Aim: To reduce the incidence of Retinopathy of Prematurity (ROP) in infants on supplemental therapeutic oxygen during their stay in the Neonatal Intensive Care Unit (NICU).

Setting: NICU at Jack D. Weiler Hospital, Montefiore Medical Center, Albert Einstein College of Medicine

Mechanisms: Hemoglobin saturation in oxygen-treated infants in the NICU was targeted and specific alarm limits were prescribed for all patients on supplemental oxygen. For full-term infants and those with pulmonary hypertension target O2 saturation was kept at > 95 %, while alarms were set at > 90%. For preterm infants < 32 weeks GA or <1500g, O2 saturation was targeted between 90% to 94%, and saturation alarms were set at 88-96%. For premature babies ≥ 32 weeks corrected GA or ≥1500g the target range was from 92% to 97%, while the saturation alarms were set at 90-98%.

Methods: A multidisciplinary approach was employed to implement this protocol. An oxygen targeting protocol using the parameters described above was developed based on available evidence. Specific order sets for respiratory settings were developed that matched the oxygen targets and alarm settings. Bedside cards were printed that indicate the patient’s oxygen target and alarm limits which were affixed to the cardiac monitor for all infants receiving supplemental oxygen. The on-service team made the decisions regarding the specific group that the patient fell in as the baby grew every week and changed the orders in the computer appropriately. During weekly audits, feedback was provided to nurses, respiratory therapy, and provider when the settings or orders were not compliant with the new policy. If a card was missing and/or an alarm setting did not concur with the policy, then the bedside nurse and medical team were informed and/or educated about the proper procedure. Missing orders in the EMR resulted in the on-service team being informed regarding this deficiency.

Measures: Over 10 months we audited the alarm settings on cardiac monitors and corresponding orders in the EMR for babies at weekly to biweekly intervals. Oxygen target range orders- upper and lower, pulse oximetry limit orders- upper and lower and alarms settings on cardiac monitors- upper and lower were the quality metrics that were looked on at every audit. Data was collected on babies who developed > stage 1 ROP, number of laser retinopexy and bevacizumab injections.

Data/Results: A total of 27 audits were performed starting November 15, 2013 through September 7, 2014. The alarm setting adherence to the policy during earlier half of the study was erratic. During the latter half of the study, the compliance rate to the policy with respect to alarm settings on cardiac monitors increased (>70% for the most part of second half) (Figure 1). For the oxygen target range orders and pulse oximetry orders, the compliance rate was lower during first few weeks of the study but after that it was mostly above 60% and finally reached mostly >80% for last 2 months (Figure 2). As a result of aforementioned interventions, the requirement for laser eye surgery and bevacizumab injections from November 15, 2013 through September 7, 2014 has fallen from 7 to none, in comparison to the same duration before the study (January 22, 2013 to November 14, 2013) (Figure 3). Similarly, the diagnosis of high grade
ROP (> Stage 1 ROP) declined during the study period to 9 infants (Stage 2 ROP- 5 cases; Stage 3 ROP- 4 cases) from 23 infants (Stage 2 ROP- 17 cases; Stage 3 ROP- 6 cases), in comparison to the same duration before (Figure 4).

**Discussions:** We have demonstrated that with active education, consistent motivation of the staff, and regular monitoring of adherence to the policy, a decline in ROP rates can be achieved. The essential elements of this program include multidisciplinary involvement in ordering and maintaining oxygen saturation levels within the target ranges. Sustained improvement will depend on continued efforts at maintaining the changes and tracking compliance with the improved protocol.

![Figure-1: Alarm settings per policy- compliance with the policy.](image)

- Alarms set per policy- Upper percentage
- Alarms set per policy- Lower percentage

![Figure-2: Pulse Oximetry Orders](image)

- Pulse Oximetry Orders per policy- Upper Limit %
- O2 Target range order per policy- Upper Limit %
Figure-2: Pulse oximetry orders and oxygen target orders in the EMR- compliance with the policy.

![Pulse oximetry orders and oxygen target orders in the EMR- compliance with the policy.](image)

Figure-3: Number of Laser Eye Surgeries and avastin injections during the stretch of study and same duration before the study.

![Number of Laser Eye Surgeries and avastin injections during the stretch of study and same duration before the study.](image)

Figure-4: Number of diagnosed babies with ROP > Stage 1 during the stretch of study and same duration before the study.

![Number of diagnosed babies with ROP > Stage 1 during the stretch of study and same duration before the study.](image)