

Effectiveness of training on primary care nurses' knowledge and screening practice in identification of children at risk for developmental delay: An Indian perspective

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ABSTRACT

Background: In India, overall, 1.5–19.8% of the children were found to be developmentally delayed. The evaluation of development in young children and health professionals' early referrals for diagnostic assessment will accelerate appropriate early intervention as early as possible. Nurses can screen the children and help the parents by providing the necessary information and support. **Aim:** To train the primary care nurses on developmental screening and early identification of developmental delay (DD) in children and find the effectiveness of the same. **Objectives of the study:** To evaluate the effectiveness of the training program on the knowledge and screening practice of the nurses towards the identification of children at risk for DD and to find out the relationship between nurses' knowledge and screening practice. **Methods and Materials:** A quasi-experimental, one-group pretest, post-test design was adopted among 69 nurses, who were providing child care services and working in the selected government hospitals in Bengaluru, South India. Nurses' knowledge and screening practice in identifying children at risk for DD were assessed before and after the training. SPSS package 21.00 version was used to analyse the descriptive and inferential statistics. **Results:** The training program was effective in the enhancement of primary care nurses' knowledge and screening practice in the identification of DDs in under-five children. **Conclusion:** The findings of this study concluded that developmental screening can be performed by nurses with suitable training programs. The training program played a significant role in the enhancement of nurses' knowledge and screening practice in the identification of DDs in under-five children.

Keywords: Children, developmental delay, knowledge, nurses, primary care, screening, training

Introduction

In India, a total of 12.2% of children under the age of five are found to have poor development.^[1] The childhood developmental delay (DD) rate among under-five children ranged from 2.3

to 19.8% in various studies.^[2] In Karnataka, the prevalence of global DD among children is 19.8%.^[3] It is more evident that the "WHO" recommends the process of regular monitoring of child development in the healthcare delivery system as part of childcare services and an early referral action by healthcare professionals towards developmental assessment among young children may accelerate the appropriate early interventions.^[2,4-6] Further, this can make a significant difference in the health outcomes of both the child and family. Early developmental screening and monitoring to identify child's developmental problems are not

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regularly done in India.^[1,2] The American Academy of Pediatrics recommended the need for a screening program. Periodic developmental examinations at the 9th, 18th, 24th, and 30th months can be very much helpful to report potential developmental problems in children.^[7-9] Evidence shows that there is a strong correlation found between compromised child development and neuropsychological risks faced by children from birth to five years of age.^[8,9] Hence, 0–5-year-olds are considered to be at higher risk for developmental problems. Therefore, it is important to identify the children at risk for DDs or suspected to have delayed development and provide them with appropriate services and support.^[10] However, in low- and middle-income countries, most of the healthcare system treats children for specific illnesses and their routine vaccinations.^[11] Likewise, children's developmental growth has not been monitored very regularly by healthcare workers until parents express their children's developmental concerns.^[12]

Paediatricians and primary care physicians in India are heavily scheduled with regular child care services. Further, they have inadequate manpower assistants and are overwhelmed by paediatric illnesses. So, developmental monitoring and screening may not be a priority.^[12,13] Other aspects, such as time spent on screening, training in the use of screening tools, as well as the cost of purchasing these tools, are barriers to their regular use in clinical practice.^[13,14] It is recommended by the government of India, that all children of 0–18 yrs should undergo a physical examination and developmental screening process.^[15] Along with primary care medical professionals, nurses have to provide high-quality care to the children with and without developmental problems.^[16] Given the limitations of developmental screening and supervision by paediatricians only, Ts *et al.*^[17] suggested the possibility of providing these services by primary care nurses after training at an infant and immunization clinic as a bottom-up approach. Nurses are the primary and secondary healthcare providers^[18] and members of the multidisciplinary team who give care to the children in hospitals and the community. Further, most of the time, nurses are the first person to contact the children before they could meet doctors in the hospitals during the course of primary and secondary health care visits (either well-baby or sick-baby visits) at OPD and inpatient settings.^[19] It may be easy and convenient for the nurses to check for the regular height, weight, and temperature of the children; they also can ask a few questions regarding the child's age-appropriate developmental milestones and related issues to identify DDs and disorders in young children. The nurse-driven protocol was most effective in identifying and screening patients and it has achieved a practical global-level screening, said previous studies.^[20,21] It is identified that basic curriculum-based clinical skills which are required to identify and manage developmental and behavioural impairments among children are not sufficient among nurses.^[22,23] Inadequate understanding of child developmental process, developmental issues, DDs, and screening practices towards identifying delayed development in children among healthcare professionals might be a major barrier to do early identification and interventions for the same.^[23,24] Factors such as nurses' age, educational level,

availability of time and resources in the working area, lack of continuing education about developmental screening methods and tools, and years of experience in childcare services can further affect their knowledge and screening practice.^[13,14,25] Further, it looks like an information and communication gap was found between health professionals and parents of children with DDs, which may exist due to limited knowledge and awareness of normal child development processes, developmental monitoring, and screening practices among the nurses.^[12,23] Thus, improving nurses' understanding, knowledge and practice regarding screening for DD, and early identification of the children at risk for DD is essential to improve the quality of patient care and standard nursing practice.^[26-28]

Materials and Methods

Study design and setting

The one-group pretest post-test design was chosen for this research study. Before implementing a training program, a baseline assessment was performed through a cross-sectional online survey to find out the nurses' existing knowledge and screening practice towards the identification of children at risk for DD. The training program was completed in four online sessions, that is weekly two sessions, each session was carried out for one-hour. Following the training, a post-test evaluation was conducted six weeks later to determine the effectiveness of the training program. The overall study was conducted online in the maternal and child health block of four selected government hospitals in south Bengaluru, Karnataka, India.

Study participants and sampling

Nurses who are working in the selected government hospitals in south Bengaluru, India and currently providing primary and secondary child care services and holding the minimum qualification of Diploma in Nursing and above were included in this study. Nurses who are in the process of transfer, near the retirement stage, nurses who are on long leave due to various reasons, and nurses who underwent for the same and related training were not included in the study. A nonprobability convenient sampling technique was used for selecting the participants in this study. The final sample size calculated for the analysis was 69 ($N = 69$).

Data collection tools

The socio-demographic data sheet was prepared by the authors and was used to collect the personal details of the study subjects. Knowledge about Childhood Neuro-Developmental Disorders Questionnaire, developed by M.O. Bakare *et al.*, 2016^[16] was used to assess the knowledge on causes and symptoms of DDs in children, which has multiple choice questions; the total score ranges from 0 to 14, and this questionnaire assessed nurses' knowledge about symptoms (6 items in domain 1) and causes (8 items in Domain 2) of DD in children. A higher score indicated higher knowledge. The tool has a good reliability score with a Cronbach alpha of 0.97. Further, Awareness of Community

Health Workers on Early Identification of Developmental Delays questionnaire developed by Vidya. L. Rao (2016)^[28] was used to assess the nurses' knowledge regarding the identification of children at risk for DD, in the form of multiple-choice questions, correct responses will score one mark, and incorrect responses will score zero. The total score ranges from 0 to 35. A higher score indicated higher knowledge. To assess the nurses' current screening practice in child developmental assessment, the authors used the Current Screening Practice Questionnaire which was prepared and pretested by the authors, it has 17 items with Yes, No, and Sometimes with qualitative responses about child developmental screening. Further, four Case Vignettes also were prepared by the authors and were used to assess the Nurses' screening Practice Score towards the identification of children at risk for DD, the score ranged from 0 to 30. A Higher score indicated good screening practice. All the tools were pretested during the a panel with 12 experts pilot study. The research tools and training module were sent to 12 experts which include a developmental paediatrician, speech and audiologist, child neurologist and child, and adolescent psychiatrist who opined and endorsed the relevancy, appropriateness, and usability of the questionnaires and the training module.

Data collection procedure and data analysis

Data collection and training were carried out from 15th December 2020 to 31st May 2021 after getting the necessary permission from the respective hospital authorities. Based on the initial meetings with the hospital authorities, researchers collected the names, phone numbers, and mail IDs of nurses from the respective hospitals. Nurses who met the inclusion criteria and willing to participate were included in this present study. The Google form with an information sheet, online consent form, and baseline data forms were sent to the selected 82 nurses working under four selected government hospitals. For the baseline data assessment, personal details of the study subjects through socio-demographic data sheet, current screening practice details, knowledge about causes and clinical symptoms of DDs, and identification of children for DD through knowledge questionnaire and Screening Practice Score towards identification of children for DD through case vignettes were assessed. The training program was delivered through Zoom online platform. The "Modified Centers for Disease Control and Prevention (CDC): Learn The Sign Act Early Module"^[29] was delivered in four sessions. Group of participants having four to five members attended weekly two sessions through online mode. The training sessions were carried out with lecture cum discussions using PPTs, group discussion by using case scenarios and videos, handouts with pictures to differentiate normal children and developmentally delayed children, developmental screening, monitoring, and screening tools in three sessions, and one session of demonstration of screening with parental guidance was done through role play. After the training, the researchers instructed all the study subjects to perform the screening procedure regularly to assess the children's development and to provide parental guidance towards child development during their regular assessment

of the under-five (2 months to 5 years) children who visit the respective hospitals. The subjects were instructed to record the information they had collected from the parents or caregivers in a given checklist diary and to report and refer the children to the respective doctors or treating team if the child is suspected to have a DD. A post-training assessment was done six weeks after the training and the post-test assessment data were collected on the nurses' current screening practice in child developmental assessment, their knowledge, and screening practice. Overall, 69 nurses completed pretest, training, and post-test. All the data were analysed using descriptive and inferential statistics after the normality check. All the analyses were performed in IBM SPSS-21.00 Version.^[30]

Results

The study results showed a positive impact and were categorized under the following headings.

Description of the sample characteristics

The descriptive analysis revealed that the majority of nurses (88.4%) were from the female gender category, and the mean and standard deviation (SD) of the nurses' age was 33.83 ± 9.13 . The majority of the nurses were having more than 30 years age. Most (79.7%) of them had their basic qualification as a diploma in nursing. The majority of the nurses were parents and had experience in raising their own children (49.3%). Most (91.3%) of them were working as staff nurses. Most of the nurses (78.3%) worked in the inpatient wards and the remaining worked in the outpatient department, where they provided primary and secondary nursing care to the children. The nurses who participated in the study had an overall mean year of nursing professional experience of 9.14 ± 7.38 , and an overall mean year of childcare service experience of 4.70 ± 5.22 . All the nurses who participated in the (100%) study showed their interest in receiving more information about child development, monitoring, and screening.

Effectiveness of the training on study subjects' knowledge

The nurses' knowledge scores about symptoms and causes of DD in children in the pretest were slightly lower than in the post-test [Table 1]. Similarly, nurses' total pre-test mean knowledge score about the identification of children at risk for DD was low in the pre-test and it was increased in the post-test, after the training [Table 2]. There was a significant difference found between the nurses' pretest and post-test knowledge scores towards the causes and symptoms of DD in children and identification of the DD ($P < 0.01$) (Tables 1 and 2). Further, based on the item-wise analysis of the knowledge questionnaire revealed that the majority 65.2–79.7% of the nurses answered correctly for the symptom domain questions in the pretest itself. However, in the post-test, 97.1–98.6% of the nurses answered correctly. On the other hand, for the causes-related questions, 44.9–73.9% of the participating nurses answered correctly in the

Table 1: Comparison of nurses' knowledge scores about causes and symptoms of developmental delay in children over pre- and post-test (n=69)

Knowledge assessment	Mean±SD	t	df	P
Pretest Score	15.06±8.52	-16.974	68	<0.01
Post-test Score	33.45±2.92			

Table 2: Comparison of nurses' knowledge scores about the identification of developmental delay in children over pre- and post-test (n=69)

Knowledge assessment	Mean±SD	Median	Wilcoxon (Z)	P
Domain-1* (Symptoms)				
Pretest score	3.49±0.77	4	-5.081	<0.01
Post-test score	4.89±0.46	5		
Domain-2 ** (Causes)				
Pretest score	5.11±3.19	5	-6.251	<0.01
Post-test score	8.74±0.88	9		
Total				
Pretest score	8.61±4.63	8	-6.326	<0.01
Post-test score	13.64±1.20	14		

*Domain-1 is symptoms-related knowledge on developmental delay in children. **Domain-2 causes related knowledge on developmental delay in children

pretest; also, they were not much aware that social deprivation, trauma, metabolic disorder, and toxic and environmental factors might cause DDs, but in the post-test majority, more than 98.6–100% of the participated nurses answered correctly for all the causes related questions. Regarding the identification of children at risk for DD questions, in the pretest, 18.8– 66.7% of the subjects answered correctly and 50–70% of subjects did not know about the early identification of DDs in children. Nearly 20–50% of the subjects only answered correctly about identification-related questions. However, in the post-test, the majority, around 90–97%, of the nurses answered correctly for all the identification of children at risk for DD questions.

Effectiveness of the training on the nurses' screening practice score based on case vignettes

Table 3 shows the mean and SD of screening practice scores of the nurses before and after the training, that is, the pre-test and post-test, which were obtained through the case vignettes. In the pretest, the mean screening practice score was 6.51 ± 3.87, and in the post-test, the mean screening practice score was 20.26 ± 5.00. To compare both practice mean scores, a “t-test” was used. The t-value was - 17.349 and the P < 0.01. Hence, there is a significant change found between nurses' pretest and post-test screening practice scores based on the case vignettes.

Effectiveness of training on nurses' routine and current screening practice in child developmental assessment

The item-wise assessment of nurses' current screening practice questionnaire and responses revealed that the majority (89%) of the subjects said that they are routinely assessing the children in their nursing practice; however, they did not use

any of the developmental screening tools to identify the delayed development in children and were not followed the similar form of assessments in their practice; they said they were checking either height and weight (n = 27, 39.1%) or milestones (n = 7,10.1%) growth and development (n = 10,14.5%), or general physical examination (n = 6,8.7%) or followed none of the method (n = 7,10.1%) to assess the children in their nursing practice. Around 60% (59.4%) of the study, subjects said that they did not screen under-five age children for DD and developmental issues at the 9th, 18th, and 30th month of age. A minimum percentage (30%) of the study subjects only said that they regularly ask the parents/caregivers about their under-five children's age-appropriate motor, language, cognitive, and socio-emotional milestones. The majority, 70%, of them said that they did not concentrate on the milestone assessments to verify the children's normal development. The majority (86.9%) of the study subjects said that they were not screening the children for DD very regularly during the pretest because they do not know what is developmental screening, what are the specific periods to screen, what tools are available, and mostly they said that they did not get screening tools and it is not mandatory for their nursing practice. Only 36.2% of the subjects said, if they suspect that the child has a DD, they would educate the parents or caregivers about normal developmental milestones, early stimulations, and give guidance to meet the respective doctor/specialist for further assessment in the pretest. Nevertheless, the post-test revealed that the nurses' current screening practice has significantly changed positively after the given training based on the CDC Learn the Sign Act Early Module (P < 0.05).

Correlation between the study subjects' knowledge and practice

A significant correlation was found between the study subjects' knowledge and practice. The P value shows < 0.01 (symptoms and causes: r=0.378 and P = 0.001; identification: r = 0.530 and P = 0.001); hence, there is a significant positive correlation found between knowledge and screening practice [Table 4].

Discussion

Evidence-based research studies and their results revealed that appropriate instructions, training, and continuing nursing education on child developmental monitoring or surveillance, screening, and early identification of developmental issues improved the nurses' knowledge, subsequent practice, and their attitude towards healthcare service;^[31,32] However, very few studies are found in this arena.^[33] This study seeks to examine the existing knowledge and screening practice of nurses in detecting DDs in children, thereby bridging gaps that happened through a training program with selected educational modules to evaluate the effectiveness of training. As per the analysis of the data, the majority of the study subjects have fair enough knowledge regarding symptoms of DD in children. However, less than 50% of the study subjects were aware of the causes of DDs. Further, more than 50% of the study subjects do not know “What is early identification of Developmental Delays? What is Developmental

Table 3: Comparison of nurses' screening practice scores about the identification of developmental delay in children over pretest and post-test (n=69)

Screening Practice Score	Mean±SD	t	df	P
Pre	6.51±3.87	-17.349	68	<0.01
Post	20.26±5.00			

Table 4: Correlation between the study subjects' knowledge and practice (n=69)

Outcome Variables	Pearson correlation value	P
Screening Practice Score		
Knowledge score on symptoms and causes	0.378**	<0.01
Knowledge Score on identification	0.530**	<0.01

**Correlation is significant at the 0.01 level

Screening? What is Developmental Monitoring? “What are relevant tools for Developmental Screening and Monitoring? When to do it? Who can do it? Further, they do not know relevant government policies and their purposes in early identification of DDs in children. Subsequently, study subjects were holding insufficient screening practice in the aspect of age-appropriate “Developmental Screening”, methods, and parental guidance towards child development. These findings were supported by various previous study results.^[23,31,34-38] In the present study, lack of knowledge of screening practice and lack of time were the strong barriers and the reason for the poor practice among many of the nurses. Similar barriers were also mentioned in other different studies by other authors in their study.^[34,38,39] This could be because, most of the time, healthcare professionals give importance to other common childhood illnesses and emergency conditions only, further it might be, because of limited available time, resources, and limited training received by the health professionals in the basic curriculum concerning detailed developmental screening methods. Similar reasons were discussed by other authors in their studies.^[40-43] Thus, the present study aimed to evaluate the impact of training on nurses' knowledge and screening practice in the identification of children at risk for DD. The training program and the findings of the study demonstrated a positive change in outcome variables in the study group and created a positive impact on the identification of children at risk for DD and parental guidance towards child development. These findings were supported by other authors in their study.^[34,37,38,44,45]

The major strength of this study is that it is a preliminary and the first known effort in India for the nurses, while most of the studies reported that the developmental screening practice role has been limited to the paediatricians alone. It is very much required for the Indian population which is facing acute manpower shortage but with a huge burden of the disease. The training module has CDC's modified milestones checklist, which was prepared by the researchers as per the Indian context and child development. This screening checklist did not have a complex scoring system and can be used with a simple technique

by enquiring the parents or caregivers about their child's development. Nurses trained in developmental assessments, monitoring, and screening can do intramural and extramural referrals for further developmental assessments, diagnosis, and for necessary early intervention to reduce the disability in children. Nurses attending this training program will be able to implement three levels of prevention (primary, secondary, and tertiary) in their nursing care process for under-five children. Nurses, nurse educators, and nursing students can undergo this training program to enhance their knowledge and practice on developmental assessments, monitoring, screening, early identifications, early referrals, and parental guidance. Nurse administrators are responsible for conducting a training program for their staff and students to create awareness about the early identification of children with DD, referral pathways, and early intervention. Community health officers under the Ayushman Bharath program will be benefited from doing their routine screening practice on early identification of non-communicable diseases (NCD)s and referral to the early intervention centres. Nurses working under the Primary Health Centres, National Rural Health Mission (NRHM) and Rashtriya Bal Swasthya Karyakram (RBSK) teams can utilize the handouts on the milestones checklist and parental guidance as an additional tool for their routine practice. Nurse researchers can take initiation to conduct research studies to increase the knowledge and ability of nursing professionals to promote early identification and early intervention regarding child developmental issues.

Limitations and future recommendations

Limitations: However, the present study was conducted based on a convenience sampling technique in selected Government hospitals in Bengaluru, Karnataka, India, which limits the generalizability of the study findings to the whole of the population in the country. Self-reported information obtained through diary and Google survey forms has its limitations due to its elements of subjectivity. **Future Recommendations:** The authors could not retrieve many studies in this arena. Hence, further research can be conducted in these areas. Long-term follow-up studies can be conducted to evaluate the retention of information on DD, its early identification, and nurses' screening practice for the same. A similar study can be replicated in a larger sample and in different healthcare settings to generalize the findings to all nursing professionals. A qualitative study can be conducted towards nurses' subjective feelings on barriers to do the screening practice. This kind of study can be conducted among other healthcare professionals and childcare providers.

Conclusion

The findings of this study concluded that the given training program was effective in enhancement of nurses' knowledge and screening practice in the identification of DDs in under-five children. The “Modified Learn the Sign Act Early” training module which was used to train the nurses towards child developmental monitoring and screening seems to be useful. Hence, developmental screening practices and health education activities need to be

planned and implemented in all healthcare settings to improve child developmental monitoring practices and early identification of DDs. Nurses who are working in various other primary and secondary health sectors need to be trained to upgrade their knowledge in developmental screening and monitoring. Regular developmental screening practice and monitoring will improve early identification and accelerate the early intervention. Thus, we can prevent and reduce childhood disorders and disabilities.

Ethical considerations

The research protocol was presented to an institutional review board and approved Institute Ethical Committee clearance was obtained (IEC No. NIMH/DO/BEH.Sc.Div./2019 Dated 27/07/2019). Permission was taken from the respective authorities of the selected hospitals and informed consent was taken from the subjects who participated in the study.

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Conflicts of interest

There are no conflicts of interest.

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