

Non-narcotic Emergency Management of Renal Colic Improves Length of Stay and Discharge Rate

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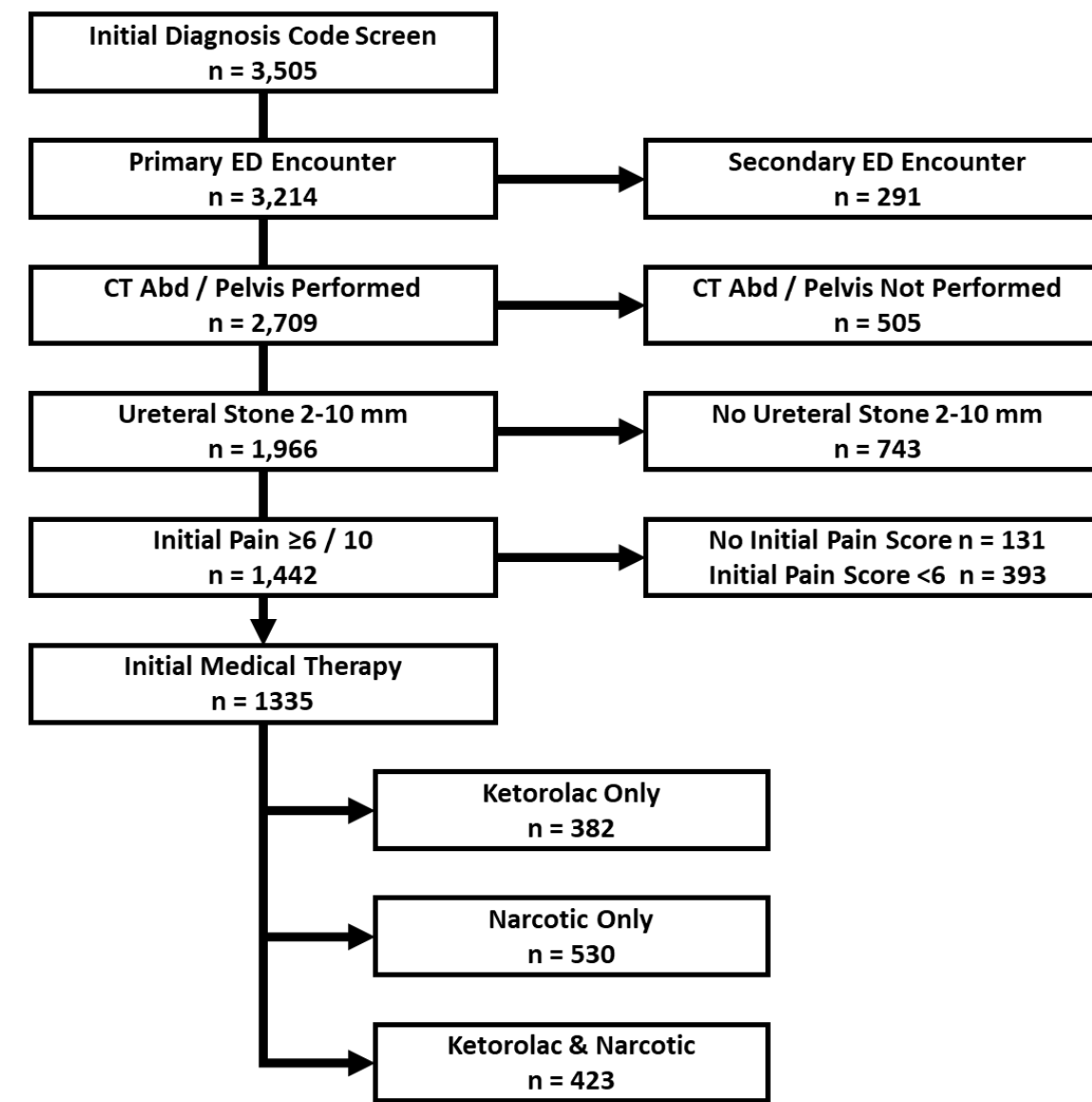
Introduction

NSAIDs in general, and ketorolac in particular, have been recognized to be more effective in acute management of renal colic than narcotics for more than 25 years. However, narcotics remain a mainstay of ED symptom control.

Examination of the precipitants of the current opioid crisis, reveals that many can trace dependency to initial iatrogenic opioid exposure. Stone patients are at particular risk because of the recurrent severely symptomatic episodes and procedures.

We report ED care patterns in a large metropolitan US health system. Patients were identified by ED billing code query between 6/2014 – 12/2016

Patient Flow



Likelihood of Receiving “Rescue” Analgesia

| Parameter | Predictor | Referent | Odds Ratio | 95% C.I. | p |
|--------------------------|-----------|----------|------------|-----------|--------|
| Sex | Male | Female | 0.76 | 0.6-0.97 | 0.028 |
| | Female | Male | 1.32 | 1.05-1.63 | 0.019 |
| Age | <30 y | 30-65 y | 0.98 | 0.69-1.39 | 0.939 |
| | >65 y | 30-65 y | 0.67 | 0.47-0.96 | 0.032 |
| Stone location | Proximal | Distal | 1.02 | 0.78-1.32 | 0.869 |
| | Distal | Proximal | 0.98 | 0.75-1.27 | 0.939 |
| Stone size | <4 mm | 4-6 mm | 1.1 | 0.85-1.42 | 0.459 |
| | >6 mm | 4-6 mm | 1.05 | 0.71-1.56 | 0.789 |
| Initial ED pain | 7 | 6 / 10 | 1.02 | 0.61-1.71 | 0.913 |
| | 8 | 6 / 10 | 1.08 | 0.68-1.73 | 0.724 |
| | 9 | 6 / 10 | 1.49 | 0.92-2.4 | 0.101 |
| | 10 | 6 / 10 | 1.77 | 1.13-2.77 | 0.012 |
| CT IV contrast | Yes | No | 1.05 | 0.73-1.51 | 0.755 |
| CT ordered | <1 hour | >1 hour | 0.53 | 0.39-0.72 | <0.001 |
| Time to first medication | <1 hour | >1 hour | 2.95 | 2.19-3.98 | <0.001 |
| Initial management | NO | KO | 4.81 | 3.54-6.54 | <0.001 |
| | KN | KO | 1.37 | 1.01-1.85 | 0.037 |

KO = ketorolac only
NO = narcotic only
KN = ketorolac & narcotic

Likelihood of Admission to Hospital

| Parameter | Predictor | Referent | Odds Ratio | 95% C.I. | p |
|--------------------------|-----------|----------|------------|-----------|--------|
| Sex | Male | Female | 0.55 | 0.37-0.8 | 0.002 |
| | Female | Male | 1.82 | 1.35-2.45 | 0.000 |
| Age | <30 y | 30-65 y | 0.21 | 0.07-0.61 | 0.004 |
| | >65 y | 30-65 y | 2.68 | 1.72-4.17 | 0.000 |
| Stone location | Proximal | Distal | 1.07 | 0.71-1.61 | 0.736 |
| | Distal | Proximal | 0.94 | 0.67-1.31 | 0.736 |
| Stone size | <4 mm | 4-6 mm | 0.51 | 0.33-0.8 | 0.004 |
| | >6 mm | 4-6 mm | 1.79 | 1.06-3 | 0.027 |
| Initial ED pain | 7 | 6 / 10 | 0.63 | 0.26-1.5 | 0.300 |
| | 8 | 6 / 10 | 1.15 | 0.54-2.44 | 0.701 |
| | 9 | 6 / 10 | 0.77 | 0.35-1.69 | 0.519 |
| | 10 | 6 / 10 | 1.26 | 0.62-2.57 | 0.509 |
| CT IV contrast | Yes | No | 0.91 | 0.53-1.54 | 0.729 |
| CT ordered | <1 hour | >1 hour | 0.66 | 0.43-1.02 | 0.067 |
| Time to first medication | <1 hour | >1 hour | 0.91 | 0.59-1.41 | 0.687 |
| Initial management | NO | KO | 4.06 | 2.25-7.33 | <0.001 |
| | KN | KO | 2.04 | 1.06-3.93 | 0.031 |

KO = ketorolac only
NO = narcotic only
KN = ketorolac & narcotic

Patient Characteristics

| Initial Medical Management | Ketorolac Only | Narcotic Only | Ketorolac and Narcotic | p |
|----------------------------|------------------------|--------------------------|------------------------|--------|
| N | 382 (29%) | 530 (40%) | 423 (32%) | |
| Male (%) | 217 (56%) | 297 (56%) | 267 (63%) | 0.064 |
| Age (y) (mean±SD) | 45.5±14.1 ^b | 51.4±16.7 ^{a,c} | 46.7±13.8 ^b | <0.001 |
| <30 | 60 (32%) | 71 (38%) | 55 (29%) | <0.001 |
| 30-65 | 292 (30%) | 342 (35%) | 330 (34%) | |
| >65 | 30 (16%) | 117 (63%) | 38 (20%) | |
| Distal location | 242 (63%) | 351 (66%) | 273 (64%) | 0.659 |
| Average stone size (mm) | 4.1±2.0 | 4.1±1.9 | 3.9±1.8 | 0.124 |
| 2-3 mm | 187 (28%) | 247 (37%) | 217 (33%) | 0.316 |
| 4-6 mm | 142 (27%) | 219 (41%) | 164 (31%) | |
| >6 mm | 53 (33%) | 64 (40%) | 42 (26%) | |
| Average initial pain score | 8.3±1.3 ^{b,c} | 8.6±1.3 ^{a,c} | 8.9±1.2 ^{a,b} | <0.001 |
| 6/10 | 47 (39%) | 48 (40%) | 23 (19%) | <0.001 |
| 7/10 | 63 (35%) | 74 (42%) | 39 (22%) | |
| 8/10 | 102 (33%) | 117 (38%) | 85 (27%) | |
| 9/10 | 70 (27%) | 97 (38%) | 88 (34%) | |
| 10/10 | 100 (20%) | 194 (40%) | 188 (39%) | |

a = different from ketorolac only
b = different from narcotic only
c = different from ketorolac & narcotic

Care Parameters

| Initial Medical Management | Ketorolac Only | Narcotic Only | Ketorolac and Narcotic | p |
|---|------------------------|------------------------|------------------------|--------|
| N | 382 (29%) | 530 (40%) | 423 (32%) | |
| Time to first medication (hrs) (mean±SD) | 1.1±0.8 ^{b,c} | 1.2±0.9 ^{a,c} | 0.9±0.7 ^{a,b} | <0.001 |
| First medication prior to CT | 352 (92%) | 478 (90%) | 412 (97%) | <0.001 |
| CT ordered within 1 hour | 273 (71%) | 327 (62%) | 329 (78%) | <0.001 |
| CT with contrast | 39 (10%) | 126 (24%) | 20 (5%) | <0.001 |
| Ondansetron administered | 228 (59%) | 394 (74%) | 318 (75%) | <0.001 |
| Any rescue medication | 138 (36%) | 369 (69%) | 197 (46%) | <0.001 |
| Any rescue narcotic | 138 (36%) | 278 (52%) | 197 (46%) | <0.001 |
| Any narcotic | 138 (36%) | 530 (100%) | 423 (100%) | <0.001 |
| ED length of stay average (hrs) (mean±SD) | 3.4±1.1 ^b | 4.0±1.3 ^{a,c} | 3.4±1.3 ^b | <0.001 |
| ED length of stay <3 hours | 154 (40%) | 104 (19%) | 181 (42%) | <0.001 |
| ED discharge | 367 (96%) | 442 (83%) | 391 (92%) | <0.001 |

a = different from ketorolac only
b = different from narcotic only
c = different from ketorolac & narcotic

Likelihood of ED length of Stay >3 hours

| Parameter | Predictor | Referent | Odds Ratio | 95% C.I. | p |
|--------------------------|-----------|----------|------------|-----------|--------|
| Sex | Male | Female | 0.63 | 0.48-0.84 | 0.002 |
| | Female | Male | 1.59 | 1.21-2.08 | 0.000 |
| Age | <30 y | 30-65 y | 0.54 | 0.36-0.8 | 0.002 |
| | >65 y | 30-65 y | 1.28 | 0.81-2.04 | 0.279 |
| Stone location | Proximal | Distal | 1.15 | 0.85-1.56 | 0.358 |
| | Distal | Proximal | 0.87 | 0.65-1.15 | 0.358 |
| Stone Size | <4 mm | 4-6 mm | 0.78 | 0.58-1.04 | 0.100 |
| | >6 mm | 4-6 mm | 1.23 | 0.75-2.03 | 0.396 |
| Initial ED Pain | 7 | 6 / 10 | 0.79 | 0.44-1.43 | 0.452 |
| | 8 | 6 / 10 | 0.94 | 0.54-1.62 | 0.824 |
| | 9 | 6 / 10 | 1.01 | 0.57-1.78 | 0.952 |
| | 10 | 6 / 10 | 1.24 | 0.73-2.11 | 0.416 |
| CT IV contrast | Yes | No | 2.21 | 1.39-3.5 | 0.001 |
| CT ordered | <1 hour | >1 hour | 0.13 | 0.08-0.21 | <0.001 |
| Time to first medication | <1 hour | >1 hour | 0.45 | 0.32-0.64 | <0.001 |
| Initial management | NO | KO | 1.88 | 1.33-2.66 | <0.001 |
| | KN | KO | 0.99 | 0.71-1.39 | 0.996 |

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Conclusions

1. Ketorolac monotherapy was associated with superior length of stay and discharge rates
2. Offering ketorolac to more patients could improve outcomes and reduce opioid exposure