

Neonatal Safe Sleep Compliance:  
Measurement of Education Literacy Levels

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**Abstract**

Caregivers of neonates who have received care under the neonatal intensive care unit (NICU) undergo an education process with many considerations. A key part of every neonate's care plan is safe sleep considerations. Although safe sleep is covered, rates of caregiver noncompliance exist. It is the nursing staff's role to educate on safe sleep practices with caregivers, including the use of resources like infographics and brochures. Educational resources vary in health literacy levels and can be written at a level above the average caregiver's literacy level. This research project will measure the literacy level of safe sleep educational resources to determine whether or not a caregiver's compliance is impacted. Thirteen educational handouts were run through six readability formulas to establish the corresponding literacy level. This study documents that the average safe sleep educational resource literacy level is below that of the average American literacy level thus literacy level is not identified as a cause of caregiver noncompliance. Further efforts to identify caregiver noncompliance are identified.

*Keywords:* infant safe sleep, NICU education, caregiver compliance, health literacy levels

**Neonatal Safe Sleep Compliance: Measurement of of Education Literacy Levels**

The neonatal intensive care unit (NICU) is a unique hospital unit in which its patients are high-risk infants receiving various degrees of healthcare. The infants' caregivers receive a wide range of education throughout discharge planning as they will be taking home an infant with special medical considerations (Dowling, Barsman, Forsythe, & Damato, 2018). NICU discharge planning includes aspects such as infant medical status, caregiver readiness, insurance coverage, and home health care management plans (AAP, 2008). For this reason, NICU staff are constantly striving towards providing the most up-to-date, evidence-based knowledge in a comprehensible manner. NICU nursing staff are tasked with caregiver education as a part of discharge planning and often take part in research efforts to improve the quality and efficiency of education efforts (Dufer & Godfrey, 2016).

Although education is specialized to each patient, the NICU includes mandatory topics (Dufer & Godfrey, 2016). One of such topics is safe sleep (Dowling, Barsman, Forsythe, & Damato, 2018). Safe sleep refers to the sleeping position, sleep environment, and other safety considerations for an infant (AAP, 2016). Safe sleep is a concern for the neonatal population because both sudden infant death syndrome (SIDS) and sudden unexpected infant death (SUID) are often associated with improper sleeping conditions (for example, if an infant is placed in a crib with a blanket the infant can turn onto it and suffocate) (Naugler & DiCarlo, 2018). For the NICU in particular, safe sleep is important because preterm infants are twice as likely to die from SIDS compared to a full-term infant, making the NICU population higher risk (Dowling, Barsman, Forsythe, & Damato, 2018).

Safe sleep is a key focus for the United States healthcare system. The American Academy of Pediatrics (AAP); an organization with members across the world with a common goal to “attain optimal physical, mental, and social health and well-being” for all children (AAP, 2020); has released recommendations for safe sleep practices that have been accepted and promoted by the United States Department of Health and Human Services (HHS). The sixteenth recommendation states that “health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse and model the SIDS risk reduction recommendations from birth” (AAP, 2016). The AAP estimates that approximately 3,500 infant deaths occur annually in the United States with causes related to SIDS and SUID. Furthermore, the HHS promotes Healthy People 2020 that also identifies safe sleep as a key area for research. Within the ‘Maternal, Infant, and Child Health’ (MICH) portion of the Healthy People 2020, MICH-1.8 and MICH-1.9 set reducing the incidence of SIDS and SUID as a goal for the healthcare system of the United States (HHS, 2020).

As determined by the AAP, nursing interventions related to safe sleep include supine positioning of the neonate, using a firm sleep surface with no loose bedding, and caregiver education. Education efforts focus on the promotion of skin-to-skin care, room-sharing rather than bed-sharing, breast feeding, proper immunization, and the reduction of infant exposure to smoke, alcohol, and illicit drugs (AAP, 2016). Safe sleep interventions are taught to caregivers in the beginning of the neonates stay and the nursing staff reiterates the safe sleep standards throughout the neonate’s care and especially at discharge (Dufer & Godfrey, 2016). Although such interventions and education are required in NICUs, there is still a high rate of caregiver noncompliance, especially after discharge (Naugler & DiCarlo, 2018). Research has shown that caregivers are aware of these interventions and the importance of safe sleep, but rates of

noncompliance are still prevalent (Naugler & DiCarlo, 2018). A key research area in regard to the NICU is how caregiver compliance rates can be increased; the prospective goals of such research is to identify the effectiveness of current nursing interventions and identify areas for improvement (Naugler & DiCarlo, 2018). Current research includes many nursing interventions such as the creation of online educational modules for caregivers (Dowling, Barsman, Forsythe, & Damato, 2018), improving the identification of barriers (Naugler & DiCarlo, 2018), and even in-person educational sessions (Dufer & Godfrey, 2016). However, a key area that has not been thoroughly researched is the effectiveness of the resources provided to caregivers; infographics and brochures are often readily available to the nurse's disposal to pass out to caregivers to serve as a written reminder of safe sleep practices.

Additionally, a key issue in nursing discharge education is health literacy of resources. The term health literacy has a multitude of definitions from organizations but ultimately refers to one's current and prior knowledge, cultural preferences, cognitive abilities, and health status all of which can influence one's understanding and decision-making in relation to healthcare (Parnell, Stichler, Barton, Loan, Boyle, & Allen, 2019). Health literacy varies based on the learner's background, culture, age, education, and so on (Polster, 2018). When working in healthcare, it is vital to be cognizant of the learner's health literacy to ensure that any education is understood and processed (Weis, 2007). When providing educational resources, healthcare providers (HCPs) assume that the provided materials are written at an appropriate literacy level that can be understood by the majority of patients (Parnell, Stichler, Barton, Loan, Boyle, & Allen, 2019). Both the American Medical Association (AMA) and the National Institutes of Health (NIH) recommend that the literacy levels of education materials should be at or below

that of a sixth grader (Weis, 2007). When applying this issue to the NICU, the health literacy of caregivers affects their overall understanding and comprehension of safe sleep practices.

By looking into the health literacy of NICU safe sleep resources, it can be determined if caregiver noncompliance is related to inadequate literacy levels during education. Furthermore, this identification will allow other areas to be identified that could further caregiver compliance to safe sleep practices. The overall outcomes of research into safe sleep education will result in an increased caregiver compliance which will show as decreased incidences of infant mortality (specifically from SIDS), decreased infant hospitalizations, and overall increased health of former NICU infants.

### **Literature Review**

The AAP has identified possible causes for caregiver noncompliance; of note the AAP mentions that neonates with certain medical conditions may be exempt from their recommendations (for example, sleeping prone rather than supine for infants with severe gastroesophageal reflux disease (GERD)). These exceptions can create confusion between healthcare staff and caregivers. The AAP has also identified proven interventions that can increase compliance through the evidence of multiple studies. Such interventions include supine positioning, firm sleep surface, skin-to-skin care, room-sharing, breast feeding, and immunization (AAP, 2016).

Dowling, Barsman, Forsythe, and Damato wrote an article covering an educational safe sleep module for caregivers entitled “Caring about Premies’ Safe Sleep (CaPSS): An Educational Program to Improve Adherence to Safe Sleep Recommendations by Mothers of Preterm Infants”. This study found that parents will mimic the actions of nurses and other staff seen during their neonates stay and will adopt these actions once discharged; thus, a caregiver

might feel more inclined to go against safe sleep practices if they witness a HCP doing so. This study also stressed the importance of safe sleep education being tailored for the higher-risk population seen in the NICU as rates of noncompliance from staff is high within this setting. (Dowling, Barsman, Forsythe, & Damato, 2018).

In the article “Integration of Safe Sleep and Sudden Infant Death Syndrome (SIDS) Education Among Parents of Preterm Infants in the Neonatal Intensive Care Unit (NICU)” Dufer and Godfrey research the impact in-person educational sessions holds on caregiver compliance. The research concluded that caregiver compliance and general knowledge of safe sleep was greatly improved with proper written and verbal education methods. These authors also stressed the importance of addressing safe sleep within the NICU setting. (Dufer & Godfrey, 2016).

Barriers to compliance were identified in “Barriers to and Interventions that Increase Nurses’ and Parents’ Compliance with Safe Sleep Recommendations for Preterm Infants” by Naugler and DiCarlo. These authors agreed that a reason for noncompliance was HCP noncompliance and the role modeling of such behaviors by caregivers once at home with their infant. These authors expanded upon this idea by mentioning that the developmental needs and comfort measures provided in the NICU might go against recommendations; for example, the use of positioning tools for containment violate the recommendation of having a clear sleep surface. Because rates of staff noncompliance exist, caregivers may become confused as related to inconsistencies in practice being demonstrated and witnessed firsthand. This research also found that education is not always provided to caregivers and that education can be inconsistent between HCPs. Reasons behind noncompliance were identified by caregivers such as parental exhaustion, fear of choking, and fear of infant discomfort. Research identified that educational

materials needs to be further assessed as all education initiatives that were studied included written parental education. (Naugler & DiCarlo, 2018).

While it has been established that safe sleep is an issue in the United States healthcare system, health literacy is still being discussed. Of note, authors Güner and Ekmecki of “A Survey Study Evaluating and Comparing the Health Literacy Knowledge and Communication Skills Used by Nurses and Physicians” discussed the importance of addressing health literacy in a healthcare setting. The authors established that one’s health literacy can be a key determinant in patient outcome. When creating personalized patient care plans, education should be tailored to fit one’s health literacy level. Globally, low health literacy has shown to be a problem impacting individuals all the way up to an economic level related to financial and health impacts of a country. From the results of this study, it was found that of the surveyed healthcare personnel, 91.5% never received education related to health literacy. While some HCP’s may have knowledge regarding HL, this research states that hospitals globally should create education programs for its staff on HL and its impact on the healthcare system. (Güner & Ekmecki, 2019).

“A concept analysis of health literacy” by Parnell, Stichler, Barton, Loan, Boyle, and Allen further established the importance behind health literacy. This article identified that one’s health literacy can be impacted by interactions with HCPs. One’s reading level and comprehension level were identified as key components of health literacy, especially when utilizing printed materials. The research identified that a key nursing intervention to enhance health literacy is the teach-back method; in particular, the use of pictures, infographics, and other materials can reduce the complexity of healthcare related information. This research concluded that health literacy promotion must become a key nursing intervention. (Parnell, Stichler, Barton, Loan, Boyle, & Allen, 2019).



“Confronting barriers to improve healthcare literacy and cultural competency in disparate populations” by Polster covered new areas to address to improve patient understanding. Polster identified that limited health literacy can result in bad management of chronic illness, increased hospitalizations, and miss understanding of discharge instructions. Polster further identified that a patient’s health literacy can be established through clear communication between the HCP and the patient. This article endorsed the use of plain language, teach-back method, and visuals to promote better education. (Polster, 2018).

The aims of this project are to evaluate the barriers and limitations of the resources covering the topic of neonatal safe sleep that are provided to the caregivers in the NICU and to identify areas for improvement. Evidence has shown that safe sleep practices are an important intervention in care of neonates but is also an area for high noncompliance rates (Duffer & Godfrey, 2016). The focus will be on the health literacy of the resources provided in NICUs that service communities of varied socioeconomic statuses. The current health literacy of varied resources will be compared with the standards and ideals for health literacy levels. This research focuses on caregiver noncompliance within the neonatal and newborn populations in an attempt to determine possible causation by exploring a new factor of educational resource literacy levels.

## **Method**

### **Overview**

Educational materials on safe sleep provided to caregivers by HCPs were gathered. The literacy levels of these materials were assessed by running the written information through a multitude of reading indexes and formulas. These indexes and formulas pre-established the literacy level of the average American citizen. The literacy levels of the materials were compared to the average literacy levels.

**Sample**

Educational materials were found on the internet browser Google through searches such as ‘safe sleep infographics’, ‘safe sleep handouts’, and ‘safe sleep education materials’; searches were also conducted by searching the previous phrases with the United States state names. ‘Safe sleep infographics’ had 879,000 results. ‘Safe sleep handouts’ had 1,040,000 results. ‘Safe sleep education materials’ had 57,800,000 results. Inclusion criteria for the infographics included English language, targeted for the American population, limit of two pages in length, and clear purpose to either be handed out to caregivers or posted for caregiver reference. Materials under 150 words and over 3,000 words were not included as the readability indexes later discussed did not allow for such lengths of texts. Materials available in different formats with the same written information were excluded, such as those with both longitudinal and horizontal posters or those with door hangers and posters. The first three resulting pages of the Google searches were analyzed based on criteria. Many of the results were of the same education material posted on different sites (for example, many sites sourced variations of AAP materials) and only one version was included in the study. Any results related to a specific product, such as a ‘sleep sack’ or ‘Owlet baby monitor’ were also excluded; these products are separate interventions aimed to improve safe sleep but did not constitute the guidelines of this study.

**Instrument**

The site <https://readabilityformulas.com/free-readability-formula-tests.php> was used to identify the literacy levels of the materials. This free readability tool utilizes six reading indexes and formulas; the Flesch Reading Ease formula, the Flesch-Kincaid Grade Level, the Fog Scale, the SMOG Index, the Coleman-Liau Index, and the Automated Readability Index. This site establishes that the average sentence length for the American adult is between thirteen and

sixteen words, the average grade level is between seventh and eighth grade, and the average amount of three syllable words for an adult reader is between twelve and fourteen percent (<https://readabilityformulas.com>). This site does have limitations on word count; the sample text can have between 150-3,000 words. For this reason, resources were confined to this word count and were excluded if they were found to be below or above the requirement.

The Flesch Reading Ease formula assesses the grade level of written materials on a scale of 0 to 100 by establishing the readability ease by looking at average sentence length and average number of syllables per word. This formula is used by the U.S. Department of Defense and is considered one of the most accurate readability formulas. The specific formula is:  $RE = 206.835 - (1.015 \times ASL) - (84.6 \times ASW)$ . RE refers to readability ease, ASL refers to average sentence length, and ASW refers to average number of words.

The Flesch-Kincaid Grade Level analyzes the average sentence length and number of syllables per word to give a score between zero and eighteen, corresponding to grade levels; for example, a score of 5 is comparable to that of a grade school student. This formula is used by the U.S. Navy. The specific formula is:  $FKRA = (0.39 \times ASL) + (11.8 \times ASW) - 15.59$ . FKRA refers to the Flesch-Kincaid Reading Age.

The Gunning Fog Index Readability Formula, or the Fog Scale, identifies the average sentence length and number of words that are three or more syllables. Results are given in a number that corresponds to a grade level. The average score is between seven and eight. The specific formula is:  $Grade\ Level = 0.4 (ASL + PHW)$ . PHW refers to the percentage of hard words.

The SMOG Index takes into account words at or over three syllables, the number of polysyllabic words corresponds to a grade level when using the indexes conversion table. The specific formula is:  $\text{SMOG grade} = 3 + \text{Square Root of Polysyllable Count}$ .

The Coleman-Liau Index outputs a grade level based on syllables per word and sentence length. The specific formula is  $\text{CLI} = 0.0588L - 0.296S - 15.8$ . CLI refers to Coleman-Liau Index, L refers to the average number of letters per 100 words, and S refers to the average number of sentences per 100 words.

The Automated Readability Index takes into the number of letters per word and number of words per sentence to generate a number corresponding to grade level.

By utilizing a multitude of indexes, this readability formula site allows for a general grade level, reading level, and reader's age to be established. This site also results in a breakdown of how many words were included in the text including unique and repeated words. The average number of words per sentence and number of sentences is the result. The average syllables per word including number of single, double, and anything beyond three syllables are also resulted (<https://readabilityformulas.com>).

## **Results**

Thirteen safe sleep educational materials were run through the readability formula site including infographics, charts, posters, brochures, and flyers. Six of the educational materials were state specific. The other seven were from national organizations. All thirteen materials were analyzed using the readability formulas site, undergoing analysis from the six formulas.

<b>Educational Material</b>	<b>Flesch Reading Ease</b>	<b>Fog Scale</b>	<b>Flesch-Kincaid Grade Level</b>	<b>Coleman-Liau Index</b>	<b>SMOG Index</b>	<b>Automated Readability Index</b>
American Academy of Pediatrics Campaign Safe Sleep Infographic (AAP, 2020)	93.3	4.8	3.1	6	2.4	3.4
Charlie's Kids Foundation Do's and Don'ts of Safe Sleep Chart (Charlie's Kids Foundation, 2013)	86.4	5.3	3.6	6	3.9	2.8
Connecticut Office of Early Childhood Safe Sleep Poster (COEC, 2021)	86.2	4.4	3.4	6	3.2	2.2
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe Sleep for Your Baby Infographic (Horizontal) (NICHD, 2019)	72.7	10	7.7	8	6.5	8.1
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe to Sleep Doorhanger (NICHD, 2013)	78.2	9.3	7	7	5.8	7.4
Eunice Kennedy Shriver National Institute of Child Health and Human Development What Does A Safe Sleep Environment Look Like? (NICHD, 2019)	81.3	6.7	5.4	6	4.1	4.7
Michigan Department of Health and Human Services Breastfeeding & Safe Sleep Flyer	76.9	8.7	6.4	7	6.3	6.5

(MDHHS, 2016)						
Michigan Department of Health and Human Services Infant Safe Sleep Brochure (MDHHS, 2016)	87.4	6.2	3.8	6	4.6	2.8
National Institute for Children's Health Quality Safe Sleep in Child-Care Settings Infographic (NICHQ, 2020)	69.2	8.4	7	8	7.2	6.3
Nebraska Department of Health and Human Services ABCs of Safe Sleep Brochure (NDHHS, 2017)	78.8	6.9	5.1	8	5.7	4.9
New York State Department of Health Safe Sleep Brochure (NYSDH, 2020)	82	6.1	4.4	7	4.4	3.5
Ohio Department of Health Safe Sleep Environment Brochure (ODH, 2018)	84	5.7	4.7	6	3.7	4.1
Safe Sleep Kentucky Campaign Safe Sleep Crib Graphic (Safe Sleep KY, 2015)	79.6	6.6	6	7	4.1	6
<b>Average</b>	81.2	6.9	5.2	6.8	4.8	4.8

<b>Educational Material</b>	<b>Grade Level</b>	<b>Reading Level</b>	<b>Reader's Age</b>
American Academy of Pediatrics Campaign Safe Sleep Infographic (AAP, 2020)	4	very easy to read	8 to 9 yrs old
Charlie's Kids Foundation Do's and Don'ts of Safe Sleep Chart (Charlie's Kids Foundation, 2013)	4	easy to read	8 to 9 yrs old
Connecticut Office of Early Childhood Safe Sleep Poster (COEC, 2021)	4	easy to read	8 to 9 yrs old
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe to Sleep Doorhanger (NICHD, 2013)	7	fairly easy to read	11 to 13 yrs old
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe Sleep for Your Baby Infographic (Horizontal) (NICHD, 2019)	8	fairly easy to read	12 to 14 yrs old
Eunice Kennedy Shriver National Institute of Child Health and Human Development What Does A Safe Sleep Environment Look Like? (NICHD, 2019)	5	easy to read	8 to 9 yrs old
Michigan Department of Health and Human Services Breastfeeding & Safe Sleep Flyer (MDHHS, 2016)	7	fairly easy to read	11 to 13 yrs old
Michigan Department of Health and Human Services Infant Safe Sleep Brochure (MDHHS, 2016)	5	easy to read	8 to 9 yrs old
National Institute for Children's Health Quality Safe Sleep in Child-Care Settings Infographic (NICHQ, 2020)	7	standard/average	11 to 13 yrs old
Nebraska Department of Health and Human Services ABCs of Safe Sleep Brochure (NDHHS, 2017)	6	fairly easy to read	10 to 11 yrs old
New York State Department of Health Safe Sleep Brochure (NYSDH, 2020)	5	easy to read	8 to 9 yrs old
Ohio Department of Health Safe Sleep Environment Brochure (ODH, 2018)	5	easy to read	8 to 9 yrs old

Safe Sleep Kentucky Campaign Safe Sleep Crib Graphic (Safe Sleep KY, 2015)	6	easy to read	10 to 11 yrs old
<b>Average</b>	5.6		



<b>Educational Material</b>	<b>Average Sentence Length</b>	<b>Average Percent of Polysyllabic Words</b>
American Academy of Pediatrics Campaign Safe Sleep Infographic (AAP, 2020)	<b>11</b>	<b>1%</b>
Charlie's Kids Foundation Do's and Don'ts of Safe Sleep Chart (Charlie's Kids Foundation, 2013)	<b>10</b>	<b>4%</b>
Connecticut Office of Early Childhood Safe Sleep Poster (COEC, 2021)	<b>9</b>	<b>2%</b>
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe Sleep for Your Baby Infographic (Horizontal) (NICHD, 2019)	<b>19</b>	<b>6%</b>
Eunice Kennedy Shriver National Institute of Child Health and Human Development Safe to Sleep Doorhanger (NICHD, 2013)	<b>19</b>	<b>5%</b>
Eunice Kennedy Shriver National Institute of Child Health and Human Development What Does A Safe Sleep Environment Look Like? (NICHD, 2019)	<b>14</b>	<b>3%</b>
Michigan Department of Health and Human Services Breastfeeding & Safe Sleep Flyer (MDHHS, 2016)	<b>16</b>	<b>7%</b>
Michigan Department of Health and Human Services	<b>11</b>	<b>5%</b>

Infant Safe Sleep Brochure (MDHHS, 2016)		
National Institute for Children's Health Quality Safe Sleep in Child-Care Settings Infographic (NICHQ, 2020)	<b>14</b>	<b>11%</b>
Nebraska Department of Health and Human Services ABCs of Safe Sleep Brochure (NDHHS, 2017)	<b>11</b>	<b>8%</b>
New York State Department of Health Safe Sleep Brochure (NYSDH, 2020)	<b>10</b>	<b>5%</b>
Ohio Department of Health Safe Sleep Environment Brochure (ODH, 2018)	<b>13</b>	<b>2%</b>
Safe Sleep Kentucky Campaign Safe Sleep Crib Graphic (Safe Sleep KY, 2015)	<b>15</b>	<b>3%</b>
<b>Average</b>	<b>11.5</b>	<b>4%</b>

## Analysis

### Preliminary analysis

Based on the formulas, the easiest educational materials to read were the AAP Campaign Safe Sleep Infographic (AAP, 2020) and the Connecticut Office of Early Childhood Safe Sleep Poster (COEC, 2021). The hardest to read were the NICHQ Safe Sleep in Child-Care Settings Infographic (NICHQ, 2020) and NICHD Safe Sleep for Your Baby Infographic (NICHD, 2019).

### Collective analysis

The Flesch Reading Ease formula results ranged from 69.2 to 93.3; meaning all materials are understandable by eighth and ninth graders. The Fog Scale ranged from 4.4 to 10; five being readable and ten being hard. The Flesch-Kincaid Grade Level ranged from 3.1 to 7.7, corresponding to American grade level. The Coleman-Liau Index ranged from sixth grade to eighth grade. The SMOG Index ranged from 2.4 to 7.2, corresponding to American grade level. The Automated Readability Index ranged from 2.2 to 8.1, corresponding to American grade level. Based on the statistic that the average American adult reader is in the seventh or eighth grade (<https://readabilityformulas.com>), establishing the ideal health literacy level as the highest of eighth grade, all of these materials are at or below this literacy level.

The readability formulas site also established averages. The average grade level for all thirteen materials was 5.6 with fourth grade being the lowest and eighth grade being the highest level. The reader's age average spanned eight to thirteen years old. The reading level ranged from very easy to read to standard. Again, these results meet the ideal health literacy level of the typical American, even with the lower recommendation from the AMA and the NIH that the literacy levels of education materials should be at or below that of a sixth grader (Weis, 2007).

The readability formulas site also addressed specifics for aspects of literature. The average sentence length for American ninth graders is between thirteen and sixteen words (<https://readabilityformulas.com>). The average sentence length for all fifteen materials was eleven words per sentence; below the average. The results ranged from nine to nineteen. The lowest and highest scores corresponded to the previous findings of the easiest and hardest materials to read.

The average percent of polysyllabic words for American ninth graders is between twelve and fourteen percent (<https://readabilityformulas.com>). The average percent of polysyllabic words for the fifteen materials was four percent; below average. The results ranged from one to eleven. Again, the lowest and highest percentages corresponded to the previous findings of the easiest and hardest materials to read.

### **Discussion**

This pilot research was the first to assess the literacy levels of safe sleep educational materials provided to caregivers in the NICU setting. Few studies within the study of safe sleep have addressed the literacy levels of education. As a result, this study provides insight into whether or not these materials were written at an ideal literacy level.

The findings of this research showed that thirteen sample materials at both state and national levels, were written at or below the ideal literacy level for the average American adult reader. Additionally, these materials were at the recommended literacy level recommended by the AMA and NIH for healthcare considerations. In other words, the current safe sleep educational materials provided to caregivers in the NICU are already written at an appropriate literacy level. Thus, HCPs within the NICU setting can be assured that the materials they use are appropriately targeted for the caregiver's health literacy. However, it is still important to consider

literacy level a high priority when providing any educational resource and materials should still be read over to determine if these sources are at an appropriate level. Because these materials meet the average health literacy needs of the caregivers, the literacy level of educational materials can begin to be ruled out as a reason for caregiver noncompliance to safe sleep standards; further studies with more data will solidify this finding, and any new materials will have to continuously be assessed for literacy levels.

This study agreed with previous research that education within the NICU regarding safe sleep remains a high priority. Previous research on this topic had an aim at generating more educational resources and this research was able to identify the new materials such as updated information and state specific materials. This study also shows that the written materials provided to caregivers has been appropriately written and established to meet the needs of the caregivers and have a higher likelihood of being comprehended. Although this study was not successful in identifying safe sleep educational material literacy levels as a cause of caregiver noncompliance, it was successful in identifying further areas for related research. By narrowing areas for further research, possible correlations between compliance and safe sleep can be identified and other areas of concern can be ruled out.

### **Limitations**

This research had a few limitations in which the results could have been strengthened. One such limitation was the lack of accessibility of NICU safe sleep resources. Many states have their own versions of safe sleep posters as do organizations with a tie to pediatric and infant health. Some of these resources were not available to the public but rather to healthcare systems or required a log-in. Additionally, many hospital systems have their own standards for what educational materials are used and tend to be unit specific. Due to COVID-19, research was

unable to be done in a hospital setting to assess what resources were actually being utilized. Another limitation was the restrictions for use of the readability formula site. More educational materials could have been analyzed and considered if there had not been a minimum word count of 300 words. Furthermore, future research aimed at longer educational resources, like brochures and education for staff, could be assessed if the site did not have a maximum word count of 3,000 words. Future studies looking at literacy levels could establish another site or another way to utilize these formulas without doing the work by hand.

### **Clinical Implications**

This study showed that the safe sleep educational materials currently available to hospital systems across the United States meet the literacy levels of the caregiver population. Because these materials can be read by the average American citizen, these sources can help caregivers comprehend a difficult subject matter as they have something to reference back to that is written in language that is understandable. These materials should be given to caregivers to increase compliance with safe sleep practices as indicated in past research efforts. This finding agrees with previous research that written materials are a key component of the teach-back method and are a key nursing intervention for safe sleep. These materials are not only written at a comprehensible level, but they also include images and diagrams that further understanding by addressing different aspects of learning. Beyond the NICU, these findings are applicable to other units such as mother baby and pediatrics that also provide education on safe sleep efforts. This study also established that assessing health literacy should be a nursing intervention within the NICU setting. This intervention can help establish the literacy level of the caregiver and can help the nurse determine the best education methods. Literacy level can be incorporated into caregiver assessment by asking about previous or current education, primary language, and

preferred method of education. Literacy level should be addressed early on during the neonates NICU admission in order to set an appropriate health literacy level for all education efforts. Beyond the NICU, literacy level and health literacy should be a concern hospital and healthcare wide; education is a key aspect of all patient's hospitalizations and discharges and patient compliance and understanding can be improved. HCP's need education on literacy level; it's importance, how to assess it, and the average patient's literacy level.

### **Research Implications**

This study identified multiple areas of aim for future studies. In regard to the NICU, other AAP recommendations for neonatal care can be assessed for educational material literacy levels; although there is no clear correlation between safe sleep education literacy levels and caregiver noncompliance, there could be a correlation with other areas of noncompliance. The AAP identified that research is necessary for specific populations; the African American, American Indian, and Alaskan Native populations have higher incidences of SIDS and SUID; thus, making these populations a researchable topic. Research for these populations could include assessing these populations' health literacy with a focus on identifying how resources can be catered to their needs. Educational materials could also be assessed for their availability in different languages as that also affects health literacy. The quality and consistency of education in the NICU were also an area of concern that could be addressed to improve compliance. Research efforts could assess what resources were actually handed out to caregivers and how often such materials were of use. As already addressed, in the future it would be important to gather the safe sleep materials used within hospitals nationwide and find a way to access materials that may only be available in particular states, organizations, or hospital systems. Beyond the NICU, health literacy is a key area that requires much needed research. Most importantly, the current

education HCPs receive on health literacy would be an ideal research topic as this correlates to patient compliance throughout the healthcare system. Future education efforts on literacy levels can also be addressed.

### **Conclusion**

Caregiver noncompliance to safe sleep standards remains unchanged over the past years and is still an area of concern for the NICU. It is vital that the education provided on safe sleep is addressed and tested for comprehension. Previous research has identified the provision of educational materials as a key nursing intervention to improve understanding. This study was a pilot to test the literacy level of educational handouts provided to caregivers to establish if literacy level was an area of concern for noncompliance rates. Various materials were run through multiple readability indexes to establish a relative health literacy level. The study found that the literacy levels of current safe sleep educational materials met, or were below, the literacy level of the average American adult. This study rules literacy level out as a primary area of concern, although it cannot be entirely ruled out until further research is conducted. While this study did not prove the initial thesis, this study identifies new areas of research that could be linked to caregiver noncompliance, and new areas of research for healthcare in general.



### References

- American Academy of Pediatrics (2020). *Campaign safe sleep infographic 1* [Infographic]. aap.org.  
<https://downloads.aap.org/DOPA/campaign-safe-sleep-infographic-1.pdf>
- American Academy of Pediatrics Committee on Fetus and Newborn (2008). Hospital discharge of the high-risk neonate. *Pediatrics*, 122(5), 1119–1126. doi:10.1542/peds.2008-2174
- American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome (2016). SIDS and other sleep-related infant deaths: Evidence base for 2016 updated recommendations for a safe infant sleeping environment. *Pediatrics*, 138(5). doi:10.1542/peds.2016-2938
- Charlie’s Kids Foundation (2013). Do’s and don’t’s of safe sleep [Chart]. charlieskids.org.  
<https://www.charlieskids.org/dos-donts>
- Connecticut Office of Early Childhood (2021). Safe sleep poster [Poster]. Portal.cv.gov.  
[https://portal.ct.gov/-/media/DCF/Safe\\_Sleep/SSPosterpdf.pdf](https://portal.ct.gov/-/media/DCF/Safe_Sleep/SSPosterpdf.pdf)
- Dowling, D., Barsman, S., Forsythe, P., & Damato, E. (2018). Caring about preemies’ safe sleep (CaPSS): An educational program to improve adherence to safe sleep recommendations by mothers of preterm infants. *Journal of Perinatal & Neonatal Nursing*, 32(4), 366–372. doi: 10.1097/JPN.0000000000000345
- Dufer, H., & Godfrey, K. (2016). Integration of safe sleep and sudden infant death syndrome (SIDS) education among parents of preterm infants in the neonatal intensive care unit (NICU). *Journal of Neonatal Nursing*, 23(2), 103–108. doi: 10.1016/j.jnn.2016.09.001
- Eunice Kennedy Shriver National Institute of Child Health and Human Development (2019). Safe sleep for your baby infographic (horizontal) [Infographic]. Nichd.nih.gov.  
[https://safetosleep.nichd.nih.gov/resources/providers/downloadable/infographic\\_horizontal](https://safetosleep.nichd.nih.gov/resources/providers/downloadable/infographic_horizontal)

Eunice Kennedy Shriver National Institute of Child Health and Human Development (2013). Safe to sleep doorhanger for general audiences [Doorhanger]. NICHHD.nih.gov.

[https://www.nichd.nih.gov/sites/default/files/publications/pubs/Documents/STS\\_DoorHanger\\_General\\_2013.pdf](https://www.nichd.nih.gov/sites/default/files/publications/pubs/Documents/STS_DoorHanger_General_2013.pdf)

Eunice Kennedy Shriver National Institute of Child Health and Human Development (2019). What does a safe sleep environment look like? [Poster]. NICHHD.nih.gov.

<https://safetosleep.nichd.nih.gov/resources/caregivers/environment/look>

Güner, M., & Ekmekci, P. (2019). A survey study evaluating and comparing the health literacy knowledge and communication skills used by nurses and physicians. *Inquiry*, 00469580, 56. doi: 10.1177/0046958019865831

US Department of Health and Human Services, Office of Disease Prevention and Health Promotion (2020). Healthy people 2020. HealthyPeople.gov.

<https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>. Accessed January 08, 2021.

Michigan Department of Health and Human Services (2016). MDHHS breastfeeding & safe sleep [Flyer]. Michigan.gov.

[https://www.michigan.gov/documents/mdhhs/Breastfeeding\\_and\\_Safe\\_Sleep\\_630063\\_7.pdf](https://www.michigan.gov/documents/mdhhs/Breastfeeding_and_Safe_Sleep_630063_7.pdf)

Michigan Department of Health and Human Services (2016). MDHHS infant safe sleep brochure [Brochure]. Michigan.gov.

[https://www.michigan.gov/documents/dhs/DHS\\_Infant\\_Safe\\_Sleep\\_Brochure\\_221150\\_7.pdf](https://www.michigan.gov/documents/dhs/DHS_Infant_Safe_Sleep_Brochure_221150_7.pdf)

National Institute for Children's Health Quality (2020). Safe sleep in child-care settings [Infographic]. NICHQ.org.

<https://www.nichq.org/sites/default/files/resource-file/infographic%20for%20web.pdf>

- Naugler, M., & DiCarlo, K. (2018). Barriers to and interventions that increase nurses' and parents' compliance with safe sleep recommendations for preterm infants. *Nursing for Women's Health*, 22(1), 24–39. doi: 10.1016/j.nwh.2017.12.009.
- Nebraska Department of Health and Human Services (2017). DHHS ABCs of safe sleep brochure in English [Brochure]. Dhhs.ne.gov. <https://dhhs.ne.gov/MCAH/MI-Re-ABCss-Eng.pdf>
- New York State Department of Health (2020). Safe sleep brochure in English [Brochure]. Health.ny.gov. <https://www.health.ny.gov/publications/0672.pdf>
- Ohio Department of Health (2018). Safe sleep environment [Brochure]. Odh.ohio.gov. <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/maternal-child-health-program/media/what-does-safe-sleep-environment-look-like>
- Parnell, T., Stichler, J., Barton, A., Loan, L., Boyle, D., & Allen, P. (2019). A concept analysis of health literacy. *Nursing Forum*, 54(3), 315–327. doi: 10.1111/nuf.12331
- Polster, D. (2018). Confronting barriers to improve healthcare literacy and cultural competency in disparate populations. *Nursing*, 48(12), 28–34. doi: 10.1097/01.NURSE.0000547717.61986.25
- Safe Sleep KY (2015). Safe sleep crib graphic in English [Infographic]. Safesleepky.com [http://www.safesleepky.com/wp-content/uploads/2016/05/Safe\\_Sleep\\_Crib\\_Graphic\\_Eng.pdf](http://www.safesleepky.com/wp-content/uploads/2016/05/Safe_Sleep_Crib_Graphic_Eng.pdf)
- Weis, B. (2007). *Health literacy and patient safety: Help patients understand*. American Medical Association Foundation and American Medical Association. Retrieved from <http://www.partnershiphp.org/Providers/HealthServices/Documents/Health%20Education/CandLToolkit/2%20Manual%20for%20Clinicians.pdf>