ARTICLE:
- Citation:
- Country:
  - U.S. of A
- Funding Sources:
  - Not mentioned

PURPOSE:
- Research Question(s):
  - What is the efficacy of PCA in the ED and is there a difference in patient satisfaction and / or clinical outcomes versus traditional analgesia delivery.
  - Hypothesis: 1) that PCA would provide greater short-term pain relief and be associated with less overall pain during the entire 2-hour study period when compared to non-PCA physician-administered analgesia. 2) that patients who received a higher demand dose of morphine via PCA would experience greater short-term pain relief and less overall pain than those with a lower demand dose.

DESIGN:
- Study Design:
  - randomized
  - prospective
  - three arms (2 PCA regimens, 1 “control” physician directed analgesia)
- Dependent / outcome Variable(s):
  - satisfaction with pain treatment,
  - desire for the same treatment in the future,
  - need for additional analgesia
- Independent / research Variable:
  - Morphine analgesia via either physician discretion or PCA
SETTING / SUBJECTS:
- **Research Setting:**
  - Urban ED with 75,000 annual adult visits (NYC)
- **Subjects:**
  - Adult ED patients with abdominal pain
- **Study population:**
  - Predominately African-American and Hispanic and female
- **Inclusion / Exclusion criteria:**
  - **Inclusion:** Patients age 18 to 65 years presenting to the ED between April 3, 2009, and June 30, 2010, with a chief complaint of abdominal pain of at most 7 days’ duration, and deemed by the ED attending physician to require IV opioid analgesia, were eligible for inclusion.
  - **Exclusion:** Exclusion criteria were use of prescription or nonprescription opioids within 24 hours; long-term use of opioids or chronic pain syndrome; clinician suspicion of opioid dependence or abuse; clinical suspicion of intoxication; pregnancy or breastfeeding; history of chronic obstructive pulmonary disease, sleep apnea, renal insufficiency, or renal failure; oxygen saturation of < 97% on room air or systolic blood pressure (sBP) < 100 mm Hg on presentation; use of monoamine oxidase inhibitors, phenothiazines, or tricyclic antidepressants; prior allergic reaction to morphine; inability to provide informed consent; and previous entry into the study
- **Number (control / intervention groups):**
  - 210 total, non-PCA=69, PCA1= 67, PCA 2=70
- **Demographics:**
  - Table 1: 65 men, 141 women, 124 hispanic, 56 black, 12 white, 14 Asian
- **Attrition:**
  - 1 withdrew after chest pain from loading dose of morphine

METHODS:
- **Interventions:**
  - Non-PCA (Control) group consisted of administration of a bolus of 0.1 mg/kg IV morphine and physician-managed analgesic supplementation as needed.
  - PCA1: consisted of administration of a loading dose bolus of 0.1 mg/kg IV morphine and a PCA demand dose of 1.0 mg IV morphine with a lockout interval (time from the end of delivery of one dose until the PCA pump will respond to another patient demand for analgesia) of 6 minutes and supplemental physician-managed analgesia as needed.
PCA2: consisted of administration of a loading dose bolus of 0.1 mg/kg IV morphine and a PCA demand dose of 1.5 mg IV morphine with a lockout interval (time from the end of delivery of one dose until the PCA pump will respond to another patient demand for analgesia) of 6 minutes and supplemental physician-managed analgesia as needed.

Measurements
- The NRS pain intensity measurement was administered at baseline (prior to morphine loading dose) and at 30, 60, 90, and 120 minutes from the end of the loading dose administration.
- Nausea, vomiting, and pruritus during each time period were ascertained by patient report and recorded every 30 minutes.
- Sedation was measured using a modified Ramsay Sedation Scale recorded every 30 minutes.
- Results of oxygen saturation, RR, and blood pressure measurements as well as any necessary interventions for adverse events were recorded by the nurse every 10 minutes.
- 24 follow-up by phone to assess for rebound
- At study completion, satisfaction was assessed by having the research associate ask patients, “How satisfied are you with the result of your pain treatment overall?” using the scale ‘very dissatisfied,’ ‘dissatisfied,’ ‘uncertain,’ ‘satisfied,’ and ‘very satisfied.’ Patients were asked, “If you were to come to the ED again with the same kind of pain, would you like the same pain management that you had today?” and “Do you want more pain medication?”

DATA ANALYSIS:
- Statistics Used:
  - AUC
  - ANOVA,
- What, if any, variables were controlled for?:
  - No controls mentioned

RESULTS:
- Brief answers to research questions:
  - No change in short term analgesia (30 min) between all three groups
  - PCA was associated with greater improvement of pain score, and overall decrease of mean pain during treatment time
  - The higher dose PCA was most effective anecdotally, but results did not support superiority of a 1.5-mg PCA bolus dose over 1 mg.
  - Total mean amount of morphine received by patients in the two PCA groups was very similar.
  - The occurrence of side was not significantly different between the groups
  - Satisfaction was much higher in the PCA groups
• **Additional findings:**
  o none

• **Other possible explanation for findings:**
  o Prescriber bias (see limitations)

• **Limitations:**
  o Unblinded investigators and patients
  o Only abdominal pain included
  o Close attention of research nurse may not reflect typical flow in busy ED
  o Heavily Hispanic and female study population
  o Did not study chronic pain or chronic opioid users
  o Only one setting--practice specific variances in pain management bias

**IMPLICATIONS FOR PRACTICE:**

• **Applicable to this clinical practice:**
  o Pain management and patient satisfaction are both “headline” goals in our ED right now
  o Could potentially reduce physician burden

• **Feasible (cost, resources, etc):**
  o Cost of PCA machine
  o Deciding which patients are PCA-able

• **Clinically Relevant:**
  o Reconsider our pain management strategy. If nothing else the authors note to all of us: “Sustained use of PCA beyond the loading dose by patients in the PCA groups supports prior reports that a 0.1 mg/kg dose of morphine is not adequate for many patients.”

**LEVEL OF EVIDENCE / DECISION FOR USE:**

• **Background**

  • **Consider Replication**

  • **Ready for use**

• **Level of Evidence:**

  □ Ia  Evidence obtained from meta-analysis of randomized controlled trials
  □ Ib  Evidence obtained from at least one RCT
  □ IIa Evidence obtained from at least one well-designed controlled study without randomization
  □ IIb Evidence obtained from at least one other type of well-designed quasi-experimental study
  □ III Well-designed non-experimental studies
  □ IV Expert committee reports, opinions of experts