and less than 30 days of continuous enrollment after the procedure date (or date of hospital discharge if the procedure was performed on an inpatient basis).

**Outcomes.** Our study had two aims: (1) to describe the incidence of and variation in unplanned episodes of care after procedural intervention for a renal or ureteral stone; and (2) to characterize the incremental costs resulting from episodes of unplanned care. The primary outcome for the first aim was the occurrence of an unplanned visit after the initial procedure. Unplanned care can occur in many settings, such as an outpatient clinic, the ED, or as inpatient care. We elected to focus on ED and inpatient encounters for two reasons. First, these two care settings imply a greater degree of acuity than an outpatient clinic visit, and from the health policy perspective are likely much more expensive than care in an ambulatory clinic setting. Second, differentiating unplanned versus planned outpatient follow-up visits in a claims-based analysis is unreliable. For the purposes of our analysis, we therefore defined an unplanned visit as either an ED encounter or a hospital admission within 30 days of the initial procedure. Because some surgeons stage or perform “second-look” procedures after PNL, we did not consider follow-up hospital admissions where a PNL occurred to constitute an unplanned visit. To understand the potential financial impact of unplanned care, we examined the difference in total health care expenditures in the 30 days after the initial procedure, conditional on an unplanned episode of care. Expenditures included facility and provider payments, patient deductibles, coinsurance, copayments, and coordination of benefit payments, as recorded in the MarketScan dataset.

**Covariates.** Patient-level covariates included age and sex as reported in the MarketScan database. We identified comorbid conditions using established claims-based algorithms and summarized these as a Charlson score.<sup>13,14</sup> We categorized patients according to Charlson score of 0, 1, or  $\geq 2$ . We included median household income and the percentage of the population with at least a high school diploma as reported in the Area Resource File to adjust for the potential influence of socioeconomic status. The inclusion of the year of the initial procedure controlled for potential changes in secular patterns of care or patient follow-up. Given well-established variations in regional patterns of care, we included census

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