



**HEARING HEALTH OF NEWBORNS AND INFANTS: HEALTH EDUCATION
ACTIONS FOR NURSES**
**SAÚDE AUDITIVA DE NEONATOS E LACTENTES: AÇÕES EDUCATIVAS EM SAÚDE PARA
PROFISSIONAIS DE ENFERMAGEM**
**SALUD AUDITIVA EN RECIÉN NACIDOS Y LACTANTES: ACCIONES EDUCATIVAS EN MATERIA DE
SALUD PARA PROFESIONALES DE ENFERMERÍA**

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ABSTRACT

Objective: to assess the effectiveness of educational activities for nurses focussing on the hearing health of newborns and infants. **Method:** a quasi-experimental design with time-series. 58 nursing professionals (nurses, technicians and assistants) who worked in a university hospital and answered a semi-structured questionnaire were involved. This study was approved by the Ethics Research Committee of the Centre of Health Sciences, Federal University of Pernambuco, under number 0130.0.172.000-0. **Results:** significant assimilation of knowledge by nursing staff was observed six months after the educational activity, especially regarding the ideal age to perform the Newborn Hearing Screening, the ideal age to perform the diagnosis and intervention for hearing loss and risk indicators for hearing loss. **Conclusion:** it is believed that the methodology used in educational activities, based on the problematization of professional practice, may have contributed greatly to the increase in knowledge about hearing health, particularly in neonates and infants. **Descriptors:** Hearing; Screening; Nursing.

RESUMO

Objetivo: verificar a efetividade de ações educativas para profissionais de enfermagem sobre a saúde auditiva de neonatos e lactentes. **Método:** estudo quase-experimental, com delineamento tempo-série. Participaram 58 profissionais de enfermagem (enfermeiros, técnicos e auxiliares), que trabalhavam em um hospital universitário e responderam a um questionário semi-estruturado. Estudo aprovado pelo Comitê de Ética em Pesquisa do Centro de Ciências da Saúde da Universidade Federal de Pernambuco sob número 0130.0.172.000-0. **Resultados:** pôde-se observar assimilação significativa de conhecimento dos profissionais de enfermagem seis meses após a ação educativa, especialmente no que se refere a idade ideal para realizar a Triagem Auditiva Neonatal, idade ideal para realizar o diagnóstico e intervenção da perda auditiva e os indicadores de risco para perda auditiva. **Conclusão:** acredita-se que a metodologia utilizada nas ações educativas, baseadas na problematização da prática profissional, pode ter contribuído sobremaneira para o aumento do conhecimento sobre saúde auditiva, especialmente da população neonatal e lactente. **Descritores:** Audição; Triagem; Enfermagem.

RESUMEN

Objetivo: verificar la efectividad de las acciones educativas para profesionales enfermeros sobre la salud auditiva de los recién nacidos y los lactantes. **Método:** estudio medio experimental con un delineamiento de tiempo y serie. Participaron 58 profesionales de enfermería (Enfermeros, técnicos, y auxiliares), que trabajaron en un hospital universitario y respondieron un cuestionario sem-estructurado. Estudio aprobado por el Comité de ética en Investigaciones involucrando seres humanos del Centro de Ciencias de la Salud de la Universidad Federal de Pernambuco con el numero 0130,172,000-0. **Resultados:** puede observarse la asimilación significativa de conocimiento de los profesionales de enfermería seis meses después de la acción educativa, especialmente en la que se refiere a la edad ideal para realizar la prueba auditiva Neonatal para recién nacidos, la edad ideal para realizar el diagnóstico e intervención de pérdida auditiva y los indicadores de riesgo de pérdida auditiva. **Conclusión:** se cree que la metodología utilizada en las acciones educativas, basadas en la problematización de la práctica profesional, puede haber contribuido en gran parte al aumento del conocimiento sobre la salud auditiva, especialmente en la población neonatal y lactante. **Descriptores:** Audición; Pruebas; Enfermería.

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INTRODUCTION

Hearing is one of the senses necessary to acquire important information for human development, especially for sensory information coming from acoustic stimulation. Hearing loss, if not identified, may harm linguistic, emotional, social, and educational development, among others.¹ The relationship between hearing and oral language development in humans makes it important that the diagnosis of hearing loss should be achieved as soon as possible.²⁻³

The first step in identifying hearing loss prior to the age of six months occurs in Newborn Hearing Screening programmes (NHS). A neonatal hearing screening should be performed on all newborns prior to hospital discharge or within one month of life.⁴ However, as some Newborn Hearing Screening programs do not reach the entire newborn population, some factors should be considered, such as the professionals who should be involved with newborn hearing screening. Besides audiologists responsible for neonatal hearing screening program, it is necessary to involve the professionals who deal with the newborn and infant, especially paediatricians, neonatologists and nurses.²⁻³

The interdisciplinary approach is one of the key factors in the effectiveness of newborn hearing screening programs, which justifies the need to invest in promoting educational activities in order to educate these professionals about infant hearing health by addressing issues relating to the promotion, prevention, detection and diagnosis of hearing loss, followed by medical intervention and speech therapy.²⁻³

Given the above, information regarding the hearing health of newborns and infants in their promotional, diagnosis and intervention aspects should be familiar to everyone. In general, this information must come from the health professionals who deal with newborns and infants, such as the nursing professional, whose work is based on providing care.⁵ It is understood that, from their knowledge, the population may develop more specific information regarding the hearing health of their children, increasing the effectiveness of hearing health programs, in order to achieve interventions that minimize the consequences of hearing loss in the individual development.

In this sense, nurse practitioners can help to promote hearing health and diagnosis of hearing loss as early as possible, through guidance to the public during the pre-natal, perinatal and postnatal periods, or even follow-up visits of the child in their first year

of life. However, most professionals, including nurses, receive no information about the topics of hearing health, hearing loss and its consequences, hindering the identification of such problems in the population⁶⁻⁷, often leading to failure to identify children with hearing loss. The sooner the diagnosis and early adaptation, the better and faster the results will be, generating lower costs and reducing the time taken for the individual to be part of society and the labour market.⁸

All efforts regarding hearing health are only valid if there is awareness of professionals working with infants and toddlers and their families, in order to initiate the process of detection, identification, diagnosis and rehabilitation of hearing loss.⁹ Some authors⁶ observed that the knowledge of health professionals about hearing health contributes to hearing loss prevention, as well as in monitoring the development of the language and hearing of every child. Thus, communication between health professionals is critical to the success of a program, through educational activities.

In addition to the above, through Ordinance GM/MS nº 2,073 of 28/09/2004¹⁰, the Ministry of Health established the National Policy on Hearing Health Care, which includes attending at Primary, Middle and High complexity levels. Ordinance SAS/MS nº 587/2004 contains the standards of care in the Hearing Health Care Network and specifies which actions constitute hearing health in primary care, including hearing health promotion, prevention and identification of hearing change as soon as possible, through informative, educational and family counselling actions, and referral when necessary to the proper auditory health services.

In this context, Child Hearing Health Programs must address health care, not only in the identification and diagnosis of hearing disorders as early as possible, but also through effective actions to promote hearing health.

In order for health professionals, especially nurses, to work in guiding families on the prevention, diagnosis, identification of hearing loss and orientate them about the rehabilitation process¹¹, there is a need for specific information on children's hearing health, as this issue is not addressed during these professionals' studies.

Therefore, in order to educate them, it is necessary to conduct studies to verify the most effective way of increasing these professionals' knowledge of issues related to hearing health.

OBJECTIVE

- To determine the effectiveness of educational activities for nurses focussing on the hearing health of newborns and infants.

METHOD

A quasi-experimental design with time-series. Initially, 82 nursing professionals (nurses, technicians and assistants) participated, completing a questionnaire prior to the realization of educational activities. These professionals worked at a university hospital in the Paediatric Outpatients, Paediatrics, Neonatal Intensive Care Unit (NICU), Maternity and Obstetrics departments in the period from August 2011 to July 2012. The inclusion criterion for participation in the research was attending at least three meetings in which educational activities were carried out.

All participants were invited to participate in four educational meetings, according to various schedules offered. At the last educational meeting, the same questionnaire was administered with the aim of verifying the grasping of the subjects covered over the four meetings. Six months after the last meeting, all 82 professionals were contacted to respond once more to the same questionnaire, but only 58 nurses participated, which is the sample of this study.

Thus, data collection was conducted in four phases:

(1) Initial Application of the Questionnaire - at this stage, the 82 nursing professionals responded to the semi-structured questionnaire;

(2) Educational Activities - based on information collected in the semi-structured questionnaire, themes to be addressed in the educational activities with participants were developed. Four meetings were held to discuss the topic of infant hearing health, focusing on the neonate and infant, conducted by a speech therapist and a nursing student. These meetings lasted on average an hour, interspersed by 30 days, on average. The contents were presented through slide projection, video presentations, group dynamics and discussion groups, approached as problems, analysed and interpreted, resulting in the creation / re-creation of knowledge, in a dialogical relationship between the researcher and nursing professionals. Based on what was discussed at the meetings 1, 2 and 3, and the contents of the discussions in these meetings, an

educational brochure was designed and distributed to participants at the last meeting as material support for it, as well as allowing the nursing professionals to use it in their practice;

(3) First Reapplication of the Questionnaire - this step was performed immediately after the fourth meeting, when the same semi-structured questionnaire was reapplied to 82 nursing professionals; and

(4) Second Reapplication of the Questionnaire - this step was performed six months after the educational activities with the same semi-structured questionnaire, when only 58 nursing professionals participated.

The data was entered into a database - the statistical program *Statistical Package for the Social Sciences* (SPSS) version 13.0. In analysing the data, the percentage frequencies for these variables were calculated, and also constructed contingency tables of interest. The chi-square test was used to evaluate the association of various factors studied, independently. In the tables in which the chi-square test assumptions were not met, the Fisher Exact test was used. To assess the knowledge of professionals before and after the educational activities, the chi-square test for homogeneity was used. The chi-square test was also used for the comparison of the percentage ratio of simple frequency distributions. In all findings, a significance level of $p\text{-value} \leq 0.05$ was considered.

This study was part of a project approved by the CNPq, under number 014/2010, in the process. 476288/2010-0, entitled “Effectiveness of a training program for nurses on the hearing health of newborns and infants,” and approved by the Ethics Committee on Research involving Human Subjects of the Centre for Health Sciences of the UFPE under number 0130.0.172.000-10.

RESULTS

58 nurses participated in this study, with the female gender predominant ($n = 57$) and aged between 21 and 63 years (mean of 42 years). More than 50% of the study population (51.7%, $n = 30$) had finished high school, with a period of educational and professional activities of less than 20 years [55.2% ($n = 32$) and 53.4% ($n = 31$)], respectively. The majority of the nursing professionals (86.2%, $n = 50$) said they had not received information about hearing health during their training.

In Table 1 is the data for the workplace of nurses who participated in this study.

Table 1. Demographics of nursing professionals. Recife, 2012

Demographic variables	n	%
Function at Hospital		
Nurse	18	31
Nurse technician	21	36,2
Nursing assistant	19	32,8
Hospital Sector		
NICU	15	25,9
Obstetric ward	15	25,9
Paediatrics	13	22,4
Infirmery	13	22,4
Medical residency	2	3,4
Workplace		
Public Hospitals only	56	96,6
Private and public Hospitals	2	3,4
Total	58	100,0

In Table 2, the change of nursing knowledge after the educational actions and six months after the educational activity can be observed.

Table 2. Knowledge of nursing professionals before, after and six months after the educational activity. Recife, 2012

Knowledge about	Before Educational Activity (a)		After Educational Activity (b)		Six months after Educational Activity (c)		p-value a x c	p-value b x c
	n	%	n	%	n	%		
Assessment of hearing in the absence of RHL								
Yes	78	95,1	80	97,6	57	98,3	0,403 ²	1,000 ²
No	4	4,9	2	2,4	1	1,7		
Assessment of hearing in the presence of RHL								
Yes	82	100,0	82	100,0	58	100,0	-	-
No	0	-	0	-	0	-		
Ideal age to perform NHS								
Yes	63	76,8	79	96,3	51	87,9	0,096 ¹	0,092 ²
No	19	23,2	3	3,7	7	12,1		
Ideal age to assess HL								
Yes	18	22,0	57	69,5	18	31,0	0,226 ¹	<0,001 ¹
No	64	78,0	25	30,5	40	69,0		
Ideal age to initiate intervention								
Yes	15	18,3	59	71,9	16	27,6	0,192 ¹	<0,001 ¹
No	67	81,7	23	28,1	42	72,4		
HL consequences								
Yes	72	87,8	81	98,8	52	89,7	0,735 ¹	0,020 ²
No	10	12,2	1	1,2	6	10,3		
RHL								
Yes	53	64,6	81	98,8	58	100,0	<0,001 ¹	1,000 ²
No	29	35,4	1	1,2	0	0,0		
Socioeconomic and demographic factors								
Yes	71	86,6	80	97,6	57	98,3	0,015 ²	1,000 ²
No	11	13,4	2	2,4	1	1,7		
Hearing evaluation tests								
Yes	69	84,1	82	100,0	55	94,8	0,050 ¹	0,069 ²
No	13	15,9	0	-	3	5,2		
Professionals who perform NBHL								
Yes	70	85,4	82	100,0	58	100,0	0,001 ²	-
No	12	14,6	0	0,0	0	0,0		
Hospitals that perform NBHL								
Yes	78	95,1	82	100,0	58	100,0	0,142 ²	-
No	4	4,9	0	0,0	0	0,0		
TOTAL	82	100,0	82	100,0	58	100	-	-

¹p-value of chi-square test for homogeneity. ²p-value of Fisher exact test

Table 2 shows that it was not possible to perform statistical tests of significance for analysis of change in nurses’ knowledge of the need to assess the hearing of neonates and infants with the Indicator of Risk for Hearing Loss (RHL), as all reported it to be relevant to evaluate the hearing of this population before, immediately after and six months after the educational activities. Regarding

knowledge about which hospitals perform the NHS, most professionals could answer, both before and after the educational actions, and this knowledge remained after six months.

In Table 3, it can be observed that there was an acquisition of knowledge regarding the ideal age to perform NHS, the ideal age for diagnosing hearing loss and the ideal age to begin intervention.

Table 3. Knowledge of nursing professionals about: ideal age to perform Newborn Hearing Screening, diagnosis and intervention in hearing loss, before, after and six months after the educational activity. Recife, 2012

Knowledge	Before Educational Activity (a)		After Educational Activity (b)		Six months after Educational Activity (c)		p-value a x c	p-value b x c
	n	%	n	%	N	%		
Ideal age to perform NHS								
Up to one month	64	78,1	79	96,3	51	87,9	0,573 ¹	0,138 ¹
Up to three months	12	14,6	3	3,7	5	8,6		
Up to six months	4	4,9	0	-	1	1,7		
Over one year	1	1,2	0	-	0	0,0		
Does not know	1	1,2	0	-	1	1,7		
Ideal age for HL diagnosis								
Up to one month	27	32,9	17	20,7	23	39,9	0,319	<0,001 ¹
Up to three months	18	22,0	57	69,5	18	31,0		
Up to six months	17	20,7	6	7,3	9	15,5		
Over one year	19	23,7	2	2,4	7	11,9		
Does not know	1	1,2	0	-	1	1,7		
Ideal age to initiate intervention								
Up to one month	14	17,1	4	4,9	13	22,4	0,007	<0,001 ¹
Up to three months	7	8,5	9	11,0	13	22,4		
Up to six months	15	18,3	68	82,9	16	27,6		
Over one year	43	52,4	1	1,2	14	24,1		
Does not know	3	3,7	0	-	2	3,4		
TOTAL	82	100,0	82	100,0	58	100,0	-	-

¹p-value of Fisher exact test

Table 4 shows that the knowledge of nursing professionals regarding tests that assess hearing remained the same before the educational actions and six months after the

same. However, knowledge decreased compared with the immediate post-test and six months later.

Table 4. Knowledge of nursing professionals about the tests that aid in the assessment of hearing, before, after and six months after the educational activities. Recife, 2012

Knowledge	Before Educational Activity (a)		After Educational Activity (b)		Six months after Educational Activity (c)		p-value a x c	p-value b x c
	n	%	n	%	n	%		
NHS								
Yes	49	59,8	79	96,3	46	79,3	0,022 ¹	0,003 ²
No	20	24,4	3	3,7	10	17,2		
Does not know	13	15,8	0	-	2	3,4		
Audiometry								
Yes	38	46,3	71	86,6	39	67,2	0,007 ¹	0,008 ²
No	31	37,8	11	13,4	18	31,0		
Does not know	13	15,8	0	-	1	1,7		
BAER								
Yes	3	3,7	53	64,6	14	24,1	<0,001 ¹	<0,001 ²
No	66	80,5	29	35,4	42	72,4		
Does not know	13	15,8	0	-	2	3,4		
Immitanciometry								
Yes	1	1,2	22	26,8	1	1,7	0,064 ¹	<0,001 ²
No	68	82,9	60	73,2	55	94,8		
Does not know	13	15,8	0	-	2	3,4		
TOTAL	82	100,0	82	100,0	58	100,0	-	-

¹p-value of chi-square test for homogeneity. ²p-value of Fisher exact test

Table 5 shows that there was no significant change in knowledge of nursing professionals about the professionals considered qualified to perform NHS, when compared with the knowledge immediately after the educational

actions and knowledge six months later. However, when comparing the knowledge before the educational activity with the knowledge after six months, it can be seen that knowledge was assimilated.

Table 5. Knowledge of nursing professionals before and after the educational activities relating to professionals who perform the New-born Hearing Screening. Recife, 2012

Knowledge	Before	Educationa	After	Educationa	Six months	after	Educationa	p-value a x c	p-value b x c
	Activity (a)		Activity (b)		Activity (c)				
	n	%	n	%	n	%			
Phonoaudiologist									
Yes	58	70,7	77	93,9	56	96,6		<0,001 ¹	0,699
No	24	29,3	5	6,1	2	3,4			
Otolaryngologist									
Yes	32	39,0	15	18,3	11	19,0		0,011 ¹	0,920
No	50	61,0	67	81,7	47	81,0			
Paediatrician									
Yes	10	12,2	0	-	0	0,0		0,005 ²	-
No	72	87,8	82	100,0	58	100,0			
Nurse									
Yes	2	2,4	0	-	1	1,7		1,000 ²	0,414
No	80	97,6	82	100,0	57	98,3			
TOTAL	82	100,0	82	100,0	58	100,0		-	-

¹p-value of chi-square test for homogeneity. ²p-value of Fisher exact test

DISCUSSION

In Brazil, hearing loss in childhood is being discussed in the public health arena, among other things, in order to plan and promote educational actions hearing health to help prevent, diagnose and identify hearing loss as early as possible, providing intervention within the recommended period.²⁻³ Such actions must include educational health professionals in order to make them sensitive to the subject of child hearing health, and spreaders of knowledge among parents, family members and their working teams.⁷

The study population was characterized as predominantly female. This result can be explained by socio-historical aspects¹² and can say that nursing was born as a service organised by the institution of Holy Orders, coexisting with home care for children, the sick and the elderly, associated with the figure of woman-mother who has always been healer and holds an informal knowledge of health practices, passed from woman to woman.¹³

Over 86% of nurses said they had not received information during their training. According to the national curriculum of guidelines for undergraduate nursing, the curriculum content, skills and abilities to be assimilated and acquired at the graduate level nurse should give them academic and/or professional capabilities, considering the prevalent and priority demands and needs of the population concerning the epidemiological situation of the country/region. Health professionals, within their professional environment, must be able to develop prevention, promotion, protection and rehabilitation, both individually and collectively. Every professional should ensure that their work is performed seamlessly and continues with the other instances of the health system.^{14 5}

The percentage of these professionals believing that NHS to be important regardless of the presence of a risk factor for hearing loss was: 95.1% (n=78) in the pre-test, 97.6% (n=80) in the post-immediate test and 98.3% (n=57)in the post-test after six months. That is, the assimilation of knowledge occurred over the three steps. Such a result is positive, given that 50% of hearing losses are identified in neonates and infants considered at low risk for hearing loss.²

Another important point relates to the first step in assessing hearing in neonates and infants - Newborn Hearing Screening (NHS) - which aims to identify and intervene as early as possible in hearing loss. Studies indicate that when hearing disorders are diagnosed before three months of age and intervention therapy is started within six months, the development of understanding and expression of language, as well as the social relationships and academic performance of children with a hearing impairment, can be compatible with hearing children of the same age. Thus, it amplifies newborn hearing screening (NHS), defining it as a process of evaluation of infant hearing that allows detection of possible hearing changes, covering all infants, including those considered free of risk indicators for deafness, recommending the implementation of these programs in maternity wards.¹⁶

By comparing the acquisition of knowledge of the ideal age to perform NHS between the stages, this knowledge proved consolidated, showing the importance of activeness of nursing professionals in these areas, as from their encouragement to perform NHS and from proper orientation of the family on the signs of hearing loss, diagnosis and intervention at the ideal age could be achieved.¹⁷

In Brazil, the average age of diagnosis varies from around three to four years, and may take up to two years to complete.¹⁸ The difficulty in establishing a diagnosis of hearing

loss as early as possible is due to the reduced participation of health professionals in primary prevention.¹⁴ As a result, intervention is started late, delaying medical action and/or speech therapy during the critical period of maturation and functional plasticity of the central nervous system, in which a favourable prognosis in relation to rehabilitation and development of the child can be achieved.¹⁹ In this study, we observed that the knowledge about the ideal age for audiological diagnosis and initiation of intervention increased after completion of educational activities, although there is a significant loss of knowledge between the immediate post-test and six months later. This makes it necessary that such actions are carried out routinely in health services.¹⁸

Annex I of the Ordinance SAS n° 587, which sets out the standards of care in the Hearing Health Care Network, specifies that the actions of hearing health in primary health care meet the training concerning hearing health promotion, prevention and early identification of hearing impairment through informative and educational actions, family orientation and referral, when necessary, to appropriate hearing health services. However, primary care activities are not performed by the audiologists and not by otolaryngologists, as they are not part of Family Health teams, the locus of this attention.²⁰

Regarding risk factors, the training helped in how nurses can be effectively active in referring the families of infants who may present some symptoms related to hearing loss. Before the educational activities, nursing professionals reported knowing only some risk indicators. However, soon after the educational activities, regardless of the time that has passed, this knowledge was well assimilated. This is a key factor, because an NHS program can only be effective with the effective participation of all health professionals who deal with the newborn and infant.²¹ This is because it is fundamental that nursing professionals know these risk indicators to identify them, prevent them, and act appropriately in the guidance and referral of families.

Socioeconomic and demographic factors also influence health, and should be considered in the evaluation of neonates and infants in view of the physical, mental and social health of the population as well as the risks to which the population is exposed.²² As it was seen, initially only half of the professionals realized the need for knowledge regarding some of these factors, such as the hearing health risk of neonates and infants.

This knowledge increased after the educational activities, regardless of the time that had elapsed between the first meeting and the application of the final questionnaire, further reinforcing the need for training of health professionals in hearing health.²⁰

In relation to knowledge of tests that assess hearing, most professionals confirmed knowing NHS. However, concerning knowledge about the Brainstem Auditory Evoked Response (BAER) test and Immittance testing, less than 10% of the professional interviewed showed knowledge of these types of assessment, with an increase in the professionals' knowledge of evaluative tests soon after the educational actions. This type of knowledge is important so that referrals from nursing professionals can be best suited for families, often with socioeconomic and demographic difficulties.²³ The same information should be known for the immittance and audiometric test.

With regard to knowledge of nursing professionals of which health professionals are qualified to perform hearing tests and which hospitals in the metropolitan area that perform NHS, it was found that, initially, over 70% of the participants judged audiologists as being the skilled professionals, undervaluing knowledge of the health professionals who work with neonatology and otolaryngology. Again, this knowledge can lead to greater effectiveness of diagnosis and intervention.^{2,7}

In summary, it can be seen that learning comprises a dynamic process that incorporates four essential cognitive components; one of them is the feedback, which is the repetition of information for memorizing and learning. This justifies the fact that education and training is an on-going process for absorption of knowledge.²⁴

CONCLUSION

The results of this study demonstrated an effective increase in the knowledge of nursing professionals of hearing health after educational activities, even when evaluated six months after those actions. Thus, it can be seen that this was a positive experience that should be divulged and incorporated into hospitals that offer newborn hearing screening.

These results are expressed by the significant comparison of the knowledge of nursing professionals, not only soon after the realization of educational activities, but also six months later, showing the assimilation of most of the content worked on regarding the issue of hearing health of newborns and infants.

These results justify the fact that educational activities were developed to multiply and spread information about the issue of children's hearing health. Given this situation, health professionals, in general, can provide support for families who are in so much need of support and clarification.

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