



Building Better Baby Brains – The 4B Project

NICU Nurse Driven IVH Prevention Initiative

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Background

Improved survival of low birth weight infants has resulted in a greater number of survivors with brain injury. Intraventricular hemorrhage (IVH) tends to occur in the first seventy-two hours of life in gestational ages less than thirty-two weeks. Fifty percent occur in the first twenty-four hours of life with eighty-five percent occurring by the third day. The long term effects of intellectual disability attributable to IVH significantly diminish quality of life for the infant. These effects also increase the emotional and financial burden on families and health care systems, as well as education and government resources. The lifetime care costs for these children exceeds 3.6 billion dollars.

If IVH in premature infants is related to pressure fluctuations within the brain, then an evidence and science based set of nursing interventions aimed to reduce these pressure changes will decrease the incidence of IVH in premature infants.

Methods & Materials

Upon researching evidence and science based practices related to IVH prevention, we found a number of interventions specific to nursing care at the bedside that could impact cerebral blood pressure fluctuations in the vulnerable preterm infant. From this information, we formulated a set of guidelines suitable for implementation in our NICU. We instituted the guidelines after completing the following:

- ✓ Guidelines submitted to medical staff for review.
- ✓ An accredited educational plan (CNE) was developed with the guidelines that were approved.
- ✓ The CNE included a PowerPoint Presentation, Poster Review, Hands-on Practice Station, and Post-Test.
- ✓ Resource educators recruited from the NICU nursing staff.
- ✓ Developed a computer documentation screen, bedside reference list, bedside notice signs, and family education tips.
- ✓ Enlisted the participation of the respiratory care department.

IVH Prevention Guidelines for the Bedside Caregiver

1. Admit infant to a bed space location against a solid wall in a low traffic area when available which *decreases noise stressors from other monitors and NICU traffic.*
2. Report mean arterial blood pressures lower than gestational age to medical staff *to intervene and support which prevent further blood pressure fluctuation.*
3. Maintain midline (neutral) head alignment when positioning or lifting infant for care or procedures which *avoids jugular vein compression impeding venous drainage.*
4. Maintain head of bed elevation at thirty degrees. Avoid head down and prone positions *to promote venous drainage and lower intracranial pressure.*
5. Provide strict thermal regulation with humidity set as ordered *to prevent cold stress which has been associated with IVH.*
6. Rewarm infant no faster than 1 degree/hour *which prevents sudden vasodilation and hypotension.*
7. Close the top of the isolette within one hour of admission and lift only for emergency interventions. *Providing care and parent interaction via the side portals with air curtain in use limits light, cold and noise.*
8. Avoid routine endotracheal suctioning *which prevents hypertensive spikes and physical stress.* Suction only based on clinical signs and symptoms.
9. Organize care interventions to provide minimal handling. Provide gentle hands on care every 4 hours *which decreases noxious stimuli preventing infant stress.*
10. Avoid rapid infusion of medications, fluid boluses and line flushes. Do not to exceed 1 mL / 1 minute *to prevent spikes of arterial hypertension resulting in CBF (cerebral blood flow) fluctuations.*
11. Provide slow blood draws and blood returns not to exceed 1 mL / 1 minute *which prevents spikes of arterial hypertension causing fluctuations in CBF.*
12. Log roll or lift from the hips for diaper changes *to avoid sudden increases in thoracic and abdominal pressures.*
13. Control environmental noise and cover infant's ears *which prevents spikes in arterial hypertension causing fluctuations in CBF.*
14. Protect infant's eyes from the stress of bright or direct light. *Premature infants have sluggish pupillary reflexes and cannot adjust for brightness.*
15. Educate, inform and include parents in IVH risk reduction procedures. *Involve parents by allowing them to understand the plan of care. It encourages and values their contribution of comfort measures guided by the bedside caregiver allowing them to provide gentle touch, hand containment and voice comfort, especially after any intervention or assessment.*



Impact

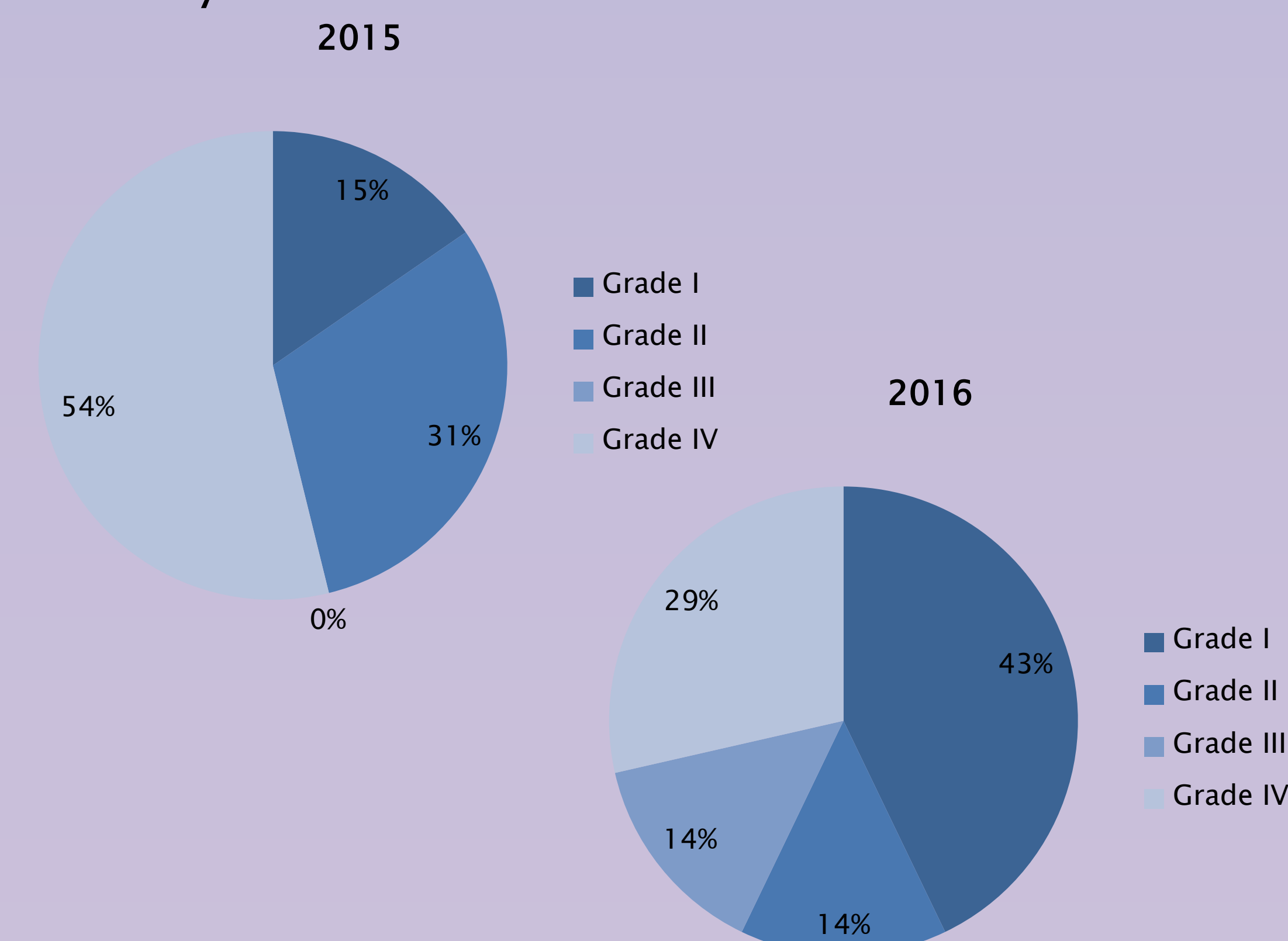
- Increased the staff nurses' and respiratory therapists' knowledge base regarding anatomy and physiology of the premature infant's brain and its vulnerability to cerebral blood flow fluctuations.
- Increased their awareness of the impact that basic bedside procedures/activities can produce because of this vulnerability.

Evaluation

- Followed compliance by creating and using a Quality Improvement tool that collected both documented and visualized data.
- Tracked admissions of infants less than thirty-two weeks gestation and monitored for the occurrence of IVH. Gestational ages of this group ranged from twenty-three weeks and three days to thirty-two weeks and zero days.

Results

- Out of the data collected on forty-nine infants, the average compliance for all interventions in The 4B Project within the first six months after implementation was ninety-two percent compliance.
- Comparison of the current Vermont Oxford Network data for all VLBW infants treated at ETCH demonstrated the following:
 - Prior to implementation (2015)– 21.3% IVH
 - Post implementation (2016)– 10.9% IVH
 - This is a 48.8% decrease in all grades of IVH.
- The breakdown of IVH grades in the following graphs also demonstrate a decrease in the level of severity:



Barriers to Implementation

- No process in place for bedside nursing staff to develop and implement initiatives.
 - Resolution: A hospital wide planning process was created for future initiatives.
- Unit culture/resistant to change.
 - Resolution: Education and personal involvement of bedside nurses as resources generated enthusiasm, which sparked tremendous engagement for this initiative.
- Radiology unaware of the guidelines and special considerations of moving and positioning infants.
 - Resolution: Information provided to the radiology department regarding the initiative and their safe participation.
- Nursing staff identified the need for a family education pamphlet.
 - Resolution: Developed a Sharing Information pamphlet.

Learning Objectives

1. Recognize the importance of nursing's role in applying a standardized approach in the prevention of IVH.
2. Describe the methodology necessary to implement a nursing based IVH prevention initiative.
3. Recognize the importance of follow-up in identifying barriers and implementing effective culture change.

Acknowledgements

- Tracie Savage, BSN, RNC–NIC, Nurse Manager NICU, Neonatal Transport, Children's Neonatal Services at East Tennessee Children's Hospital
- Sarah Gordon, MSN, RN, Accredited Education Specialist, Organizational Development and Learning at East Tennessee Children's Hospital
- Lindsay Harris, Outcomes and Data Specialist, Organizational Development and Learning at East Tennessee Children's Hospital
- NICU Developmental and Family Centered Care Council at East Tennessee Children's Hospital, Chair: Dawn Jeffers, RN, BA

References

Additional resources/bibliography available upon request.

