

ENGAGE WITH QUALITY IMPROVEMENT AND PATIENT SAFETY (E-QIPS)

Strategies to Optimize Nephrolithiasis Emergency (STONE) Care: Creation of an Emergency Department Clinical Pathway



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QUALITY OR SAFETY PROBLEM

Kidney stone disease is common, with nearly 9% of the U.S. population affected and resulting in over 1 million ED visits per year.¹⁻³ Despite this significant burden, the emergency care of patients with suspected kidney stones has not been standardized. This variability exposes patients to excess ionizing radiation, ineffective pain control, and the potential for opioid abuse.

BACKGROUND

National guidelines support low dose (<4 mSv) computed tomography of kidneys, ureters, and bladder (CT KUB) as the imaging of choice for renal colic patients when cross-sectional imaging is required.⁴⁻⁶ However, higher dose conventional imaging is performed in >90% of cases.^{7,8} Meta-analyses of randomized trials demonstrate that non-steroidal anti-inflammatory drugs (NSAIDs) are at least as effective as opioids for renal colic, though the absence of a standardized approach to these patients precludes NSAIDs' consistent utilization.⁹ Clinical pathways offer a potential solution to this problem by linking evidence-based recommendations to daily practice. Pathway implementation has been shown to reduce variability and improve patient outcomes.¹⁰

PROJECT OBJECTIVES

The aim of this study was to construct a clinical pathway for the effective and efficient management of adult patients with kidney stones through partnership with a multidisciplinary panel of stakeholders. We then prospectively assessed the pathway's effects on clinical care. The primary specific aim of this project at initial design was to improve rates of low dose CT KUB for patients with renal colic in our ED from 10% to >50% within 6 months. Secondary outcome measures are described below, though these were identified by our multi-disciplinary group as the pathway was iteratively constructed.

INTERVENTION

The project was conducted at two academic medical centers that are affiliated with a single university. The multi-disciplinary team consisted of physicians from the Departments of Urology, Radiology, and Emergency Medicine. The interventions consisted of: 1) creating a consensus-based care pathway for patients who present to the ED with renal colic and linking this to an order set within our Electronic Health Record (EHR), and 2) creating a low dose CT KUB protocol that would specifically be called for by CTs ordered within our care pathway. The low dose protocol was designed based on example protocols highlighted at the 2017 AUA QI Summit on imaging in nephrolithiasis.¹¹ Orders necessary for pathway-based care were then programmed into order sets that could be used for both ED care and at ED discharge.¹²

MEASURES OF SUCCESS

We did not have the resources necessary to facilitate the creation of a pathway dashboard to monitor utilization in real-time. Instead, patients were identified by reviewing ED billing records for all patients who underwent CT KUB, CT abdomen/pelvis, or retroperitoneal ultrasound (US) on a monthly basis. This data abstraction method was selected because it provided the largest population of potential ED stone patients, with the understanding that many would be excluded from our analysis due to the imaging being for an unrelated diagnosis (e.g., ultrasound to monitor a transplanted kidney). We chose not to identify patients based on billing diagnoses because review of internal records demonstrated these diagnoses to be heterogenous. For example, a patient with an obstructing stone could have a billing diagnosis of “nausea,” which is neither sufficiently sensitive nor specific to identify the broadest collection of ED patients with suspected nephrolithiasis.

Variables of interest (e.g., imaging type, ED medications, discharge medications) were recorded for each patient. Outcome, process, and balance measures were analyzed by statistical process control.

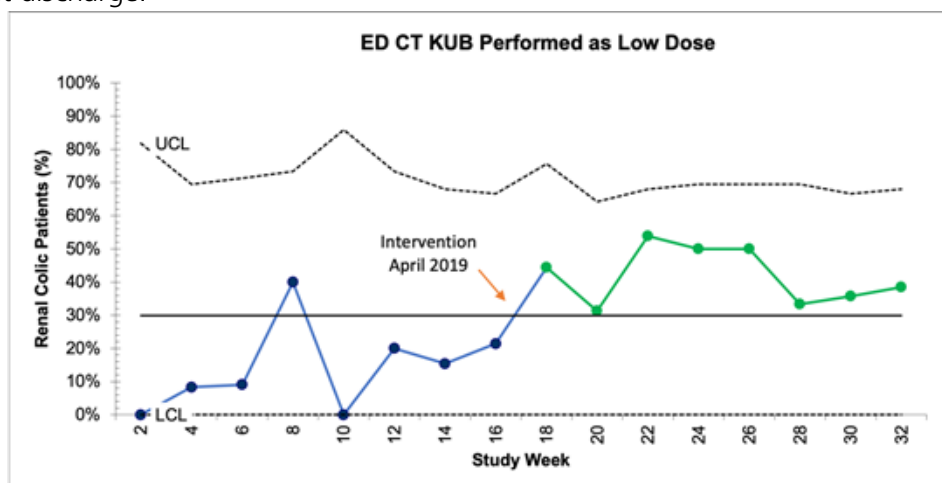
OUTCOMES

The primary outcome measure selected at project inception was the proportion of patients whose ED CT imaging was low-dose (≤ 4 mSv), as opposed to conventional CT KUB (>4 mSv, typically >10 mSv). Secondary outcome measures included the proportion of patients receiving pathway-concordant pain medications, including non-steroidal anti-inflammatories (NSAIDs), acetaminophen (APAP), and opioids, both while in the ED and at discharge, as well as the proportion of patients receiving urine strainers. In the absence of society guidelines, our multi-disciplinary panel developed institutional consensus on best practices (e.g., appropriate ED discharge medications for confirmed nephrolithiasis). Order set utilization was tracked as a process measure. Balance measures included return ED visits, repeat imaging, hospitalizations, and urology clinic visits or urological surgeries within 30 days of ED discharge.

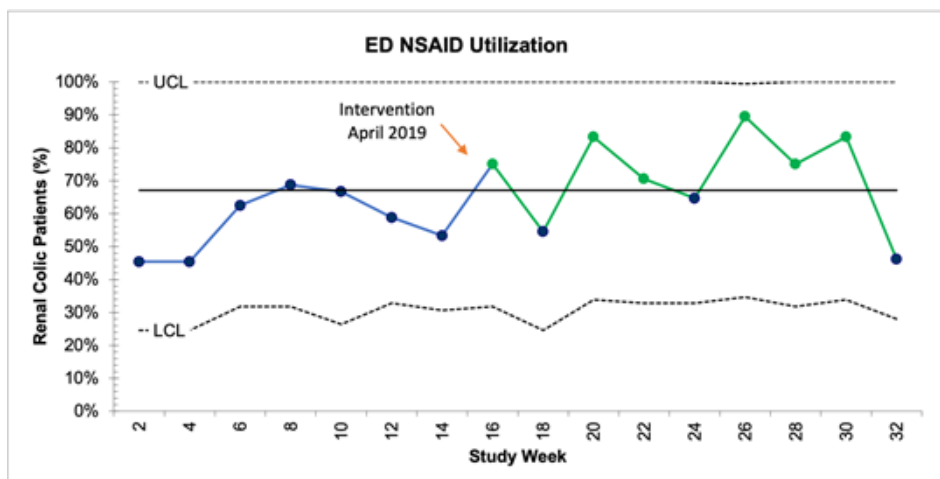
POTENTIAL IMPACT AND SCALABILITY

Pathway release was followed by improved rates of low dose CT KUB within the ED for patients presenting with renal colic. Pathway utilization was low, ranging from 20-38% of eligible patients. Improved utilization would likely result in higher rates of guideline-concordant imaging, pain medications in the ED, and medications at discharge.

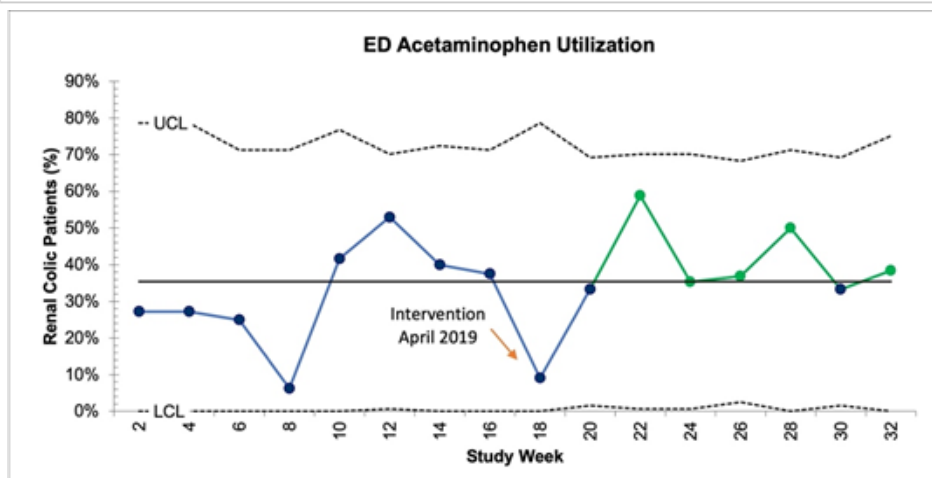
A



B



C



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SUSTAINING THE CHANGES

This project led to an institutional paradigm shift in CT protocoling such that all CT KUBs are now protocolled as low dose. Utilization of the STONE pathway itself is motivated by the convenience of a single order set that consolidates best practices for ED clinicians who may be unfamiliar with evidence-based stone care.

ADDITIONAL RESOURCES

We have several suggestions for other sites who may wish to replicate this work:

- a. Identify a broad group of stakeholders within the departments of Radiology and Emergency Medicine who are motivated to participate in pathway creation.
- b. Begin with a baseline assessment of the clinical practice within your ED, particularly with respect to pain medication utilization and imaging. It has been our experience that many urologists, emergency physicians, and even radiologists believe that they are obtaining low dose CTs, when this is not actually the case.
- c. Identify mechanisms for frequent monitoring of pathway outcome, balance, and process measures. Ideally, this would take the form of a data dashboard that does not require labor-intensive manual chart review. We hypothesize that the primary barrier to pathway utilization within the ED was our team’s inability to monitor uptake in real time. Had such data been available, it could have facilitated continuous reinforcement of pathway uptake within the ED.

KEY SUMMARY

- a. Despite the ubiquity of ED presentations for renal colic, the emergency care of these patients is not widely standardized.
- b. A stone care pathway and associated order set can link evidence-based recommendations to daily practice.
- c. Despite low pathway utilization (20-40%), implementation in our institution resulted in improved rates of low dose CT KUB, prescription of guideline-concordant pain medication, and discharge supplies.

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