

Evaluation of the Roatán, Honduras caries prevention through the  
vaccination program

by

Alexandra Malebranche, DDS

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

Oral and Craniofacial Sciences



in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO



## Acknowledgements

For the children we live to help and serve

## Abstract

Roatán, Honduras Caries Prevention and Vaccination Program Evaluation and Best Practices

**Authors:** Alexandra Malebranche, Jing Cheng, Pamela Den Besten, Karen-Sokal-Gutierrez, Arup Roy-Burman, and Ling Zhan

**Purpose:** To evaluate feasibility and barriers for implementation of a novel oral-health and fluoride-varnish program for 0-5 year old children in vaccination clinics in Roatán, Honduras.

**Methods:** Administrators, physicians, nurses, and dentists involved in the oral-health and fluoride-varnish programs in vaccination clinics in Roatán were recruited for a mixed survey and interview study. Information regarding staff demographics, knowledge, confidence, attitudes and behavior, implementation barriers, as well as, suggestive solutions in providing oral health services in the vaccination clinic were collected.) The data were analyzed using SPSS Statistics 22.

**Results:** Twenty-five subjects were enrolled. The time that non-dental providers spent learning oral health education was between 2.5-5.3 hours. Of these individuals, more than 68% of the subjects correctly identified the frequency and method for application of fluoride-varnish, and cariogenicity of candy and soda. However only 32% subjects identified juice as cariogenic and the correct timing of fluoride-varnish application in children. Nine of the 25 subjects were confident that they could effectively provide fluoride-varnish and oral-health education. All subjects requested more training on oral-health with preference for hands-on-training and reading-material with pictures. Most subjects supported to providing basic oral health services during vaccination visits, such an oral exam (78-100%), nutrition counseling (71-88%), applying fluoride varnish (88-100%), or

demonstrating brushing technique (100%). The most commonly reported barriers of the program were lack of supplies, family interest, staff time, and staff interest. Increased government support and improved training were common suggestions for program improvement.

**Conclusions:** The administration of fluoride varnish in vaccination clinics in Roatán, Honduras was largely supported by staff. Barriers to success were inadequate training in oral health, lack of interest by staff and families and inadequate supplies. Improving training and increased government support were identified as key elements to improve the program's effectiveness.

## **TABLE OF CONTENTS:**

TITLE PAGE	i
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	vii
INTRODUCTION	1
• Definition	
• Cause of ECC	
• Consequences of ECC	
• Prevention strategies, evidence and roadblocks	
• Preliminary data	
• Aims and hypothesis	
• Significance	
LITERATURE REVIEW	2
PURPOSE AND AIMS	5
HYPOTHESIS	6
MATERIALS AND METHODS	7
RESULTS	9
DISCUSSION	18

CONCLUSION	20
REFERENCES	22
<b>APPENDICES</b>	<b>23-51</b>
A. LETTERS OF SUPPORT	
B. ENGLISH QUESTIONNAIRE	
C. SPANISH COVER LETTER	
D. SPANISH QUESTIONNAIRE	
E. ENGLISH CONSENT	
F. SPANISH CONSENT	
G. CHR APPROVAL	
H. UCSF LIBRARY RELEASE	

## **LIST OF TABLES**

TABLE 1: SUBJECTS' DEMOGRAPHICS AND WORK EXPERIENCE	10
TABLE 2: KNOWLEDGE, ATTITUDE AND CONFIDENCE	13
TABLE 3: PROVIDING ORAL HEALTH CARE EXPERIENCES	15
TABLE 4: MAIN ROAD BLOCKS IDENTIFIED BY PROVIDERS FOR FV APPLICATION	17
TABLE 5: MAJOR THEMES DURING INTERVIEW	17



## INTRODUCTION

**Definition and Prevalence:** Early childhood caries (ECC) refers to the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six.<sup>1</sup> ECC is the most prevalent chronic disease in children; globally, approximately 60-90% of children experience caries by 12 years of age.<sup>2</sup>

**Cause and Prevention of ECC:** ECC is an infectious chronic disease with multi-pathological causing factors. The development and progress of EEC is a balance between the pathological risk factors and protective factors. The main pathological risk factors in ECC are bacterial infection and poor diet and feeding practices, which include high and frequent intake of sugar containing fermentable carbohydrate diet.<sup>3</sup> Sugar sweetened beverages (soda and juices), candy, chips and crackers are examples of the cariogenic foods children regularly consume. Frequent simple sugar and carbohydrate intake leads to prolonged acid production by cariogenic bacteria in the mouth, which results in prolonged tooth demineralization and facilitation of cariogenic bacteria colonization and growth. On the other hand, fluoride, calcium and phosphate present in saliva reduce and repair the demineralization caused by acid. Transition and introduction of high-frequency intake of sugary diet has created a pandemic of ECC globally especially in under developed countries.<sup>45</sup> High-risk diet, poor brushing and oral hygiene habits are predictive of caries are often established before a child turns 12 months of age.<sup>6</sup>

**Consequences:** There are lifelong consequences associated with ECC. Childhood caries are predictive of caries and restorations in the primary and permanent dentition.<sup>7</sup> ECC in children is also

associated with pain, emergency visits, more expensive treatment, risks for delayed growth and development, loss of school days, loss of work for parents, and a diminished ability to learn.<sup>8,9,10</sup> Caries in the permanent dentition affects nearly 100% of adults in the majority of countries; it is associated with pain, reduced wages and an overall lower quality of life.<sup>11</sup> In addition, the main causes for ECC, high frequent sugary diet and feeding practices, are the main causes of the other world pandemic, non-infectious chronic diseases such as obesity, diabetes, and hypertension etc as well (1). Therefore, presence of ECC can be a risk predictor of future non-infectious chronic diseases while early education and build-up of healthy diet habits could also benefit on prevention of future non-infectious chronic diseases.

**Prevention strategy:** ECC is completely preventable. Studies have shown that early intervention is the key in preventing ECC. Early interventions such as anticipatory guidance, nutrition counseling, and fluoride varnish (FV) have been shown to prevent caries and reduce overall cost of oral health care in children.<sup>12,13,14,15</sup> Application of FV application every 6 months is effective in reducing caries in high-risk children with a preventive fraction of 50-90% in reduction of dental caries.(2-4)<sup>16,17</sup>. Early oral health interventions are limited by the shortage of dental providers in the US and worldwide therefore, the World Health Organization proposed to encourage all health care providers (physicians, nurses, etc) to provide preventive oral health care services to those children at high risk for dental caries.<sup>18</sup>

Early and collaborative healthcare intervention can enhance the opportunity for a child to have a lifetime free from preventable oral disease.<sup>19</sup> While beneficial, school based programs are often too late in that they begin after high risk practices are already routine and caries have

progressed for a high proportion of children. This points for the need for preventive oral health interventions that begin in infancy.

**Intervention Background:** Honduras is the second poorest country in Central America. Approximately 65% of Hondurans are living in poverty and nearly 30% are unemployed.<sup>20</sup> Roatán is very diverse, with three languages (Spanish, English and Garifuna), being spoken on the small island with a population of approximately 60,000. Many of the islands citizens of suffer from significant economic and educational inequality. There is a pronounced shortage of medical and dental providers. The WHO estimates there are approximately 2 dentists per 100,000 Hondurans. Country data for physicians is unavailable, however at the Roatán Public Hospital, the island's only hospital, there is one full time pediatrician dedicated to children's healthcare.<sup>21</sup> The lack of physicians and dentists leads to even less access to health care for Honduras' children.

The island's dominant source of income is tourism, which has brought with it an influx of the modern processed food diet. And as a result, there has been an increase of diseases such as caries and obesity. Dental caries rates in Honduras is very high; in 2012, a screening of 5-13 year old children in Roatán revealed a caries prevalence of over 70% for 1st graders and 93% for 2nd graders with a mean number of decayed teeth of 4.<sup>22</sup>

**Intervention:** Despite the shortage of physicians and dentists in Honduras, there are many other well-established medical programs in place, such as public health clinics and vaccination programs. The vaccination program in Roatán Honduras has been successful, boasting a consistent rate of over 93% children vaccinated.<sup>23,24</sup> In 2009 the vaccination program reached 5,539 children under the age of 5, from there the program grew, reaching 6,311 children under 5 in 2014.<sup>25</sup> The Roatán public health system, in concert with Global Healing, a not-for-profit non-government organization, and

UCSF, has successfully raised awareness and provided the means for vaccines for the children of Roatán. Oral health education partnerships with physicians, nurses, and established programs such as vaccination clinics, are an important method of increasing access to disease prevention modalities such as fluoride varnish in communities with dental shortages.

Recognizing the severity of dental problems in early childhood, in 2009, working with Roatán's local medical community, the UCSF director and Global Healing rolled out a new project to include preventive oral health care for children as a part of vaccination services. Local vaccination nurses were trained by a local dentist to provide FV, oral health and nutrition counseling via a standard protocol developed by a pediatric team at UCSF. A local dentist was appointed to oversee the FV program and ensure FV supplies. By the end of 2012, 1661 children were enrolled in the oral health program and 2,682 FV treatments were performed.<sup>26</sup>

In a pilot observational and survey study, 183 children aged 6-72 months were recruited from two Roatán public vaccination clinics. Children's demographics, diet, oral health habits, FV exposure, height, weight, and general health were collected by parental interviews, medical chart reviews and physical exams. Caries scores were recorded using modified ICDAS. We found that although 97% children were vaccinated, only 34 (19%) received FV. Caries prevalence increased with the age. By age 2, about 60% of children had dental caries. Children who received FV had significantly fewer dmft (55% fewer decayed teeth, mean±SE: 2.45±0.09 for FV; 5.35±0.08 for non-FV, Mann-Whitney test, P<0.001) and lower caries prevalence (45% for FV; 69% for non-FV, Chi Square test adjusted for age, P<0.01). Parent education, frequent soda and juice intake, and frequent snacking were positively associated with ECC while daily intake of milk was inversely associated with ECC. The results indicated the need and importance of early prevention, the effectiveness of FV program and poor program coverage.

## **PURPOSE AND AIMS**

Therefore, the goal of the current study is to assess the feasibility and roadblocks of the current program, to provide evidence-based recommendations to build a sustainable, efficacious, and efficient program. The specific aim of the study is to evaluate program feasibility, coverage, best practices and implementation barriers by a mixed quantitative and qualitative interview of local health administrators, pediatricians, and nurses to evaluate the program's current implementation. The data collected will allow us to provide a guide for best practices to build long term and sustainable preventive oral health programs in low resource settings.

## **HYPOTHESIS**

We hypothesize that information on knowledge, confidence, attitudes and opinions about the strengths and barriers from local stakeholders will provide a basis for recommendation to build an efficacious and sustainable model for an oral health and fluoride varnish program through vaccination clinics in low resource settings.

## **SIGNIFICANCE**

Given the high immunization rate in Honduras and other developing countries, the current Roatán oral health program provides a unique model to study whether this novel oral health education and

FV program through the public health vaccination clinics could be an effective approach to preventing dental caries and improving the nutrition and overall health of children in low resource settings. The current study will provide information for a thorough understanding of the feasibility and efficacy of incorporating an oral-health and FV program in vaccination clinics and provide an evidence-based recommendation to build a long-term sustainable and efficient program. Further, the study will provide evidence to estimate the projected impact of this novel oral-health program in improving children's oral health, nutrition and overall health. Dental treatment is an expense many people and governments struggle to pay. Positive results of this model could then be scaled up to the national level in Honduras, and eventually, to an international level across developing nations.

## MATERIALS AND METHODS

The study was approved by the UCSF Committee on Human Research (UCSF CHR study number 12-10215 *Roatán Oral Health Retrospective Cohort Study*). All of the available health administrators, physicians, nurses, and dentists who were involved in the oral health education and fluoride varnish program through the vaccination clinics at the Roatán Public Hospital, Oakridge Clinic, and French Harbor Clinic were approached to participate in a survey and interview study regarding the Roatán vaccination-clinic-based oral health prevention intervention and fluoride varnish program in the fall of 2014. Written consent was obtained from each subject. The survey aimed to assess each clinician's knowledge of oral health and nutrition, their confidence, attitudes and behavior in providing oral health related services, as well as, an interview on the program's access, implementation, barriers and suggestions for program improvement and sustainability.

Each participant completed the survey in their preferred language, English or Spanish. The survey had five sections: demographics, knowledge, confidence, attitudes and behavior, program operations, and the fifth section was on program and clinic structure completed by health administrators only. The survey included quantitative questions as well as qualitative interview for free responses to obtain participant's opinions on improving the efficiency and reach of the oral health project (see Appendix 1). The questions were adapted from survey instruments that had been used in previously published studies on oral health interventions directed at primary care providers.<sup>2728</sup> Each participant's survey was assigned a numerical identifier and the data were analyzed anonymously.

Descriptive statistics were used to summarize the demographics of the participants and their survey responses for knowledge, confidence, attitudes and behaviors about the oral health intervention. For data on knowledge, participants were given one point for each question answered correctly, and no points if the answer was incorrect. For data on confidence, respondents chose a number 1-4 from not confident, somewhat confident, confident, to extremely confident. For data on attitudes, participants were asked to rank their view of different activities and whether they were part of the duties of the vaccination nurse with a score of 1-4 (very supportive, supportive, somewhat supportive and not supportive).

The collected quantitative data were analyzed using SPSS 22 (IBM Corp., Chicago, Ill., USA) for statistical analysis, which included frequency distribution; chi square and independent  $t$  test were used, with the level of significance set at  $p < .05$  among different clinic sites or provider type.

For the qualitative interview with free answer, the answers were audiotaped and transcribed by one researcher (AM). Then, the content analysis technique was used to identify major themes in respondents answers and categorizing the responses by two researchers involved in the project. Dr. Judith Baker served as a consultant for the qualitative data analysis.



## RESULTS

### Study Population and Demographics

A total of twenty-five clinicians and administrators from three different clinic sites: Roatán Public Hospital, Oakridge Community Clinic, and French Harbor Clinic were enrolled in the study, which included all current staff who were involved with oral health project except one physician from Roatán Public Hospital, who was on vacation during the study. Participants included 11 nurses in the vaccination clinic, 7 nurses in other departments, four physicians and three dentists. The demographic and work experience information of the participants was summarized in Table 1. The majority of the participants (20) are female. The ethnicities of respondents was similar to the demographics of the island with forty-four percent identifying as Mestizo/Latino/Hispanic, twenty percent as Amerindian, thirty percent Afro-Caribbean/Black/Garifuna, and one respondent identifying as white (non-Hispanic). Most of the participants (21 of 25) had oral health training. Physicians and nurses outside of the vaccination department reported receiving approximately 5 hours of oral health training; vaccination nurses reported the least amount of training at approximately 2.5 hours of instruction while all dentists reported over 500 hours of oral health training.

**Table 1 - Subjects' demographic and work experience information in different clinical site**

	Roatán Public Hospital N=9	Oakridge Clinic N=7	French Harbor Clinic N=9	Total N=25
Gender (M/F)	1/8	1/6	3/6	5/20
Profession				
Physician	0	1	3	4
Vaccination Nurse	5	4	2	11
Other Nurse	3	2	2	7
Dentist	1	0	2	3
Ethnicity (n)				
Mestizo/Latino/Hispanic	3	1	7	11
Amerindian	1	4	0	5
Afro-Caribbean/Black	4	2	2	8
White	1	0	0	1
More than 3 years in healthcare	7	4	5	16 (64%)
More than 3 years in current position	6	4	4	14 (56%)
Had oral health training n(%)	7 (78%)	7 (100%)	7 (78%)	21 (84%)
Oral health training (mean/SD hrs)				
Physician	—	4	5.7	5
Vaccination Nurse	1.8	3.75	0	2.5
Other Nurse	2.7	12	2.5	5
Dentist	500	—	500	500

### Oral Health Education and Knowledge

Table 2 summarizes the respondents reported oral health knowledge analyzed by profession. Overall, the majority of the subjects knew that candy and chocolate milk can cause caries (100% and 88% correct, respectively) and that vegetables do not cause caries (92% correct). However, there was a lack of knowledge regarding the area of fluoride action and mechanism (38% with correct answers), rice and juice causing caries (38% and 52% correct), and when fluoride varnish application should start to prevent caries (32% correct). In most areas, physicians scored the highest, followed

by dentists, non-vaccination nurses; vaccination nurses scored the poorest in almost all subjects regarding oral health.

Oral health and nutrition knowledge was also analyzed by clinical site. Participants from Roatán Public Hospital scored on average sixty-four percent, Oakridge sixty-two percent, and French Harbor seventy-five percent correct. Participant responses on oral health knowledge evaluated by profession or by site did not reveal statistically significant differences.

When analyzed by ethnicity however, there were statistically different results among those who identified as Mestizo/Latino/Hispanic, Afro-Caribbean/Black, Amerindian, or White (non-Hispanic)/'Islander'. Those who identified as Amerindian, did not identify chocolate milk (60% correct vs 88% correct overall) or rice as cariogenic (0% correct vs 28% correct overall) at the same rate as clinicians who identified as Mestizo/Latino/Hispanic , Afro-Caribbean/Black, or White (non-Hispanic).

### **Attitudes and confidence in providing oral health care**

The subjects were in overwhelming agreement that basic oral health services should be provided during vaccination visits, such an oral exam (78-100%), nutrition counseling (71-88%), applying fluoride varnish (88-100%), or demonstrating brushing technique (100%) (Table 2).

The majority of respondents felt confident or very confident to provide consultation in prevention of tooth decay, diet and brushing techniques. However, fewer (76%) felt confident about applying the fluoride varnish to children (Table 2).

Regarding activities that would enhance their confidence in oral health education and fluoride varnish application, all subjects indicated that more training is needed. Eighty-four percent

subjects would like more training with reading materials with pictures, followed by hand-on training and mobile phone application or video.

**Table 2- Knowledge by Profession, Attitude and Confidence by Clinical Site**

	Physicians N=4	Vacc Nurse N=11	Other Nurse N= 7	Dentist N=3	Overall N=25
<b>Knowledge</b>					
1. <u>Statements</u> about Fluoride Mechanism and Action*	3 (75%)	2 (19%)	1 (15%)	1 (33%)	8 (32%)
2. Does juice cause cavities?	3 (75%)	3 (27%)	5 (71%)	2 (66%)	13 (52%)
3. Does soda cause cavities?	4 (100%)	9 (82%)	6 (86%)	2 (66%)	21 (84%)
4. Does chocolate milk cause cavities?	4 (100%)	8 (72%)	7 (100%)	1 (33%)	22 (88%)
5. Does rice cause cavities?	2 (50%)	2 (18%)	2 (29%)	1 (33%)	7 (28%)
When should you first apply FV?	2 (50%)	4 (36%)	1 (15%)	1 (33%)	8 (32%)
How often should FV be applied each year to prevent cavities for most children?	3 (75%)	8 (72%)	6 (86%)	2 (66%)	19 (76%)
	Public Hospital N=9	Oakridge N=7	French Harbor N= 9	Overall N=25	
<b>Attitude:</b> agree or strongly agree that the following should be part of a child's vaccination visit:					
Providing an oral exam	8 (88%)	7 (100%)	7 (78%)	22 (88%)	
Providing nutrition and oral health counseling	7 (78%)	5 (71%)	8 (88%)	20 (80%)	
Applying fluoride varnish	8 (88%)	7 (100%)	9 (100%)	24 (96%)	
Demonstrating brushing technique	9 (100%)	7 (100%)	9 (100%)	25 (100%)	
<b>Confidence:</b> Somewhat confident to very confident in conducting the following procedures as part of your routine work:					
Teaching parents about how to prevent tooth decay	8 (88%)	7 (100%)	9 (100%)	24 (96%)	
Teaching parents about a good diet for their child	8 (88%)	7 (100%)	9 (100%)	24 (96%)	
Showing proper brushing technique	9 (100%)	7 (100%)	8 (88%)	24 (96%)	
Applying fluoride varnish to children	7 (78%)	6 (86%)	6 (66%)	19 (76%)	
<b>Training:</b> Which training will help you feel more confident teaching families or applying FV in children?					
Hands on training	5 (55%)	5 (71%)	6 (66%)	16 (64%)	
Reading Materials with Pictures	8 (88%)	5 (71%)	8 (88%)	21 (84%)	
Mobile phone application or video	1 (11%)	2 (29%)	2 (22%)	5 (20%)	

I do not need more training	0%	0%	0%	0%
-----------------------------	----	----	----	----

---

\*Statements about fluoride mechanism and action included five separate true or false statements:

- a. Eating food or drinks with sugar several times a day causes tooth decay. (true)
- b. Bacteria are involved in causing tooth (baby bottle) decay. (true)
- c. Children do not need fluoride or tooth brushing until they have all of their teeth. (false)
- d. Fluoride works best by brushing it on to teeth. (true)
- e. Fluoride prevents tooth decay by making teeth stronger. (true)

### **Behavior in Providing Oral Health Care**

In the quantitative questionnaire, we found that seventy-six percent of providers had previously applied fluoride varnish, with a self reported average of about 67 children per year per provider at each clinic (Table 3). Dentists applied the most fluoride varnish, reaching an average 134 children each. Nurses had a self reported average of 70 children and physicians applied varnish the least, reporting an average of 13 children. The number of children treated per provider ranged from 0 to 300 children.

The majority (56%) of respondents reported that 2-4 minutes were needed for varnish application, some (16%) needed 5-9 minutes which is longer than most manufacturer's instruction of 1 minute. More nurses from French Harbor (56%) reported no training on fluoride varnish application compared to Roatán Public Hospital and Oakridge where hands-on training or training by manual was reported more often (66% and 85%).

**Table 3 Behavior in Providing Oral Health Care**

Providing Oral Health Care	Roatán Public Hospital N=9	Oakridge N=7	French Harbor N= 9	Overall N=25
Has applied FV to a child age 0-5	7 (78%)	7 (100%)	5 (56%)	19 (76%)
Approx how many children have you applied FV to per year? Average (Range)	62 (1 to 200)	62 (0 to 240)	69 (0 to 300)	67 (0 to 300)
Takes 4 minutes or less to apply varnish	4 (44%)	5 (71%)	5 (56%)	14 (56%)
FV program does not interfere w/assigned work	6 (67%)	6 (86%)	7 (78%)	19 (76%)
Trained to apply FV	7 (78%)	7 (100%)	4 (44%)	18 (72%)

**Problems faced by current program and potential solutions:**

Table 4 illustrates the main barriers identified by the participants from each clinical site. Participants were asked to identify all the factors they felt were hindering the current program from reaching more children. A lack of supplies and fluoride varnish was identified as the most common barrier to success for the oral health program in all three sites. Lack of time to apply FV and lack of interest of participation by staff or families were also identified as major barriers for oral health service in Roatán Public Hospital and French harbor Clinic. When analyzed by site, the lack of participation from staff and lack of time to apply varnish had statistically significant results. Low reimbursement and recording FV were not considered to be a problem at any of the clinical sites.

During the interview, the clinicians reported the unsteady FV supply chain as a key reason for low coverage of FV application on children . At the public hospital, a lack of time, space, supplies, and interest from staff were seen as the biggest obstacles. Half of all respondents across all clinic sites felt the program lacked the support from administrators and the government that it

needed to succeed. Throughout the interviews regarding improvement of the oral health project, several key themes were identified (Table 5). The themes were merged into five representative groups: the theme with the most comments was program organization, followed by program leadership, family education, nurse education, and public outreach.

Program organization is the most mentioned theme. Topics which emerged across all three clinic sites included fluoride varnish supply, financial support for the program, patient flow and organization, and the possibility of providing transportation for the nurses. The emphasis of organizational aspects differed by clinic site. For example, most of the interviewees from Oakridge clinic discussed the shortage of supplies as the most important obstacle for the oral health programs whereas at Roatán Public Hospital, they were more concerned with inadequate working space, patient flow, high patient volume and wait times. The suggested solution for these obstacles by the interviewees were related to the second most common theme—leadership.

The third most often discussed obstacle was parent and family education. A few nurses stated that if parents asked for fluoride, understood what it was, and were willing to wait for it, they would provide it more often. Their recommendations to overcome this obstacle were signs in the waiting room, a public campaign or community outreach at the annual vaccination drive.

Several suggestions for improvement were related to incorporating the FV application into alternate government programs and removing it from the vaccination clinic. Those programs were the “Infant time” family program, which meets twice a month with new mothers. Another, yet to be completed health prevention program was recommended by Dr. Welcome who is working with the Ministry of Health in order to implement family planning, nutrition, and general health centers where people can come when they aren’t sick for preventive services.



**Table 4 - Main road blocks identified by the providers for FV application**

Road Blocks	Roatán Public Hospital N=9	Oakridge N=7	French Harbor N= 9	Overall N=25
Lack of interest/participation- staff	5 (55%)*	0%*	3 (33%)*	8 (32%)*
Lack of interest/participation- families	3 (33%)	1 (14%)	1 (11%)	5 (20%)
Lack of supplies (FV)	5 (55%)	6 (86%)	5 (56%)	16 (64%)
Lack of time to apply FV	6 (67%)*	0%*	4 (44%)*	9 (36%)*
Low reimbursement	0%	1 (14%)	0%	1 (4%)
Unable to record FV encounters	0%	0%	0%	0%

\* p&lt;.05

**Table 5 - Major themes in interview** “Do you have any suggestions to improve the program? Can you think of ways the program may be able to reach more children?” Numbers indicate how many times each topic was mentioned during a interviewee’s free responses.

	Public Hospital	Oakridge	French Harbor	Overall
Program Organization: ie. FV supply, finances, structure, records, patient flow and transportation	17	5	12	34
Program Leadership: ie. Government, Physicians, Nurses	8	3	7	18
Education for parents and families	6	5	6	16
Nurse Education: Training, Attitudes, Motivation	8	0	9	15
Public Campaign, Outreach and Awareness	4	3	7	14
Fluoride Varnish Supplies	1	4	1	6

## DISCUSSION

Our preliminary study has shown ECC to be a severe problem in children at Roatán. It also showed that ECC is preventable that FV application was effective in reducing caries in this high-risk population. Our recommendations are in line with the World Health Organization's recommendations and encouragement to all health care providers (physicians, nurses, etc) to provide preventive and collaborative oral health care services to those children at high risk for dental caries.

Children in developing countries often receive inconsistent medical care across all modalities, by utilizing a collaborative approach the number of opportunities for a family to receive oral health and nutrition education and prevention are greatly increased. This platform also offers the opportunity to provide oral healthy prevention and education to young child to help establish healthy practices early in life that can bring long-term benefits in oral health as well as general health.

We found the coverage rate of the vaccination clinics to be very high, while the subsequent coverage of FV application in Roatán population was low. Low rates of FV are unlikely to be due to provider attitudes, as clinicians across all clinics were highly enthusiastic for the program and valued its benefit to helping the children. Organizational issues that plague the program included inconsistent leadership and supply chain, along with nearly non-existent training.

Nurses, physicians and dentists all reported issues with leadership, highlighting problems from the government to the local level. While the program is structured with a dentist in charge, this may be problematic. Nurses identified leadership from local physicians as one of the key factor to success of the program, which is especially true at the Oakridge and French Harbor clinics. Physicians direct the daily activities of nurses who may not see the need to follow directions from the dentist unless their supervising physician reinforces the need. Dentists are also not on site to

oversee nurses daily, as they are typically hired for 1-2 days per week, whereas physicians remain at the same clinic with the same nurses each day. Dentists' reports of being overwhelmed and having difficulty motivating local nurses to participate in the program also suggests that a different organizational structure may be needed. Nurses called for motivation and training from the Ministry of Health and physicians; they did not mention any of the community dentists. Many would like to see the government officially recognize or incorporate the program to motivate other nurses to participate.

The medical director in Oakridge clinic showed great enthusiasm to incorporate the oral health program into medical care. Therefore, it stands out in that leadership and training were not mentioned at the Oakridge site, indicating a level satisfaction of interviewees with his leadership. At Roatán Public Hospital and French Harbor, several administrators anecdotally credited Dr. Batiz for his leadership at Oakridge stating, "The program [at Oakridge] works well because of him." Program organization and leadership were closely related to nurse education, training and motivation. At Oakridge, where leadership was not reported to be a problem, more nurses reported having been trained. This relates to the discussion at Roatán Public Hospital and French Harbor, in that more nurses reported never having been trained, insufficient training, or a lack of confidence in their training.

Our results suggest that future interventions should be collaborative but also utilize existing hierarchies or relationships in the clinic which it expects to function. With its current structure, the program does not include reading material or pictures for parents. Clinics can take advantage of wait times with printed signs and material regarding oral health education and fluoride varnish. Another project could assess the inventory of varnish on the island and identify supply chain issues. As

turnover at the clinics for staff is very low, an annual training by the Ministry of Health or department dentist should be sufficient for staff to feel confident in applying varnish.

## **CONCLUSION**

The administration of FV in vaccination clinics in Roatán, Honduras was largely supported by staff. Barriers to success were inadequate training in oral health, lack of interest by staff and families and inadequate supplies. Improving training and increased government support were identified as key elements to improve the program's effectiveness. Some limitations of the study are related to its small sample size and relying on respondents to self report their interest and desire to participate which can be biased.

The survey responses highlighted important areas to create an efficacious and efficient program namely training and leadership. The nursing staff takes a direct cue from the physicians within the hospital system. Turnover in the hospital system is low, with few new nurses coming on each year. In person, formal training could every other year, with less formal training from nurse to nurse on an as needed basis. The survey also highlighted aspects of diet and nutrition where knowledge is lacking among providers, which can be used directly to improve training.

The direction for future research in Roatán may involve a new government project that began after data collection occurred. The project focuses on preventive medicine and has an oral health component to it. The dentist from the Ministry of Health, Dr. Marcia Welcome, has received approval from the Department of Health to expand the fluoride varnish program into new prevention clinics that are a part of the SOFAR program (Salud Oral y Factores de Riesgo). The

SOFAR program is a collaboration between the Pan American Health Organization, in concert with Colgate. The programs aim is to bring improved attention to children's oral health throughout Latin America. The program includes educational materials for families and providers. It also includes incorporating fluoride varnish into the immunization schedule. Work is being done to continue to improve the program training and strengthen its organization via a standard protocol using the results of this research; these changes can thereby be adopted on mainland Honduras and in other low resource settings via the collaboration with Ministry of Health and the SOFAR program.

- 
- <sup>1</sup> Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies,” American Academy of Pediatric Dentistry, 2014.
- <sup>2</sup> Peterson, Poul, “Challenges to improvement of oral health in the 21<sup>st</sup> century—the approach of the WHO Global Oral Health Programme,” *International Dental Journal* (2004) Vol 54./No 6 (supplement), 329-343.
- <sup>3</sup> I Johansson, AC Tanner, “Snacking Habits and Caries in Young Children,” *Caries Research*, Nov 2010; 22(5): 421-430.
- <sup>4</sup> Bourgeois DM, Llundra JC, “The Global burden of dental condition among children in nine countries participating in an international oral health promotion programme, 2012-2013,” *International Dental Journal* 2014; 64(Supp 2), 27-34.
- <sup>5</sup> Llana C, Leyda A, Fornder L, Garcet S, “Association between the number of early carious lesions and diet in children with a high prevalence of caries,” *European Journal of Paediatric Dentistry*, 2015 Mar; 16(1): 7-12.
- <sup>6</sup> Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies,” American Academy of Pediatric Dentistry, 2014.
- <sup>7</sup> “The association of early dental caries patterns with caries incidence in preschool children,” *Journal Public Health Dentistry* 1996 Spring; 56(2):81-3. O’Sullivan DM, Tinanoff N
- <sup>8</sup> Increasing prevalence of emergency department visits for pediatric dental care, 1997-2001, Larillo, T *JADA* vol 137 March 2006 379-385.
- <sup>9</sup> Acs, G, Lodolini G, Kaminsky S, “Effect of nursing caries on body weight in a pediatric population,” *Pediatric dentistry* 1992 Sept-Oct; 14(5): 302-305.
- <sup>10</sup> Detty AM, Oza-Frank F, Oral Health Status and academic performance among Ohio third graders, 2009-2010, *Journal of Public Health Dentistry* Jun 2014
- <sup>11</sup> “The global burden of oral diseases and risks to oral health,” PE Peterson *Bulletin of the World Health Organization*, September 2005, 83 (9).
- <sup>12</sup> “Early Preventive Dental Visits : Effects on Subsequent Utilization and Costs,” *Pediatrics*, 2004; 114 e418
- <sup>13</sup> “Fluoride Varnish in the Prevention of Dental Caries in Children and Adolescents: A Systematic Review,” Azarapazhooh, A, Main, P., *Journal of the Canadian Dental Association*, Feb 2008 Vol 74 no 1 74-79.
- <sup>14</sup> “Professionally applied topical fluoride: Evidence-based clinical recommendations,” *Journal of the American Dental Association*, vol 137 August 2006, 1151-1159.
- <sup>15</sup> Hawkins R, Noble J, Locker D, Wiebe D, Murray H, Wiebe P, and others. A comparison of the costs and patient acceptability of professionally applied topical fluoride foam and varnish. *J Public Health Dent* 2004; 64(2):106–10.
- <sup>16</sup> “Fluoride Varnish in the Prevention of Dental Caries in Children and Adolescents: A Systematic Review,” Azarapazhooh, A, Main, P., *Journal of the Canadian Dental Association*, Feb 2008 Vol 74 no 1 74-79.
- <sup>17</sup> Marinho, Worthington, Clarkson, “Fluoride varnishes for preventing dental caries in children and adolescents,” *Cochrane Review*, 2014.
- <sup>18</sup> Peterson, P “World Health Organization global policy for improvement of oral health- World Health Assembly 2007,” *International Dental Journal* (2008) 58, 115-121.
- <sup>19</sup> “Policy on the Dental Home,” American Academy of Pediatric Dentistry, 2013.
- <sup>20</sup> CIA World Factbook, Honduras,  
<https://www.cia.gov/library/publications/the-world-factbook/geos/ho.html>
- <sup>21</sup> WHO, Country Profiles - Honduras <http://www.who.int/gho/countries/hnd.pdf?ua=1>
- <sup>22</sup> WHO, Oral Health Information Systems; [www.who.int/oral\\_health/action/information/surveillance/en/](http://www.who.int/oral_health/action/information/surveillance/en/), accessed Jan, 31 2015.
- <sup>23</sup> WHO Honduras Health Fact sheet,  
<http://www.who.int/gho/countries/hnd.pdf>
- <sup>24</sup> WHO, Country Profiles - Honduras <http://www.who.int/gho/countries/hnd.pdf?ua=1>
- <sup>25</sup> Public health data, email correspondence—Global Healing, Health Minister Fermin, March 2015.
- <sup>26</sup> Public health data, email correspondence—Global Healing, Health Minister Fermin, March 2015.
- <sup>27</sup> Caspary G, Krol DM, Boulter S, Keels MA, Romano-Clarke G. Perceptions of oral health training and attitudes toward performing oral health screenings among graduating pediatric residents. *Pediatrics*. 2008;

1. Johansson I, Holgerson PL, Kressin NR, Nunn ME, Tanner AC. Snacking habits and caries in young children. *Caries Res.* 2010; 44(5):421-30. doi:10.1159/000318569
2. Weintraub JA, Ramos-Gomez F, Jue B, et al. Fluoride varnish efficacy in preventing early childhood caries. *J Dent Res.* 2006; 85(2):172-6. doi:85/2/172 [pii]
3. Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev.* 2013; 7:CD002279. doi:10.1002/14651858.CD002279.pub2
4. Weintraub JA. Fluoride varnish for caries prevention: comparisons with other preventive agents and recommendations for a community-based protocol. *Spec Care Dentist.* 2003; 23(5):180-6.

APPENDIX A. LETTERS OF SUPPORT

June 30, 2014

Dr. Augustin Batiz,  
Oakridge Community Clinic


A Quien Corresponda,



Esta carta tiene el propósito de confirmar mi apoyo y participación en el estudio: Estudio de Cohorte Retrospectivo de Salud Oral Roatán con la nueva modificación para incluir entrevistas y cuestionarios de proveedores y pacientes, para evaluar la viabilidad del programa, la cobertura, las mejores prácticas y las barreras de implementación del barniz de fluoruro en curso y programa de salud oral a través de clínicas de vacunación en Roatán, Honduras.

Sirvo en capacidad de Director Médico de la clínica de la comunidad Oak ridge, el cual será la sede principal de la investigación. Es un placer participar en este estudio ya que es posible nos informe acerca de la efectividad de un programa de salud oral que incluya barniz de fluoruro en un contexto médico y puede permitir la expansión de este nuevo programa de salud oral el resto de Honduras y en última instancia de todo el mundo para mejorar la salud oral y la nutrición en la primera infancia. Apoyamos plenamente el proyecto de investigación para su conducción exitosa.

Seguiremos todas las regulaciones requeridas por el gobierno de Honduras y el Comité de Investigación Humana de la Universidad de California, San Francisco, U.S.A.

Si tiene alguna pregunta puede contactarme al 011-504-9946-5566 por teléfono o email.

Sinceramente,  
  
Augustine Batiz

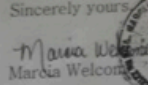
Subject: UCSF - Roatan Fluoride Research Study  
From: Malebranche, Alexandra (Alexandra.Malebranche@ucsf.edu)  
To: marsue76@yahoo.com  
Date: Monday, July 7, 2014 9:52 AM


Dr. Welcome,  
Below is the letter (it is also attached). Please let me know if you have any trouble with printing and signing this email.  
Thank you,  
Alexandra

Dra. Welcome  
French Harbor Public Clinic  
011 + 50432302422

To whom it may concern,  
This letter is to confirm my support for participation of the pilot study: Roatán Oral Health Retrospective Cohort Study with the new modification to include interviews and questionnaire of providers and patients to evaluate the program feasibility, coverage, best practices, and implementation barriers of the current fluoride varnish and oral health program through vaccination clinics in Roatán, Honduras.  
I am the dental director of the French Harbor Clinic, which is one of the study locations. I am pleased to participate in this study as it may provide understanding of the program and help us to generate recommendations for building a sustainable and efficient oral-health program in vaccination clinics in Roatán and may set the stage for expanding this novel oral-health program to mainland Honduras and ultimately worldwide to improve early-childhood oral-health and nutrition. We will fully support the research project for its successful conduction.  
We will be compliant with the regulation required by the Honduran government as well as the regulation held by the Committee of Human Research at the University of California, San Francisco, U.S.A.

If you have any questions please contact me at by phone 011-504-3230-2422 or by e-mail

Sincerely yours  
  
Maria Welton





## APPENDIX B. ENGLISH QUESTIONNAIRE

My name is Alexandra Malebranche at I am dentist from the University of California at San Francisco. I will be creating a protocol with the intent to improve the current program, and to bring the fluoride varnish project to mainland Honduras and possibly elsewhere in the world. In order to do so, we must find out how the project runs in the Roatán public health system and any factors which may make it difficult for children to receive this oral health care intervention.

The survey is designed to assess the current fluoride varnish project and your role in the project. It should take no more than 40 minutes to complete. I will use the information to design a protocol for the fluoride varnish project.

Date:

Name:

### A. Demographic Information

1. Clinic:
  - a. Roatán Public Hospital
  - b. Oakridge
  - c. French Harbor Clinic
  - d. Other:
2. Gender:
  - a. male
  - b. female
3. What is your profession?
  - a. Physician (Doctor)
  - b. Nurse
    - i. If Nurse, which department (ie vaccination, pediatric, etc): \_\_\_\_\_
  - c. Dentist
  - d. Other:
4. How many years have you worked in the Roatán healthcare system (ie a Roatán public clinic or hospital)?
  - a. 0-3
  - b. 4-6
  - c. 7-10
  - d. more than 10 years
5. How many years have you worked in your current position?
  - a. 1-3
  - b. 4-6
  - c. 7-10
  - d. more than 10 years
6. During your education, did you receive any lecture or class related to oral health?

- a. Yes
  - b. No
- If yes, how many hours: \_\_\_\_\_

7. What is your ethnicity?

- a. Mestizo/Latino/Hispanic
- b. Amerindian
- c. Afro-caribbean/Black
- d. White (non hispanic)

### B. Knowledge

1. Select all of the true statements

- a. Eating food or drinks with sugar several times a day causes tooth decay.
- b. Bacteria are involved in causing tooth (baby bottle) decay.
- c. Children do not need fluoride or tooth brushing until they have all of their teeth.
- d. Fluoride works best by brushing it on to teeth.
- e. Fluoride prevents tooth decay by making teeth stronger.

2. Please select as many foods that cause cavities (baby bottle decay) as you can think of :

- a. Seafood (ex fish, shrimp, crab)
- b. Candies (ex chocolate, lollipop)
- c. Juice (ex apple juice, fruit punch)
- d. Soda (ex Coca Cola, Fanta)
- e. Chocolate Milk (ex Nesquik)
- f. Rice
- g. Vegetables (broccoli, lettuce)

3. Please choose all correct answers: What can happen to people who get cavities

- a. Lose their teeth
- b. Have problems or pain to eat
- c. Difficulty in school
- d. Get infection

4. From what age, do you think fluoride varnish will help children from getting cavities?

- a. 0-1 yr old
- b. 2-3 yrs old
- c. 3 yrs or older
- d. When they have teeth
- e. Fluoride varnish is not good for children to have

5. How often should FV be applied each year to prevent caries for most children?

- a. once a year
- b. every 6 months
- c. once a month

C. Attitude, Confidence and Behavior toward the oral health and fluoride varnish program

Typically, healthcare workers who provide vaccinations are not required to participate in oral health activities. The following questions are designed to give us information about your level of comfort with oral health and your practice of nursing or medicine. We will use this information to tailor the program or training associated with it.

2. Do you AGREE or DISAGREE that the following should be part of children’s vaccination visits? (Attitude)

		<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Does not apply</b>
1	early signs of dental problems (e.g. dental decay, gingivitis) during the vaccination appointment.					
2	Baby bottle and infant diet counseling on preventing dental caries.					
3	Apply fluoride varnish for 0-5 yr old children					
4	Give out tooth brush and fluoride toothpaste					
5	demonstrate proper brushing technique					

0.

1.

Do you feel confident in conducting following procedures as a part of your routine work (confidence)?

		<b>Not confident</b>	<b>Somewhat confident</b>	<b>Confident</b>	<b>Very confident</b>
6	Teach parents about how to prevent tooth decay in their children				

7	Give parent good diet instruction				
8	Show parents proper brushing technique				
9	Apply fluoride varnish in children				

10. Which of following activity will you help you feel more confident on teaching families on oral health or apply FV in children (choose all that apply):

- a. Hands on training
- b. Reading material with picture
- c. Mobile phone or video tutorial
- d. I do not need more training
- e. Other :

E. FV program operations

*For clinicians and providers*

1. Have you ever applied FV to a child aged 0-5? If no, please skip to question 5.
  - a. Yes
  - b. No
  
2. How many children have you applied FV to per year?
  
3. How long does the FV application take you for each patient (start to finish)?
  - a. less than 1 minute
  - b. 2-4 minutes
  - c. 5-9 minutes
  - d. 10 minutes or more
  
4. Does the FV program keep you from finishing your other assigned work?
  - a. Yes
  - b. No
  
5. How were you trained to apply FV?
  - a. Hands on training
  - b. A booklet or reading
  - c. A video
  - d. I was not trained
  
6. Please chose any problems your FV program experiences:
  - a. Lack of interest or participation from staff
  - b. Lack of interest or participation from families
  - c. Lack of supplies (Fluoride varnish)
  - d. Lack of time to apply FV
  - e. Low reimbursement for FV
  - f. Unable to record FV encounters
  - g. Please describe any other problems:
  
7. What is the best way to reach children for fluoride application?
  - a. At the vaccine clinic
  - b. With a traveling vaccine nurse
  - c. At a school
  - d. Other:
  
8. How would you assess the current support for the FV program?
  - a. More than enough support
  - b. Some support
  - c. Not enough support

d. No support at all

9. If there is not enough support, select all which are needed:

- a. Financial support
- b. Fluoride varnish supply support
- c. Personnel support
- d. Training support
- e. Other:

10. Do you need more time to organize the FV program in your clinic?

- a. Yes
  - If yes, are you able to request time to do so?
- b. No

11. How could this program be better incorporated into your clinic?

D. Clinic's general operation, oral health assessment

*To be completed by clinic administrators only.*

1. On average, how many 0-5 year old children do you see in your clinic each week?
  - a. 20 or fewer
  - b. 21-40
  - c. 41-60
  - d. 60 or more

2.

	0-25%	26-50%	51-75%	75-99%	All (100%)	Do not know
What percentage of children 0-5 years old bring their government issued vaccination card to appointments?						
What percent of 0-5 yr old children your see in the clinic have tooth decay?						
What percent of the children visiting the clinic are up-to-date on their vaccines?						
What percent of children (0-5 years old), who received vaccines also received a FV treatment?						

3. How would you rate the overall health of the children in the vaccination clinics that you have seen?

- a. Very healthy      b. Healthy      c. Unhealthy      d. Very unhealthy      e. Unsure

4. How would you rate the diet and nutrition status of the children in the vaccination clinics that you have seen?

- a. Very healthy      b. Healthy      c. Unhealthy      d. Very unhealthy      e. Unsure

6. On average, how long does it take the children to travel to the vaccination sites?

- a. 20 minutes or less

- b. 21-45 minutes
  - c. 46-60 minutes
  - d. More than 60 minutes
  - e. Unsure
7. What are the main reasons children miss their vaccinations (select all that apply)?
- a. Unable to reach the clinic; difficult transportation
  - b. Vaccination nurse unable to get to them
  - c. Lack of parental consent
  - d. Unable to pay
  - e. Unsure
  - f. Other:
8. How do **mothers** keep a record of their children's **vaccines** (select all that apply)?
- a. logged in their vaccination card
  - b. A receipt
  - c. Directed to come on a certain date or recall period
  - d. Mother's do not keep track of vaccinations
  - e. Unsure
  - f. Other:
9. How do **mothers** keep a record of their children's **FV** applications (select all that apply)?
- a. A vaccination booklet
  - b. A receipt
  - c. Directed to come on a certain date or recall period
  - d. Mother's do not keep track of FV applications
  - e. Unsure
  - f. Other:
10. How do clinics keep a record of vaccines for a child(select all that apply)?
- a. A vaccination card or the child
  - b. A clinic vaccination log
  - c. There is no standard way to record vaccinations
  - d. Other:
11. How do clinics keep a record of FV applications of a child (select all that apply)?
- a. A vaccination card of the child
  - b. In the clinic vaccination log with other vaccinations
  - c. A separate FV log
  - c. There is no standard way to record FV applications
  - d. Other:
12. How do you identify whether a child is due for FV application?
- a. check on FV log
  - b. Check on child's vaccination card
  - c. ask the child's guardian for last application
  - d. do not check and just do it
  - e. other:
13. How were your staff trained to become involved in the program?



- a. Hands on training
- b. A booklet or reading
- c. A video
- d. There is no formal training program

## APPENDIX C. SPANISH QUESTIONNAIRE

Mi nombre es Alexandra Malebranche en soy dentista de la Universidad de California en San Francisco. Va a crear un protocolo con la intención de mejorar el programa actual y traer el proyecto de barniz de fluoruro a Honduras continental y posiblemente en otros lugares del mundo. Para ello, debemos averiguar cómo el proyecto se ejecuta en el sistema de salud pública de Roatán y los factores que pueden dificultar los niños reciben esta intervención de salud oral.

El estudio está diseñado para evaluar el proyecto actual de barniz de fluoruro y su papel en el proyecto. Debería tomar no más de 40 minutos para completar. La información será utilizada para diseñar un protocolo para el proyecto de barniz de fluoruro.

Date:

Name:

### A. Demographic Information

1. Clinic:
  - a. Roatán Public Hospital
  - b. Oakridge
  - c. French Harbor Clinic
  - d. Other:
  
2. Género:
  - a. masculino
  - b. femenino
  
3. ¿Cuál es tu profesión?
  - a. Médico (Doctor)
  - b. Enfermera
    - i. Cuál departamento (es decir, vacunación, pediátrica, etc.): \_\_\_\_\_
  - c. Dentista
  - d. Otro:
  
4. ¿Cuántos años ha trabajado en una de las clínicas de Roatán (es decir una clínica pública Roatán u hospital)?
  - a. 0-3
  - b. 4-6
  - c. 7-10
  - d. more than 10 years
  
5. How many years have you worked in your current position?
  - a. 1-3
  - b. 4-6
  - c. 7-10
  - d. más de 10 años
  
6. Durante su educación, recibiste alguna conferencia o clase relacionados con la salud oral?
  - a. Si

b. No

En caso afirmativo, cuántas horas: \_\_\_\_\_

7. ¿Cuál es su origen étnico?

- a. Mestizo/Latino/Hispanic b. Amerindian c. Afro-caribbean/Black d. White (non hispanic)

### B. Knowledge

1. Seleccione todas las afirmaciones verdaderas

- a. Comer alimentos o bebidas con azúcar varias veces al día causa caries.
- b. Las bacterias son implicadas en causar caries en los dientes (biberón).
- c. Los niños no necesitan flúor o diente de cepillado hasta que tienen todos sus dientes.
- d. Fluoruro trabaja mejor con lo del cepillo sobre los dientes.
- e. El fluoruro previene las caries al hacer los dientes más fuertes.

2. Por favor, seleccione como muchos alimentos que causan caries (caries biberón) :

- a. Mariscos (ex peces, camarones, cangrejos)
- b. Dulces (ex chocolates, paletas)
- c. Jugo (jugo de manzana ex, jugo de frutas)
- d. Soda (ex Coca Cola, Fanta)
- e. Chocolate con leche (ex Nesquik)
- f. arroz
- g. Verduras (brócoli, lechuga)

3. Por favor seleccione todas las respuestas correctas ¿Qué puede suceder a las personas que reciben las caries. a. Perder sus dientes b. Tiene problemas o dolor al comer c. Dificultad en la escuela d. Obtén la infección

4. A partir de qué edad, ¿crees que el barniz de fluoruro ayudará a los niños de tener caries?

- a. 0-1 años de edad
- b. 2-3 yrs años de edad
- c. 3 años de edad o mas
- d. Cuando tienen dientes
- d. El barniz de fluoruro no es bueno que los niños tienen

5. ¿Con qué frecuencia se debe aplicar barniz de flúor cada año para prevenir la caries para la mayoría de los niños? a. una vez al año b. cada 6 meses c. una vez al mesa.

C. Attitude, Confidence and Behavior toward the oral health and fluoride varnish program

Por lo general, las enfermeras que proporcionan las vacunas no están obligados a participar en las actividades de salud oral. Las siguientes preguntas están diseñadas para darnos información sobre su nivel de comodidad con la salud oral y su práctica de la enfermería o la medicina. Usaremos esta información para adaptar el programa o la formación asociada a él.

2. ¿Está de acuerdo o en desacuerdo con que el siguiente debe ser parte de las visitas de vacunación de los niños? (Attitude)

		<b>Muy de acuerdo</b>	<b>Acuerdo</b>	<b>Desacuerdo</b>	<b>muy en desacuerdo</b>	<b>no se aplica</b>
1	los primeros signos de problemas dentales (por ejemplo, la caries dental, gingivitis) durante la cita de vacunación.	•	•	•	•	•
2	Biberón y consejería dieta infantil en la prevención de la caries dental.	•	•	•	•	•
3	Aplique el barniz de fluoruro para los niños de 0-5 años de edad	•	•	•	•	•
4	Dar a el cepillo de dientes y pasta dental con fluoruro	•	•	•	•	•
5	demostrar técnica de cepillado adecuada	•	•	•	•	•

0.

1.

•	•	no confianza	algo de confianza	confianza	muy confiado
6	Enseñe a los padres sobre cómo prevenir la caries	•	•	•	•

	dental en sus hijos				
7	Enseñar a los padres acerca de una dieta saludable	•	•	•	•
8	Mostrar los padres técnica de cepillado adecuada	•	•	•	•
9	Aplique el barniz de flúor en los niños	•	•	•	•

0.

¿Confía usted en su capacidad de hacer los siguientes procedimientos?

10. ¿Cuál de siguientes actividad va a ayudar a sentirse más confiados en las familias de enseñanza sobre la salud oral o aplicar FV en niños (elija todas las que apliquen):

- a. Las manos en el entrenamiento
- b. Material de lectura con la imagen
- c. Teléfono móvil o video tutorial
- d. No necesito más entrenamiento
- e. Otros :

E. FV program operations

*For clinicians and providers*

1. ¿Alguna vez ha aplicado FV a un niño de 0-5 años? ***If no, please skip to question 5***
  - a. Si
  - b. No
  
2. ¿Cuántos niños tienen que aplicó a FV por año?
  
3. ¿Cuánto tiempo la aplicación de barniz lo lleve para cada paciente (de principio a fin)?
  - a. menos de 1 minuto
  - b. 2-4 minutos
  - c. 5-9 minutos
  - d. 10 minutos o mas
  
4. ¿El programa de barniz le impida terminar su otro trabajo asignado?
  - a. Si
  - b. No
  
5. ¿Cómo fue entrenado para aplicar barniz?
  - a. Las manos en el entrenamiento
  - b. Un folleto o lectura
  - c. Un vídeo
  - d. Yo no fui entrenado
  
6. Por favor, elegir los problemas que su programa de barniz de flúor tiene:
  - a. Una falta de interés o la participación de personal
  - b. una falta de interés o la participación de las familias
  - c. La falta de suministros (barniz de fluoruro)
  - d. La falta de tiempo para aplicar FV
  - e. Pago bajo para FV
  - f. No se puede grabar encuentros FV
  - g. Por favor describa cualquier otro problema:
  
7. ¿Cuál es la mejor forma de llegar a los niños para la aplicación de flúor?
  - a. En la clínica de la vacuna
  - b. Con una enfermera vacuna viajar
  - c. En una escuela
  - d. Otros:
  
8. ¿Cómo valora el apoyo actual para el programa de fluoruro?
  - a. Más que suficiente apoyo
  - b. Algunos apoyo
  - c. No hay suficiente apoyo

d. No apoyo en absoluto

9. Si no hay suficiente apoyo (o ayuda), seleccionar todo lo que se necesita:

- a. apoyo financiero
- b. apoyo oferta barniz de fluoruro
- c. Personal de Apoyo
- d. apoyo a la formación
- e. Otros:

10. ¿Necesita más tiempo para organizar el programa de FV en su clínica?

- a. sí
  - En caso afirmativo, ¿eres capaz de pedir tiempo para hacerlo?
- b. no

11. ¿Cómo podría ser mejor este programa incorporado en su clínica? (¿Cómo podrían llegar a más personas el acceso a este servicio)?

D. Clinic's general operation, oral health assessment

*To be completed by clinic administrators only.*

1. En promedio, ¿Cuántos niños de 0-5 años de edad, es lo que ves en la clínica cada semana?
  - a. 20 o menos
  - b. 21-40
  - c. 41-60
  - d. 60 o mas

2.

	0-25 por ciento	26-50%	51-75%	75-99%	All (100%)	Do not know
¿Qué porcentaje de niños de 0-5 años de edad traen su gobierno emitió la tarjeta de vacunación a las citas?	•		•	•	•	•
¿Qué porcentaje de los niños de edad 0-5 yr su sede en la clínica tienen caries dental?	•	•	•	•	•	•
¿Qué porcentaje de los niños que visitan la clínica son hasta al día con sus vacunas?	•		•	•	•	•
¿Qué porcentaje de niños (0-5 años), que recibieron vacunas también recibieron un tratamiento de barniz de flúor?	•	•	•	•	•	•

3. ¿Cómo calificaría la salud general de los niños en las clínicas de vacunación que usted ha visto?
  - a. Muy saludable.
  - b. saludable
  - c. no saludable
  - d. muy poco saludable
  - e. inseguro
4. ¿Cómo calificaría la dieta y la nutrición de los niños en las clínicas de vacunación que usted ha visto?
  - a. Muy saludable.
  - b. saludable
  - c. no saludable
  - d. muy poco saludable
  - e. inseguro
6. En promedio, ¿cuánto tiempo se tarda en los niños a viajar a los sitios de vacunación?



- a. 20 minutos o menos
- b. 21-45 minutos
- c. 46-60 minutos
- d. Mas de 60 minutos
- e. insegura

7. ¿Cuáles son las principales razones de los niños faltan a sus vacunas (Seleccione todas las que aplican)?

- a. No es posible llegar a la clínica; transporte difícil
- b. Enfermera Vacunación no puede llegar a ellos
- c. La falta de consentimiento de los padres
- d. Incapaz de pagar
- e. inseguro
- f. Otros:

8. ¿Cómo las madres llevar un registro de las vacunas de sus hijos (seleccione todo lo que corresponda)?

- a. conectado a su tarjeta de vacunación
- b. Un recibo
- c. Dirigida por venir en un determinado período o fecha de retiro
- d. Madre de no guardan un registro de las vacunas
- e. inseguro
- f. Otros:

9. ¿Cómo las madres lleven un registro de las aplicaciones FV de sus hijos (seleccione todo lo que corresponda)?

- a. Un folleto de la vacunación
- b. Un recibo
- c. Le dicen a regresar en una fecha determinada o período de recuerdo
- d. Madre de no guardan un registro de las aplicaciones FV
- e. inseguro
- f. Otros:

10. How do clinics keep a record of vaccines for a child(select all that apply)?

- a. A vaccination card or the child
- b. A clinic vaccination log
- c. There is no standard way to record vaccinations
- d. Other:

11. ¿Cómo clínicas mantienen un registro de las vacunas para un niño (seleccione todo lo que corresponda)?

- a. Una tarjeta de vacunación o el niño
- b. Un registro de vacunación clínica
- c. No hay manera estándar para registrar las vacunas
- d. Otros:

12. ¿Cómo identificar si un niño está prevista para la aplicación FV?

- a. comprobar el registro FV
- b. Compruebe en la tarjeta de vacunación del niño
- c. pedir el tutor del niño para la última aplicación
- d. no marque y sólo lo hacen
- e. otros:

13. ¿Cómo fue su personal a aprender a participar en el programa?
- a. Las manos en el entrenamiento
  - b. Un folleto o lectura
  - c. Un vídeo
  - d. No hay un programa de capacitación formal

APPENDIX E. ENGLISH CONSENT

**UNIVERSITY OF CALIFORNIA, SAN FRANCISCO  
CONSENT TO PARTICIPATE IN A RESEARCH STUDY**

**Study Title:** *Roatán Oral Health Study*

This is a research study about a survey of your experience and opinion on providing oral health consultation and fluoride varnish service for young children through immunization services in Roatán. The study researchers from *School of Dentistry at University of California, San Francisco* (UCSF), will explain this study to you.

Research studies include only people who choose to take part. Please take your time to make your decision about participating, and discuss your decision with your family or friends if you wish. If you have any questions, you may ask the researchers.

You are being asked to take part in this study because you work in a clinic that has provided oral health consultation or fluoride varnish treatment to young children in Roatán. You can give consent to this study if you are an adult who works at one of the clinic sites.

**Why is this study being done?**

The purpose of this study is to learn about the best way to provide a preventive oral health and Fluoride varnish program in Roatán.

UCSF, the Kwan-Eustace Family Foundation, and Global Healing pay for the conduct of this study. The investigators do not have any financial or proprietary interests.

**How many people will take part in this study?**

Approximately 20 adults who work in the immunization clinics in Roatán Island will take part in this study.

**What will happen if I take part in this research study?**

If you agree, the following procedures will occur:

- You will complete a questionnaire, which asks about your experience and view related to the oral health of children in Roatán, preventive oral health, fluoride varnish, and the fluoride varnish projects at Roatán. It will take you about 30 minutes to complete the survey.
- **Study location:** All these procedures will be done at the same clinic that you were approached at (Roatán Public Health Hospital or at the immunization clinics at French Harbor, Los Fuertes, and Oak Ridge) or we can reach you by the phone.

**How long will I be in the study?**

Participation in the study will take a total of about 30 minutes.

### **Can I stop being in the study?**

Yes. You can decide to stop at any time since participation is entirely voluntary. Just tell the study researcher or staff person right away if you wish to stop being in the study.

Also, the study researcher may stop you from taking part in this study at any time if he or she believes it is in your best interest, if you do not follow the study rules, or if the study is stopped.

### **What side effects or risks can I expect from being in the study?**

- Some of the survey questions may make you feel uncomfortable or raise unpleasant memories. You are free to skip any question or discontinue the questionnaire.

### **Are there benefits to taking part in the study?**

There will be no direct benefit to you from participating in this study. However, the information that you provide may help health professionals better understand the oral health prevention program in Roatán that may help to build stronger and sustainable programs to prevent dental caries in children at Roatan and beyond.

### **What other choices do I have if I do not take part in this study?**

You are free to choose not to participate in the study. If you decide not to take part in this study, there will be no penalty to you.

### **Will information about me be kept private?**

Participation in research may cause a loss of privacy. In this study you will be asked about your occupation. The researchers will keep information about you as confidential as possible, but complete confidentiality cannot be guaranteed. We will do our best to make sure that the personal information gathered for this study is kept private. The survey itself may include details that directly identify you, such as your name or occupation.

### **What are the costs of taking part in this study?**

You will not be charged for any of the study treatments or procedures.

### **Will I be paid for taking part in this study?**

You will not be paid for taking part in this study.

### **What are my rights if I take part in this study?**

Taking part in this study is your choice. You may choose either to take part or not to take part in the study. If you decide to take part in this study, you may leave the study at any time. No matter what decision you make, there will be no penalty to you in any way. You will not lose any of your regular benefits, and you can still get your care from our institution the way you usually do.

### **Who can answer my questions about the study?**

You can talk to the researcher(s) about any questions, concerns, or complaints you have about this study. Contact the principle investigator Dr. Ling Zhan or other investigators Dr. Alexandra Malebranche of the study.

If you wish to ask questions about the study or your rights as a research participant to someone other than the researchers or if you wish to voice any problems or concerns you may have about the study, please call the Office of the Committee on Human Research at 001-1-415-476-1814.

**CONSENT**

You have been given a copy of this consent form to keep.

**PARTICIPATION IN RESEARCH IS VOLUNTARY.** You have the right to decline to be in this study, or to withdraw from it at any point without penalty or loss of benefits to which you are otherwise entitled.

\_\_\_\_\_

Date

\_\_\_\_\_

Signature

**UNIVERSIDAD DE CALIFORNIA, SAN FRANCISCO  
CONSENTIMIENTO PARA PARTICIPAR EN UN ESTUDIO DE  
INVESTIGACIÓN**

**Título del estudio:** *Estudio de salud oral de Roatán*

Este es un estudio de investigación sobre la salud oral en los niños jóvenes. Los investigadores del estudio de la Clínica Pública Voluntaria de Roatán (Roatán Volunteer Public Clinic) y el *Departamento de Odontología de UCSF* le explicarán este estudio.

Los estudios de investigación se hacen solo con personas que eligen participar en ellos. Por favor tómese el tiempo que necesite para tomar su decisión sobre la participación en este estudio y hable sobre su decisión con su familia o amigos, si así lo desea. Si tiene alguna pregunta, puede hacérsela a los investigadores.

Se le está solicitando que *participe en este estudio porque usted tiene un niño de entre 6 meses y menos de 6 años de edad. Usted puede dar su consentimiento para este estudio si usted es el principal encargado de cuidar a este niño. El principal encargado de cuidar a un niño es la persona responsable del niño y puede tomar decisiones médicas por él. Puede haber más de un principal encargado de cuidar al niño en la familia, por ejemplo la madre y el padre del niño.*

**¿Por qué se realiza este estudio?**

El propósito de este estudio es aprender sobre *los diferentes factores asociados con el desarrollo de caries dentales en los niños jóvenes.*

UCSF, la Fundación Familiar Kwan-Eustace (Kwan-Eustace Family Foundation) y Global Healing pagan para realizar este estudio. Los investigadores no poseen ningún interés financiero o de titularidad en este estudio.

**¿Cuántas personas participarán en este estudio?**

Participarán en este estudio aproximadamente *450 niños y los encargados de cuidarlos que asisten a las clínicas de inmunización en la Isla de Roatán.*

**¿Qué pasará si participo en este estudio de investigación?**

Si usted acepta participar, se llevarán a cabo los siguientes procedimientos:

- Usted completará un cuestionario, *que le pregunta sobre el crecimiento de su niño y sobre su familia, incluyendo qué tipo de comida come la familia, cómo es el cuidado oral de la familia,*

y preguntas sobre sus opiniones sobre la salud de su niño. Le tomará aproximadamente 20 minutos completar la encuesta.

- **Ubicación del estudio:** Todos estos procedimientos se llevarán a cabo en la misma clínica en la que le preguntaron si deseaba participar (Hospital de Salud Pública de Roatán o las clínicas de inmunización en Puerto Francés, Los Fuertes y Oak Ridge).

### **¿Cuánto tiempo estaré en el estudio?**

La participación en el estudio tomará aproximadamente 20 minutos.

### **¿Puedo interrumpir mi participación en el estudio?**

Sí. Como su participación es voluntaria, usted puede decidir interrumpirla en cualquier momento. Simplemente avísele de inmediato al investigador o al miembro del personal del estudio si desea dejar de participar en el estudio.

Además, el investigador del estudio puede retirarlo del estudio en cualquier momento si él o ella cree que es lo que más le conviene a usted, si usted no cumple con los reglamentos del estudio o si el estudio se detiene.

### **¿Qué efectos secundarios o riesgos puede causarme la participación en el estudio?**

- Es posible que algunas de las preguntas de la encuesta le hagan sentir incómodo o despierten recuerdos desagradables. Usted puede optar por no contestar cualquier pregunta o interrumpir el cuestionario.

### **¿La participación en el estudio me traerá algún beneficio?**

Usted no recibirá ningún beneficio directo por participar en este estudio. Sin embargo, la información que provea puede ayudar a los *profesionales de la salud a entender mejor los factores que causan o previenen las caries dentales en los niños.*

### **¿Qué otras opciones tengo si no participo en este estudio?**

Usted es libre de elegir no participar en el estudio. Usted no sufrirá penalidad alguna si decide no participar en este estudio. No perderá ninguno de sus beneficios habituales, y podrá recibir la atención médica que recibe habitualmente en nuestra institución.

### **¿Se protegerá la confidencialidad de mi información?**

Haremos lo posible para proteger la confidencialidad de la información personal que se reúna en este estudio. La encuesta no incluye detalles que le identifican directamente, tales como su nombre o dirección. Por favor no ponga esta información en su encuesta. Las encuestas completadas se guardarán en un lugar seguro y separado de la información que le identifica. Solo una pequeña cantidad de investigadores tendrá acceso directo a las encuestas completadas. Si el estudio se publica o presenta en reuniones científicas, no se utilizarán los nombres y demás datos que puedan identificarle.

### **¿Cuáles son los costos de participar en este estudio?**

No se le cobrará por ninguno de los tratamientos o procedimientos del estudio.

### **¿Se me pagará por participar en este estudio?**

No se le pagará por participar en este estudio.

### **¿Cuáles son mis derechos si participo en este estudio?**

La participación en este estudio es voluntaria. Usted puede elegir ya sea participar o no participar en el estudio. Si usted decide participar en este estudio, podrá retirarse de él en cualquier momento. Usted no sufrirá penalidad alguna, sin importar cuál sea la decisión que tome. No perderá ninguno de sus beneficios habituales, y podrá recibir la atención médica que recibe habitualmente en nuestra institución.

### **¿Quién puede responder a mis preguntas sobre el estudio?**

Puede hablar con el(los) investigador(es) sobre cualquier pregunta, inquietud o queja que tenga sobre este estudio. Comuníquese con la investigadora en el lugar: Esther Lee.

Si desea hacer preguntas sobre el estudio o sobre sus derechos como participante a otra persona que no sea la investigadora o si desea expresar cualquier problema o inquietud que tenga sobre el estudio, por favor llame a la Oficina del Comité de Investigación Humana (Office of the Committee of Human Research) al 001-415-476-1814.



## **CONSENTIMIENTO**

Se le ha dado una copia de este consentimiento para guardar.

LA PARTICIPACIÓN EN LA INVESTIGACIÓN ES VOLUNTARIA. Usted tiene derecho a negarse a estar en el estudio, o a retirarse del estudio en cualquier momento sin penalidad o pérdida de los beneficios que de todos modos hubiera tenido derecho a recibir.

\_\_\_\_\_  
Fecha

\_\_\_\_\_  
Su firma

## APPENDIX G. CHR APPROVAL



### Human Research Protection Program Committee on Human Research

#### Notification of Expedited Review Approval

*Principal Investigator*  
Dr. Ling Zhan PhD, PhD

*Co-Principal Investigator*

**Type of Submission:** Modification Form  
**Study Title:** Roatan Oral Health Retrospective Cohort Study

**IRB #:** 12-10215  
**Reference #:** 123172

**Committee of Record:** San Francisco General Hospital Panel

**Study Risk Assignment:** Minimal

**Approval Date:** 10/26/2014                      **Expiration Date:** 02/26/2017

**All changes to a study must receive CHR approval before they are implemented.** Follow the [modification request](#) instructions. The only exception to the requirement for prior CHR review and approval is when the changes are necessary to eliminate apparent immediate hazards to the subject (45 CFR 46.103.b.4, 21 CFR 56.108.a). In such cases, report the actions taken by following these [instructions](#).

**Expiration Notice:** The iRIS system will generate an email notification eight weeks prior to the expiration of this study's approval. However, it is your responsibility to ensure that an application for [continuing review](#) approval has been submitted by the required time. In addition, you are required to submit a [study closeout report](#) at the completion of the project.

**Approved Documents:** To obtain a list of documents that were [approved with this submission](#), follow these steps: Go to My Studies and open the study – Click on Submissions History – Go to Completed Submissions – Locate this submission and click on the Details button to view a list of submitted documents and their outcomes.

For a list of [all currently approved documents](#), follow these steps: Go to My Studies and open the study – Click on Informed Consent to obtain a list of approved consent documents and Other Study Documents for a list of other approved documents.

**San Francisco Veterans Affairs Medical Center (SFVAMC):** If the SFVAMC is engaged in this research, you must secure approval of the VA Research & Development Committee in addition to CHR approval and follow all applicable VA and other federal requirements. The CHR [website](#) has more information.

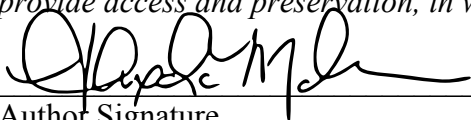
APPENDIX H. UCSF LIBRARY RELEASE

**Publishing Agreement**

*It is the policy of the University to encourage the distribution of all theses, dissertations, and manuscripts. Copies of all UCSF theses, dissertations, and manuscripts will be routed to the library via the Graduate Division. The library will make all theses, dissertations, and manuscripts accessible to the public and will preserve these to the best of their abilities, in perpetuity.*

***Please sign the following statement:***

*I hereby grant permission to the Graduate Division of the University of California, San Francisco to release copies of my thesis, dissertation, or manuscript to the Campus Library to provide access and preservation, in whole or in part, in perpetuity.*

  
\_\_\_\_\_  
Author Signature

06/15/15  
\_\_\_\_\_  
Date