ORIGINAL RESEARCH

Educating Nursing Students about Pediatric Oral Health: An Interprofessional Education Collaboration

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Abstract

Aim: Despite dental caries in children being a large public health concern in the United States, there remains a lack of training of nondental healthcare professionals in pediatric oral health. An interprofessional learning experience for nursing students with pediatric dental residents was created to increase nursing students' knowledge of pediatric oral health. The study's purpose was to evaluate the effectiveness of an interdisciplinary education program targeting nursing students providing a didactic and clinical oral health program.

Materials and methods: In 2016, 105 nursing students were recruited and presented oral health information in a didactic program, didactic and clinical program, clinical program, or no program. Nursing students were surveyed to assess their knowledge before and after the educational experiences.

Results: There was a significant improvement in children's oral health knowledge for nursing students in the clinical, clinical and didactic, and didactic program in comparison to those that did not complete a program ($p < 0.05$).

Conclusion: This interprofessional learning experience increased students' knowledge of pediatric oral health, and additionally reflected in a positive experience for nursing students.

Keywords: Nursing students, Oral health education, Pediatric dentistry.

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Introduction

Both the American Academy of Pediatrics (AAP) and the American Academic of Pediatric Dentistry (AAPD) recommend children have an initial oral evaluation as early as 6 months of age and no later than 12 months of age.[1] The establishment of the dental home follows the medical home model which was defined in 1992. The medical home model has been shown to provide patients with a more effective and less costly environment compared to emergency care facilities or hospitals[2] and the establishment of the dental home follows with similar results.[3] Establishment of a dental home has been shown to decrease the number of dental treatment procedures experienced by young children and the financial burden.[3,4]

Unfortunately, data has shown that only 2% of infants have seen a dental provider by the age of one.[5] Dental caries remains the most prevalent chronic childhood disease,[6] it is four times more common than asthma.[7] Disparities in children's oral health and access to care have led to disadvantaged children disproportionally being affected with dental disease.[8,9] A national survey from 2011–2012 indicated that early childhood caries (ECC) remains highly prevalent in poor and near-poor preschool children of the USA.[10,11] The ECC can lead to more hospitalizations and emergency room visits,[12] loss of school days,[13] more difficulties in learning,[14] and higher treatment costs.[4,15,16]

Pediatric patients routinely see nondental health professionals earlier in life. A child may be seen in healthcare prior to seeing a dentist multiple times, therefore this opens an opportunity for healthcare providers to identify oral health issues and complete timely referrals to a dentist. However, proper training in oral health in the medical curriculum is needed for healthcare providers to be effective and confident in oral health assessments and healthcare providers receive limited training in children's oral health.[17–19]

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With the proper training, nurses can be effective in providing the needed oral health assessments and referrals that are so desperately needed. Studies have shown the incorporation of oral health training as part of interprofessional education; however, there remains a lack of studies on this interprofessional education and its incorporation into medical education. Incorporation of interdisciplinary oral health education into a medical education program, such as a nursing program, could provide competence in oral health assessments and referral to a dental home at the appropriate time. The aim of this study was to explore the effectiveness of an interdisciplinary education program targeting nursing students providing a didactic and clinical oral health program.

Materials and Methods

An evaluation of this interprofessional education program was conducted to determine the influence of an oral health education curriculum implemented for nursing students. A survey was

completed before and after the educational experience that assessed the retention of dental knowledge. The project was approved by the X Institutional Review Board (#BSR078).

Participants

Three pediatric dental residents at X Residency Program provided education on pediatric oral health to nursing students didactically and/or clinically from September 2014 to April 2017. Each resident trained the following resident on the project, for a succession of 3 years. The nursing students recruited were currently enrolled in a 4-year program at X College of Nursing, each completing a written informed consent. There were a total of 105 nursing students enrolled in this study.

Didactic and Educational Activities

Four groups were formed for this study including didactic program only, clinical program only, didactic and clinical program, and no program (control). Participants were recruited over three phases. During phase I, nursing students were recruited and completed a didactic program only. The didactic program involved the same 1-hour presentation by one of the three dental residents. Models and videos were included in addition to the Microsoft PowerPoint presentation on pediatric oral health. During phase II, students from phase one were randomly selected to participate in the clinical program. The clinical program included a 3- and 1-half hour clinical rotation within the pediatric dental clinic. The nursing student was assigned to one of the three pediatric dental residents assigned specifically to the project and the program involved a tour of the dental clinic and office, an explanation of the schedule and procedures, shadowing of the residents during treatment, and observation of a round table discussion with the pediatric dental residents and attending. The resident assigned to the nursing students had a strict outline to follow. During phase II a second group of participants was recruited as the control group and completed the survey but without receiving any education. In phase III, another group of nursing students were recruited, and this time they were randomly assigned into the didactic, clinical, didactic, and clinical or control group. All participants completed the same survey prior to the program and again prior to graduation.

Program Evaluation

To assess the effectiveness of the programs, a survey was completed by the nursing students prior to the program and again prior to graduation. The survey included fifteen questions, True/False, assessing the nursing students' knowledge of pediatric oral health. The surveys were modified from surveys previously utilized in a study implementing oral health educational interventions to nurse practitioner students.[20] At the end of the survey, there was an opportunity to provide additional comments for those that completed the clinic program including the overall experience, if the program was beneficial, and their comfort level with providing pediatric oral health recommendations to future patients and parents (Table 1).

Statistical Analysis

Data were analyzed using a statistical package for the social sciences (SPSS) statistical software, version 23 (IBM Corporation, 2014, Chicago, Illinois, USA). In the oral health knowledge section of the pre-test and post-test, a 1 was given for each correct answer and a 0 was given for each incorrect answer. Analysis of variance (ANOVA) was used to analyze knowledge differences among the four different groups and the Tukey *post hoc* test was utilized for multiple comparisons of the scores for each group.

Results

A total of 105 nursing students completed the pre- and post-test, with 41 (39%) nursing students completing the didactic program, 12 (11%) completing the didactic and clinical programs, 18 (17%) completing the clinical program, and 34 (32%) not completing the didactic or the clinical program. The mean pre-test scores in all groups ranged from 9.5 to 9.8 correct answers out of 15. The mean increased to 13.6 correct answers out of 15 for the group that received the didactic program, 14.3 correct answers out of 15 for the group that received the didactic and clinical program, 13.6 correct answers out of 15 for the group that received the clinical program, and 9.9 correct answers out of 15 for the group that did not receive any program (Table 2).

Overall, a statistical difference was found for the post-test scores among the four groups ($p < 0.05$) (Table 3). *Post hoc* comparisons using the Tukey honestly significant difference (HSD) test indicated significantly higher post-test scores for subjects who completed the didactic program, didactic and clinical program, and clinical program compared to those who did not complete any program. There was no significant difference in the post-test scores when comparing the didactic program, didactic and clinical program, and clinical program (Table 4).

Overall, the open-ended comments reflected a positive clinical experience for the nursing students. The students unanimously declared the clinical experience to be beneficial and that it improved their comfort when providing pediatric oral health recommendations and suggestions to future patients.

Discussion

This study focused on evaluating the effectiveness of an interprofessional oral health education program within a nursing program. Overall, it was found that by providing a didactic program, a clinical program, or a combination of both, knowledge was increased by nursing students that participated in these programs. This study also found that nursing students reflected on the training in a positive manner, providing positive feedback.

While dental caries remains the most prevalent chronic childhood disease in the United States, many in healthcare are still not confident in providing an oral health assessment and/or referral for children. Additionally, there remain disparities in access to oral health care and nondental pediatric primary care providers may encounter an increase in oral health issues.[21,22] If dental caries is left untreated, it can result in pain, infection problems speaking, eating, and also learning.[23] Recent studies have shown that primary care providers and nurses lack competence in performing oral health assessments and referrals.[24,25] A survey of pediatricians found that one-half of respondents reported no previous training in dental health issues during medical school or residency.[18] A national survey found that 10% of United States medical schools include no oral health training in their curricula, and 69% have fewer than five hours across all four years of training.[19] There remains a huge gap in the medical education for nurses, physician assistants, and physicians on oral health for children.

This study is one among the few studies that have looked at the incorporation of an oral health curriculum within a nursing program. Nurses are in a unique position to play a significant role

Table 1: Survey questions

Part 1: True/false		
Dental caries is the most common chronic childhood disease	True	False
Caries results from tooth-adherent bacteria that metabolize sugars to produce acid which, over time, demineralizes tooth structure	True	False
On average, a child's first tooth erupts between 9 month and 1 year of age	True	False
The bacteria that cause dental decay can be transmitted from mother to child	True	False
Xylitol is a carbohydrate that is not fermentable by oral bacteria	True	False
Fluoride prevents tooth decay by making teeth stronger	True	False
Ingesting fluoride while teeth are forming (before eruption) helps prevent tooth decay	True	False
Infants should not be put to bed with a bottle of juice or milk	True	False
Toothpaste containing fluoride should not be used to brush a 3-year-old child's teeth due to risk of fluorosis	True	False
Fluoride prevents tooth decay when applied topically to the surfaces of teeth	True	False
Nondental health professionals can be reimbursed for fluoride varnish applications	True	False
A child's first dental exam should occur by 3 years of age or when all primary teeth have completed eruption	True	False
Chalky white spots on a child's teeth can be remineralized with fluoride varnish	True	False
Infants should not be put to bed with a bottle of juice or milk	True	False
Frequent snacking with carbohydrates increases the risk of developing early childhood caries	True	False
Part 3: Open-ended questions for those that completed clinical rotation		
How would you describe your overall experience during your clinical rotation at Bon Secours Pediatric Dental Associates office?	Open ended	
Do you feel that your clinical rotation at Bon Secours Pediatric Dental Associates office was beneficial to your understanding of pediatric oral health?	Open ended	
Do you feel you are more comfortable providing pediatric oral health recommendations and suggestions to future patients and parents after your clinical rotation at Bon Secours Pediatric Dental Associates office?	Open ended	

Table 2: Descriptive statistics of post-test scores

					95% Confidence interval	
*Group**	*N*	*Mean*	*SD*	*SE*	*Lower bound*	*Upper bound*
Group I	41 (39%)	13.5854	1.30337	0.20355	13.1740	13.9968
Group II	12 (11%)	14.3333	0.77850	0.22473	13.8387	14.8280
Group III	18 (17%)	13.5556	1.09664	0.25848	13.0102	14.1009
Group IV	34 (32%)	9.8824	1.38749	0.23795	9.3982	10.3665
Total	105	12.4667	2.19294	0.21401	12.0423	12.8911

*Group I includes didactic instruction. Group I: Didactic instruction; Group II: Didactic and clinical instruction; Group III: Clinical instruction; Group IV: Control, no instruction. SD, standard deviation; SE, standard error

Table 3: Analysis of variance

	Sum of squares	*df*	*Mean square*	*F*	*Significance*
Between the groups	341.542	3	113.847	72.504	0.000
Within groups	158.592	101	1.570		
Total	500.134	104			

in pediatric oral health promotion, assessment, and referral. With proper training, they can gain the confidence they need to provide an oral health assessment and/or referral. The incorporation of oral health education into pediatric medical visits has been shown to improve the chances a child will receive dental preventive services and decrease caries[26,27]; therefore, opening an opportunity to help children that may otherwise not receive the necessary dental services they need.

This study found that interprofessional education in the form of didactic, clinical, or both significantly improved students' knowledge of children's oral health. Post-survey scores of oral health knowledge increased and feedback from the nursing students was very positive. These results are similar to previous studies where interprofessional education increased the participants' knowledge of oral health.[20,28,29] Ramos et al. found that an increase in knowledge and skills in oral health led to an increase in screening for

Table 4: *Post hoc* analysis

					95% Confidence interval	
*Group**	*Group*	*Mean difference*	*SE*	*Significance*	*Lower bound*	*Upper bound*
Group I	Group II	−0.74797	0.41128	0.271	−1.8224	0.3264
	Group III	0.02981	0.35431	1.000	−0.8957	0.9554
	Group IV	3.70301*	0.29066	0.000	2.9437	4.4623
Group II	Group I	0.74797	0.41128	0.271	−0.3264	1.8224
	Group III	0.77778	0.46700	0.347	−0.4422	1.9977
	Group IV	4.45098*	0.42075	0.000	3.3518	5.5501
Group III	Group I	−0.02981	0.35431	1.000	−0.9554	0.8957
	Group II	−0.77778	0.46700	0.347	−1.9977	0.4422
	Group IV	3.67320*	0.36526	0.000	2.7190	4.6274
Group IV	Group I	−3.70301*	0.29066	0.000	−4.4623	−2.9437
	Group II	−4.45098*	0.42075	0.000	−5.5501	−3.3518
	Group III	−3.67320*	0.36526	0.000	−4.6274	−2.7190

*Group I is the didactic instruction, Group II is the didactic and clinical instruction. Group I is the Didactic instruction, Group II is the Didactic and clinical instruction, Group III is the Clinical instruction only, Group IV is the Control, no instruction. SE, standard error

ECC.[30] If additional training is provided in oral health, studies have shown an increase in oral health confidence.[31] Additionally, studies have found that most health professionals want more education on oral health.[32] This is similar to the results of this study, with nursing students providing positive feedback on receiving the training on oral health. Overall, this study suggests along with others that the incorporation of training early during a nursing student's training has the potential to integrate oral health knowledge, confidence, referral, and assessment within the primary care practice.

This study has limitations as the sample size was limited to 105 total students, with only 12 students completing the clinical and didactic program. Clinical skills were not assessed in this study along with assessing outcomes after the nursing students graduated. Future studies should be developed to look at nursing students' clinical skills, knowledge retained over time, and knowledge utilized in different healthcare settings.

Overall, this study is innovative, and it shows promise for future studies as it supports the interprofessional oral health education into a nursing program. This curriculum can additionally be replicated easily in nursing programs that are associated with pediatric dental residency programs. Interprofessional education involving oral health education is necessary for all healthcare providers to gain knowledge to better serve children's oral health and prevent dental caries.

Conclusion

Interprofessional children's oral health education for nursing students can improve their knowledge of children's oral health. This study found it is possible to incorporate an interprofessional educational program within a nursing curriculum and increase a nursing student's knowledge of children's oral health. With the incorporation of children's oral health into the medical curriculum, there is hope that more medical professionals can assist to decrease the high percentage of children with dental caries.

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