DEM Journal Club

# Article Appraisal

**Article:** A comparison of acute treatment regimens for migraine in the emergency department.
Bachur RG, Monuteaux MC, Neuman M. A comparison of acute treatment regimens for migraine in the emergency department. Pediatrics. 2015 Feb;135(2):232-8.

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## Background and Study Objective(s):

As quoted in this study, pediatric migraine prevalence ranges between 8-23% by age 15. This may lead to morbidity through missed school, reduced participation in sports, and depression. Few studies address pediatric migraine in the emergency department (ED) and there is only one controlled trial to date. Most of the current pediatric ED migraine treatments are taken from pediatric outpatient settings or adult data.

To further the literature, this study's objective is to evaluate the relationship between acute medications/combinations and ED revisits. Their primary outcome was ED revisits within 3 days for initially discharged patients. Their primary analysis examined the individual medications/treatment regimens and the risk of revisit.

## Study Design:

A large, retrospective comparative effectiveness study was designed using the Pediatric Health Information System administrative database. Children, ages 7-18 years old, with the principle diagnosis of migraine were selected from 35 American academic children's hospital EDs between 2009-2012. Children with complex comorbid conditions such as cystic fibrosis, congenital heart disease, myopathies, sickle cell disease, and hospital transfer were left out.

A logistic regression model evaluated the relationship between treatments and revisit rate using the following: dependent variable - revisit status, the primary predictor - treatment regimen, the referent - nonopioid analgesic treatment only, and the covariants - gender, age, race, insurance status, IV fluid tx, lumbar puncture, CT, MRI, Severity Classification System (SCS) score. All tests were two tailed with an alpha of 0.05. Clustered sandwich SE estimates were added to account for intrahospital correlation.

## Results:

The study evaluated 32,124 patients, age 7-18 years old, with a principle diagnosis of migraine. A significant portion of patients did not receive treatment at all (19.6%) but when treated, the most common used medications were nonopioid analgesics 66%, dopamine receptor antagonists 50%, and diphenhydramine 33%. Ondansetron was given as part of 21.1% treatment regimens despite being recommended for migraine treatment. Triptan use was minimal

at 3.1% of all patients despite previous studies showing effectiveness in outpatient pediatric settings. Lastly, opioid administration was appropriately low (5.6%) as it is not recommended in migraine ED treatment.

A total of 85% of patients were initially discharged from the ED and applicable for the 3 day revisit analysis. The revisit rate was 5.5% with a median time of 2 days. Atypical abortive migraine medication and combination medication treatments saw higher revisit rates. Overall, procholoperazine (Stemetil) was better at preventing revisits compared to metoclopramide (Maxeran) with an odds ratio of 1.31 (CI 1.11-1.55) favouring Stemetil. Lastly, all combinations involving diphenhydramine (Benadryl) had increased rates of revisit compared to the same agent without Benadryl (OR ranging 1.15-1.4).

## Validity of Results:

The use of a large administrative dataset inherently presents validation challenges. Though the 35 hospitals in the study were said to have gone through "a more detailed validation of ED data", there was little explanation on how this was done.

The dataset itself was met with limitations, as it was administrative data without patient-level clinical information. Thus, the following presentation factors were not accounted for: pre ED medication, migraine severity, acute vs chronic migraine, discharge medications/treatments prescribed. Similarly, the dataset could not account for the reason for revisit within 3 days and was limited only to return visits to the same institution (preventing capture of return visits to other sites and to primary care). The assumption was made that all diagnositic tests and treatments were for the evaluation/treatment of migraine and all revisits within 3 days were counted regardless of return principle diagnosis.

Confounder correction was attempted through removal complex children and covariant correction. Further cofounders are Benadryl use (treatment vs EPS prophylaxsis?) and IV fluids (treatment vs hypotension prophylaxsis?). Lastly, the 3 day return time may not fully capture all migraine returns or EPS symptoms as both can extend beyond 3 days.

The logistic regression modelling used was poorly described. There was no mention of the specific type of regression, or any use of propensity methodology to compensate for the lack of randomization. Clustered sandwich SE estimates were added to account for intrahospital variability.

## Generalizability of Results:

In addition to validity limitations, ED practice variation and drug availability limit the generalizability. This study takes place in American pediatric EDs but the size and locations are not specified. Of note, 21.5% of the study population was of black race; clearly higher than most Canadian cities. The study reports similar migraine admission rates (15%) compared to previous studies. However, with the difference in practice patterns between Canadian and American EDs, the Canadian admission rate of pediatric migraines appears to be much lower. Lastly, dopamine receptor antagonist availability is often limited to metochlopramide (Maxeran) as prochlorperazine (Stemetil) is not used routinely or is not always available.

## The Bottom Line:

This is an incredibly large, novel study on pediatric migraine in the emergency department; however, it is limited by the challenges of administrative datasets, unmeasured cofounders and poor logistic regression modelling without strengthening propensity methodology. The results here are hypothesis generating and important for furthering studies to address optimal pediatric migraine management in the ED. Future studies are needed comparing prochlorperazine (Stemetil) and metoclopramide (Maxeran), diphenhydramine (Benadryl) and the rate of return, and pediatric ED triptan use.