JEHDI
The Journal of Early Hearing Detection and Intervention
NCHAM National Center for Hearing Assessment and Management Utah State University
2022; 7(3): 35–46

Nurses' Perceptions of the Universal Newborn Hearing Screening Program

Aaron M. Roman, AuD[1]
Michelle O'Connor Kensey, DNP[2]
[1]Salus University, Elkins Park, PA
[2]West Chester University of Pennsylvania, PA

Abstract

This study explores the knowledge and perceptions of the newborn hearing screening (NBHS) program from the perspective of nurses and nursing support staff. Registered nurses and nursing support staff ($N = 84$) completed a digitally administered survey that queried their understanding of JCIH guidelines, perceptions around NBHS administration, and parental anxiety. The results demonstrated that while most respondents felt comfortable and confident about NBHS administration, there was a significant difference in their understanding of appropriate screening milestones compared to JCIH recommendations. Participants further demonstrated an interest in additional learning opportunities related to the NBHS.

Keywords: newborn hearing screening, nursing, newborn screening

Acronyms: AABR = automated auditory brainstem response; NBHS = newborn hearing screen; NCHAM = National Center for Hearing Assessment and Management; OAE = otoacoustic emissions

Correspondence concerning this article should be addressed to: Aaron M. Roman, AuD, Osborne College of Audiology, Salus University, 8360 Old York Road, Elkins Park, PA 19027. Email: aroman2@salus.edu

For more than twenty years, screening newborns for permanent hearing loss has become a standard of practice in perinatal care in the United States. In 1999, the Centers for Disease Control and Prevention estimated that 45% of newborns were screened for hearing loss (Centers for Disease Control and Prevention [CDC], 2010). As of 2019, 97.9% of newborns were screened before hospital discharge (CDC, 2021). Currently, at least 45 states, including Puerto Rico and the District of Columbia require all hospitals and birthing centers to screen infants for hearing loss prior to discharge (National Conference of State Legislatures [NCSL], 2021). Most states either mandate insurance providers to cover the cost of the screenings or use state funding to provide the necessary monies to identify newborns at risk for developmental speech, language, and cognitive issues (NCSL, 2021). Although screening rates have grown substantially in the two decades since the 1999 position statement from the American Academy of Pediatrics (AAP), a strong screening program is reliant on consistent administration and access to follow-up resources for those in need.

The responsibility of administering the initial newborn hearing screen (NBHS) is not allocated to a singular professional. Across the United States, technicians, audiologists, perinatal nurses, and unlicensed nursing support staff often shoulder the responsibility to administer the screening tests, as well as informing the parents of the results. In many settings, the responsibility of screening for hearing loss falls into the scope of practice and practice purview of perinatal nurses and nursing support staff (Ravi et al., 2018). However, birthing hospitals and other neonatal institutions may not provide any formal training or education on how to perform the tests, proper techniques, or explanation of results. This can lead to high rates of inter-rater error among those personnel performing the screening. Furthermore, it is often the responsibility of the nurse or nursing support staff (including nursing students) to provide the parents with the results of the screen.

To date, there are few studies that assess the knowledge of and sentiment toward NBHS programs from a screener's perspective. Ravi et al. (2018) conducted a systematic review analyzing knowledge and attitudes toward NBHS programs worldwide and found that, in most studies, there was a lack of understanding around NBHS by healthcare providers, though it was not directed exclusively at screening providers. There was a lack of understanding regarding etiology of permanent hearing losses, state regulations, and current practices in executing the screening. Ravi et al. further note that between 43% to 78% of healthcare providers feel as if they require additional training on NBHS.

Despite nurses being one of the primary providers of the NBHS in birthing hospitals and centers, there is little evidence assessing the perception of NBHS programs

among them. Roberts and Jones (2017) conducted a survey of 15 nursing professionals to evaluate their perceptions of the NBHS program prior to completing a training provided by the National Center for Hearing Assessment and Management (NCHAM). The pre-training survey responses suggest that participants felt as though their initial training did not adequately prepare them to complete NBHS procedures using the most up-to-date practices. The study noted discomfort surrounding testing equipment and documenting the results of the screening. Importantly, this study found that the NCHAM training improved the participants' survey responses, indicating a perceived improvement in comfort around the NBHS. Jones et al. (2018) expanded upon these concerns by assessing whether NBHS training in nursing school would increase comfort among nurses. The study found that following training, perceived comfort around the NBHS significantly increased. However, after five months, this perceived comfort decreased significantly, indicating the need for continued education around the NBHS program.

The survey designed by Roberts and Jones (2017) was modified to design the survey used for this study. The specific goals of this study were to (a) evaluate maternal newborn/perinatal nurses' and support staff knowledge related to NBHS programs, (b) understand the attitudes and perceptions of those who deliver NBHS services, and (c) determine areas of further education for this population.

Method

This study targets the knowledge and perceptions of nurses and nursing support staff members who administer newborn hearing screenings. To accomplish this, an invitation to participate in a 20-item survey was circulated to those who provide newborn hearing screening services via email request to perinatal clinical educators at a large five-institution health system and to members of Association of Women's Health, Obstetrics and Neonatal Nurses (AWHONN). The AWHONN was selected due to its potential ability to reach a wide variety of professionals who provide newborn hearing screening services. The health systems was used due to its affiliations with the university, thereby producing a higher likelihood of responses. To qualify for this study, participants must have self-identified as a nurse or nurse support staff who directly administers a newborn hearing screening at a birthing center. The survey was administered using Qualtrics Survey software. Those who accepted the invitation to participate were required to provide their consent prior to initiating the survey. This study was supported by the Institutional Review Board (IRB). No incentive was provided for completing this survey.

Survey Development

The survey for this study was developed through a modification of the survey administered to nurses by Roberts and Jones (2017) and to nursing students by Jones et al. (2018). Specifically, the survey from Roberts and Jones was modified to add questions that reflect on the participants' sentiments toward the newborn hearing screening (e.g., "In your opinion, how important is it to screen all children for hearing loss?"), perceptions on the impact of the screening on parental anxiety (e.g., "Do you believe that newborn hearing screenings cause excessive anxiety and/or concern for parents?"), and general knowledge (e.g., "Does your state have a newborn hearing screening program?"). Questions reflecting on participants' perceptions were assessed using a five-point Likert scale. Additionally, general knowledge questions were scored using forced-choice responses. A full copy of the survey can be found in Appendix A.

Analysis

All survey data were analyzed using R statistical software (R Core Team, 2021). Descriptive statistics were used to calculate means and standard deviations for all Likert-scale data. Questions regarding participants' knowledge related to the JCIH (2019) 1-3-6 guidelines were measured using one-sample *t*-tests with each *mu* value set to a JCIH recommended timeframe. For example, when analyzing at what age participants believe a newborn should receive a formal diagnosis, the *mu* value was set to 3 to reflect the JCIH recommendation of receiving a formal diagnosis by three months of age. Further *t*-tests were used to assess whether participants experience a difference in comfort between screening instrumentation (automated auditory brainstem response measurement [AABR] vs. otoacoustic emission [OAE] screening) and documenting passing vs. referring outcomes.

Sullivan and Artino (2013) and de Winter and Dodou (2010) provided a rationale for the use of *t* tests for pairwise comparisons of Likert-scale data. Reasons supporting the use of *t* tests included that parametric tests such as *t* tests are generally more robust than non-parametric tests even when statistical assumptions (e.g., a normal distribution of data) are violated. Parametric tests are also robust enough to yield unbiased answers when analyzing Likert-scale responses or ordinal data (Sullivan & Artino, 2013). For five-point Likert items, the *t* tests (i.e., parametric test) and Mann-Whitney-Wilcoxon (i.e., non-parametric test) have equivalent power for pairwise comparisons (de Winter & Dodou, 2010). Moreover, using non-parametric methods can result in a loss of information when Likert-scale responses with high response rates are analyzed (Mircioiu & Atkinson, 2017).

Results

A total of 84 participants (81 licensed nurses and 3 nursing support staff) participated in this survey. However, not all participants responded to every question. The number of responses are indicated with each analysis. Table 1 highlights the demographic distribution of the study population. Most respondents were female-identifying licensed nurses between the ages of 35 and 44 who have been practicing for ten years or greater.

Sentiment Toward NBHS

Of the 82 respondents who completed questions relative to the sentiment toward NBHS, 11% (9/82) had completed

Table 1

Demographic Characteristics of Participants

	Characteristic	Frequency	Percentage
Age			
	18–24	5	6.0%
	25–34	18	21.4%
	35–44	22	26.2%
	45–54	20	23.8%
	55–64	17	20.2%
	65–75	2	2.4%
Gender			
	Female/Woman	83	98.8%
	Male/Man	1	1.2%
Licensure			
	Licensed Nurse	81	96.43%
	Nursing Aid/ Support Staff	3	3.57%
Employment Status			
	Employed Full Time	57	67.86%
	Employed Part Time	27	32.14%
Employment Length			
	1–3 years	7	8.33%
	4–7 years	9	10.71%
	8–10 years	6	7.14%
	> 10 years	62	73.81%

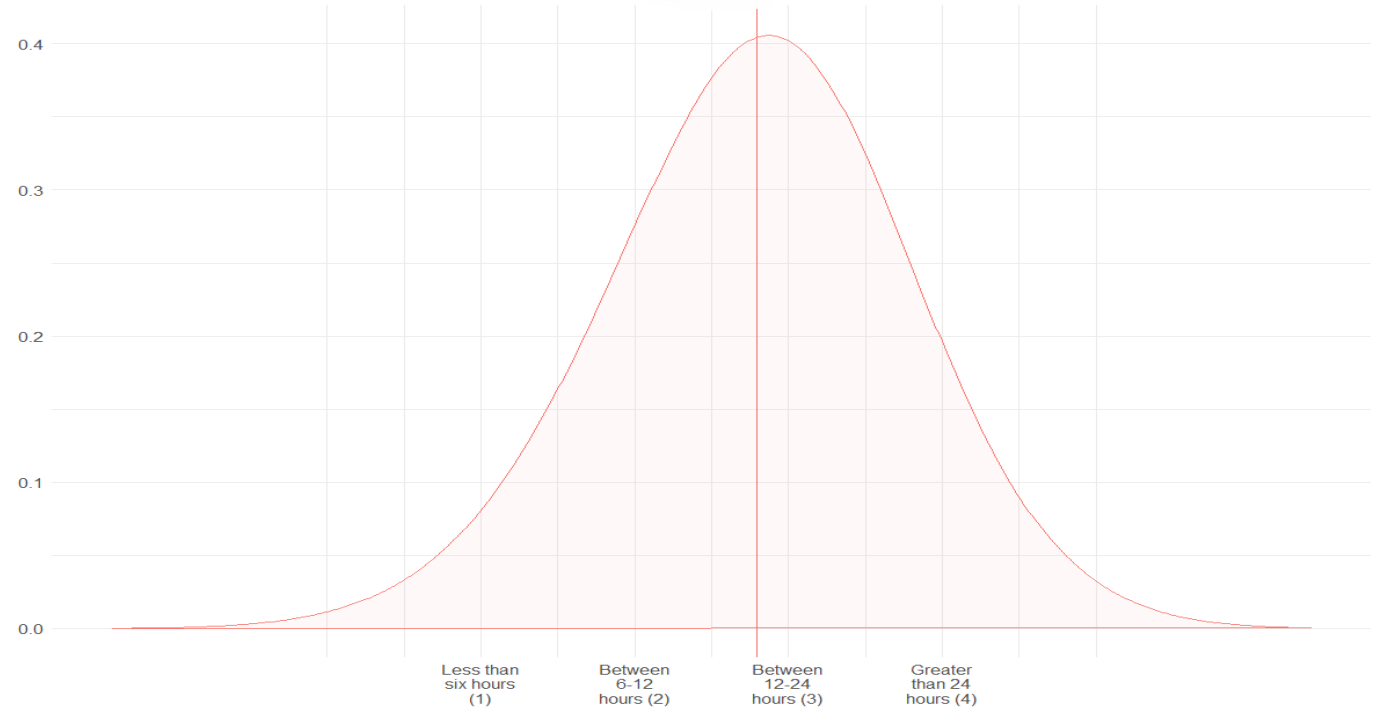
the NCHAM NBHS Training Program, while 89% (73/82) had not. Over 86% of participants (71/82) viewed the importance of the NBHS program as either *very* or *extremely* important. When queried if they knew whether their state mandated newborn hearing screening, 85% (70/82) stated that yes, their state mandated hearing screenings for newborns, with 15% (12/82) stating that they were unsure. Additionally, sentiment among respondents suggested that they perceived the NBHS to be a relatively low-stress procedure for parents. Nearly three quarters (74.4% [61/82]) of respondents felt that the NBHS did not cause stress/anxiety to parents of newborns. Additionally, 77.6% (59/76) reported being either *somewhat* or *extremely* comfortable communicating the results of the newborn hearing screening to parents.

Knowledge of JCIH 1-3-6 Guidelines

When queried on the optimal time to wait to rescreen a newborn that fails the initial NBHS, 69% of respondents believe that the ideal wait time is between 12 and 24 hours. Figure 1 illustrates the density of responses to this question. Participants were asked at what age (in months) was an appropriate time to rescreen in the event of a failed NBHS at the birthplace. 64.4% of participants indicated that 1 month was the appropriate age, 15.8% of participants indicated three months was an appropriate age, 10.5% stated that two months was the appropriate time, and the remaining 5.25% said four months or later was an appropriate age. When asked by what age would it be appropriate to diagnose a hearing loss, only 26.3% of participants reported that three months of age (the recommended age by the JCIH) would

Figure 1

Density of Participant Responses When Asked the Optimal Time to Rescreen a Newborn who Fails Their Initial Hearing Screen



be an appropriate age. Almost 60% of participants (59.7%) stated an age higher than three months and 14.3% believed the age to be lower.

Participants appeared to vary in their responses when queried about the appropriate timeline for intervention. When asked about their perception of the appropriate time to fit a child with hearing aids, 31.6% of participants (18/57) answered six months, which aligns with the JCIH recommendations. This answer was the most concentrated of the responses, though the highest percentage of respondents (38.6% [22/57]) believed that newborns should be fit with hearing aids earlier than six months. When queried regarding the recommended age to enroll in early intervention (EI) services, 31.6% of participants (18/57) again indicated that the recommended age was enrollment by six months of age. As with hearing aids, this response had the highest concentration of respondents, but the majority of respondents (47.4%) believed that the recommended age of EI enrollment is before six months.

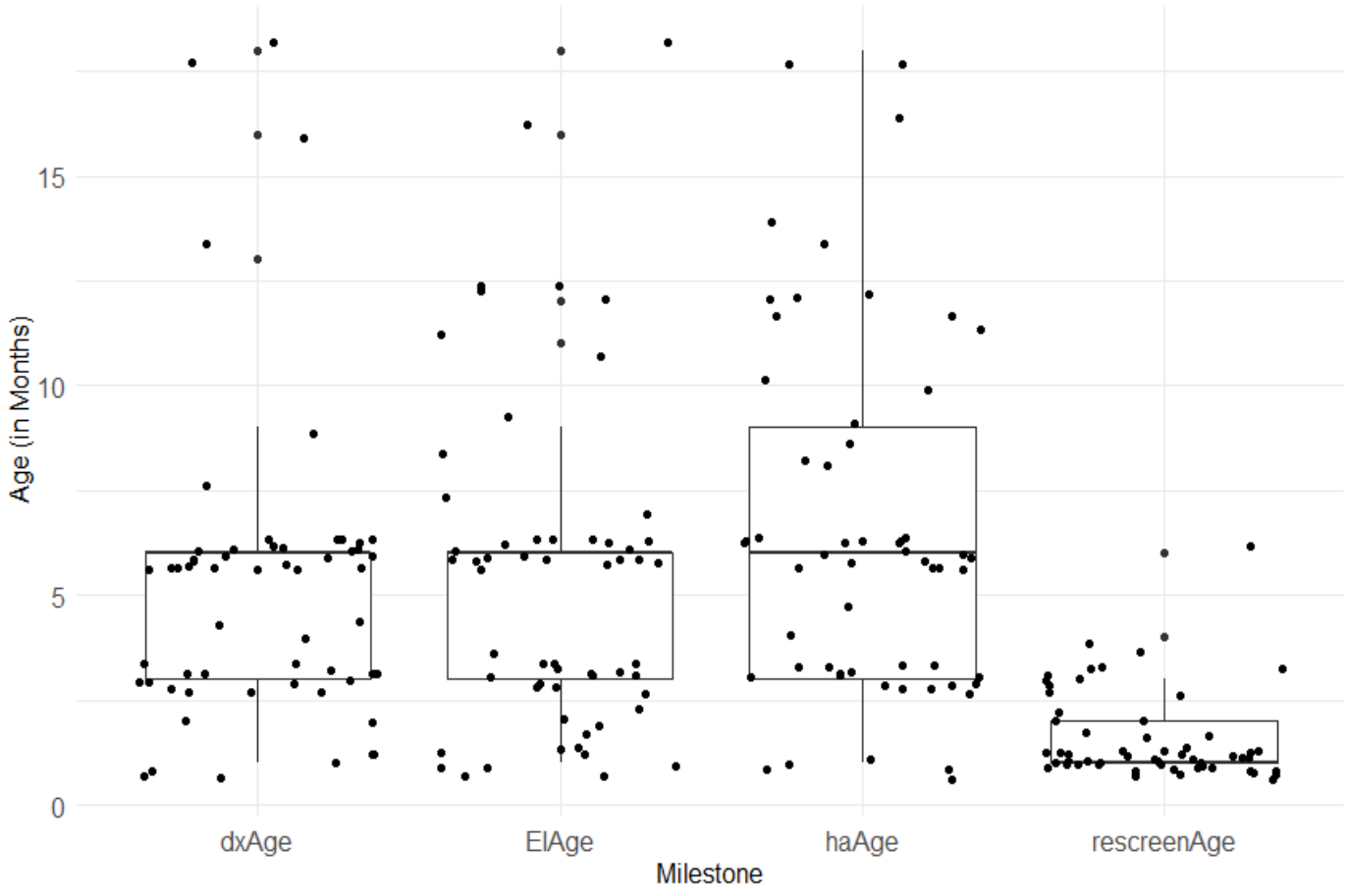
One-sample *t*-tests were used to compare the knowledge of the study group to the JCIH's recommendations of screening by one month, diagnosing by three months, and treating by six months. The mean estimated age of rescreening after referring from the birth center by respondents was 1.69 months, significantly higher than the recommended one month ($t(61) = 5.408$, $p < .005$). Respondents estimated that the recommended age for diagnosis of hearing loss was 5.49 months, significantly higher than the recommended three months ($t(69) = 5.701$, $p < .001$). Estimates for treatment were divided into estimated age for early intervention enrollment ($M = 5.44$ months) and hearing aid fitting ($M = 6.33$), neither of which were significantly different from the JCIH's recommendation of treatment by six months of age. Individual responses are visualized on Figure 2.

Education Preparation

Respondents' opinions were divided as to whether their educational training prepared them to conduct newborn hearing screenings. Thirty-four percent (26/76) indicated that their educational training prepared them either *very* or *extremely well*, while 30% (23/76) felt that their training prepared them only *slightly well* or *not well at all*. Respondents largely felt that their education training helped prepare them to use the equipment for administering NBHS, with 67% (51/76) reporting that they felt adequately trained to use the equipment. Despite their comfort, 78% (59/76) expressed interest in future trainings related to NBHS procedures.

Figure 2

Participant Responses When Asked for the Optimal Age (in Months) to Rescreen, Diagnose (dx), Treat with Hearing Aids (ha), and Enroll in Intervention (EI)

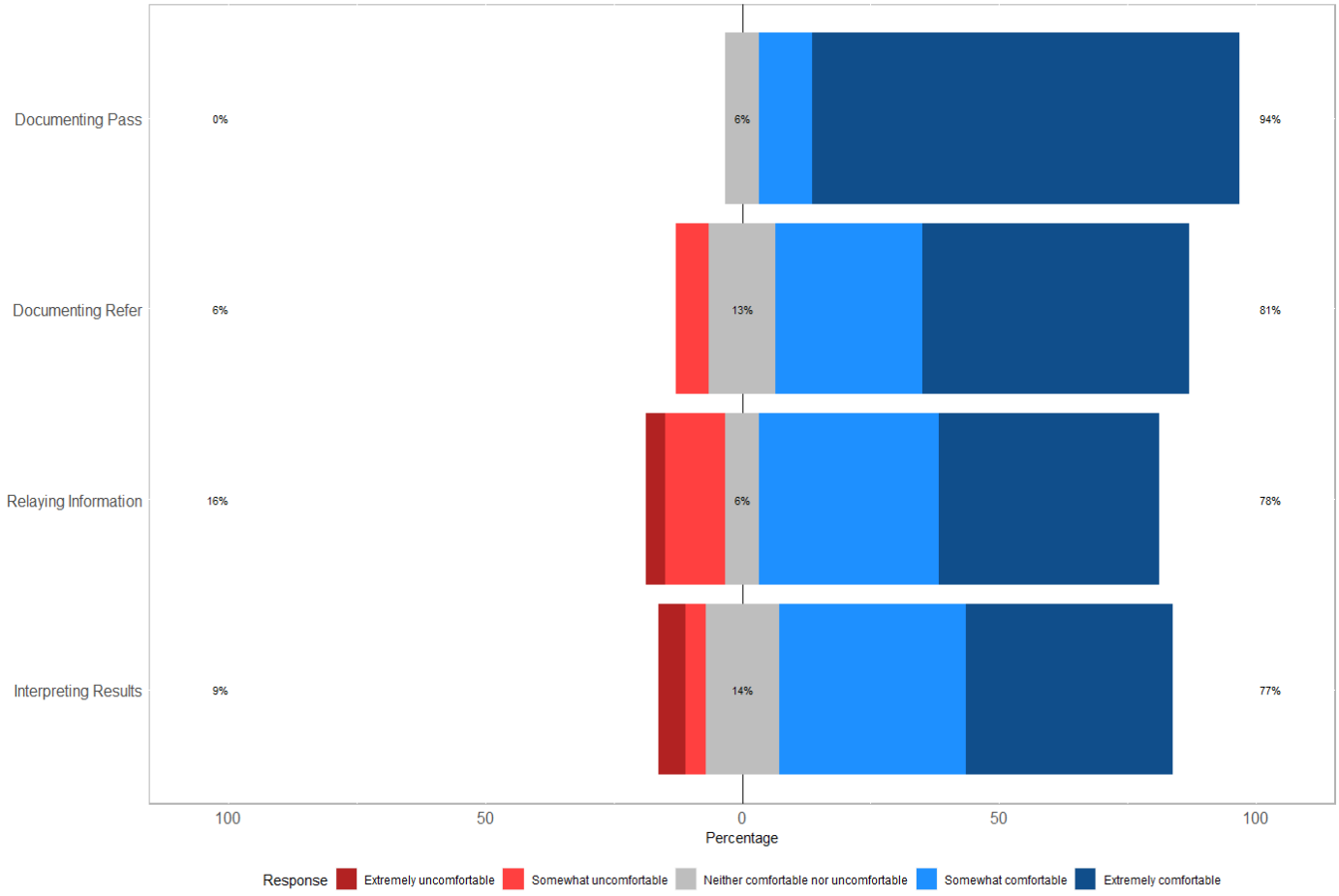


Administration Comfort

Figure 3 illustrates the perceived comfort levels related to administering the newborn hearing screening, including interpreting the results, documenting both pass and referrals, and informing parents of the results of the screening. Overall, 78% (60/77) of respondents classified their comfort level administering the newborn hearing screening as either *somewhat* or *extremely comfortable*. Seventy-seven percent (59/77) of respondents were either *somewhat* or *extremely comfortable* interpreting the results of the screening once administered, and 78% (60/77) of respondents were either *somewhat* or *extremely comfortable* relaying the results to parents. Informing parents of the results of the screening appeared to be the area of highest discomfort, with 16% (12/77) noting that they were either *somewhat* or *extremely uncomfortable*. Respondents perceived the NBHS to have little impact on the stress of parents, with 75% (62/83) indicating that they do not believe that the NBHS creates anxiety to parents of newborns.

Figure 3

Likert Responses Highlighting Participants' Comfort Levels Regarding (a) The NBHS Administration in General, (b) Informing Parents of Screening Results, and (c) Interpreting the Results of the Screen



Perceptions of Documentation

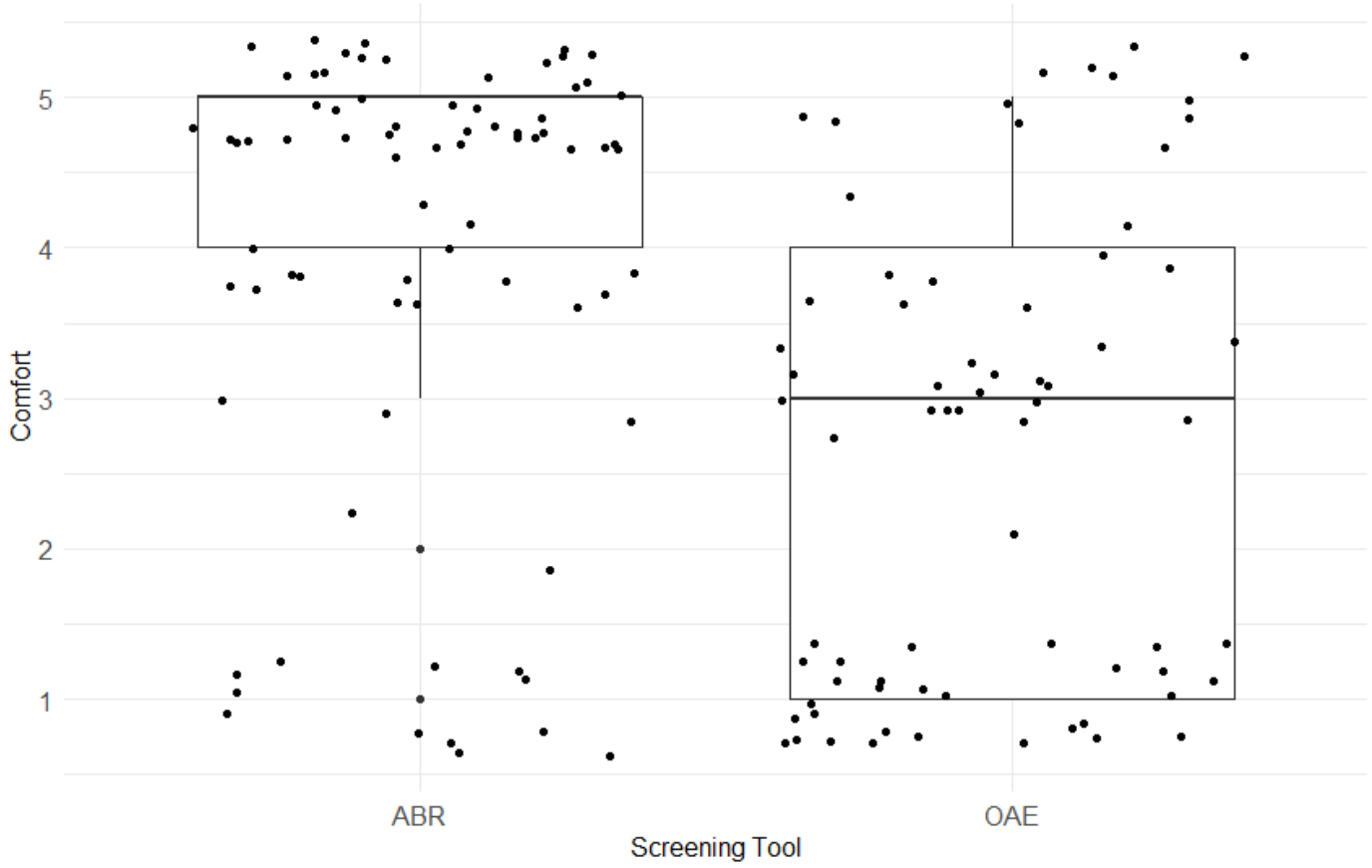
When asked about their comfort documenting results of a passing NBHS, 93% of respondents stated that they felt either *somewhat* or *extremely comfortable* completing the necessary documentation. In contrast, 80% of participants were *somewhat* or *extremely comfortable* documenting the results of a NBHS in which the individual referred. This difference is statistically significant ($t(125.18) = 4.12$, $p < .001$).

Instrumentation Comfort

Participants were asked to rank their comfort using an automated auditory brainstem response (AABR) screening device and otoacoustic emissions (OAE) screening device on a scale of 1 (*Not at All Comfortable*) to 5 (*Very Comfortable*). More than three quarters of respondents (77.6%; 59/76) indicated that they were either *somewhat* or *extremely comfortable* using an AABR system compared to the 30% (21/70) of respondents who felt similarly about the OAE system. Only 18.4% (14/76) felt uncomfortable using an AABR to conduct screenings, while 44.3% were uncomfortable using an OAE machine to conduct screenings. Overall, participants perceived themselves as significantly more comfortable using AABRs to conduct NBHS procedures compared to OAE devices ($t(141.39) = 5.624$, $p < .001$). The distribution of responses can be found in Figure 4.

Figure 4

Perceived Comfort Between Use of Automated Auditory Brainstem Response (AABR) and Otoacoustic Emissions (OAE) to Screen for Hearing Loss



Discussion

The goal of this study was to gain greater insight into the perception of the newborn hearing screening program directly from those who administer the screening. To achieve this goal, this study assessed (a) the general knowledge of those who administer newborn hearing screening, (b) the perceptions around the NBHS procedures, and (c) whether there is interest in further education around NBHS in the population that administers these screenings.

NBHS Knowledge

The findings from this study suggest that participants, while generally comfortable with newborn hearing screening techniques, may benefit from education around the policies and procedures that guide NBHS programs in the United States. Fifteen percent of participants surveyed were unsure if their state mandated a NBHS screening. This finding is not entirely new, as Ravi et al. (2017) cite state regulations as a gap in knowledge among healthcare providers in their systematic review. However, the study that Ravi et al. cited assessed physician sentiment toward NBHS prior to the 1999 recommendation from the AAP (Wall et al., 2006). Since that time, providers seem to be more cognizant of state-level mandates around NBHS, with 85% of this study's population accurately indicating that their state (Pennsylvania) mandates the screening. Presently, 43 of the 50 states in the United States have either statutes or regulations that mandate a NBHS (NCHAM, 2021).

The participants' knowledge regarding the JCIH's 1-3-6 guidelines in this study is somewhat similar to previously documented studies. Ravi et al. (2017) found that roughly 67% of pediatricians were aware of the 1-3-6 guidelines from the JCIH, though the pediatricians surveyed were based in India. Danhauer et al. (2009) surveyed America-based pediatricians and found that they demonstrated a fair to moderate amount of familiarity with the 1-3-6 guidelines, with the most respondents (86.7%) familiar with the one-month screening guidance. Interestingly, this study found statistically significant differences in the participants' responses from the JCIH recommended ages for rescreening and age of diagnosis, but not age of interventions. This differs from Danhauer et al., who found that the fewest number of respondents (63.6%) were able to correctly identify the age of intervention at six months.

Attitude and Perceptions of NBHS

Our study finds that 86% of respondents found the NBHS program to be an important aspect of the newborn screening process. This finding aligns with findings by Moeller et al. (2006), who surveyed primary care physicians' attitudes toward the NBHS program and found

that 81% of physicians supported the program. Although Moeller et al. surveyed physicians, there is little evidence regarding the perception of the NBHS program among those who carry out the screening services. To that end, our study adds to the literature, indicating that sentiment toward the program among nurses and nurse-support staff is similar, if not higher, than primary care providers.

In terms of administration and documentation comfort and their relationship to educational training, this study found that many nurses surveyed felt well-educated on the use of the NBHS instrumentation used by their institution. Although most of the study participants reported high comfort levels performing the newborn screening tests and reporting the results to the parents, many perinatal nurses and nursing support staff remain below optimal comfort levels with performing the screening tests and reporting the results to parents. This further supports the need for nursing and nurse-support staff education on reporting findings to parents.

Of particular significance is the low percentage of those surveyed who perceived that their formal education was useful in conducting NBHS procedures. This finding aligns with the findings by Roberts and Jones (2017), who also found that nurses felt that they were not adequately trained on NBHS procedures. In addition to lack of education about the procedures in general, Roberts and Jones found that nurses felt that they were not trained to use the most up-to-date equipment. Interestingly, our study negates this finding, instead finding that most participants felt well-trained to use the most up-to-date equipment. When asked about the specific tools used to screen, there was a statistically significant difference between equipment comfort, with more respondents comfortable using AABR as a screening tool compared to an OAE machine.

The results of this survey suggest the need for perinatal nurses and support staff continuing education about screening procedures, test validity, and reporting results to parents. According to Moeller et al. (2006), there is considerable evidence that newborn hearing screening tests are accurate and that most experts and physicians believe in the value of such screening. Beliefs about the importance of newborn hearing screening may be linked to nurses' clear understanding of the consequences for newborns with hearing loss on speech development, language acquisition, and learning. A clear understanding that even minimal hearing loss has consequences for the development of speech and language will put nurses in a better position to guide families in providing effective counseling relative to screenings. Specifically, nurses and other newborn hearing screening administrators should be effectively educated on the importance of counseling parents and caregivers on the implications and limitations of screening, while providing beneficial referral information in the event of a referral.

Interest in Future Education

Respondents overwhelmingly indicated that they would largely be interested in future educational opportunities related to newborn hearing screening practices and guidelines. Designing such programs must be considered carefully to optimize practical learning for these individuals. For example, Moeller et al. (2006) found that though 51.7% of physicians reported using the Internet to access medical information, very few indicated that they used Internet-based resources to research topics related to newborn hearing screening. The authors postulate that the physicians surveyed may not have been knowledgeable about these resources, but resource accessibility may not be the only barrier. Continuing education presented in the form of print documents tends to only have a slight effect on medical decision-making (Giguère et al., 2020). Therefore, it may be prudent for future research to design interactive educational opportunities for newborn hearing screening providers to optimize learning opportunities.

Limitations and Future Directions

Attitudes, not just knowledge, are paramount to promote changes in health care practices. Perceptions regarding comfort level in administration and documentation, as well as educational preparation were important aspects of this study to elucidate the need for further research and education on NBHS, though there are several limitations that should be noted in interpreting results. In this study, nursing personnel and support staff felt much more comfortable using the AABR machine versus the OAE machine. However, the primary tool to conduct newborn hearing screens in the area surveyed is AABR. Participants may have felt significantly less comfortable with OAEs because they simply use AABR machines more often for newborn screenings. Additionally, as reported in Moeller et al. (2006), participants may have become aware of areas that they lack knowledge in as they completed this survey. This awareness may have biased their later responses.

Although this study adds to the existing literature by further exploring perceptions and attitudes of nurses who administer newborn hearing screenings, future research is essential for this group. Moving forward, research may wish to direct a lens toward nursing education, including the incorporation of undergraduate nursing student knowledge, comfort, and perceptions of NBHS. According to Jones et al. (2018), nursing students who completed the NCHAM NBHS Training Program showed significantly higher comfort and knowledge levels performing the screenings and documenting and reporting the results. Their study further found that regular follow-up training was required to be comfortable with NBHS policies and procedures, akin to the recommended guidelines for CPR training.

Conclusions

The purpose of this study was to evaluate the knowledge and perceptions of the newborn hearing screening program from those who directly administer the screening, specifically nurses and nursing support staff. The study found that perceptions from this sample population are generally very favorable around the NBHS program,

and that those who administer the screening perceive themselves as quite proficient in the knowledge and skills required to execute the screening. Participants also find the screening as a low-stress procedure for both screeners and parents of newborns. Areas of further development in this population include training on documentation, particularly when a newborn does not pass their initial screen, as well as further training on the JCIH 1-3-6 guidelines around the timing of screenings and subsequent follow-ups.

References

Centers for Disease Control and Prevention. (2010). Overview and summary of 1999–2004 DSHPSHWA Data. https://www.cdc.gov/ncbddd/hearingloss/documents/1999-2004_dshpshwa-summary.pdf

Centers for Disease Control and Prevention. (2021). 2019 Summary of hearing screening among total occurrent births. https://www.cdc.gov/ncbddd/hearingloss/2019-data/02-screen.html

Danhauer, J. L, David, K. B, Johnson, C. E., & Meyer, D. H. (2009). Survey of pediatricians and early hearing detection and identification programs at a precise local level: An academic medical center. *Seminars in Hearing, 30*(3), 165–183.

de Winter, J. C. F., & Dodou, D. (2010). Five-point Likert items: *T* test versus Mann-Whitney-Wilcoxon (addendum added October 2012). *Practical Assessment, Research & Evaluation, 15*(Article 11). https://doi.org/10.7275/bj1p-ts64

Giguère, A., Zomahoun, H. T. V., Carmichael, P. H., Uwizeye, C. B., Légaré, F., Grimshaw, J. M., Gagnon, M-P., Auguste, D. U., & Massougbodji, J. (2020). Printed educational materials: Effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, *8*(8), CD004398.

Joint Committee on Infant Hearing. (2019). Year 2019 position statement: Principles and guidelines for early hearing detection and intervention programs. *Journal of Early Hearing Detection and Intervention, 4*(2), 1–44. https://doi.org/10.15142/fptk-b748

Jones, A. L., Lambert, A. W., & Barnett, M. (2018). Nursing students: Training and maintaining universal newborn hearing screening knowledge. *Nurse Education in Practice*, *32*, 72–77. http://doi.org/10.1016/j.nepr.2018.07.011

Mircioiu, C., & Atkinson, J. (2017). A comparison of parametric and non-parametric methods applied to a Likert scale. *Pharmacy (Basel, Switzerland), 5*(2), 26. https://doi.org/10.3390/pharmacy5020026

Moeller, M. P., Eiten, L., White, K., & Shisler, L. (2006). Primary care physicians' knowledge, attitudes, and practices related to newborn hearing screening. *Pediatrics*, *118*(4), 1357–1370. http://dx.doi.org/10.1542/peds.2006-1008

National Center for Hearing Assessment and Management. (2021). State EHDI/UNHS mandates: Summaries by provision: Requires screening. https://www.infanthearing.org/legislative/provisions/requires.html

National Conference of State Legislatures. (2021). Newborn hearing screening state laws. https://www.ncsl.org/research/health/newborn-hearing-screening-state-laws.aspx

R Core Team. (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

Ravi, R., Gunjawate, D. R., Yerraguntla, K., & Rajashekhar, B. (2018). Systematic review of knowledge of, attitudes towards, and practices for newborn hearing screening among healthcare professionals. *International Journal of Pediatric Otorhinolaryngology*, *10*, 138–144. https://doi.org/10.1016/j.ijporl.2017.11.004

Roberts, C. P., & Jones, A. L. (2017). Measuring nurses's knowledge and understanding of universal newborn hearing screenings. *The Journal of Early Hearing Detection and Intervention*, *2*(2), 38–47. https://digitalcommons.usu.edu/jehdi/vol2/iss2/8/

Sullivan, G. M., & Artino, A. R., Jr. (2013). Analyzing and interpreting data from Likert-type scales. *Journal of Graduate Medical Education, 5*(4), 541–542. https://doi.org/10.4300/JGME-5-4-18

Wall, T. C., Senicz, E., Evans, H. H., Woolley, A., & Hardin, J. M. (2006). Hearing screening practices among a national sample of primary care pediatricians. *Clinical Pediatrics*, *45*(6), 559–566.

Appendix A

Newborn Hearing Screening Survey

Please select the age range that aligns to your age.

- ○ Under 18
- ○ 18–24
- ○ 25–34
- ○ 35–44
- ○ 45–54
- ○ 55–64
- ○ 65–74
- ○ 75–84
- ○ 85 or older

Which of these best applies to you

- ○ I am a licensed nurse
- ○ I am a nursing aid or support staff
- ○ I am a student

Which of the following best describes your employment status?

- ○ Employed full time
- ○ Employed part time
- ○ Unemployed looking for work
- ○ Unemployed not looking for work
- ○ Retired
- ○ Student

Please select the gender that you identify, or most closely identify, as:

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Other

How many years have you been a practicing clinician?

- ○ 0–1 years
- ○ 1–3 years
- ○ 4–7 years
- ○ 8–10 years
- ○ 10 + years
- ○ I am currently a student

In which unit do you most commonly work?

_____

Have you completed the Newborn Hearing Screening Training Curriculum from the National Center for Hearing Assessment and Management (NCHAM)?

- ○ Yes - I have completed the NCHAM Newborn Hearing Screening Training Curriculum
- ○ No - I have not completed the NCHAM Newborn Hearing Screening Training Curriculum

---

Appendix A (contd.)

Does your state have a newborn hearing screening program?

- ○ Yes
- ○ Unsure
- ○ No

Do you believe that newborn hearing screenings cause excessive anxiety and/or concern for parents?

- ○ Yes
- ○ Unsure
- ○ No

Do you think your training has prepared you to complete the newborn hearing screening using the most up to date equipment?

- ○ Yes
- ○ No

How well do you feel that your educational training prepared you concerning the newborn hearing screening?

- ○ Extremely well
- ○ Slightly well
- ○ Very well
- ○ Not well at all
- ○ Moderately well

In your opinion, how important is it to screen all children for hearing loss?

- ○ Extremely important
- ○ Slightly important
- ○ Very important
- ○ Not at all important
- ○ Moderately important

In your opinion, at what age (in months) should...

	1 3 6 8 11 13 16 18
○ A newborn not passing the initial hearing screening receive an additional screening?	
○ A child be definitively diagnosed as having a permanent hearing loss?	
○ A child begin to wear hearing aids?	
○ A child with permanent hearing loss be referred to early intervention?	

Please rate your overall comfort with administering a newborn hearing screen

- ○ Extremely comfortable
- ○ Very comfortable
- ○ Moderately comfortable
- ○ Slightly comfortable
- ○ Not at all comfortable

Please rate your comfort level using the following screening equipment

	Extremely comfortable	Somewhat comfortable	Neither comfortable nor uncomfortable	Somewhat uncomfortable	Extremely uncomfortable
(A)ABR - (Automated) Auditory Brainstem Response Equipment					
OAE - Otoacoustic Emission Testing Equipment					

How comfortable are you in interpreting the results of the newborn hearing screening?

- ○ Extremely comfortable
- ○ Somewhat comfortable
- ○ Neither comfortable nor uncomfortable
- ○ Somewhat uncomfortable
- ○ Extremely uncomfortable

If your newborn refers on their initial screening, how comfortable do you feel documenting the result?

- ○ Extremely comfortable
- ○ Somewhat comfortable
- ○ Neither comfortable nor uncomfortable
- ○ Somewhat uncomfortable
- ○ Extremely uncomfortable

If your newborn refers on their initial screening, how long should you wait to re-screen?

- ○ Less than six hours
- ○ Between 6–12 hours
- ○ Between 12–24 hours
- ○ Greater than 24 hours

Appendix A (contd.)

If your newborn has a passing result, how comfortable do you feel documenting the result?

- ○ Extremely comfortable
- ○ Somewhat comfortable
- ○ Neither comfortable nor uncomfortable
- ○ Somewhat uncomfortable
- ○ Extremely uncomfortable

How comfortable are you in relaying information to parents who have questions about their child's newborn hearing screening results?

- ○ Extremely comfortable
- ○ Somewhat comfortable
- ○ Neither comfortable nor uncomfortable
- ○ Somewhat uncomfortable
- ○ Extremely uncomfortable

Would you be interested in further information and/or training related to newborn hearing screenings?

- ○ Yes
- ○ No