**Development of a Golden Hour Protocol for ELBW Infants to Improve Outcomes**
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**Background**

Quick and efficient admission process of extremely low birth weight (ELBW) neonates may help improve neonatal outcomes such as Intraventricular Hemorrhage (IVH). Stabilization during the first hour with quick resuscitation, avoidance of hypothermia and acquisition of IV access for nutrition and fluid administration should be completed during the 1st (golden) hour of life. In our NICU it would frequently take up to 3 hours before admission processes are completed. We also noted a higher incidence of IVH among the VON database for comparable NICUs. In order to address prolonged admission times, a multidisciplinary tiny baby workgroup was initiated focusing on the golden hour. The Golden hour protocol (GHP) implemented evidence-based standardized processes and identified pre-specified team member roles from pre-delivery preparation to management of ELBW infants during the first hour of life.

**Aim**

Our “SMART” aim is to stabilize ELBW infants within the first golden hour as reflected by line placement x-ray, arterial blood gas measurement and TPN initiation. We also wanted to assess the impact of GHP on IVH as reflected by the 1 week head ultrasound. GHP was implemented in Jan 2015 for 1 year study period.

**S – Improve time to completion of ELBW infant admission**

M – The time of line placement X-ray and initiation of TPN were selected as our time measurement for evaluation since TPN is the first fluid hung on ELBW infants in our NICU and it reflects completion of line insertion

A – Prolonged stabilization and admission time can result in short and long term problems including temperature instability, fluid loss and increased risk of IVH

R – Improvement of the admission process should result in improved short and long term outcomes

T – Improving outcomes of ELBW infants using the golden hour approach is imperative to decrease complications

**Mechanism**

The multidisciplinary group utilized modified 8 step problem solving. To identify occurrence points that were delaying a timely admission. Value stream mapping was used to map the current process factors identified as potential obstacles.
SMART AIM

Decrease admission time for ELBW infants to one hour

KEY DRIVERS

Variable processes for admission depending on admitting physician

Lack of standard work flow surrounding ELBW admission

Lack of role assignments and identification of key personnel for EBLW admissions

Lack of timely orders for X-rays, medication and fluids

INTERVENTIONS

Group consensus on admitting protocol with agreement on golden hour goals

Time based specified work roles with a flowchart

Additional nurse to monitor workflow and document golden hour flowchart

Limiting routine care such as measuring length, head circumference and EKG lead placement after the golden hour and after infant is stabilized

Second physician/provider/fellow to help with timely order placement

Update Pyxis stock to include typical medications and TPN for ELBW admissions
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Methods

The multidisciplinary workgroup standardized resuscitation and admission processes for ELBW infants (GA ≤ 28 weeks, birth weight ≤ 1000 grams) in a level IV, 70 bed NICU. Delivery room management of ELBW infants including surfactant administration and thermoregulation had been standardized successfully in previous quality improved projects. Based on value stream mapping essential personnel were defined and a standard work sheet (attached) developed that delineated job roles and time by which each task should be completed. Key processes were selected to measure and monitor; including time to line placement, confirmatory X-ray, time to first blood gas and time to initiation of TPN. Checklists were evaluated every 2 weeks for PDSA cycle review.

Before implementation of GHP, time for X-ray for line placement was 103 mins (median [interquartile range] 83-132 mins), time to first blood gas was 85 mins [53-109 mins], time to TPN initiation was 90 mins [60.5-140 mins]. In addition, we assessed impact of GHP on the incidence of severe IVH. Major PDSA changes were 1) limiting time for UAC placement to 20 minutes and attempts to one artery before calling attending physician for help; 2) limiting UVC placement time to 20 minutes before stabilizing at low line UVC; 3) placing arterial fluids in to the NICU med-station (Pyxis) for easy access.

Results

After 6 months, the time to first blood gas analysis decreased by 19 minutes (median [interquartile range] 66 min [61-90.5] vs 85 min [53-109]; p=0.15). Time to first X-ray for umbilical catheter placement verification decreased significantly (82 min [67.5-103.5] vs 103 min [83-132]; p<0.05). Similarly, time to TPN initiation decreased (75 min [66.5-93] vs 90 min [60.5-140]; p=0.12). The incidence of severe IVH decreased significantly (0.2 vs 0.5 p=0.03).

Discussion

Utilization of value system mapping and development of standard work processes for key bedside personnel resulted in an improvement in all metrics evaluated but we still did not achieve completion of admission within a 60 minute window. The long distance between labor hall and NICU results in a 5-7 minute transport time which cannot be resolved. A lag time average of 16 minutes between line placement by POC blood gas and x-ray confirmation decreased slightly from baseline of 18.5 minutes. This is an identified area to evaluate to further improve admission times. Although statistically significant, the number of patients does not allow us to determine with certainty that there was a clinically significant decrease in IVH; the data appears promising. We will continue rapid cycle changes until end of study period (Dec 2015).

In summary, a standardized approach to ELBW infants’ management in the first golden hour of life decreases time to umbilical catheter insertion and may improve neonatal outcomes.
GH protocol

- Limiting attempt to 1 artery and 20 mins
- Accept low lying umbilical venous catheter for starting fluids
- Have line fluids in Pyxis

Time in minutes

Pre-GHP implementation         Post-GHP implementation

Time to blood gas
Time to x-ray*
Time to TPN

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Team Acknowledgement
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