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# Discharge materials provided to patients with kidney stones in the emergency department may be a source of misinformation

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**Introduction:** Renal colic is commonly seen in the emergency department (ED), where the focus is on diagnosis and symptom control. Educational materials are sometimes provided upon discharge, however, no standard content has been established. We characterized the educational materials given to patients reporting to EDs in different regions across the U.S. for symptomatic kidney stones, specifically evaluating disease-specific information, symptom management, prevention strategies including dietary recommendations (DRs), and patient follow up plans.

**Materials and methods:** Generic discharge instructions for patients presenting to EDs with renal colic were obtained from community hospitals and academic medical centers between October 2016 and November 2017. Hospitals were called directly. If the same discharge instructions were used by more than one hospital, each was included in our analysis. We assessed the different types of information provided with a focus on stone

prevention and DRs by characterizing them into specific nutritional categories.

**Results:** Of 266 hospitals contacted, 79 provided discharge instructions. Of these, 51 (65%) provided some information on diet. While most recommended higher fluid intake, almost 40% endorsed unnecessary fluid restrictions. Recommendations to reduce protein and oxalate intake were common, but erroneous information for both was given. Nearly 1 in 5 EDs recommended lower calcium intake. Less than 30% of EDs mentioned that stones can have different composition or causes. Less than 30% referenced consultation with a registered dietitian nutritionist (RDN) or that dietary approaches to stone prevention are optimally individualized. Only 9 summaries recommended urologic follow up.

**Conclusions:** Many ED discharge materials contain DRs for stone prevention. These recommendations can be inaccurate and/or inappropriate. Advice on diet and stone prevention is more appropriately addressed in the outpatient setting when more data (stone composition, serum and urine parameters) and expert consultants are available.

**Key Words:** kidney stones, discharge instructions, patient education

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## Introduction

Renal colic is one of the most common diagnoses for which patients present to the emergency department (ED), and this trend has been increasing over time.<sup>1</sup> The primary focus of the ED provider when evaluating patients with possible renal colic is to differentiate renal colic from other life-threatening conditions.<sup>2</sup>

Once the suspicion of an uncomplicated stone is confirmed, attention turns to symptom management and establishing a safe discharge plan. Most patients with uncomplicated urolithiasis are able to be safely discharged from the ED once pain control is achieved and they are able to tolerate oral intake.<sup>3</sup>

Patients are typically provided discharge instructions to help guide follow up care and to provide condition-specific patient education. Currently, there are no standard ED discharge materials and no agreed upon follow up plan for this patient population. There is also a paucity of existing research defining the necessary features of discharge instructions in general that should be provided in EDs. Several key components have been identified and include: 1) the diagnosis and expected

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course of the illness, 2) potential complications of the illness, 3) general management instructions (non-drug and medication), 4) advice on follow up care, and 5) when to return to the ED.<sup>4</sup>

For many conditions, especially those characterized by intermittent exacerbations or recurrence, the chronic nature of the disease lends itself to further evaluation and education regarding prevention. This is true for patients with urolithiasis. However, much of the biochemical and other data necessary to guide prevention is not yet available at the time of discharge from the ED. Guidelines from the American Urological Association<sup>5</sup> and the European Association of Urology<sup>6</sup> advocate that stone prevention strategies be individualized to each patient based on stone type, if known, and metabolic testing (specific serum and 24-hour urine parameters). Based on these and other factors (which may include underlying medical issues or use of certain medications), dietary and/or pharmacologic intervention may be recommended to improve the risk factors thought to be contributing to stone formation in a particular individual.

Providing patients with recommendations about kidney stone prevention without the appropriate information and diagnostic testing can result in recommendations aimed at the wrong target(s) and, potentially, inappropriate patient action. Even when appropriate, dietary recommendations can have a profound effect on patients, as dietary changes are

difficult to make. When inappropriate or unrelated to the individual's specific stone formation factors, dietary changes are ineffective. Not all stone formation is related to diet. Dietary changes in this scenario will not prevent recurrence and could lead to patient frustration.<sup>7</sup>

The purpose of this study was to characterize generic discharge instructions given to patients with symptomatic kidney stones from EDs across the United States. We aimed to identify and categorize the educational materials, focusing on information regarding symptom management, stone prevention (including diet), and follow up care plan. We further sought to determine whether the recommendations provided were accurate and appropriate for patients with urolithiasis at the time of ED discharge.

## Materials and methods

From October 2016 to November 2017, academic and community hospitals across the United States were called and asked to provide the generic discharge instructions given to patients with a diagnosis of kidney stones/renal colic. Hospital EDs and/or medical records units were called directly. The areas of focus included New England, upstate New York, West coast, and Wisconsin. Hospitals in these regions were identified through internet searches. If similar materials were provided from more than one site, these were all included in the analysis.

**TABLE 1. Emergency services at hospitals in the Northeastern, Midwestern, and Western United States were contacted (n = 266) and asked to provide the written materials they give to patients presenting with renal colic related to urolithiasis. Data in the table represent those from whom information was received (n = 79)**

State	Number of emergency rooms/ departments providing materials
Number of states from which information was received	11
Northeastern states (% of total)	41 (51.9)
Connecticut	4
Maine	1
Massachusetts	2
New Hampshire	15
New York	7
Rhode Island	1
Vermont	11
Midwestern states (% of total)	14 (17.7)
Wisconsin	14
Western states (% of total)	24 (30.4)
California	10
Oregon	5
Washington	9

TABLE 2. Characteristics of dietary recommendations provided to patients at emergency room visits for acute urolithiasis events

Recommendation	N
Number of all recommendations received	79
Mentioned anything about different types of stones (%)	22 (27.8)
Suggested follow up with RDN (%)	14 (17.7)
Mentioned anything about over-the-counter dietary supplements (%)	21 (26.6)
Gave any dietary recommendation(s) (%)	51 (64.6)
Of recommendations mentioning anything about diet:	51
Reduce salt (NaCl) (%)	45 (88.2)
Reduce protein (%)	43 (84.3)
Had errors in protein information (%)	10 (23.3)
Reduce oxalate (%)	29 (56.9)
Had errors in oxalate information (%)	21 (72.4)
Increase fruits/vegetables (%)	24 (47.1)
Maintain or avoid excessive calcium intake (%)	21 (41.2)
Reduce caffeine (%)	14 (27.5)
Reduce calcium (%)	9 (17.6)
Increase phytate (%)	8 (15.7)
Increase citrate/citric acid (%)	9 (17.6)

The materials received were categorized into different subsets for further analysis. These included general information about urolithiasis (symptoms, disease course, etc.), symptom management and activity after discharge, disease prevention (including dietary recommendations), and follow up care plan. Statistical analysis was descriptive.

## Results

Of the 266 hospitals contacted, 79 (30%) provided discharge instructions for inclusion. The geographic distribution of the included summaries was as follows: New England (34), New York (7), West coast (24), and

Wisconsin (14), Table 1. Of the hospitals providing discharge instructions, 27 (34%) were academic of which 20 provided dietary recommendations. Table 2 summarizes the recommendations provided by the entire group while Tables 3 and 4 summarize specific dietary information by hospital type and geographic location.

### *General information about kidney stones*

Seventy (89%) instruction sets addressed the etiology of renal colic symptoms and 56 (71%) reviewed the symptoms associated with a kidney stone event. The most common symptom descriptors included cramping pain, radiation of abdominal/flank pain to the groin, nausea and vomiting, urinary frequency and

TABLE 3. Characteristics of dietary recommendations provided to patients at emergency room visits for acute urolithiasis events separated by academic (n = 20) and nonacademic (n = 31) hospitals

Recommendation	Academic	Nonacademic
Had errors in fluid information	8	11
Reduce calcium	3	6
Avoid excess calcium intake	3	2
Reduce oxalate	13	16
Had errors in oxalate information	10	11
Reduce protein	16	27
Had errors in protein information	3	7

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TABLE 4. Characteristics of dietary recommendations provided to patients at emergency room visits for acute urolithiasis events separated by different geographic regions: West Coast (n = 17), Wisconsin (n = 14), New York (n = 5), and New England (n = 15)

Recommendation	West Coast	Wisconsin	New York	New England
Had errors in fluid information	8	3	3	5
Reduce calcium	1	1	1	6
Avoid excess calcium intake	3	1	0	1
Reduce oxalate	10	8	1	10
Had errors in oxalate information	10	5	0	6
Reduce protein	14	13	4	12
Had errors in protein information	3	2	0	5

urgency, and hematuria. Only 20 (25%) summaries mentioned what to expect during the course of passing a kidney stone. Fewer than 30% noted that there are different types of kidney stones.

#### *What patients should do after ED discharge*

The majority recommended that patients strain their urine (90%) and bring the stone in to the doctor if it passes (87%). For pain management, 59 (75%) discussed the use of non-steroidal anti-inflammatory medications and 48 (61%) discussed prescription medications for pain. Twenty-eight (35%) recommended that patients stay active to help with stone passage. The majority (84%) listed reasons patients should return to the ED including fevers, voiding difficulty, hematuria, uncontrolled emesis, pain not responding to the recommended medications, weakness, and dizziness.

#### *Kidney stone prevention and fluid intake*

Seventy-four (94%) of the 79 total instructions recommended that patients increase their overall fluid intake. Of these, about half (38) included specific target quantities ranging from 6-12 glasses/day. Some suggested remaining hydrated to keep the urine clear while others generally advised simply to drink more fluids.

#### *Kidney stone prevention and diet*

Fifty-one (65%) of ED materials discussed some aspect of diet (other than fluid intake) as it relates to kidney stones. Of the 51 that addressed diet: 19 (37%) contained errors about which types of fluids to avoid, defined as those for which evidence for avoidance is lacking (coffee, tea, grapefruit juice, alcohol, carbonated beverages, and caffeinated beverages).

Forty-five (88%) recommend limiting salt intake, 24 (47%) recommended eating more fruits and vegetables,

29 (57%) advised restriction of foods high in oxalate, and 43 (84%) recommend protein restriction.

Conflicting information was given regarding calcium intake; 17 (33%) advised normal calcium intake while 9 (18%) advised to limit oral calcium intake.

#### *Follow up*

The majority of instructions (95%) suggested follow up after the ED encounter while 55 (70%) provided a specific time frame for follow up. Of the 75 suggesting a future outpatient visit, 65 recommended to see the primary care physician while only 9 (12%) recommended seeing a urologist. Thirty-nine (49%) mentioned that the follow up visit may include additional kidney stone imaging.

#### Discussion

To our knowledge, this is the first study to summarize the types of educational material patients receive from the ED after a visit for renal colic and kidney stone management. The fact that 65% of the discharge summaries we reviewed provided information on diet and kidney stone prevention is surprising and concerning. First and most importantly, the biochemical information required to appropriately counsel patients on stone prevention is not available at the time of acute presentation. Prevention approaches should be individualized and based on multiple factors including stone composition, stone-specific laboratory tests, dietary assessment, and 24-hour urine parameters.<sup>5,6</sup> In addition, stone prevention counseling requires time- and disease-specific expertise which is absent or difficult to obtain in the ED setting.

Providing education about stone prevention and diet without an individualized assessment risks harmful patient actions, patient anxiety, and

frustration. Yet, a recent review from the Emergency literature advocated that “patients who are discharged should be advised on dietary changes”.<sup>3</sup> From our review, some of the information provided was incorrect and, if followed, could even serve to worsen the risk of kidney stone recurrence. For example, approximately 20% recommended limiting calcium intake. Calcium restriction has been shown to increase, rather than decrease, the risk of calcium oxalate stone recurrence.<sup>8</sup> Other discharge summaries provided information that was contradictory and could therefore contribute to patient misunderstanding and anxiety. For example, some advised limitation of foods high in oxalate while at the same time suggested consuming more fruits and vegetables – some of which were listed in the “high oxalate” category. Additionally, not all kidney stones are the result of diet. Therefore, dietary recommendations place the blame of stone formation on the patient and can lead to frustration when dietary changes do not result in future stone prevention.

Regarding follow up recommendations, we found that while most discharge instructions suggested outpatient follow up, only a small number recommended seeing a urologist. Most advocated follow up with a primary care provider, particularly for patients with a first episode of urolithiasis. This represents a missed opportunity for urologic involvement as patients who are at high risk of stone recurrence or who simply have a strong interest in pursuing stone prevention would benefit from urologic evaluation.<sup>5</sup> Overall, information about who, when, and with whom patients should follow up varied widely, perhaps due to the fact that no standard guidelines exist.

Others suggested follow up strategies focused on specific stone parameters identified with diagnostic imaging. For example, some recommended urologic follow up for patients found to have stones greater than 5 mm.<sup>3</sup> While stone size and location impacts the possibility of spontaneous stone passage,<sup>9</sup> this level of diagnostic accuracy is not always available due to the more recent shift away from standard computed tomography (CT) to other imaging strategies. Ultrasound, for example, has been found to be a safe approach to renal colic imaging<sup>10</sup> and a way to avoid CT imaging all together for the majority of patients.<sup>11</sup> Ultrasound, however, does not provide the same diagnostic accuracy as CT.<sup>12</sup>

Appropriate outpatient follow up after symptomatic stone episodes could confirm stone passage. This is important as it relates to the small but serious risk of silent obstruction. While lack of symptoms usually indicates that a stone has passed, this is not always the case.<sup>13</sup> Therefore, discharge instructions should define

the expected course of the stone event, actions to take to ensure definitive stone passage like straining of urine, and specify which patients should be evaluated in the outpatient setting.

Our findings suggest that the ED may be an original source of patient misinformation regarding kidney stone diet and prevention strategies. This finding suggests the need for a standardized approach to patient discharge educational materials for kidney stone disease. This initiative should involve an evidenced-based approach and include the input of all stakeholders including emergency medicine providers, urologists, registered dietitians, and patients themselves. In addition to providing accurate and appropriate educational information to patients with kidney stones at the ED stage of management, standardized discharge materials could serve as an opportunity to improve the transition of care of patients from the acute to the outpatient setting.

## Conclusion

ED discharge instructions for patients with kidney stones should include only information pertinent to the current symptomatic stone episode. This includes knowledge of the signs and symptoms indicating the need to return for medical care, maintaining adequate hydration, straining urine for stone collection and evaluation, and encouraging follow up when appropriate. Patients should be given information about the course of renal colic and how a stone may persist even if symptoms resolve. For those without confirmed stone passage or those who have passed their stone but are at high risk or are recurrent stone formers, urologic follow up is important. Creation of standardized discharge educational materials is an opportunity to not only educate but to appropriately transition care and ensure best patient-centered outcomes. □

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