and intracranial bleeds, among others. The primary outcome was a missed clinical injury, defined as an injury missed by clinical exam but identified on imaging.

During this study, 2,929 patients were enrolled. 2,058 patients were identified as having at least one DI. Of the 2,929 patients enrolled, cervical spine injuries were found on CT in 222 patients (7.6%). Of the entire study population, clinically-missed cervical spine injuries occurred in 25 patients (0.8%), and the study found no significant difference in the rate of clinically missed cervical spine injuries between those with and without a DI. Study patients with a DI were significantly less likely to have a cervical spine injury than patients without a distracting injury (6.6% vs. 10.0%, p= 0.0016). In regards to detecting cervical spine injury, physical exam was 89.6% and 87.4% sensitive in those with and without a DI, respectively. Physical exam was 88.7% and 78.0% specific in those with and without DI, respectively. The negative predictive value of a negative physical examination was 99.2% and 98.2% in patients with and without a DI, respectively. The positive predictive value of a positive cervical spine examination was 35.8% and 30.8% in patients with and without a DI, respectively.

The authors of this study concluded that a distracting injury in an awake and alert patient with a GCS of at least 14 should not exclude them from having cervical spine clearance based on a negative physical exam in the setting of blunt trauma. The authors state there is no evidence to support the use of radiographic imaging of the cervical spine in all patients with a distracting injury, and that the adoption of more evidence-based practice could help curb resource over-utilization and costs.

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Comment: This is the first multi-center prospective study attempting to debunk the theory that a distracting injury makes our clinical exam for cervical spine injury less reliable in blunt trauma. These data add to the growing body of evidence that distracting injury may not be truly distracting, and that possibly those with distracting injury actually have a lower prevalence of cervical spine injuries overall. The overall number of missed injuries is concerning, however, as it is higher than expected and threatens the generalizability of this study to other sites.

☐ EFFECT OF INTRANASAL KETAMINE VS FENTANYL ON PAIN REDUCTION FOR EXTREMITY INJURIES IN CHILDREN: THE PRIME RANDOMIZED CLINICAL TRIAL.

Frey TM, Florin TA, Caruso M, et al. *JAMA Pediatrics*. 2019;173(2):140-146

Extremity injuries in children are a common presenting complaint in the Emergency Department. Inadequate pain control in children is a continued problem, in part due to increased time to obtain intravascular access compared to adult patients. The intranasal route is a rapid-acting alternative route for pain control. Ketamine is a promising alternative to opioids in situations in which opioids are contraindicated or confer increased risk, such as prior to procedural sedation. Current studies comparing intranasal ketamine to fentanyl are limited by conservative dosing and coadministration of other forms of pain control.

The objective of this prospective double-blinded randomized clinical trial was to demonstrate that intranasal ketamine is not inferior to intranasal fentanyl for pain control in extremity injuries in children. Children 8-17 with an acute extremity injury and a visual analogue scale (VAS) scores greater than 35mm (moderate to severe pain) who had not received opioids prior to arrival were selected. Exclusion criteria included inability to obtain a VAS score, Glasgow coma scale (GCS) less than 15, significant injury to the head or trunk, abnormal nasal anatomy or nasal trauma, epistaxis, allergy to one of the study agents, in police custody, and postmenarchal girls who did not have a documented negative pregnancy test. Subjects were randomized to receive either 1.5 mg/kg of intranasal ketamine or 1.5 mg/kg of intranasal fentanyl. All ED and study staff involved were blinded as well as patients and their families. Medications were delivered in de-identified syringes containing premixed weight-based doses rounded to the nearest 0.1 mL. Baseline VAS scores were recorded and scores were monitored at 15, 30, and 60 minutes post-administration. Video monitoring provided continuous vitals for the first 15 minutes post-intervention. Patients were monitored for 120 minutes total for adverse events and abnormal vital signs. A non-inferiority margin of 10mm was chosen for statistical analysis of the primary outcome of reduction of VAS 30 minutes after medication administration. Secondary outcomes included adverse events experienced, change in vital signs, level of sedation achieved, and rescue analgesia requirements.

Ninety patients were randomized. Five participants dropped out of the study, leaving 43 patients randomized to the ketamine group and 42 randomized to the fentanyl group. At 15, 30, and 60 minutes, both groups experienced significant pain reduction at each time interval with similar reduction in pain in both groups and with no difference in the use of additional rescue analgesics. For the primary outcome, intranasal ketamine was noninferior to intranasal fentanyl for pain control at 30 minutes post-treatment. The ketamine VAS difference was −30.6mm (95% CI −35.8 to −25.4), compared to the Fentanyl VAS difference of −31.9mm (95% CI of −37.2 to −26.6). The ketamine group did experience more adverse events with 77% of patients experiencing at least one compared to 31% in the Fentanyl group, but these events were considered minor and self-limited. There was no significant difference in vital sign changes between the two groups and no vital sign changes that required intervention. Highest achieved sedation scores were also not significantly different between groups, with no scores above a two on the Michigan Sedation Scale score.

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The authors suggest that ketamine is noninferior to opioids for analgesia and although ketamine may cause more side effects, these were considered transient and minor. They conclude that ketamine would be a good alternative to opiates in the setting of acute fractures in pediatric patients.