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Consensus guidelines for postnatal steroids in preterm infants with developing bronchopulmonary dysplasia: a quality improvement initiative

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Quality Improvement Abstract Title

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Other authors/contributors involved in project: Alain Cuna, MD

IRB Number (if applicable):

Describe role of Submitting/Presenting Trainee in this project (limit 150 words):

With aid of multidisciplinary team made a proposed consensus guideline and presented to the faculty in NICU. After, sent out anonymous voting survey. When accepted started following infants that met criteria for enrollment and tracked their progress. Sent just-in-time e-mail reminders to faculty and fellows. Recorded all data and graphed results.

Problem Statement/Question, Background/Project Intent (Aim Statement), Methods (include PDSA cycles), Results, Conclusions limited to 500 words

Problem Statement/Question:

To develop and implement consensus guidelines with regards to initial PNS treatment for developing BPD in high-risk infants.

Background/Project Intent (Aim Statement):

The American Academy of Pediatrics supports a selective strategy of postnatal steroid (PNS) treatment that targets infants at high-risk for developing bronchopulmonary dysplasia (BPD). However, the lack of evidence-based guidelines regarding optimal patient selection and timing of treatment has led to wide variation in clinical practice.

Aim: To develop and implement consensus guidelines with regards to initial PNS treatment for developing BPD in high-risk infants.

Methods (include PDSA cycles):

A multidisciplinary team was assembled to review evidence from existing literature as well as analyze local data regarding PNS use for BPD. Guidelines were drafted and presented to the staff at Children's Mercy NICU, and consensus was reached through an anonymous voting process. The Plan-Do-Study-Act

model of quality improvement was adopted to implement the finalized guidelines. The primary outcome measure was rate of compliance to guidelines, with a goal of $\geq 90\%$ adherence by December 31, 2018. We also looked at time to first PNS treatment, with a goal of starting treatment at 14-28 days of life.

Results:

Our consensus guidelines are presented in **Figure 1**. Implementation was limited to intubated infants ≤ 30 weeks gestation and ≤ 30 days of life. We adopted the Neonatal Research Network's online BPD outcome estimator to help identify high-risk infants for PNS treatment (**Figure 2**). Infants deemed high-risk by this tool were recommended for early treatment (defined as between 2-4 weeks of life) with a short course of low-dose dexamethasone. Retrospective chart review determined a baseline rate of compliance of 75% (n=34 over 8 month period). Following implementation of just-in-time e-mail reminders on day of life 14, 21, and 28, a compliance rate of 92% (n=16 over 4 month period) was achieved by December 2018 (**Figure 3**). Time to first PNS treatment was consistently under goal of 28 days other than two outliers (29 days and 41 days, **Figure 4**). In both cases there was concern for sepsis which appropriately caused delay in steroid treatment.

Conclusions:

Just-in-time e-mail reminder system is effective in facilitating implementation of consensus guidelines for PNS treatment, but is labor-intensive. Future aims include determining rate of mechanical ventilation at 36 weeks postmenstrual age (clinical outcome measure) and rate of repeat or rescue PNS (balancing measure).

Recommendations for Care:

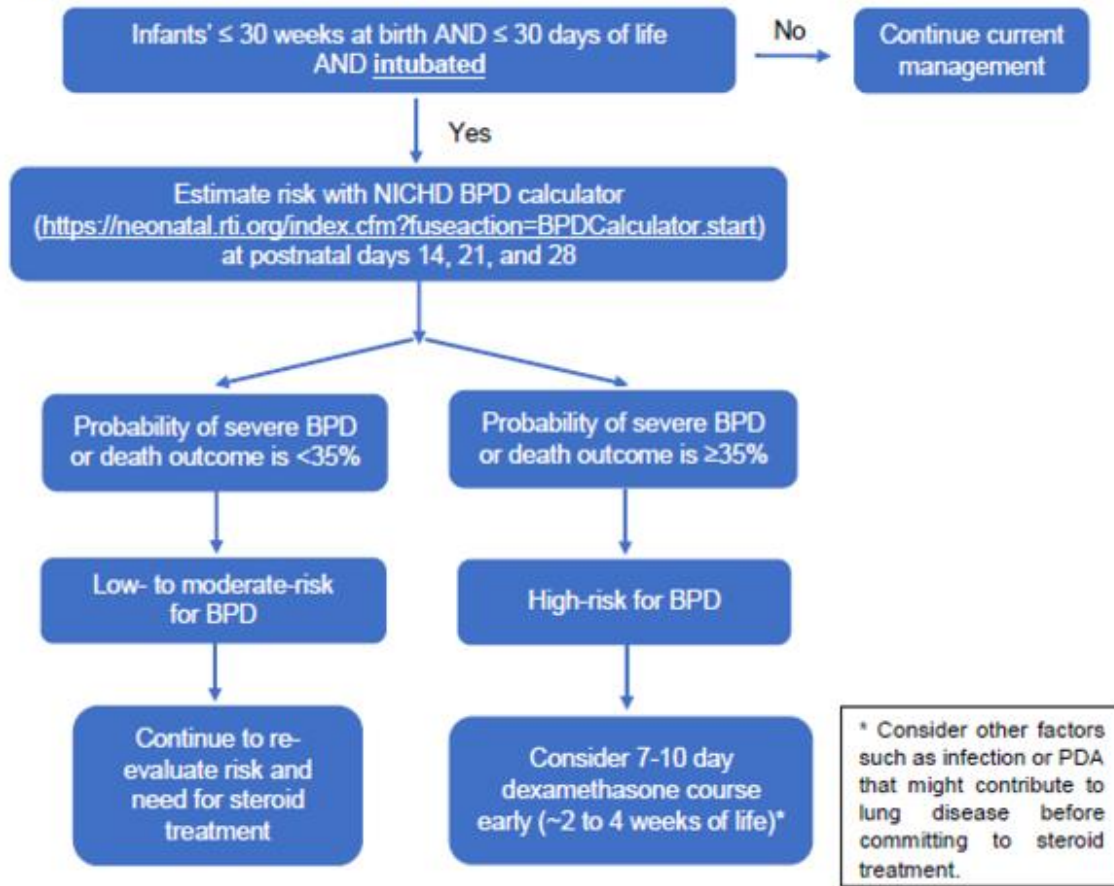


Figure 1. Consensus guidelines for initial postnatal steroid treatment of preterm infants with developing BPD

Neonatal BPD Outcome Estimator
 Infants with GA 23-30 weeks & Birth Weight 501-1249g

Gestational Age (Weeks)	24
Birth Weight (Grams)	600
Sex	Male
Race / Ethnicity	Black

Probability of Outcome
 (expressed as a percent)

Time Period	Ventilator Type	FiO2	Death	Severe BPD	Moderate BPD	Mild BPD	No BPD
Day 21	HF Vent	64	41.5	22.9	28.7	6.6	0.4

Hello,

Just a reminder with the BPD calculator Q1 one of your patients qualifies. The following patient __, MRN __ has a severe BPD risk/death of __% and if appropriate with his/her clinical course would recommend starting on dexamethasone. Attached are the recommendations per proposed guidelines.

Fig 2: Example of BPD outcome estimator calculation and just-in-time e-mail reminder. In this example, the infant has a combined risk of severe BPD or death of 64.4% at 21 days of life. Per our consensus guidelines, we would recommend him for early steroid treatment.

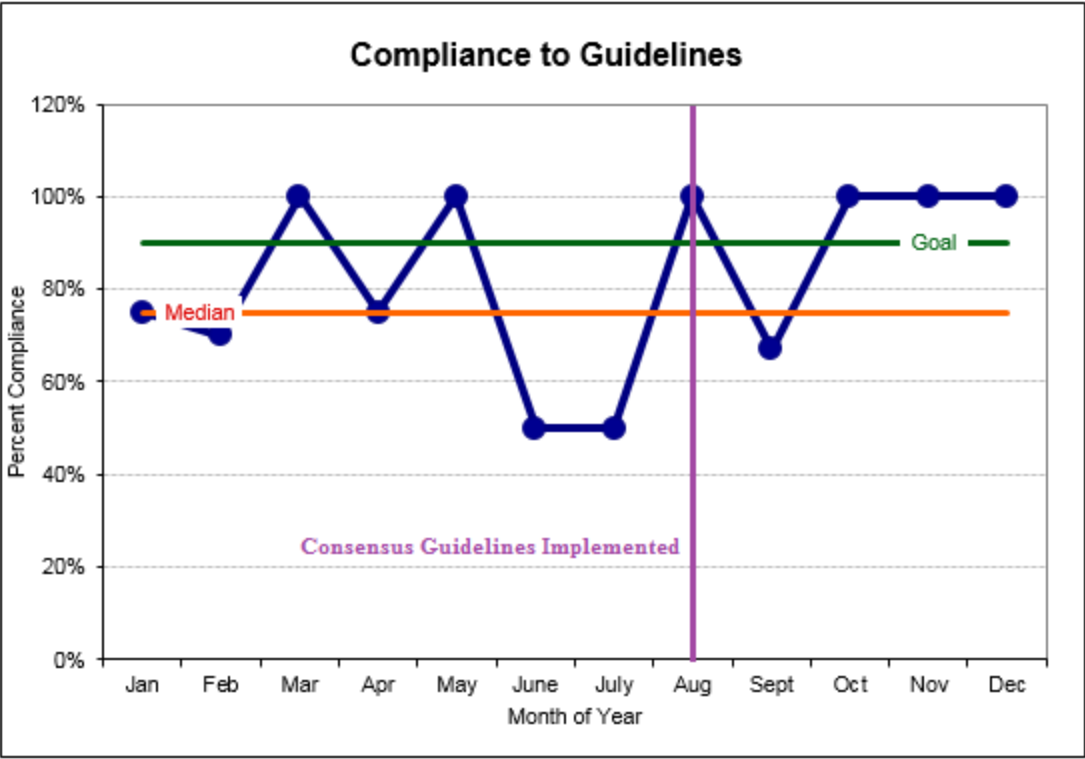


Figure 3: Run chart showing compliance to consensus guidelines. Baseline median rate of compliance was 75%. After implementation of guidelines (depicted by purple vertical line) and just-in-time e-mails, compliance increased to a median of 92%.

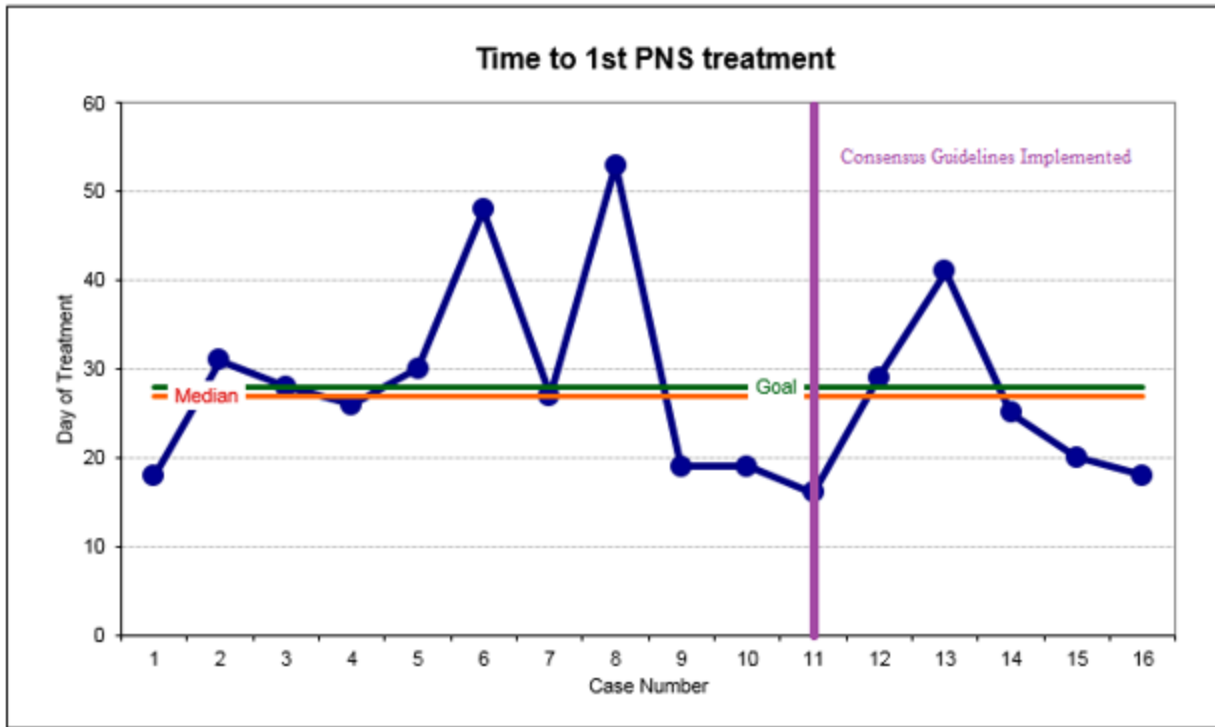


Figure 4: Run chart showing time to first postnatal steroid treatment for each case in the unit that qualifies per the guidelines. After implementation of guidelines (depicted by purple vertical line), 2 infants (case 12 and 13) received PNS treatment after the goal of 28 days. Upon chart review, these were deemed appropriate delays in treatment due to sepsis concerns.