

Jet Ventilation Algorithm Decreases Variations in Practice



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Background

Variations in practice for every discipline are common in most institutions based on training and previous experience. Our team sought to minimize those variation, improve patient outcomes, and provide best practice for the care of our infants by developing an algorithm for patients necessitating high frequency jet ventilation. Prior to the development and implementation of a new jet algorithm, patients were initiated on our conventional ventilation protocol and only converted to the jet as a rescue modality, most commonly in our smallest patients within the first few days of life. Furthermore, once the patient was placed on jet ventilation, startup settings varied widely between clinicians and the patients’ clinical status. Variations included starting with or without sigh rates, peak inspiratory pressure range of the sigh rate, peak inspiratory pressure range for jet ventilation, and jet rate. Our goal was to develop a first-intent jet algorithm for the highest-risk patients and to decrease variability between providers.

Aim

Reduce variations in ventilation practice for patients necessitating jet ventilation.

Setting

Urban hospital 60 bed level 3 NICU that has 700 NICU admissions and 120 very low birth weight (VLBW) infant admissions per year

Methods

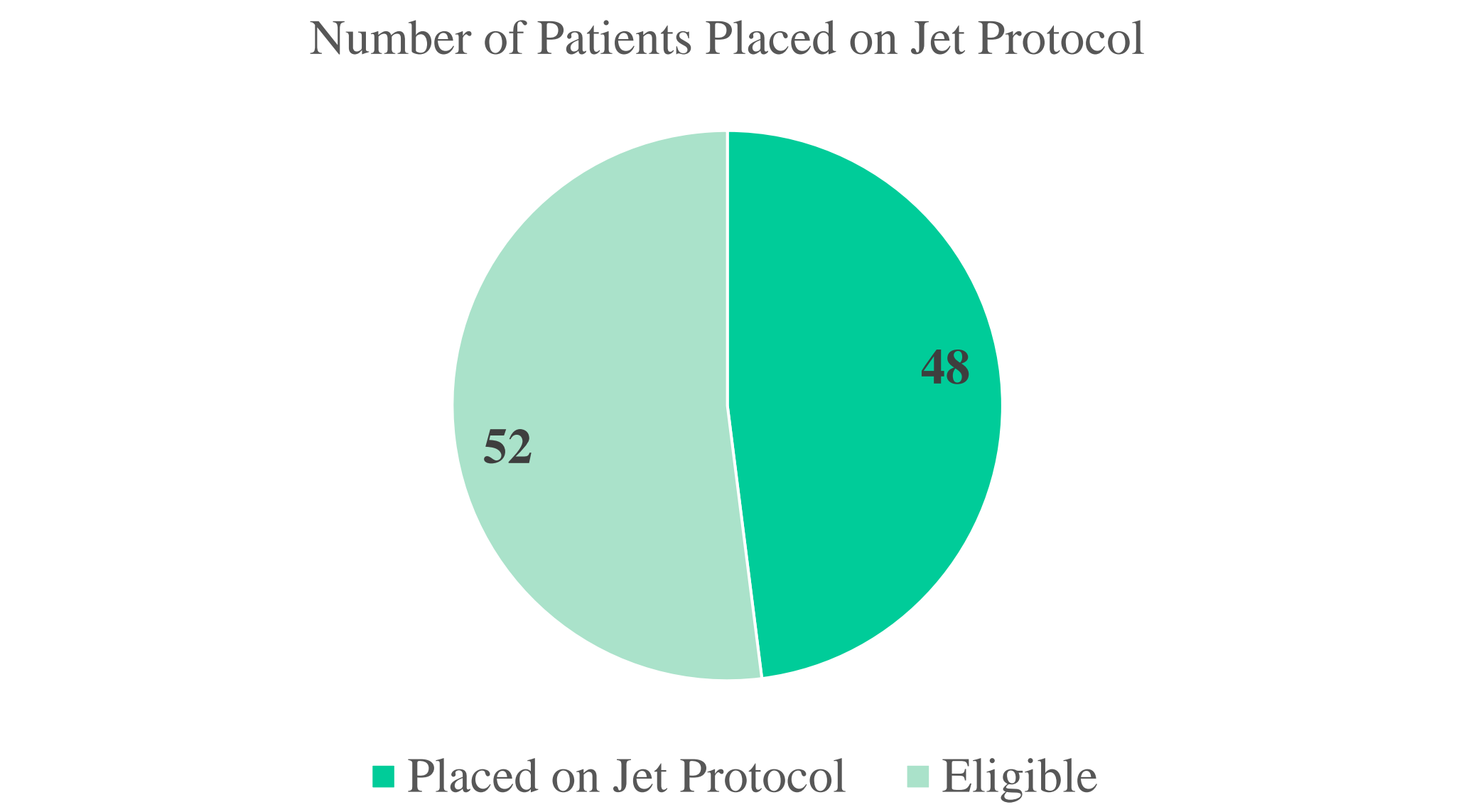
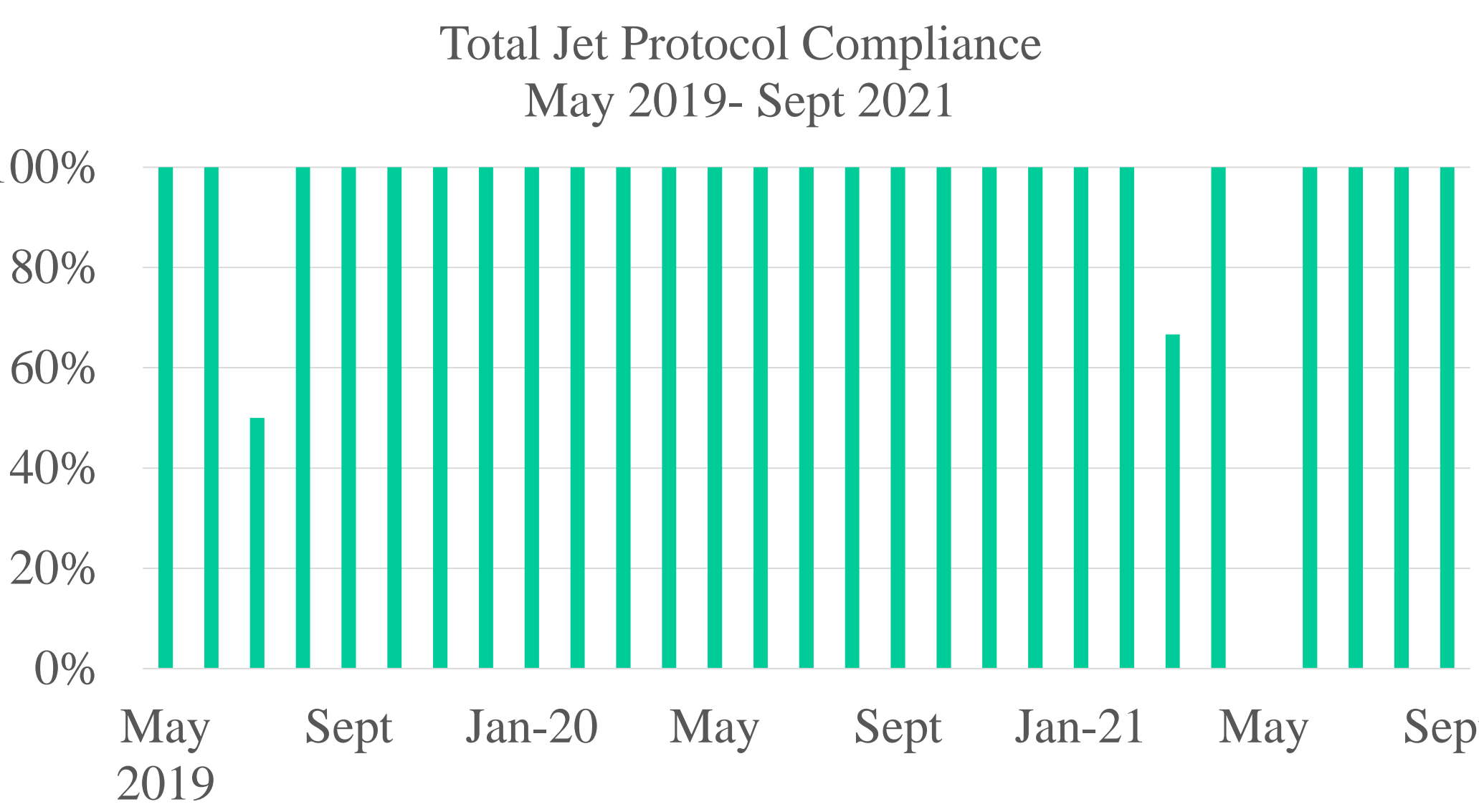
A multidisciplinary group was formed to develop a ventilation algorithm utilizing jet ventilation for patients with birth weight of 750g or less of any gestational age that required intubation at birth or within the first 72 hours of life. A literature search was performed to evaluate for potential algorithms and it was noted that a similar institution had publicly provided reference to their developed algorithm. We also consulted with that institution to assure we interpreted their algorithm correctly. Our team created an algorithm similar in nature but, focused on our own institution’s findings of that many infants less than 750g failed conventional ventilation. In May 2019, our first patient was placed on jet ventilation utilizing the algorithm as a first-intent mode of ventilation. After several PDSA cycles, slight variations have been made to the algorithm but nothing affecting the initial setup and implementation. Our primary process measure was compliance with the algorithm. Our primary outcome measure was the number of infants placed on the algorithm. Our balancing measure was the decrease in BPD.

Defining Measures of Change:

- Process measures
- Compliance with the algorithm
- Outcome measure
- Number of infants born less than 750g placed on the algorithm
- Balancing measure
- Decrease in the severity of Bronchopulmonary Dysplasia

Results

From May 2019 to September 2021, a total of 52 patients met criteria for inclusion of birth weight less than or equal to 750g for the jet algorithm. Of the 52 patients, a total of 48 (92%) of patients were appropriately placed on the High Frequency Jet Ventilation algorithm. A total of 4 patients were not placed on the Jet algorithm during this time; two were due to extremely low ventilation and oxygenation needs immediately after birth suggesting the patients would only need brief intubation and two due to not following the initial algorithm of placing the patient on invasive CPAP via the conventional ventilator and not utilizing sigh breaths. All other patients placed on the algorithm followed the initiation path.



Conclusions

Based on all clinicians initiating and adjusting based on algorithm there has been a decrease in the variations of and patient are prophylactically placed on jet ventilation. By implementing an algorithm this provides guidelines for inclusion, exclusion criteria, and adjustments based on oxygenation and ventilation needs of the patient.

References

1. Klein J. Management Strategies with High Frequency Jet Ventilation in Neonates. <https://uichildrens.org/health-library/management-strategies-high-frequency-jet-ventilation-neonates>.

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Disclosures

•None of the authors have anything to disclose