

Preventing Abusive Head Trauma: A Hospital-Wide Quality Improvement Study

Authors: Annie Glenney; Rochelle Thompson, MS; Susan McInerney, BSN, RN, CPN; Heather Lavella, MSN, RN, CPN; Ross Budziszewski, MS; Loreen K. Meyer, MSN, RN, CCRN, CPEN

Affiliations: St. Christopher's Hospital for Children

Abstract

Introduction:

- Pediatric abusive head trauma (AHT) frequently seen in Shaken Baby Syndrome (SBS)
- Most common cause of traumatic death in children <2yr
- Results in injury to 4,000 infants a year
- 18-25% of shaken, hospitalized babies die
- 80% of surviving infants suffer from significant neurological disabilities

Methods:

- Conducted at St. Christopher's Hospital for Children
- Retrospective chart review with 156 nurses across 6 departments
- Three step educational intervention designed by the NCSBS
- Knowledge and understanding of SBS/AHT was assessed before and after training

Results:

- Nurses demonstrated an increase in SBS/AHT knowledge after the educational intervention
- Nurses who had previous NCSBS training at any point in their career performed better on the initial assessment than nurses who had never received training

Conclusions:

- NCSBS training improved nurses' education and understanding of SBS/AHT in both short and long term
- Nurses reported increased confidence instructing patients and caregivers about its associated dangers and risks

Introduction

- Shaken baby syndrome and abusive head trauma (SBS/AHT) results from the violent shaking of an infant or child's head
- Most commonly results in subdural hemorrhage or hematoma due to tearing of the bridging veins
- National studies indicate that SBS/AHT causes injuries to roughly 4,000 infants a year, however roughly 30-40% of cases are missed at medical institutions
- Of the cases identified, roughly 18-25% of babies who are shaken and hospitalized die, and approximately 80% of surviving infants suffer from significant neurological disabilities and lifelong cognitive and neural impairment
- In addition to the possible lifelong adverse health effects of SBS/AHT, childhood head injuries create large financial burdens
- In 2008, the estimated economic burden stemming from fatal and nonfatal child maltreatment in the US was approximately \$124 billion
- Certain children are at increased risk of becoming a victim of SBS/AHT
- Risk factors include single parent homes, untrained male caregivers, and low socioeconomic areas
- St. Christopher's Hospital for Children (SCHC) is one of the poorest congressional districts in the United States
- In 2018 alone, nearly 28% of Philadelphia's abuse cases occurred in Philadelphia county
- Nursing staff at SCHC noticed a significant rise in SBS/AHT injuries presenting at our institution in 2018
- The goal of this study is to educate nurses regarding SBS/AHT, to determine whether our education is beneficial in the short and long term, and ultimately to improve caregiver education by nurses with the end goal of reducing SBS/AHT incidence and recurrence rates at SCHC

Methods

Site Description:

- SBS/AHT education program was held at St. Christopher's Hospital for Children
- SCHC is a 188-bed Level I Pediatric Trauma Center in Philadelphia, an urban Northeast US city
- Over 70,000 patients enter the ED annually, making it one of the busiest pediatric hospitals in the US
- SCHC is located in one of the poorest congressional districts in the state of PA
- Over 80% of the population at SCHC utilizes Medicaid/Medicare services

Intervention Overview:

- Period of PURPLE Crying training was developed by the National Center on Shaken Baby Syndrome (NCSBS) in order to increase caregiver knowledge about the dangers of SBS/AHT and prevent these traumas from happening
- A three-step intervention was implemented to educate SCHC nurses
- Intervention consisted of (1) Pre-implementation testing, (2) SBS/AHT education through NCSBS training modules, and (3) Post-education knowledge evaluation and Hands-On Training
- Knowledge assessment consisted of ten multiple choice questions from the NCSBS test bank of training
- Nurses indicated if they had any previous SBS/AHT education or training
- After completing the pre-test, nurses were sent the online training through the NCSBS website.
- Training consisted of (1) NCSBS online training modules, (2) review of informational packet that is distributed to families, (3) NCSBS training videos
- Topics covered included (1) A background video covering the PURPLE acronym (2) how to cope with infant crying, reasons behind infant crying, and tips for caregivers on dealing with infant crying, and (3) research discussing infant crying and its correlation with SBS/AHT.
- The second portion of this intervention took one-hour to complete.
- The nurses were compensated by receiving one hour of continuing trauma education credits, which assists in satisfying a hospital-wide requirement
- Nurses completed a 10-item, online post-test to assess their knowledge after the intervention
- Once the training was completed, nursing leaders on the floor utilized teach-back education to practice disseminating information on SBS/AHT to caregivers in their respective units

Data Collection and Analysis:

- Data was collected through two online surveys and was analyzed on SPSS 25 Software
- Independent samples t-tests were conducted comparing overall sum scores to determine changes in nurse knowledge pre vs. post intervention
- A second independent samples t-test was conducted to determine if previous training impacted pre-test knowledge

Ethical Considerations:

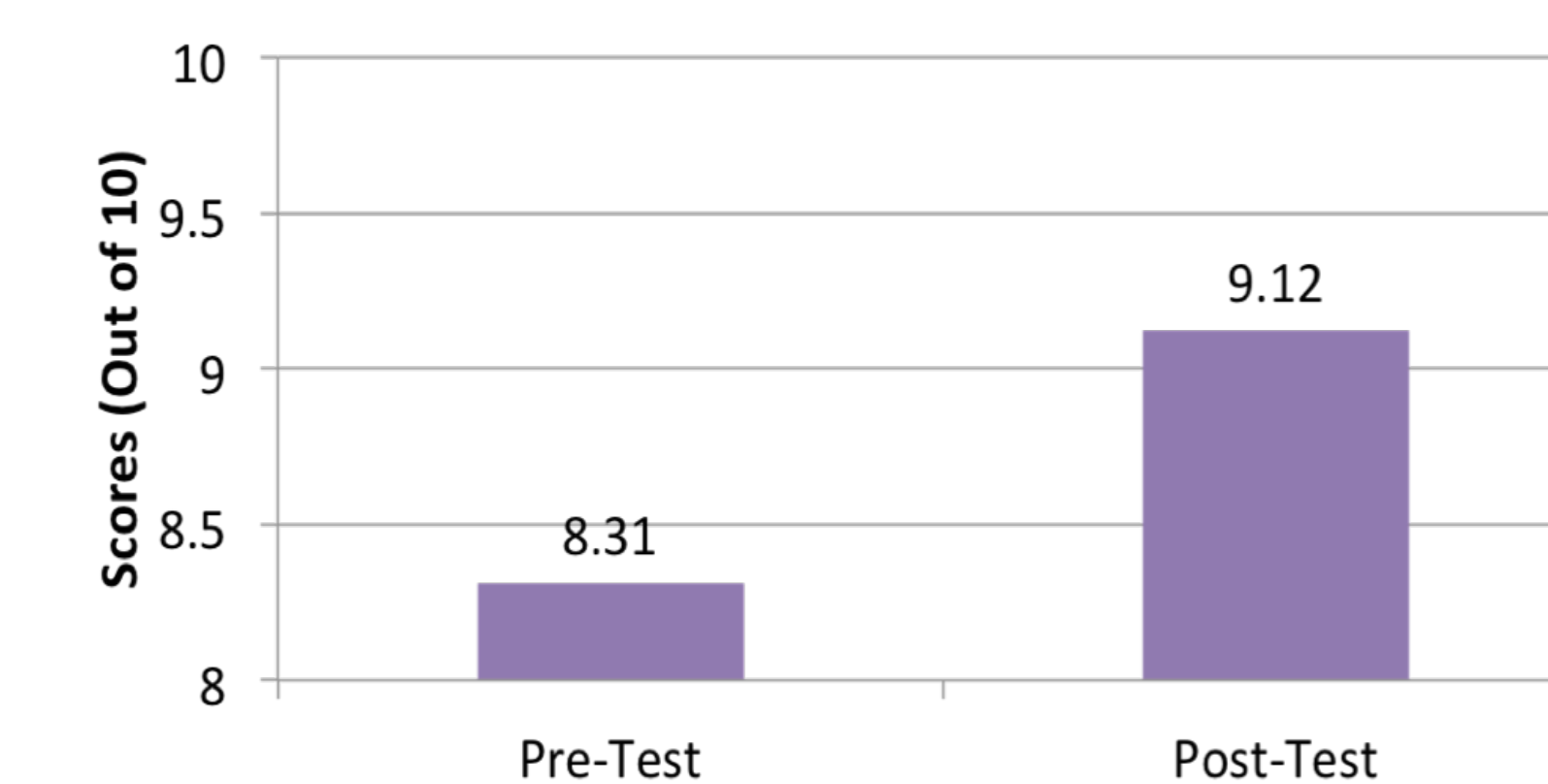
- Study and intervention approved by IRB
- Identifying information, including names, race and contact info, not collected in order to ensure anonymity for nurses
- No conflicts of interest from the interdisciplinary team who conducted the study

Results

Knowledge Assessment:

- Nurses across 6 departments at St. Christopher's Hospital for Children received training surrounding SBS/AHT
- Nurses (N = 156) were selected from multiple units: (1) 5 Neonatal Intensive Care Unit, (2) 63 Med/Surg Unit, (3) 3 Occupational Therapy Unit, and (4) 85 Pediatric Intensive Care Unit
- Nurses completed a 10 question assessment regarding their knowledge and understanding of SBS/AHT prior to and following the educational intervention
- Scores on the assessment were recorded on a scale of 0-10
- Prior to the intervention, nurses (N = 156) scored an average of 8.31 out of 10 on the knowledge assessment.
- Following the intervention, nurses (N = 147) scored an average of 9.12 out of 10 on the knowledge assessment
- A statistically significant difference was found between pre and post intervention knowledge surrounding SBS/AHT: $t(301) = -5.12, p < .001, d = .37$
- Figure 1 shows results on the knowledge assessment before and after SBS/AHT training

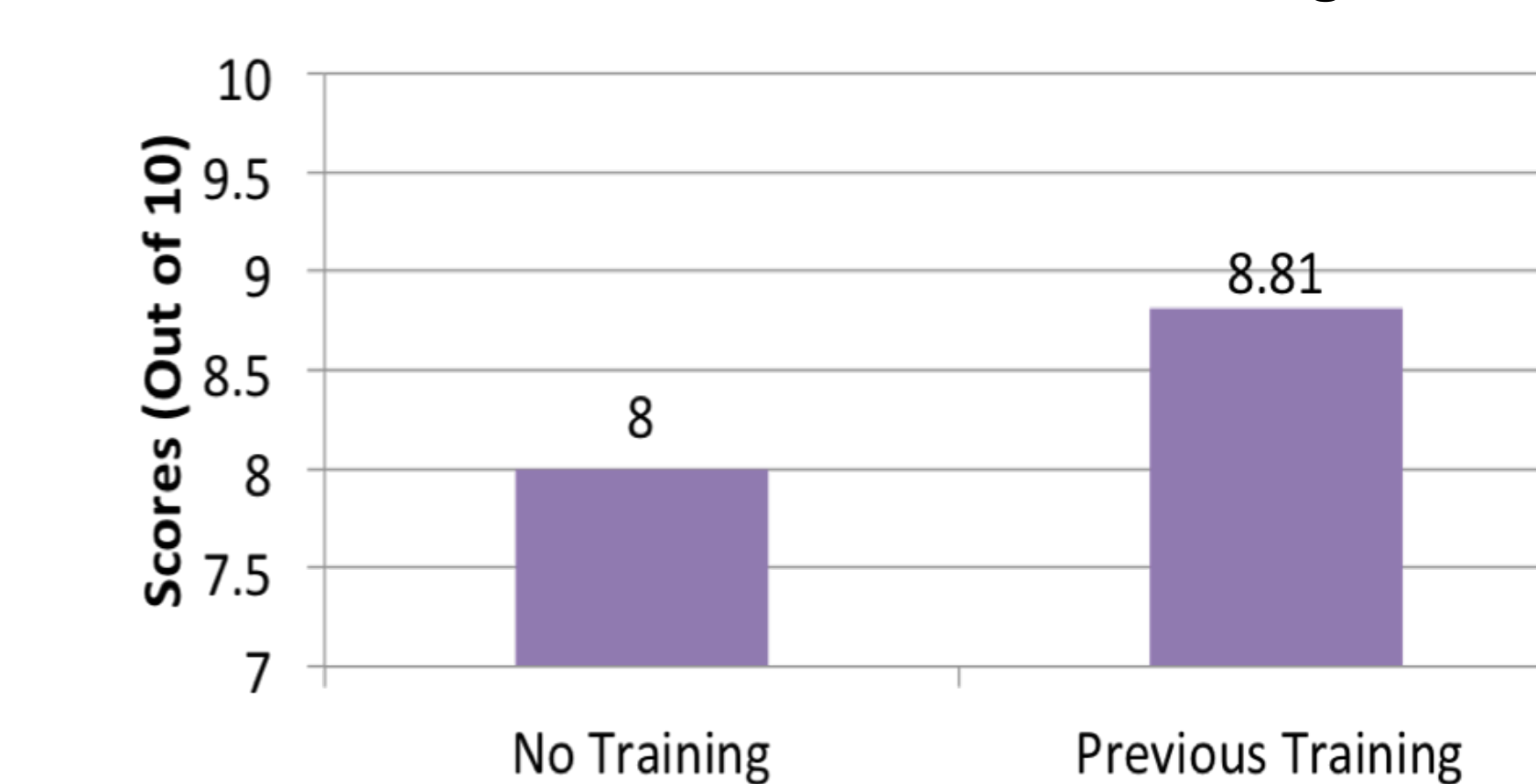
Figure 1
Nurse Education: Pre vs Post Test



Previous Education

- Of the 156 nurses included in the pre-test, 40% (N= 62) indicated that they had received SBS/AHT training in the past
- Nurses who had received previous training (N = 62) scored an average of 8.81/10 on the pre-intervention knowledge assessment, as compared to an average of 8.00/10 for the nurses (N = 94)
- While pre data was not linked to a participant to ensure anonymity, individuals who had previous SBS/AHT training scored significantly higher on the pre-test than those who did not have any previous training: $t(155) = 2.71, p = .008, d = .50$
- Figure 2 shows knowledge scores from nurses who had previous NCSBS training vs those who did not

Figure 2
Nurse Education: Previous Training



Discussion

Data Analysis:

- Study results demonstrated a significant increase in nurses' knowledge surrounding SBS/AHT after they received Period of Purple Training
- Nurses' knowledge was assessed on a 10-question multiple-choice pre- and post-test, and nurses scores improved from an average of 8.31/10 on the pre assessment (N =156), to an average of 9.12/10 on the post-assessment (N= 147)
- Nurses who received training prior to participating in the current study scored significantly higher on the pre-test than nurses who had never completed SBS/AHT training
- This result demonstrates that nurses retained knowledge from previous SBS/AHT training experiences
- Additionally, there was a statistically significant increase in nurses' knowledge gain after the educational intervention, even after an extended period of time
- Our study demonstrated the effectiveness of NCSBS training in increasing nurses' knowledge surrounding SBS/AHT
- Our study demonstrated the effectiveness of this intervention for nurses across the hospital, rather than in specific departments
- Our data additionally demonstrate nurses' retention of knowledge obtained in SBS/AHT training long-term, as evidenced by nurses' higher scores on the pre-test if they had completed NCSBS training in the past
- Through improving nurses education and understanding of SBS/AHT, and improving their confidence instructing patients and caregivers about the dangers and risks of SBS/AHT, caregiver knowledge on the topic should improve, with the goal of reducing rates of accidental SBS/AHT trauma in patients treated at St. Christopher's

Conclusion:

- Study demonstrated that NCSBS training improved nurses' education and understanding of SBS/AHT
- Training improved knowledge in the short and long term
- Nurses reported increased confidence instructing patients and caregivers about associated dangers and risks

Future Prospects

- Future work should aim to assess caregiver increase in knowledge surrounding SBS/AHT
- Strive to determine whether increases in nurses knowledge on SBS/AHT results in improved caregiver education and understanding
- Assess caregiver education post-partum, as well as post admission for SBS/AHT patients
- Study recurrence rates of SBS/AHT in patients treated at St. Chris, particularly among trained vs untrained caregivers
- Determine whether or not parental education (via nurse education) reduces recurrence rates
- Study rates of SBS/AHT at St. Chris and determine whether increased caregiver education post partum is an effective means to reducing rates of accidental pediatric head trauma
- Discern the most efficient methods of education from nurses to improve our educational programs in the future

Acknowledgements

1. Joyce, T., & Huecker, M. R. (2019). Pediatric abusive head trauma (shaken baby syndrome). *StatPearls*, 29763011.
2. Hogberg, U., Eriksson, G., Hogberg, G., & Wahlberg, A. (2020). Parents' experiences of seeking health care and encountering allegations of shaken baby syndrome: A qualitative study. *PLoS One*, 15(2), e0228911.
3. Pennsylvania Department of Health. (2020). Shaken baby syndrome program. Retrieved from: <https://www.health.pa.gov/topics/programs/Pages/Shaken-Baby-Syndrome.aspx>
4. National Center on Shaken Baby Syndrome. (2019). National Center on Shaken Baby Syndrome. Retrieved from <https://www.dontshake.org/learn-more/itemlist/category/13-facts-info>

Study conducted at St. Christopher's Hospital for Children in Philadelphia, PA with IRB approval. We would like to thank the Injury Free Coalition for Kids and the American Trauma Society- Pennsylvania Division for supporting our work.