Analysis of Pediatric Opiate Usage after State Mandated Opioid Prescription Regulations.

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Background

In response to the opioid epidemic, national prescription rates for opiates decreased by 41.4% from 2010 to 2015.[1] Despite this decrease in prescriptions, since 2014-2015, heroin and fentanyl have overtaken both cocaine and prescription-related deaths,[2] likely due to people turning to illicit drugs, which are commonly adulterated with more powerful opiates such as fentanyl. The pediatric population is not excluded from risks associated with opioid use such as hyperalgesia, tolerance, and withdrawal. On the other hand, it is necessary to provide effective pain management in children who received major surgery in order to reduce sympathetic stress responses and to increase compliance with post-surgical physical therapy exercises. On July 1, 2018, Florida passed the **HB21 Controlled Substances Bill** to limit opiate prescriptions to a three-day supply (or seven-day supply with further justification).

Objectives

❖ Does HB21 affect the amount of opiates prescribed to post-surgical pediatric patients at Nemours?
❖ Does HB21 affect number of post-op refill requests (is the 3 or 7-day limit enough to manage post-op pain?)

Methods

❖ Nemours patients who received **Pectus Excavatum or Spine Scoliosis surgery**

❖ Ages 9-18 years old

❖ Exclusion Criteria: non-verbal, developmental delays, cerebral palsy, neuromuscular conditions with spasms, conditions with baseline pain unrelated to surgical need, patients receiving intrathecal morphine, patients who experienced adverse events during or after surgery

❖ Total sample size: N = 169

Pre-Law	Post-Law	Pectus Excavatum	Spine Scoliosis
82	87	48	121

❖ Study Design: **Retrospective chart review**

Predictor Variables				
Pre-Law vs. Post-Law	Post-op pain scores [0-10]	Demographics (age, sex, ethnicity)	BMI	Surgery type

Outcome Variables	
Morphine Milligram Equivalents (MME) Prescribed	Number of Refills Requested

❖ Data was collected from Nemours EMR database

❖ SPSS Software was used to run an independent t-test, Mann-Whitney U test, Chi-Squared test, multiple variable linear regression, logistic regression.

Results

Effect of HB21 law, ethnicity, surgery type, age, and BMI on MME prescribed

Model Predictors	B Coefficient	Coefficients Standard Error	P-Value	95% CI
Pre-Law vs. Post-Law	-123.2	21.9	P<.001	(-166.4, -80.0)
# Refills Requested	78.7	22.3	P<.001	(34.7, 122.7)
Surgery Type	62.2	24.5	.012	(13.9, 110.5)
	Adjusted R square		.182	

Multiple variable stepwise linear regression.

Effect of HB21 law on refill requests while accounting for various factors

Model	Odds Ratio (95% CI)	P-Value
Crude (Pre-law vs. Post-law)*	2.069 (1.047, 4.086)	.036
Adjusted (Law, Surgery Type, Age, Post-Op Pain Score)*	2.498 (1.192, 5.233)	.015
Age	1.424 (1.167, 1.738)	<.001

Binary logistic regression.
**The reference group for the models is pre-law and pectus excavatum.*

Effect of HB21 law on amount of MME prescribed

Surgery Type	P-Value (Sig 2-Tailed)	Mean Difference MME Taken Home (95% CI)
Pectus Excavatum	.119	-59.0 (-133,8, 15.8)
Spine Scoliosis	<.001	-129.4 (-183.3, -75.5)

Independent t-test.

Effect of HB21 law on refill requests in both surgery groups while accounting for age

Pectus Excavatum			Spine Scoliosis		
Model	Odds Ratio (95% CI)	P-Value	Model	Odds Ratio (95% CI)	P-Value
Crude (Pre-law vs. Post-law*)	1.600 (0.507, 5.054)	.423	**Crude** (Pre-law vs. Post-law*)	2.864 (1.151, 7.123)	.024
Adjusted (Law, Age, Post-Op Pain Score)*	1.819 (0.550, 6.021)	.327	**Adjusted** (Law, Age, Post-Op Pain Score)*	2.871 (1.093, 7.538)	.032
Age	1.120 (0.831, 1.508)	.457	**Age**	1.582 (1.216, 2.057)	.001

Binary logistic linear regression.
**The reference group for the models is pre-law.*

Chi-squared test showed an even demographic distribution between pre- and post-law groups. There was no significant effect of any predictor variables on post-op pain scores.

Discussion

The HB21 Controlled Substances bill has significantly reduced the amount of opiate pain medication that Nemours pediatric patients are prescribed post-surgery by an average of 123.2 MME (Morphine Milligram Equivalents). This is equivalent to patients receiving 123.2 mg less of Hydrocodone or Morphine, 30.8 mg less of Hydromorphone, or 821 mg less of Codeine compared to before HB21. **This corresponds to a 31% decrease in opiate prescriptions**. This effect is mainly attributed to the scoliosis group, who, on average, took home 129.4 fewer MME after the law was passed, while the pectus group saw no significant decrease. The CDC reports that after multiple opiate-prescribing interventions were introduced in Florida from 2010-2012, statewide opiate prescriptions decreased by 80% from 2010-2015.[3] Our study has a less dramatic decrease in opiate prescriptions since we focused only on the pediatric population undergoing major surgeries.

The three to seven-day limit supply of opiate medication seems to be sufficient for post-surgical pain management in the pectus excavatum group, but not in the scoliosis group; scoliosis patients had an increased number of refill requests after the law was passed. Regression analysis showed that surgery type significantly affected the number of MME prescribed, with scoliosis patients receiving more opiates than pectus patients. Regression analysis showed that the older the patient, the more likely they were to request a refill.

This study's time frame should be expanded in order to increase the sample size, as there may be an effect of the law on MME prescribed and number of refills requested in the Pectus group (N=48) that cannot be seen; there were far more patients in the Scoliosis group (N=121). Other studies have shown that the new state prescription laws have decreased opiate-related deaths. Future studies may be done to determine if there is a correlation between MME received inpatient versus MME prescribed outpatient to determine if inpatient pain management is associated with post-op pain management needs.

Conclusion

HB21 has significantly reduced the number of Morphine Milligram Equivalents that surgical patients at Nemours are prescribed to take home, which might reduce the potential for opiate abuse. This limitation on opiate prescription may be enough to manage post-surgical pain in certain surgery types, but not others, which warrants further research.

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