Implementation of an Algorithm for Improved Dexmedetomidine Weaning in Pediatrics

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Problem Statement

- Dexmedetomidine (DEX) is commonly used for intravenous continuous sedation in pediatric critical care
- DEX withdrawal syndrome (WS) is measured by tachycardia, hypertension, tremor and agitation
- Clonidine prevents and manages DEX WS
- Protocolized sedation weaning reduces morbidity from WS

Site Problem:

- Knowledge deficit and lack of standardized practice can be improved through use of evidence based algorithm
- Baseline data: DEX used in 24% of patients

Purpose and Goals

The purpose of this quality improvement project was to implement an evidence-based DEX weaning algorithm in a cohort of pediatric intensive care unit (PICU) patients

Process Goals:

- Nursing documentation of heart rate, blood pressure and assessment of tremor and agitation from Withdrawal Assessment Tool (WAT-1)
- Use and adherence to algorithm

Outcome Goals:

- WS incidence in patients weaned using algorithm

Methods

Setting: PICU in an urban quaternary academic medical center

Population: All patients newborn – 21 years ready to wean off DEX infusion were included

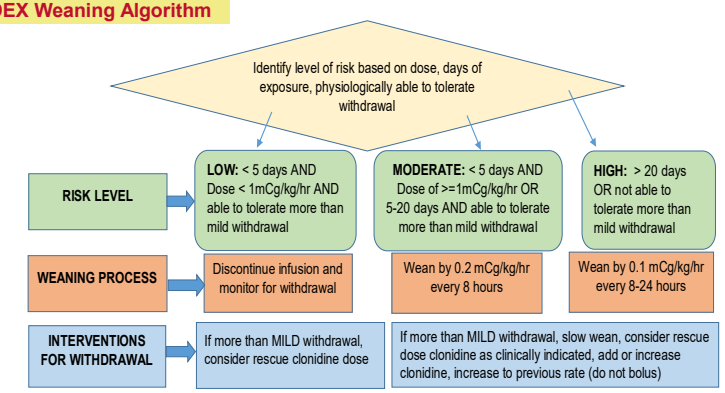
Intervention: Implementation of a WS risk-stratified DEX weaning algorithm developed at similar institution

Implementation Strategies:

- Creation of multidisciplinary team – 2 nurse practitioners, 1 attending physician, 1 pharmacist
- Education of all PICU nurses, nurse practitioners, residents, fellows, attendings and pharmacy staff
- Reference card with algorithm and WS assessment guide at bedsides, mobile workstations, and team workroom
- Weekly reminders to oncoming physician staff

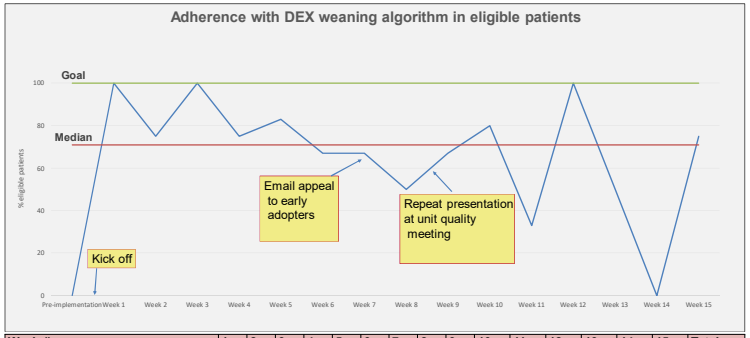
Measures: Chart audit used to measure documentation compliance, use of algorithm and number of patients with WS

DEX Weaning Algorithm



Adapted from "Weaning dexmedetomidine in non-ICU areas; an implementation effort" by Soludiuk et al., 2022, *Pediatric Critical Care Medicine*, 23(5), p.356.

Results



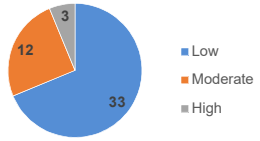
Week #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
# weaned by algorithm	1	3	2	4	5	2	2	1	2	4	2	2	2	0	3	35
# eligible patients/week	1	4	2	4	6	3	3	2	3	5	6	2	4	3	4	52

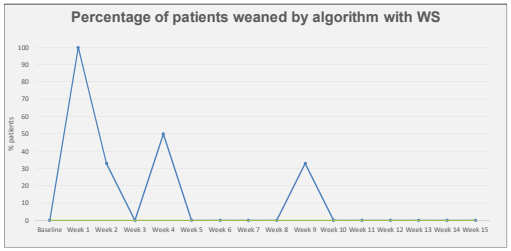
Algorithm Infidelity

Total number of patients on algorithm	N=48
Total number of patients with protocol violations	16 (33%)
1 violation	8 (17%)
2 violations	3 (6%)
3 or more violations	5 (10%)
Violation occurrences	**N=57**
Non-use	
Forgot	1 (2%)
Incorrect use/algorithm violations	
Altered weaning dose/intervals not based on algorithm	14 (25%)
Individual practice/provider discomfort	13 (23%)
Clonidine doses not based on algorithm/ clonidine not used	7 (12%)
Placed in wrong category	7 (12%)
Incorrect WS assessment	3 (5%)*
Continued DEX boluses	3 (5%)
Influence of pain team consultants	3 (5%)
Concern for respiratory depression/peri-extubation period	3 (5%)
Team discordance of patient meeting inclusion criteria	2 (4%)
Pump didn't go to 0.1, did not trouble shoot solution	1 (2%)

*Likely under reported due to retrospective chart audit

Number of patients by WS Risk
N=48





Discussion

Clinical Impact

- New approach to DEX weaning and WS assessment
- Adherence had variable results
- Algorithm could be adapted to nurse-driven approach

Successes

- Nursing documentation of vital signs and clinical WS parameters: median 100%
- Patients on algorithm experienced low rates of WS
- No algorithm failures (hemodynamic compromise)

Limitations

- Majority low WS risk patients limits sample conclusions
- Most algorithm noncompliance due to infidelity to protocol (algorithm was used but not followed correctly)– targeted education and experience needed
- Retrospective data collection limits determination of associations

Conclusions

- Embedding practice change takes >15 weeks
- Larger implementation team may improve success
- Data supports benefit, safety and applicability of model

References