Title
Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Oral Health?

Author
Das, Neha

Publication Date
2016

Peer reviewed|Thesis/dissertation

Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Oral Health?

by

Neha Das

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

The work on this thesis would not have been possible without the help and support of many people. Dr. Susan Hyde provided invaluable guidance, insight, and inspiration throughout the entire process. Dr. Pamela DenBesten's encouragement and clinical support were crucial to the success of the project. Statistical analysis would have been incredibly difficult without the help and expertise of Dr. Jing Cheng.

Drs. Amita Ruehe and Reya Das were co-collaborators on different aspects of this project, and their participation was critical for experimental design, recruitment, and data collection. In addition, all of the UCSF pediatric dentistry residents helped with patient enrollment by helping us find suitable candidates for the study.

Finally, it would not have been possible to complete any of this work if it were not for the help and support of my husband.

Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Oral Health?

Neha Das

Purpose: This randomized, prospective cohort study aimed to determine the effect educating parents about oral health via text messaging had on their children's caries incidence.

Methods: A convenience sample of 95 parent/child pairs was recruited from the University of California, San Francisco (UCSF) Pediatric Dentistry clinic upon presentation for a new patient exam. Inclusion criteria included children ages 1-6, American Society of Anesthesiologists (ASA) classification 1 or 2 (generally healthy), and parents who were able to read and give consent in Spanish or English. Parent-child pairs were randomized into two groups (randomization based upon order of presentation). For one year, parents in the experimental group received texts with oral health information every 3 weeks, reminders to schedule 6-month recall appointments, and an appointment scheduling reminder via postcard (per clinic policy). The control group did not receive educational or appointment reminder text messages and instead only received reminders to schedule their recall appointments via the conventional postcard system. Data were collected for caries and restoration status using the international caries detection and assessment system (ICDAS) scoring system at the baseline evaluation and the 12-month recall appointment.

Results: Ninety five patient-parent pairs at the UCSF Pediatric Dentistry Clinic were randomized into two groups: control and experimental. Statistical analysis of the demographics of the experimental and control groups did not show a significant difference in preferred language, race, or parent age. ICDAS scores were compared between baseline and the one year visit at both the tooth surface and individual (patient) levels. The models noted whether there was improvement, no change or worsening of caries scores as measured by ICDAS. After one year, there was no significant difference in ICDAS scores between the two groups at the individual ($p=0.5384$) or surface ($p=0.8553$) levels.

Conclusions: Oral health education is offered as a part of the comprehensive oral examination to all pediatric dentistry patients at UCSF; however, there is a need to improve that communication to decrease caries incidence. Text messaging oral health information did not result in significant differences in incidence of new decay in UCSF pediatric dentistry patients after one year. Further research must be conducted to determine whether the caries incidence in this high risk population can be reduced with more frequent or effective education on oral hygiene and caries prevention, and to discover more efficacious communication strategies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Although dental caries incidence has been decreasing in many demographic groups since the 1960s, childhood caries is on the rise in 2-5 year olds in the United States of America [**1**]. Caries is 5-8 times more common than asthma in children and is the most common chronic disease in childhood [**2**]. Furthermore, a recent review of the National Health Interview Survey revealed that dental care is the most prevalent unmet need for health care among children in the United States [**3**].

The high incidence of caries and low access/utilization of care is especially worrisome given that caries have been shown to have profound effects on the quality of life. Caries can cause dental pain, missed days of school, difficulty eating, and troubles with swallowing and speaking [**4**]. Caries and its effects can result in “increased hospitalizations or emergency room visits, increased treatment costs, risk for delayed physical growth and development, loss of school days and increased days with restricted activity, diminished ability to learn and diminished oral health-related quality of life” [**5**]. Given the serious consequences of caries, its treatment and (perhaps more importantly) prevention have become significant issues for current society. An understanding of the factors that drive the caries process is imperative if we are to understand how to improve oral health.

Dental caries occurs when there is an imbalance between protective factors and risk factors that allows pathogenic bacteria (such as *mutans streptococci* and *lactobacilli*) to proliferate and consequently destroy tooth structure [**1**]. Preventive factors include

adequate saliva, brushing with fluoride toothpaste twice daily, and limited sugar intake. There are many risk factors for caries, such as high levels of *mutans streptococci* and/or untreated caries in the caregiver, frequent nighttime bottle feeding containing a sweet liquid, breast feeding *ad lib*, frequent snacking between meals, and frequent sugary drink consumption. When the preventive factors outweigh the risk factors, patients will have dental health; however, when multiple risk factors are present *streptococcus mutans* and *lactobacilli* metabolize fermentable carbohydrates to produce acid [**1**]. These bacteria thereby create a harmful environment in which tooth structure is demineralized, leading to a competitive advantage against less pathogenic bacteria as the pH lowers, since they are aciduric in addition to being acidogenic. As the process continues, teeth can become cavitated and the demineralization can spread into the dentin, which makes it irreversible.

When caries occurs in children, special designations are given to patients' caries status depending on the severity of the disease. The American Association of Pediatric Dentists (AAPD) states that any child under the age of six who has one or more decayed, missing (due to caries), or filled tooth surfaces has early childhood caries (ECC) [**1**]. Any child who has smooth surface caries under the age of three *or* who has one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth at ages 3-5 *or* a decayed, missing, or filled score of >4 (age 3), >5 (age 4), or >6 (age 5) surfaces has severe early childhood caries (S-ECC) [**1**].

When children with ECC and S-ECC are identified, the dentist must address both the therapeutic and preventive aspects of treatment [**2**]. The therapeutic component of treatment includes many different treatment modality options. The dentist may consider the application of topical fluoride, interim therapeutic restorations (ITR), and permanent dental restorations. These treatments could take place in a variety of settings – from the dental office to the hospital – using a wide variety of behavior management techniques – from tell-show-do to protective stabilization to oral conscious sedation or anesthesia [**1**]. While the treatment of the caries that has already occurred is certainly important, the preventive aspect of the treatment plan is equally important. Approximately one in five children who received dental care under general anesthesia (GA) has to return for care under GA within the next three years [**6**]. Thus, prevention becomes just as important as the treatment of caries. Establishment of a dental home by 12 months of age, identification of caries risk factors, and utilization of a preventive oral health plan will all decrease caries risk.

At the first dental visit, the dental provider should complete an exam and also assess several factors, including biological risk (family members with caries), protective factors (habits at home), and disease indicators [**7**]. After all of these factors have been taken into account, the provider can determine the patient's caries risk and provide anticipatory guidance to the patient and his/her family. This guidance should be specific to the patient's needs and potential future problems and should also include a plan tailored to address the patient's stage in development, current habits, and established

risk factors [**8**]. This plan should also include guidelines for home, including counseling on diet and oral hygiene. [**9**]

In spite of these preventive measures, studies have shown that once a child has developed caries, s/he is more likely to develop additional lesions. Approximately 40% of children who develop S-ECC present with new caries requiring treatment within 12 months of their restorative treatment [**10**,**11**,**12**]. In fact, 75% of ECC occurs in 8% of children between the ages of 2 and 5 years old [**7**]. This indicates that current standards of care for prevention and guidance are not addressing disease factors sufficiently to lower caries risk [**13**,**14**]. Thus, new and innovative options for guidance and prevention need to be implemented and evaluated, especially for populations at high risk for caries.

At a typical new patient appointment, the dentist will conduct an exam, perform a cleaning, take radiographs (if possible/appropriate), determine caries risk and identify risk factors, and provide oral health instructions as well as guidance regarding diet and home care. In spite of these measures, caries incidence is high in children with ECC and S-ECC even after treatment [**7**,**10**,**14**]. Consequently, it is necessary to see what additional measures can be taken to decrease caries incidence in high risk populations. Text messaging has emerged as a novel communication tool. Its benefits include [**15**,**16**,**17**,**18**,**19**]:

- Two way communication
- Ability to reach many demographics (the majority of the U.S. population owns a cell phone with text messaging capabilities)

- Low cost
- Portability
- Rapid communication

In medicine, both healthcare providers and the parents of pediatric patients reported that they had a positive attitude towards receiving text messages for appointment/vaccination reminders [**20**,**21**]. When text messages were utilized, there was a decrease in missed appointments and an improvement in vaccination rate [**22**,**23**,**16**]. On the other hand, when text messages were utilized for influenza vaccination reminders in a randomized trial in the UK, there were no significant improvements in vaccine uptake [**24**]. Text messaging has also been used in the attempt to change habits. It has been found that adding a text messaging component to traditional tobacco cessation counseling increased long-term quit rates [**25**].

Text messages have also helped to improve diet adherence in overweight children and increase the daily use of sunscreen [**26**]. Improvements in diets were also seen in post-menopausal Iranian women when text messages were utilized with information about modification of food selection [**27**]. Additionally, a study in Portugal utilized text messages in 8-10 year olds to motivate positive diet and lifestyle changes [**28**]. Approximately 60% of the experimental group adhered to the text message motivational program and self-reported increased vetetable consumption and decreased screen time, which the authors considered a success.Furthermore, text messages promoting medication adherence in chronic disease was found to double the odds of medication

adherence [**29**]. Even in a low income population, text messages have been utilized to engage people 45 years and younger, indicating that accessibility is not an issue for this population [**30**].

Results in dentistry have not been homogenous. Some studies have shown benefits to text messaging while others show little change. Two studies in Scotland and one in India confirmed that sending text messages with appointment reminders reduced the number of missed appointments seen in those dental clinics [**31**,**32**,**33**]; however, a study conducted at the University of Washington showed no significant differences in the missed appointment rate for pediatric dentistry patients within a university setting [**19**]. The authors of the University of Washington study did note that almost half of the patients' parents indicated that they would prefer voice reminders rather than text messages, so the lack of change may be a result of the population's preference. Perhaps if text messages were utilized in a population eager to receive them, the results would be different. Another study (conducted in New Zealand) utilized motivational text messages for 10 weeks and noted a significant increase in self-reported brushing [**17**]. Attrition was relatively high in this study (26%) but there was no evidence of differential attrition. The authors did not note whether or not the participants were amenable to receiving text message reminders, and this may have affected their willingness to continue to participate in the study. In a different study, mothers received a 7-day series of text messages asking about flossing and presenting oral health information [**18**]. At the end of the series, mothers flossed more, showed increased dental knowledge, had

attempted to improve their child's oral health habits, and tried to improve their diets by decreasing their soda and sugary snack consumption.

Assessment of oral health includes many different factors. Soft tissue health, hard tissue health, TMJ function, etc. can all be taken into consideration. When considering caries, the hard tissue is of greatest interest. The dmft score tracks the number of decayed (d), missing (m), and filled (f) teeth in primary teeth [**34**]. While this index does allow for a quick snapshot of oral health, it does not track decalcification (early stage of caries in enamel only) and does not track the number of affected surfaces.

An alternate system, the International Caries Detection and Assessment System (ICDAS), was developed from 2002-2004 and has been adopted and endorsed by the World Health Association (WHO) [**35**]. The ICDAS is a system designed to detect and quantify caries incidence and progression. The results are intended to aid in diagnosis, prognosis, and clinical management of patients at both academic and clinical levels. Every surface of every tooth is given a restoration "score" (Table 1) and a caries "score" (Table 2) [**36**].

Restoration Score	Restoration Status
0	Sound: i.e. surface not restored or sealed (use with the codes for primary caries)
1	Sealant, partial
2	Sealant, full
3	Tooth colored restoration
4	Amalgam restoration
5	Stainless steel crown
6	Porcelain or gold or PFM crown or veneer

7	Lost or broken restoration
8	Temporary restoration

TABLE 1: INTERNATIONAL CARIES DETECTION AND ASSESSMENT SYSTEM RESTORATION SCORE

Caries Score	Dental Term	Lay Term
0	Sound	Sound
1	First visual change in enamel	Early Stage Decay
2	Distinct visual change in enamel	
3	Localized enamel breakdown	Established Decay
4	Underlying dentin shadow	
5	Distinct cavity with visible dentin	Severe Decay
6	Extensive cavity with visible dentin	

TABLE 2: INTERNATIONAL CARIES DETECTION AND ASSESSMENT SYSTEM CARIES SCORE

The diagnosis is determined primarily by visual assessment, and practitioners have the option of utilizing radiographs, fiber-optic trans-illumination, and/or electronic caries monitors to supplement the diagnostic process. Practitioners trained in the ICDAS system are able to categorize the lesions they see to determine not only the presence/absence of decay but the degree of decay as well. This feature helps distinguish it from the Decayed-Missing-Filled Surfaces (DMFS) and DMFT indices, which do not attempt to categorize decay based upon severity.

ICDAS is relatively new, and providers need to undergo a designated training program in order to become proficient in its use. The ICDAS foundation has developed an E-Learning program that is peer-reviewed and available online [**37**]. The program has been created specifically to help dental practitioners understand the examination protocol and coding system that form the foundation of the ICDAS and is provided at no

cost. Previous studies have established that those trained in ICDAS present good to excellent reproducibility in their results when using the system [**38**,**39**,**40**].

Although the DMFS score is widely accepted for use in academic studies, its scope is limited in that it detects only surfaces that are decayed – not those that are affected but not cavitated. The ICDAS system, on the other hand, recognizes and records changes in enamel prior to the extension of caries to the dentin-enamel junction (DEJ). As such, ICDAS detects the earliest mineralization changes that indicate initiation of the caries process. Kühnisch et al. concluded that ICDAS has increased diagnostic potential when compared to the DMFS system [**41**]. The DMFS scale would not involve recording decalcifications or changes in enamel, but these changes would be noted and reflected in ICDAS scores. Consequently, the ICDAS scale is more appropriate for detecting caries demineralization and remineralization over short time periods.

In 2010, Dr. Stacey Sullivan (née Baker), DDS, MS performed the following study [42]:

In order to determine whether or not it is possible to utilize text messages in the population attending the UCSF Pediatric Dentistry Clinic, a consecutive sample of 47 parents of children aged 1-5 years old from August 2010 to November 2010 was given a survey that was approved by the UCSF Committee for Human Research (CHR). The children had to be scheduled to have dental treatment under general anesthesia in order fulfill the study's inclusion criteria. The survey had questions regarding the

parents' demographics, cell phone availability, text messaging usage, and preference for appointment reminder modality.

The response rate to the survey was 98%. Ninety-one percent of the patients qualified for government dental insurance, indicating that they are low income families. Approximately half of the parents were 21-29 years old and the other half were more than 30 years old. The families had to travel an average of about 30 miles to attend the dental clinic (range: 1.1-106 miles). Of note, nine out of ten participants had a cell phone. Of the people with cell phone, 95% could receive text messages and 98% were interested in receiving text message reminders for dental appointments. Furthermore, 84% were interested in receiving text message with oral health information. Parent age did not have a statistically significant effect on cell phone availability or willingness to receive text messages.

These data indicate that the majority of parents of patients at the UCSF Pediatric Dentistry clinic have cell phones, are able to use text messaging, and are open to receiving appointment reminders and oral health information via text. Thus, Dr. Baker was able to conclude that text messaging may be a feasible communication modality for the UCSF Pediatric Dentistry clinic.

The pilot study continued by recruiting a sample of 21 parent/child pairs from the clinic. Inclusion criteria consisted of children aged 1-6 years old, classified as ASA 1 or 2, and were scheduled to have dental treatment under general anesthesia. Data was collected

regarding demographics, oral hygiene and dietary practices (at the time of presentation for the office visit), and preferred mode for appointment reminders. The parent/child pairs were randomly placed into one of two groups: the control group or the experimental group. The control group received appointment reminders via UCSF's conventional system, which is a personal phone message from the front desk. The experimental group received conventional reminders and also received both appointment reminders and oral health information by text message every two weeks.

The demographic results were very similar to those found in the initial portion of the study. Nine out of every 10 families qualified for state funded dental insurance (and were therefore considered low income), and families traveled 28 miles on average to reach the clinic. Sixty-seven percent of the parents preferred to receive their appointment reminders via text.

When Dr. Baker assessed the attendance at the two week post-op exam appointments, she found no significant differences. Previous analysis had revealed that 43% of parent/child pairs typically attend the two week post-op appointment; however, in this study, 80% of the control group pairs and 60% of the experimental group pairs returned. There was not a significant difference between the two groups, but both groups were significantly higher than the baseline return rate. This indicates that the study demonstrates a significant Hawthorne Effect.

This small pilot study effectively demonstrated that the population at the UCSF Pediatric Dental Clinic is able to receive texts and is willing to do so. It also established that parents are interested in receiving text messages with oral health and hygiene information. Due to its small size, though, it was unable to clearly establish a statistically significant difference in patient behavior when the text messages are utilized. A larger study designed to assess the effects of educational text messages on caries incidence and oral health is necessary.

In 2015, Dr. Amita Ruehe, DDS, MS performed the following study [**43**]

Parents of children presenting to the UCSF Pediatric Dentistry clinic for a new patient exam were screened for inclusion based upon the following criteria: child age 1-6 years old, American Society of Anesthesiologists (ASA) class I or 2 (healthy), parent/guardian has a cell phone and is willing to receive text messages, parent can provide written informed consent and complete questionnaires in English or Spanish. Exclusion criteria were: child would continue regular care at another dental facility and was only attending UCSF for specific short-term care, ASA 3 or greater, parent would not be living in the area for the next year and/or would not be available for regular exams over the next year. If the parent-child pair met all the inclusion criteria and none of the exclusion criteria, then the study was explained, and informed consent was obtained prior to enrollment (if they chose to participate). After enrollment was completed, the comprehensive oral examination (COE) was completed per standard of care at UCSF Pediatric Dentistry, dental knowledge questionnaire was completed, and ICDAS scores were recorded.

After completion of the COE, patient-parent pairs were randomized into the control or experimental group (based upon order of presentation). Those in the experimental group received oral health information every three weeks for 18 weeks, and on week 21 they received a reminder to schedule their 6-month periodic oral examination (POE). Additionally, they received a personal reminder phone call 1-2 days prior to the appointment (a voicemail was left it nobody answered). The oral health information provided via text addressed many subjects noted in the American Assocation of Pediatric Dentistry Guidelines [**1**] as well as the American Board of Pediatric Dentistry's Handbook of Pediatric Dentistry [**44**], including oral hygiene, diet counseling, and fluoride use. All text messages were less than 140 characters. The control group, on the other hand, received appointment reminders per the clinic's policy: one postcard send 3-4 weeks prior to the day the 6-month POE was due as well as a personal reminder phone call 1-2 days prior to the scheduled appointment (voicemails left as necessary). Nobody in the control group received supplemental information via text.

Approximately six months later, the patients returned for their recall visit, per standard of care at the UCSF Pediatric Dentistry Clinic. At this visit, an exam and prophylactic cleaning are completed, radiographs are taken as necessary/appropriate, caries risk is assessed, and fluoride varnish is applied. Oral hygiene and diet counseling are provided. Parents were also given a survey to assess dental knowledge at this visit. While this visit is referred to as the 6-month periodic oral exam (POE), it can take place anywhere between 5 and 8 months after the first visit due to scheduling constraints and

parental preferences. If the parent scheduled an appointment but the patient did not attend, a letter was sent to inform them of the failed appointment. If the parent did not call back to reschedule, then no further attempt was made to create a new appointment for the patient.

One hundred and forty three parent-child pairs were screened for participation, of which 95 enrolled. Of the 95 that enrolled, 43 returned for their 6-month POE; however, surveys were inadvertently not given to 6 of those parents (two control, 4 experimental). There was no significant difference in the appointment attendance rates between the control and experimental groups ($p=0.8378$). On average, subjects in the control group returned for their 6-month POEs one month later than the experimental group; however, this difference was not significantly different ($p=0.1694$). There were also no statistically significant differences in the frequency of scheduled, not scheduled, cancelled, and failed appointments in the control and experimental groups (all $p > 0.05$).

Fifteen of the sixteen participants in the experimental group who returned for the POE and received a survey said they “always” read the information on the text messages and 10/16 said they “always” used it; however, there were no significant differences between answers to survey questions regarding best diet practices, frequencies of dental appointments, and fluoridated toothpaste use in the control and experimental groups. The experimental group did report more adult supervision while brushing compared to baseline ($p=0.0217$). There was also a trend of more frequent brushing in the

experimental group relative to the control group but this difference was not statistically significant (p=0.2648).

This study used the same patient base as Dr. Ruehe's; however, instead of focusing upon the parental knowledge compenent, this study aimed to observe the clinical changes seen in the control and experimental groups. By utilizing the ICDAS system, we were able to objectively measure caries status and compare the two groups. The combination of the two studies allows for a comprehensive understanding of changes in parental knowledge and the clinical effects of those changes (or lack thereof).

PURPOSE AND AIMS

Purpose: The purpose of this randomized, prospective cohort study is to determine the effects of text messaging oral health information and appointment scheduling reminders on caries incidence in patients attending the UCSF Pediatric Dentistry Clinic. The study is designed to evaluate the effectiveness of the text messages in decreasing the incidence of new demineralization/caries and increasing remineralization in children after their parents receive oral health guidance once every three weeks via texts.

Aim: In a randomized prospective cohort study, analyze the influence of text messaging oral health information and appointment reminders on ICDAS scores of new patients after one year. Two groups will be created: the control group and the experimental group. The control group will not receive any communication via text while the experimental group will receive one text message every three weeks with oral health

information and/or diet counseling as well as appointment scheduling reminders. Demographic information will also be collected for all patient-parent pairs.

HYPOTHESIS

Text messaging oral health information and dental appointment reminders to parents of pediatric patients will improve the oral health of the pediatric patients at the UCSF Pediatric Dentistry Clinic.

MATERIALS AND METHODS

The study was approved by the UCSF Committee for Human Research (IRB # 13-11998) on 2/11/2014. Study participation was completely voluntary, and participants were not offered remuneration of any kind.

Screening and Enrollment

All parent/child pairs were recruited from the UCSF Pediatric Dentistry clinic in San Francisco, California. A convenience sample was utilized. Inclusion criteria were:

- Child presenting for a new patient exam at the time of the visit
- Child aged 1-6 years old
- Parent/guardian wants the child to return to UCSF Pediatric Dentistry Clinic for comprehensive care for at least one year
- Parent/guardian has a personal cell phone
- Parent/guardian is willing to receive texts messages from the clinic

- Parent/guardian is fluent in English or Spanish and can sign an informed consent in one of these two languages

Exclusion criteria included:

- Child is medically compromised (ASA III or higher)
- Parents do not intend for child to return to UCSF Dental Clinic for care after dental treatment is completed
- Parent/guardian will be leaving the area and will not be available for periodic oral exams

If the parent/child pair met the inclusion criteria and were not disqualified from participation by exclusion criteria, then a member of the study team discussed the study with the parent. If the parent consented to participate in the study, informed consent was obtained (Appendices B-F). After enrollment was completed, basic demographic information was collected. The new patient exam was completed per standard of care at UCSF Pediatric Dentistry. This includes a complete intra- and extra-oral exam, prophylactic cleaning, and fluoride varnish application. When possible/appropriate, radiographs were taken. Oral hygiene practices were reviewed and diet counseling was offered.

ICDAS scores were recorded for the purpose of the study after the prophylactic cleaning. The ICDAS examination was always carried out by the same practitioner, who had successfully completed the ICDAS E-Learning course available from the ICDAS foundation. The practitioner completed the E-Learning course at two points: before baseline visits began and before the 1-year visits began. Once the teeth were cleaned,

the teeth were observed visually using the chair's overhead light twice – once while wet, and once after being blown dry using an air syringe. If possible, radiographs were taken and utilized to record interproximal caries scores. If the patient did not demonstrate sufficient cooperation for diagnostic radiographs, visual exam alone was completed.

Six Month Periodic Oral Examination

The standard of care at UCSF Pediatric Dentistry Clinic calls for a periodic oral examination (POE) every six months after the initial exam. At the POE visit, a dental exam is completed, cleaning is provided, fluoride varnish treatment is applied, and oral hygiene instructions are reviewed. Diet counseling is also provided based on the self-reported habits at home. Although this visit is traditionally called the "6-month" POE, the visit itself can occur any time between 5-8 months after the new patient exam as result of parent preferences and scheduling constraints.

When the time comes to schedule the appointment, all parents were sent a postcard via mail per UCSF Pediatric Dentistry Clinic's policy. Parents in the experimental group also received a text message three weeks prior to the appropriate time for the appointment reminding them to schedule an exam. If the parent scheduled an appointment but did not show up for the exam, the clinic sent a letter in the mail informing the parent of the failed appointment. If the parent did not schedule an appointment, no further follow-up was attempted to schedule the 6-month POE.

Text Messages

The experimental group received one text message every three weeks (each text message was 140 characters or less) following the new patient exam. The size of the text messages allowed the entire message to be received as one standard size text. The messages contained information regarding oral health, hygiene, diet, and fluoride. Although the messages were directed at the parents, they contained information that was relevant for their children (Appendices F and G). The text messages were sent in two six-month cycles. The enrollment text message was sent 1-2 days after the new patient exam. Educational texts were sent 3, 6, 9, 12, 15, and 18 weeks after the exam. Finally, a reminder to schedule the periodic oral exam appointment was sent at week 21. The texting cycle was then repeated (except for the enrollment text) beginning in week 27. All texts were sent at noon by an automated system managed by EasyMarkit. Texts were sent in English and Spanish (depending on the patients' preferences, Appendices F and G). Thus, parents in the experimental group received texts every three weeks for one year.

Twelve-Month Periodic Oral Examination

Six months after the six-month POE, patients are scheduled for a twelve-month POE. This is also standard of care at the UCSF Pediatric Dentistry Clinic. The elements of the twelve-month POE are the same as the six-month POE – exam, prophylaxis, radiographs as necessary, fluoride varnish, oral hygiene instructions, and diet counseling – and a personalized treatment plan is created and discussed for each patient based on his/her caries risk. Again, due to scheduling issues, this exam generally does not take place exactly 12 months after the new patient exam; it can

occur 10-16 months later. For this appointment, in addition to the letter sent by UCSF to all participants and the text messages sent to the experimental group, every parent was given a personalized phone call in order to increase the number of patients seen.

The patients in this study received the standard of care at their 12 month appointment. Additionally, demographic information was reviewed, parents were readministered an oral health knowledge and practices questionnaire, and ICDAS scores were recorded. At the end of the appointment, parents were reminded to come in either for treatment (as necessary) or in 6 months for the recall exam.

Statistical Analysis

Chi-squared tests and Fisher's Exact test was utilized to detect differences in race, language, and insurance coverage between the control and experimental groups. The GLIMMIX procedure using SAS 9.4 was used to detect differences in the ICDAS scores at baseline and 1-year time points at both the tooth surface and individual (patient) levels.

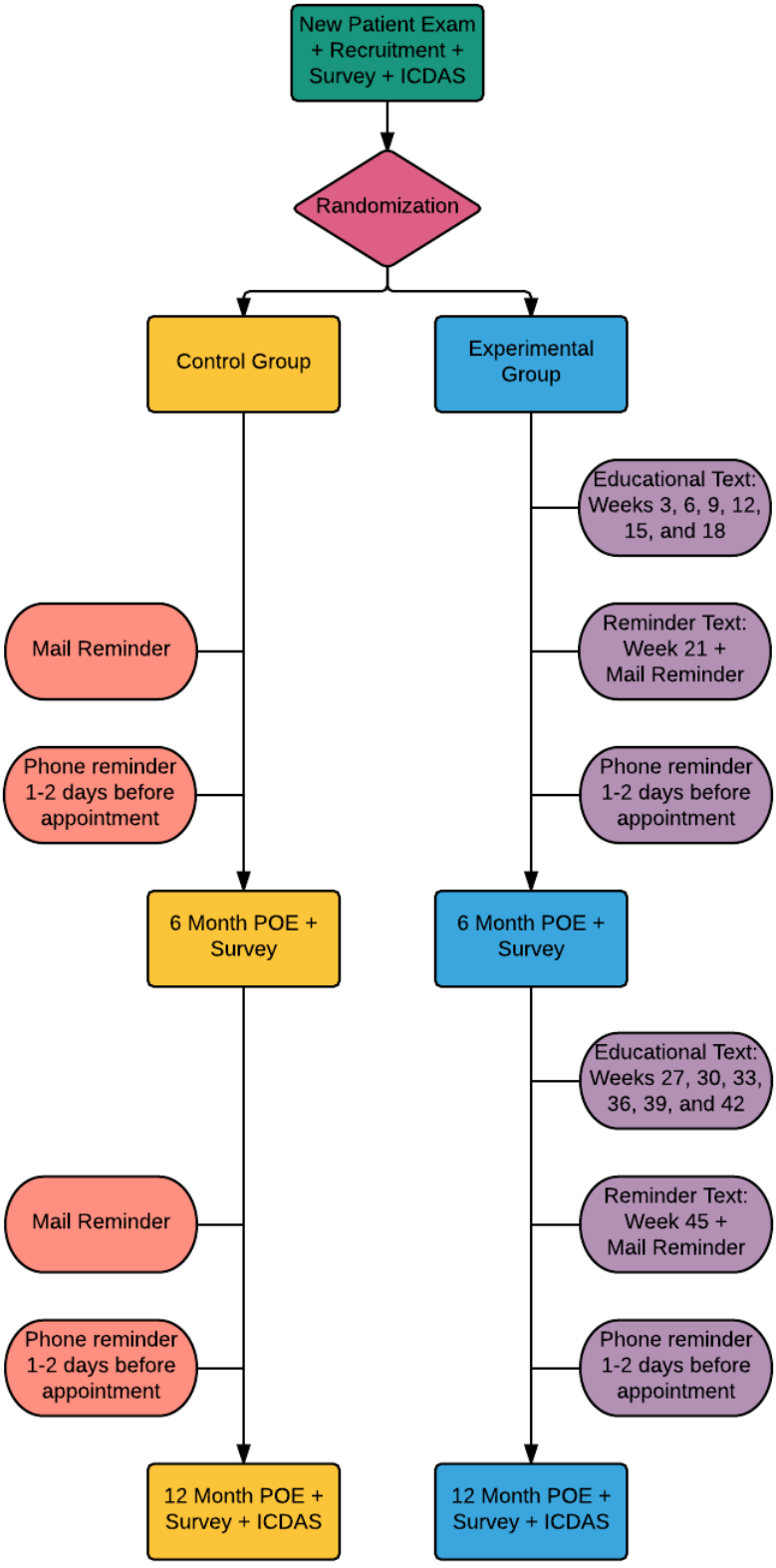


FIGURE 1: STUDY FLOW DIAGRAM

Sample Size Calculation

In order to determine the appropriate sample size, we calculated based on the following assumed values: 0.80 power with significance level of 0.05 (two tailed), detectable difference of 0.2 in attendance rate (for a different component of the study conducted by Dr. Amita Ruehe), average attendance rate (**π**) = 0.2. The following equation was used:

$$n_i = \left[\frac{Z_{1-\frac{\alpha}{2}}\sqrt{2\pi(1-\pi)}+Z_{1-\beta}\sqrt{\pi_1(1-\pi_1)+\pi_2(1-\pi_2)}}{\|\pi_1-\pi_2\|}\right]^2 = \left[\frac{1.96\sqrt{2\times0.2\times0.8}+0.84\sqrt{0.3\times0.7+0.1\times0.9}}{\|0.3-0.1\|}\right]$$

- The resulting necessary sample size is N = 62 x 2 = 124 participants.
- Pilot study [**42**] enrolled 26 patient/pair groups, and only 22 pairs completed the study. Thus, the dropout rate = 4/26 = 15%.
- Assuming the same dropout rate, we would need 15% more patient/pair groups to begin the study in order to end with 124 participants ➔ 1.15 x 124 ≈ 143

Thus, in order to achieve significant results with an adequate number of participants in our study, we needed to recruit 143 patient/parent pairs.

RESULTS

During the recruitment phase, 759 patients presented to UCSF Pediatric Dentistry for an initial comprehensive oral examination. Due to scheduling constraints of the authors' residency training program, only a fraction could be recruited. In total, 143 parent-child pairs were screened for enrollment into the study. Of the 143 pairs screened, 95 pairs were enrolled and 48 were excluded (Table 3). The primary reasons for exclusions were

parents declining to participate in the study and patients presenting to UCSF for one-time only treatment (they would return to another dental facility for regular care).

Reason for Exclusion	Number
Parent declined to participate	22
At UCSF Pediatric Dentistry for treatment only	8
Patient was ASA III	7
Parent unable to read and write in English or Spanish	6
Parents to not receive free text messages	4
Sibling was in the study	1
Total	**48**

TABLE 3: REASONS FOR EXCLUSION

Of the parents recruited, most were 30-39 years old (control group: 32.5±5.9, range 18-45 years; experimental group: 33.4±8.3, range 20-56 years), spoke English at home (75%), and traveled less than 10 miles to get to UCSF (76%, calculated by zip code). The patients were largely 2 years old or younger (control group: 2.9±1.7, range 1-6 years; experimental group: 2.6±1.3, range 0-6 years), and their predominant races were Hispanic (38%) and Asian (22%). Ninety-nine percent of the children received insurance through government plans while only 1 patient had private insurance. There was not a statistically significant difference when race (p=0.5818), language (p=0.5948), and type of insurance (p=0.2194) was compared between the two groups.

	Total (N=95)	Control (N=47)	Experimental (N=48)
PARENT AGE*			
20-29 years	27 (28%)	13	14
30-39 years	44 (46%)	22	22
40-49 years	14 (15%)	7	7

AGE OF CHILD*			
<1 year old	1	0	1
1 year old	24 (25%)	15	9
2 years old	24 (25%)	10	14
3 years old	16 (17%)	4	12
4 years old	15 (16%)	7	8
5 years old	10 (11%)	7	3
6 years old	5 (5%)	4	1
CHILD RACE*			
Hispanic	36 (38%)	16	20
Black	17 (18%)	11	6
Asian	21 (22%)	9	12
Arab	6 (6%)	2	4
Caucasian	9 (10%)	5	4
CHILD DENTAL INSURANCE*			
Denti-Cal	92 (97%)	45	47
Healthy Kids	2 (2%)	2	0
Blue Cross	1 (1%)	0	1
PREFERRED LANGUAGE*			
English	71 (75%)	34	37
Spanish	24 (25%)	13	11
DISTANCE TO UCSF*			
0-10 miles	72 (76%)	37	35
11-20 miles	14 (15%)	5	9
21-30 miles	3 (3%)	3	0
31-40 miles	3 (3%)	2	1
41-50 miles	2 (2%)	1	1
>51 miles	2 (2%)	0	2

TABLE 4: PATIENT DEMOGRAPHICS

*Differences between control and experimental groups p>0.05 (statistically insignificant)

At the six-month and twelve-month POE, the demographic information was confirmed. ICDAS scores were collected at baseline and the twelve month exam and compared at both the surface and individual level. ICDAS scores were compared between the two time points and noted as increased, decreased, or unchanged. When compared at the surface level, no significant differences were seen between the two groups (p=0.5384). Similarly, when individuals in the two groups were compared, no significant differences were seen (p=0.8553, Table 5).

Group	ICDAS Score Change (# surfaces/patient)		
	decreased	increased	unchanged
Control Group Participants	0	7	63
	0	11	69
	0	1	99
	0	4	86
	0	19	81
	0	24	76
	1	5	94
	1	1	98
	2	4	94
	3	5	50
	3	7	15
	4	1	85
	4	14	77
	4	7	89
	8	10	49
	9	6	66
	9	3	62
	10	10	63
	12	11	77
Control Total	70	150	1393

Experimental Group Participants	0	3	77
	0	9	91
	0	1	99
	0	0	0
	1	6	73
	1	4	93
	1	8	89
	2	1	65
	2	14	82
	2	29	66
	2	2	96
	3	10	52
	3	12	81
	4	21	55
	4	12	84
	4	9	86
	4	1	95
	4	10	86
	4	16	75
	5	3	84
	7	12	76
	8	6	86
Experimental Total	61	189	1691

TABLE 5: ICDAS CHANGE (INDIVIDUAL LEVEL), P=0.8553

DISCUSSION

Despite a decline in caries incidence overall, there remains an increase in dental caries in children ages 2-5 [**1**]. In fact, caries is now five to eight times as prevalent as childhood asthma [**2**]. Thus, the need to create, research, and demonstrate efficacy of new preventive techniques has become even more imperative for families with children in this age group. Ideally, ways to improve oral hygiene and diet practices while also encouraging low income families at high risk for caries to attend preventive dental appointments could be developed.

The ICDAS system is the better system for quantifying caries activity in a prevention-based model since it captures the early stages of the disease. Unlike the DMFS and dmft systems, decalcifications that have not yet extended to the DEJ are also noted, thereby allowing providers to track reversal and/or progression of early lesions. Management of these early lesions has the highest potential for prevention [**45**]; thus, it is imperative that these early lesions be identified and monitored in order to fully understand the efficacy of intervention methods. In addition, intra-examiner ICDAS scores have acceptable reproducibility, further establishing utility as an objective outcome measurement [**46**].

The purpose of this study was to determine whether texting parents oral health information and appointment reminders helped to improve the oral health of their children, all of whom were patients at UCSF Pediatric Dentistry clinic. After presenting for a complete oral examination, the ICDAS system was utilized to detect and record the caries status of all surfaces of all the teeth. Parents in the texting group received one educational or appointment reminder text every three weeks for 12 months while parents in the control group did not receive any texts. One year after the initial exam, at the periodic oral exam, ICDAS scores were recorded once again. Analysis revealed that there was not a significant difference between the two groups at either the tooth surface ($p=0.5384$) or the individual levels ($p=0.8553$).

This result is similar to those seen in the University of Washington study, where text messages were utilized for patient communication in a university pediatric dentistry residency setting with little effect on appointment attendance [**19**]. On the other hand, text messaging was efficacious in a New Zeland study, where after 10 weeks self-reported brushing habits increased [**17**], as well as another study where mothers improved their dietary and oral hygiene habits and attempted to improve those of their children after just 7 days of text messaging [**18**]. The results also mirror those of an Amsterdam study in which appointment reminders for an orthondotic clinic failed to reduce the failed attendance rate [**47**].

The differences between the results of this study and those previously described may be accounted for by several explanations. First, it is possible that patients who utilize a university setting may have different characteristics than those associated with other clinical settings. Typically, patients at UCSF qualify for DentiCal (California's Medicaid program for dentistry); in fact, only one patient from this study had private rather than DentiCal insurance. In order to qualify for DentiCal, the parents must demonstrate that their income is below a certain level. Thus, patients at the UCSF Pediatric Dental Clinic are largely from a lower socioeconomic background. Perhaps text messaging is not an effective method of transmitting oral health information to families within this income bracket.

Another possibility is that this study demonstrates the more long-term effects of texting. The previous studies described changes that occur after 7 days and 10 weeks [**17**,**18**]

while this study focused on changes after one year. There may be significant differences between short and long term change.

Third, the nature of texts may render them less efficacious than human interaction. A study in the Department of Medicine at the Robert Wood Johnson University Medical Group, a part of the University of Medicine and Dentistry of New Jersey, showed that the modality of the reminders affected their efficaciousness [**48**]. When patients were reminded by a member of the staff, there were significantly fewer no shows than when they were reminded by an automated message or did not receive a reminder at all. The authors found that the automated system was significantly less effective; even though it had the advantage of being less costly, further analysis was required to determine whether or not the economic advantage remained when the no show rate was taken into account.

In addition, there is a significant difference in the experimental design of these studies. While the University of Washington study [**19**] and this study both used objective measurements (appointment attendance and ICDAS scores, respectively), the other two studies depended on self-reporting for their results [**17**,**18**]. Although self-reporting does have its merits, it is prone to bias such as social desirability bias where participants could be more likely to try to “paint themselves in a good light” by responding that they had, indeed, changed their habits even if this was not the case. By using an objective system like ICDAS, this study was able to assess the effects of text messaging in a more objective manner.

Finally, the differences could be accounted for by the small sample size of this study. Although this is the first study of this scale and duration to be attempted at the UCSF Pediatric Dentistry Clinic, there were significant patient recruitment and attrition issues. In fact, sample size became a significant limitation of this study. The calculated necessary sample size was 143 patients; however, only ninety-five patients were recruited. With 48 subjects per group, the power was reduced to 0.1, and approximately 1600 subjects would have been necessary in order to detect statistically significant differences in the data at the individual level.

The researchers were unable to achieve the calculated necessary sample size for several reasons. First, all study participants were recruited by two resident researchers who were unable to be in clinic at all times for all COEs during the recruitment phase. Resident researchers have other obligations (such as rotations, teaching, seeing other patients for treatment, etc.) that prevent them from focusing solely on recruitment. Furthermore, the duration of the recruitment period was limited by the timing constraints of the training program in order for data collection, analysis, and manuscript preparation to be completed within the length of the residency.

An additional limitation of the study was the significant attrition rate in both the control and experimental groups at the UCSF Pediatric Dentistry Clinic. The dropout rate is significantly higher than anticipated based upon Dr. Baker's pilot study [**42**] – and utilized in our sample size calculation – perhaps because it reflects the patient return

rates for new patient exams, rather than follow-up after general anesthesia appointments. In her previously described study [**43**], Dr. Ruehe determined that the return rate for patients' periodic oral exams was 35.5%. She also determined that texting appointment reminders did not improve recall rates in the experimental group. In this arm of the study, parents were actively called and recruited for the 12-month POE. Even with this extra effort, only 41 of the 95 patients (43.2%) returned for the one-year exam. Determining why patients do not return for their follow up care is an important issue to address in future studies.

Furthermore, even though there were no statistically significant differences between the control and experimental groups, it is possible that the parents who returned are ones who shared characteristics that affect the oral health of their children. Perhaps those who returned are the families who are more responsible and knowledgeable about their children's oral health, which would have affected the results. Similarly, it is possible that there were potential confounders between those in the experimental and control groups in the children who did not return for continuing care.

Thus, although this study has many merits, it is limited by its small socioeconomic breadth, sample size, and significant attrition. Future studies should attempt to address these issues, perhaps using a practice-based research network model.

CONCLUSION

Previous studies have established some utility for text messaging in communication with patients and their families, and attempts at changing behavior using information sent via texts have had varied results. In this study, we determined that text messages can be utilized in the pediatric dentistry population in a university setting; however, the texts were not beneficial in terms of changing behaviors sufficiently to improve oral health. The ICDAS scores were not significantly different between the texting and control groups when analyzed at both the individual and the tooth surface levels. This study demonstrates that regularly text messaging oral health information and appointment reminders did not result in significant differences in the oral health status of one to six year old patients at the UCSF Pediatric Dentistry clinic after one year.

Future research should be dedicated towards increasing the sample size, increasing patient retention, and understanding why patients do not return for recall visits. This would increase the power of the study and also increase the likelihood of discovering significant differences between the texting and control groups.

WORKS CITED

[1] American Association of Pediatric Dentistry, "Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies," *Reference Mannual*, vol. 37, no. 6, pp. 50-52, 2015.

[2] Vargas K. Jamieson WJ, "Recall rates and caries experience of patients undergoing general anesthesia for dental treatment," *Pediatric Dentistry*, vol. 29, no. 3, pp. 253-7, May-June 2007.

[3] Center for Disease Control, National Health and Nutrition Examination Survey Data, 2015.

[4] GJ Roberts, "Caries and the preschool child: treatment of the preschool child in the hospital service," *Journal of Dentistry*, vol. 18, no. 6, pp. 321-4, Dec 1990.

[5] American Academy of Pediatric Dentistry Council on Clinical Affairs, "Policy on early childhood caries (ECC): unique challenges and treatment options," *Pediatric Dentistry*, vol. 27, no. 7 Suppl, pp. 34-5, 2005-6.

[6] Williams BJ, Hays K, Mancl L Sheller B, "Reasons for Repeat Dental Treatment Under General Anesthesia for the Healthy Child," *Pediatric Dentistry*, vol. 25, no. 6, pp. 546-552, 2003.

[7] Crystal YO, Ng MW, Tinanoff N, Featherstone JD Ramos-Gomez F, "Caries risk assessment, prevention, and management in pediatric dental care," *General Dentistry*, vol. 58, no. 6, pp. 505-17, Nov-Dec 2010.

[8] White JM, Hoover CI, Rapozo-Hilo M, Weintraub JA, Wilson RS, Zhan L, Gansky SA Featherstone JD, "A randomized clinical trial of anticaries therapies targeted according to risk assessment (caries management by risk assessment)," *Caries Research*, vol. 46, no. 2, pp. 118-29, April 2012.

[9] American Association of Pediatric Dentistry, "Guideline on Caries-risk Assessment and Management for Infants, Children, and Adolescents," *Reference Manual*, vol. 37, no. 6, pp. 132-9, 2015-16.

[10] Amante A, Kopycka-Kedzierawski DT, Billings RJ, Feng C Berkowitz RJ, "Dental caries recurrence following clinical treatment for severe early childhood caries," *Pediatr Dentistry*, vol. 33, no. 7, pp. 510-4, Nov-Dec 2011.

[11] Moss M, Billings RJ, Weinstein P Berkowitz RJ, "Clinical outcomes for nursing caries treated under general anesthesia," *ASDC J Dent Child*, vol. 64, no. 210-11, 1997.

[12] Hirayama K, Tsamtsouris A Sheehy E, "A survey of parents whose children had full-mouth rehabilitation under general anesthesia regarding subsequent preventive care," *Pediatric Dentistry*, vol. 16, pp. 362-4, 1994.

[13] Faibis S, Peretz B Eidelman E, "A comparison of restorations for children with early childhood caries treated under general anesthesia or conscious sedation," *Pediatric Dentistry*, vol. 22, pp. 33-7, 2000.

[14] Roseman MM, Sheff M, Huntington N, Hughes CV Almeida AG, "Future caries susceptibility in children with early childhood caries following treatment under general anesthesia," *Pediatric Dentistry*, vol. 22, pp. 302-6, 2000.

[15] M Terry, "Text messaging in healthcare: the elephant knocking at the door," *Telemed J*

E Health, vol. 14, no. 6, pp. 520-4, Aug 2008.

[16] Meara JG, Da Costa AC, Sethuraman K Downer SR, "SMS text messaging improves outpatient attendance," *Aust Health Rev*, vol. 30, no. 3, pp. 389-96, 2006.

[17] Lee M, Hamilton G, Coe G, Messer-Perkins H, Smith B Schluter P, "Keep on brushing: a longitudinal study of motivational text messaging in young adults aged 18-24 years receiving Work and Income Support," *J Public Health Dent*, vol. 75, no. 2, pp. 118-25, Spring 2015.

[18] Kritz-Silverstein D, Baker R Hashemian TS, "Text2Floss: the feasibility and acceptability of a text messaging intervention to improve oral health behavior and knowledge," *J Public Health Dent*, vol. 75, no. 1, pp. 34-41, Jan 2015.

[19] Berg JH, Bell JF, Leggott PJ, Seminario AL Nelson TM, "Assessing the effectiveness of text messages as appointment reminders in a pediatric dental setting," *J Am Dent Association*, vol. 142, no. 4, pp. 397-405, Apr 2011.

[20] Vargas CY, Kennedy A, Kitayama K, Stockwell MS Hofstetter AM, "Parental and provider preferences and concerns regarding text message reminder/recall for early childhood vaccinations," *Prev Med*, Apr 2013.

[21] Pumilia JN, Crocetti M Dudas RA, "Pediatric caregiver attitudes and technologic readiness toward electronic follow-up communication in an urban community emergency department," *Telemed J E Health*, vol. 19, no. 6, pp. 493-6, June 2013.

[22] Chesser AK, Nguyen T, Brannon J, Hart TA, Williams KS, Wittler RR Ahlers-Schmidt CR, "Feasibility of a randomized controlled trial to evaluate Text Reminders for Immunization Compliance in Kids (TRICKs)," *Vaccine*, vol. 30, no. 36, pp. 5305-9, Aug 2012.

[23] Kharbanda EO, Martinez RA, Vargas CY, Vawdrey DK, Camargo S Stockwell MS, "Effect of a text messaging intervention on influenza vaccination in an urban, low-income pediatric and adolescent population: a randomized controlled trial," *JAMA*, vol. 307, no. 16, pp. 1702-8, April 2012.

[24] Williamson E, van Staa T, Ranopa M, Free C, Chadborn T, Goldacre B, Smeeth L Herrett E, "Text messaging reminders for influenza vaccine in primary care: a cluster randomised controlled trial," *BMJ Open*, vol. 6, no. 2, Feb 2016.

[25] McRobbie H, Bullen C, Borland R, Rodgers A, Gu Y Whittaker R, "Mobile phone-based interventions for smoking cessation," *Cochrane Database Syst Rev*, Nov 2012.

[26] Hollin I, Kachnowski S Wei J, "A review of the use of mobile phone text messaging in clinical and healthy behaviour interventions," *J Telemed Telecare*, vol. 17, no. 1, pp. 41-8, 2011.

[27] Abedi P, Afshari P, Kaboli NE Vakili M, "The effect of mobile phone short messaging system on healthy food choices among Iranian postmenopausal women," *J Midlife Health*, vol. 6, no. 4, pp. 154-9, Oct-Dec 2015.

[28] Ali K, Silva C, Goncalves S, Machado PPP Fassnacht DB, "Use of Text Messaging Services to Promote Health Behaviors in Children ," *Journal of Nutrition Education and Behavior* , vol. 7, no. 1, pp. 75-80, 2015.

[29] Kurup R, Laba TL, Santo K, Thiagalingam A, Rodgers A, Woodward M, Redfern J, Chow

CK Thakkar J, "Mobile Telephone Text Messaging for Medication Adherence in Chronic Disease: A Meta-analysis.," *JAMA Intern Med*, vol. 176, no. 3, pp. 340-9, March 2016.

[30] Ward WL, Whiteside-Mansell L, Bokony P, Pettit D Swindle TM, "Technology use and interest among low-income parents of young children: differences by age group and ethnicity," *J Nutr Educ Behavior*, vol. 46, no. 6, pp. 484-90, Nov-Dec 2014.

[31] Perry JG, "A preliminary investigation into the effect of the use of the Short Message Service (SMS) on patient attendance at an NHS Dental Access Centre in Scotland," *Prim Dent Care*, vol. 18, no. 4, pp. 145-9, Oct 2011.

[32] Anand R Prasad S, "Use of mobile telephone short message service as a reminder: the effect on patient attendance," *Int Dent J*, vol. 62, no. 1, pp. 21-6, Feb 2012.

[33] O'Neill M Foley J, "Use of mobile telephone short message service (SMS) as a reminder: the effect on patient attendance," *Eur Arch Paediatr Dent*, vol. 10, no. 1, pp. 15-8, Jan 2009.

[34] Locker D, "Dpreviation and oral health: a review," *Community Dentistry and Oral Epidemiology*, vol. 28, no. 3, pp. 161-9, June 2000.

[35] Ekstrand KR PittsNB, "International Caries Detection and Assessment System (ICDAS) and its International Caries Classification and Management System (ICCMS) – methods for staging of the caries process and enabling dentists to manage caries," *Community Dentistry and Oral Epidemiology*, vol. 41, pp. e41-e52, 2013.

[36] ICDAS Foundation. (2016) International Caries Detection and Assessment System. [Online]. https://www.icdas.org/

[37] ICDAS. (2015) ICDAS E-Learning Course. [Online]. https://www.icdas.org/icdas-e-learning-course

[38] Sohn W, Tellez M, Amaya A, Sen A, Hasson H,Pitts NB Ismail A, "The International Caries Detection and Assessment System (ICDAS): an integrated system for measuring dental caries," *Community Dentistry and Oral Epidemiology*, vol. 35, no. 3, pp. 170-178, June 2007.

[39] Oliveira LB, Bonini GAVC, Bönecker M, Mendes FM Braga MM, "Feasibility of the International Caries Detection and Assessment System (ICDAS-II) in Epidemiological Surveys and Comparability with Standard World Health Organization Criteria," *Caries Res*, vol. 43, no. 245-9, 1009.

[40] Stachniss V, Ricketts D.N, Heinzel-Gutenbrunner M, Pieper K Jablonski-Momeni A, "Reproducibility and Accuracy of the ICDAS-II for Detection of Occlusal Caries in vitro," *Caries Res*, vol. 42, pp. 79-87, April 1008.

[41] Berger S, Goddon I, Senkel H, Pitts N, Heinrich-Weltzien R Kühnisch J, "Occlusal caries detection in permanent molars according to WHO basic methods, ICDAS II and laser fluorescence measurements," *Community Dentistry and Oral Epidemiology*, vol. 36, no. 6, pp. 475-84, Dec 2008.

[42] S Baker, Does Text Messaging Improve Follow-Up Attendance After Completing Pediatric Dental Treatment Under General Anesthesia?, 2010, Masters Thesis.

[43] A Ruehe, Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Appointment Attendance and Dental Knowledge at the UCSF

Pediatric Dental Clinic?, 2015, Masters Thesis.

[44] Casamino PS Nowak AJ, *The Handbook of Pediatric Dentistry*, Fourth Edition ed.: American Academy of Pediatric Dentistry, 2011.

[45] Pitts N, Tellez M. Ismail AI, "he International Caries Classification and Management System (ICCMS!): an example of a caries management pathway.," *BMC Oral Health* , vol. 15, p. S9, 2015.

[46] Alomari QD, Altarakemah Y, Alshawaf N, Honkala EJ. Qudeimat MA, "Variables affecting the inter- and intra-examiner reliability of ICDAS for occlusal caries diagnosis in permanent molars.," *J Public Health Dent*, vol. 76, no. 1, pp. 9-16, Dec 2016.

[47] Hoogstraten J, Prahl-Andersen B Bos A, "Failed appointments in an orthodontic clinic," *American Journal of Orthodontics and Dentofacial Orthopedics* , vol. 127, no. 3, pp. 355-357, March 2005.

[48] Gupta K, Wilson AC, Fields K, Cosgrove NM, Kostis JB Parikh A, "The Effectiveness of Outpatient Appointment Reminder Systems in Reducing No-Show Rates ," *The American Journal of Medicine*, vol. 123, no. 6, pp. 542-548, 2010 June.

APPENDICES

Appendix A: CHR Approval

Human Research Protection Program
Committee on Human Research

Notification of Expedited Review Approval

Principal Investigator
Susan Hyde

Co-Principal Investigator

Type of Submission: Initial Review Submission Packet

Study Title: Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Appointment Attendance , Dental Knowledge, and Oral Health at the UCSF Pediatric Dental Clinic?

IRB #: 13-11998

Reference #: 076517

Committee of Record: Parnassus Panel

Study Risk Assignment:

Approval Date: 02/11/2014 **Expiration Date:** 02/10/2017

Regulatory Determinations Pertaining to this Approval:

This research satisfies the following condition(s) for the involvement of children:

45 CFR 46.404, 21 CFR 50.51: Research not involving greater than minimal risk.

Parental Permission and Assent:
The permission of one parent or guardian is sufficient.

Individual Research HIPAA Authorization is required of all subjects. Use the Permission to Use Personal Health Information for Research form.

A waiver of HIPAA Authorization is acceptable for the recruitment procedures to identify potential subjects. The recruitment procedures involve routine review of medical or other records, do not adversely affect the rights and welfare of the individuals, and pose minimal risk to their privacy, based on, at least, the presence of the following elements: (1) an adequate plan to protect the identifiers from improper use and disclosure; (2) an adequate plan to destroy the identifiers at the earliest opportunity consistent with conduct of the research, or a health or research justification for retaining the identifiers was provided or such retention is otherwise required by law; (3) adequate written assurances that the requested information will not be reused or disclosed to any other person or entity, except as required by law, for authorized oversight of the research study, or for other research for which the use or disclosure of the requested information would be permitted by the Privacy Rule; (4) the research could not practicably be conducted without the waiver; and (5) the research could not practicably be conducted without access to and use of the requested information.

Appendix B: Informed Consent (English)

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

Study Title: Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Appointment Attendance , Dental Knowledge, and Oral Health at the UCSF Pediatric Dental Clinic?

This is a research study about sending appointment reminder messages and other dental health information by text message. The study researchers, Amita Ruehe DDS., Neha Das DDS., and Susan Hyde DDS. MPH. PhD, from the UCSF Dental Clinic, 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 are a parent of a child who is enrolling as a new patient in the UCSF Pediatric Dentistry Clinic.

Why is this study being done?

The purpose of this study is to evaluate whether sending text messages with appointment reminders and dental information to parents of children who are patients at the UCSF Pediatric Dentistry Clinic helps to improve future dental outcomes.

How many people will take part in this study?

194 parents will take part in this study.

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

First, you will be asked some questions today to find out if you can participate in the study.

To be in this study:

- Your child must be a new patient at the UCSF Pediatric Dentistry Clinic.
- You must have a personal cell phone.
- You are willing to participate and receive text messages from UCSF Pediatric Dental Clinic.
- You plan to return to UCSF Pediatric Dental Clinic for dental check-ups.
- You can read and write in English or Spanish.

If you are eligible for the study and you choose to continue, this is what will happen next:

- Study researchers will explain this study to you and you will be able to ask questions about this study.
- You will be asked to complete a questionnaire about your dental knowledge, beliefs and habits. This will take approximately 15 minutes.

- A study researcher will examine your child's teeth and write down the number of cavities that are present.
- You will be randomized into one of two study groups described below. Randomization means that you are put into a group by chance. A computer program will place you in one of the two groups. Neither you nor your doctor can choose the group you will be in. You will have an equal chance of being placed in either group.
    - **If you are in Group 1,** you will not receive text messages
    - **If you are in Group 2,** you will receive text messages about once a month with educational information and a reminder to schedule your child's 6-month dental cleaning and exam appointment.

Group 1: After the first study visit, your child will continue to be seen at the UCSF Pediatric Dentistry Clinic as necessary. If your child requires dental treatment, you will schedule these appointments at our clinic and you will receive phone call reminders for these appointments.

These phone calls will happen on the following schedule:

- Reminder (phone-call)1-2 days before 6-month exam appointment

Group 2: After the first study visit, your child will continue to be seen at the UCSF Pediatric Dentistry Clinic as necessary. If your child requires dental treatment, you will schedule these appointments at our clinic and you will receive phone call reminders for these appointments. In addition, you will begin to receive text messages with dental health information and a reminder to schedule your child's 6-month dental check up.

These phone calls or text messages will happen on the following schedule:

- Educational text messages at weeks 3, 6, 9, 12, 15, and 18 of the study
- Reminder to schedule the 6-month exam appointment 21 weeks after the COE
- Reminder (phone-call)1-2 days before the scheduled 6-month exam appointment
- At the first 6-month visit you will be asked to complete an additional questionnaire
- Repeated educations text messages at weeks 3, 6, 9, 12, 15 and 18 following the first 6-month exam appointment
- Reminder to schedule the second 6-month exam appointment 21 weeks after the first 6-month exam
- Reminder (phone-call) 1-2 days before the scheduled 6-month exam appointment
- At the second 6-month visit a study researcher will examine your child's teeth and write down the number of cavities that are present.

All appointments and exams are the standard of care and are not specific to this study. This study ends following the second 6-month visit. (Total of 12 months)

- Study location: All these procedures will be done at the UCSF Pediatric Dental Clinic at 707 Parnassus Ave. and the Ambulatory Surgery Center at 400 Parnassus Ave., San Francisco CA.

How long will I be in the study?

You will be asked to participate for 12 months after your child's first dental visit. You will return for any treatment your child needs during this study. You will also return for two

6-month exams, cleanings and fluoride treatments. After the second 6-month visit, you will have completed your participation in this study.

Can I stop being in the study?

Yes. You can decide to stop at any time. 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?

- A computer will assign your child to a treatment group (either phone calls or text messages) by chance. The treatment your group receives may be less effective than the other group.
- By agreeing to receive 8-10 text messages in this study, you may have an additional charge to your cell phone plan if you do not have unlimited text messages as part of your plan.
- Your child's dental treatment will not be affected by your participation in this study.
- For more information about risks and side effects, ask one of the researchers.

Are there benefits to taking part in the study?

There may or may not be a direct benefit from participating. One group will receive additional dental educational information by text messages that may help your child have better dental health and fewer cavities. We also hope that the information learned may allow health professionals to help other parents and their children prevent tooth decay.

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 and you will receive the same care with only reminder phone calls and not receive text messages. You will not lose any of your regular benefits, and you can still get your care from our institution the way you usually do.

Will information about me be kept private?

We will do our best to make sure that the personal information gathered for this study is kept private. However, we cannot guarantee total privacy. Your personal information may be given out if required by law. If information from this study is published or presented at scientific meetings, your name and other personal information will not be used.

What are the costs of taking part in this study?

You will not be charged to participate in this study. The study will not cover your child's dental treatment costs. You will be responsible for dental treatment costs (if they are not covered by insurance). By agreeing to receive text messages in this study, you may have an additional charge to your cell phone plan for each text message received if you do not have unlimited text messages as part of your plan.

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 researcher(s) Dr. Susan Hyde, Dr. Neha Das or Dr. Amita Ruehe at (415) 476-3276 or (415) 476-6011.

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 (415) 476-1814.

CONSENT

You have been given a copy of this consent form to keep. You will be asked to sign a separate form authorizing access, use, creation, or disclosure of health information about you.
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.
If you wish to participate in this study, you should sign below.

Date	Participant's Signature for Consent
Date	Person Obtaining Consent

Appendix C: Informed Consent (Spanish)

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

Título del estudio: ¿Los mesajes de texto con información sobre la salud oral y recordatorios de citas mejoran la asistencia de la cita, conocimiento dental y la salud oral de la UCSF Odontología Pediátrica Clínica?

Esto es un estudio de investigación sobre el envío de mensajes del recordatorio de cita y otra información de la salud dental por el mensaje de texto. Los investigadores de estudio, Amita Ruehe DDS. Neha Das DDS, y Susan Hyde DDS, MPh, PhD, de la Clínica Dental UCSF, le explicará este estudio.

Estudios de investigación incluyen solamente las personas que decidan tomar parte. Por favor, tómese su tiempo para tomar su decisión sobre la participación y discutir su decisión con su familia o amigos, si lo desea. Si tiene alguna pregunta, puede preguntar a los investigadores.

Se le ha pedido a tomar parte en este estudio debido a que usted es el padre de un niño que se inscribe como un nuevo paciente en la UCSF Odontología Pediátrica Clínica.

¿Por qué se está haciendo este estudio?

El propósito de este estudio es evaluar si enviar mensajes de texto con recordatorios de cita e información dental a padres de niños que son pacientes en la Clínica de la Odontología Pediátrica UCSF ayuda a mejorar futuros resultados dentales.

¿Cuántas personas participarán en este estudio?

194 padres participarán en este estudio.

¿Qué pasará si participo en este estudio de investigación?

Primero, le harán algunas preguntas hoy para averiguar si puede participar en el estudio.

Estar en este estudio:
• El niño debe ser un nuevo paciente en la Clínica de la Odontología Pediátrica UCSF.
• Debe tener un teléfono celular personal.
• Quiere participar y recibir mensajes de texto de la Clínica Dental Pediátrica UCSF.
• Planea volver a la Clínica Dental Pediátrica UCSF para chequeos dentales.
• Puede leer y escribir en inglés o español.

Si es elegible para el estudio y decide seguir, esto es lo que pasará después:

- Los investigadores de estudio le explicarán este estudio y será capaz de hacer preguntas sobre este estudio.
- Le pedirán completar un cuestionario sobre su conocimiento dental, creencia y hábitos.

Esto tomará aproximadamente 15 minutos.

- Un investigador de estudio examinará los dientes de su hijo y anotará el número de caries que están presentes.
- Se aleatorizará en uno de dos grupos de estudio descritos abajo. La randomización significa que se pone en un grupo por casualidad. Un programa de ordenador le colocará en uno de los dos grupos. Ni usted ni su doctor pueden elegir el grupo en el cual estará. Tendrá una posibilidad igual de colocar en el uno o el otro grupo.
    - **Si está en el Grupo 1,** no recibirá mensajes de texto
    - **Si está en el Grupo 2,** recibirá mensajes de texto sobre una vez al mes con la información educativa y un recordatorio para programar la limpieza dental de 6 meses de su hijo y la cita del examen.

Grupo 1: Después de la primera visita de estudio, su hijo continuará a ser visto en la Clínica de la Odontología Pediátrica UCSF si es necesario. Si su hijo requiere el tratamiento dental, programará estas citas en nuestra clínica y recibirá recordatorios de llamada telefónica para estas citas.

Estas llamadas telefónicas se encontrarán con el horario siguiente:

- Recordatorio (llamada telefónica) 1-2 días antes de cita del examen de 6 meses

Grupo 2: Después de la primera visita de estudio, su hijo continuará a ser visto en la Clínica de la Odontología Pediátrica UCSF si es necesario. Si su hijo requiere el tratamiento dental, programará estas citas en nuestra clínica y recibirá recordatorios de llamada telefónica para estas citas. Además, comenzará a recibir mensajes de texto con la información de la salud dental y un recordatorio para programar el cheque dental de 6 meses de su hijo.

Estas llamadas telefónicas o mensajes de texto va a suceder en el siguiente horario:

- Mensajes de texto educativos en semanas 3, 6, 9, 12, 15, y 18 del studio
- Recordatorio para programar la cita del examen de 6 meses 21 semanas después del nuevo examen paciente
- Recordatorio (llamada telefónica) 1-2 días antes de la cita del examen de 6 meses prevista
- En la primera visita de 6 meses le pedirán completar un cuestionario adicional
- Mensajes de texto educations repetidos en semanas 3, 6, 9, 12, 15 y 18 después de primera cita del examen de 6 meses
- Recordatorio para programar la segunda cita del examen de 6 meses 21 semanas después del primer examen de 6 meses
- Recordatorio (llamada telefónica) 1-2 días antes de la cita del examen de 6 meses prevista
- En la segunda visita de 6 meses un investigador de estudio examinará los dientes de su hijo y anotará el número de cavidades que están presentes.

Todas las citas y los exámenes son el estándar de cuidado y no son específicos para este estudio. Este estudio finales después de segunda visita de 6 meses. (Total de 12 meses)

- Estudio ubicación: Todos estos procedimientos se harán en la Clínica Dental Pediátrica UCSF en 707 Parnassus Ave. y el Centro de la Cirugía Ambulatorio en 400 Parnassus Ave, San Francisco CA.

¿Cuánto tiempo estaré en el estudio?

Le pedirán participar durante 12 meses después de la primera visita dental de su hijo. Devolverá para cualquier tratamiento sus necesidades del niño durante este estudio. También volverá para dos exámenes de 6 meses, limpiezas y tratamientos del fluoruro. Después de la segunda visita de 6 meses, habrá completado su participación en este estudio.

¿Puedo dejar de estar en el estudio?

Sí. Puede decidir pararse en cualquier momento. Sólo diga al investigador de estudio o persona de personal en seguida si desea dejar de estar en el estudio. También, el investigador de estudio le puede parar de participar en este estudio en cualquier momento si él o ella creen que está en sus intereses, si no sigue las reglas de estudio, o si el estudio se para.

¿Qué efectos secundarios o riesgos puedo esperar de estar en el estudio?

- Un ordenador asignará a su hijo a un grupo de tratamiento (llamadas telefónicas o mensajes de texto) por casualidad. El tratamiento que su grupo recibe puede ser menos eficaz que el otro grupo.
- Consintiendo en recibir 8-10 mensajes de texto en este estudio, puede tener un suplemento a su plan del teléfono celular si no tiene mensajes de texto ilimitados como la parte de su plan.
- El tratamiento dental de su hijo no será afectado por su participación en este estudio.
- Para más información sobre riesgos y efectos secundarios, pregunte a uno de los investigadores.

¿Hay beneficios de tomar parte en el estudio?

Puede haber o no un beneficio directo para la participación en el estudio. Un grupo recibirá más información sobre la educación dental por medio de mensajes de texto que pueden ayudar a que su hijo tenga una mejor salud dental y menos caries. También esperamos que la información aprendida puede permitir que los profesionales de la salud para ayudar a otros padres y sus hijos prevenir la caries dental.

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

Es libre de decidir no participar en el estudio. Si decide no participar en este estudio, no habrá ninguna pena a usted y recibirá el mismo cuidado con sólo llamadas telefónicas del recordatorio y no recibirá mensajes de texto. No perderá ninguna de sus ventajas regulares, y todavía puede conseguir su cuidado de nuestra institución de la manera por lo general hace.

¿Va la información sobre mí guardarse privada?

Haremos todo lo posible asegurarnos que la información personal juntada para este estudio se guarda privada. Sin embargo, no podemos garantizar la intimidad total. Su información personal se puede presentar de ser requerido según la ley. Si la información de este estudio se publica o se presenta en reuniones científicas, su nombre y otra información personal no se usarán.

¿Cuáles son los gastos de participación en este estudio?

No se ordenará que participe en este estudio. El estudio no cubrirá los gastos de tratamiento dentales de su hijo. Será responsable de gastos de tratamiento dentales (si no son cubiertos por el seguro). Consintiendo en recibir mensajes de texto en este estudio, puede tener un suplemento a su plan del teléfono celular para cada mensaje de texto recibido si no tiene mensajes de texto ilimitados como la parte de su plan.

¿Pagarán por mí participar en este estudio?

No pagarán por participar en este estudio.

¿Cuáles son mis derechos si participo en este estudio?

La participación en este estudio es su opción. Puede decidir participar o no participar en el estudio. Si decide participar en este estudio, puede dejar el estudio en cualquier momento. Pase lo que pase decisión que hace, no habrá ninguna pena a usted de ningún modo. No perderá ninguna de sus ventajas regulares, y todavía puede conseguir su cuidado de nuestra institución de la manera por lo general.

¿Quién puede contestar a mis preguntas sobre el estudio?

Se puede dirigir al investigador(es) sobre cualquier pregunta, preocupaciones o quejas que tiene sobre este estudio. Póngase en contacto con los investigadores Dr. Susan Hyde, la Dr. Neha Das o la Dr. Amita Ruehe al (415) 476-3276 o (415) 476-6011.

Si desea hacer preguntas sobre el estudio o sus derechos como un participante de investigación a alguien además de los investigadores o si desea expresar algún problema o preocupaciones puede tener sobre el estudio, por favor llame la Oficina del Comité de la Investigación Humana al (415) 476-1814.

CONSENTIMIENTO

Le han dado una copia de esta forma de consentimiento para guardar. Le pedirán firmar un acceso de autorización de la forma separado, uso, creación o revelación de la información de salud sobre usted.

LA PARTICIPACIÓN EN LA INVESTIGACIÓN ES VOLUNTARIA. Tiene el derecho de rehusar estar en este estudio o retirarse de ello a cualquier punto sin pena o pérdida de ventajas a las cuales por otra parte tiene derecho.
Si desea participar en este estudio, debería firmar abajo.

_____ _____

Fecha Firma del Participante de consentimiento

_____ _____

Fecha Persona que obtiene consentim

Appendix D: Permission for Personal Health Information (English)

IRB Approval Number **13-11998**

University of California
Permission to Use Personal Health Information for Research

Study Title (or IRB Approval Number if study title may breach subject's privacy):
Does Text Messaging Oral Health Information and Appointment Scheduling Reminders Improve Dental Recall Attendance Rates and Oral Health at the UCSF Pediatric Dental Clinic?

Principal Investigator: Amita Ruehe, DDS., Neha Das, DDS.

Sponsor/Funding Agency (if funded): None

A. What is the purpose of this form?

State and federal privacy laws protect the use and release of your health information. Under these laws, the University of California San Francisco (UCSF) or your health care provider cannot release your health information to the research team unless you give your permission. The research team includes the researchers and people hired by the University or the sponsor to do the research. If you decide to give your permission and to participate in the study, you must sign this form, as well as the Consent Form. This form describes the different ways that the researcher, research team and research sponsor may use your health information for the research study. *The research team will use and protect your information as described in the* attached Consent Form. *Once your health information is released it may not be protected by these privacy laws and might be shared with others. However, other laws protecting your confidentiality may still apply. If you have questions, please ask a member of the research team.*

B. What Personal Health Information will be released?

If you give your permission and sign this form, you are allowing Dr. Ruehe/Dr. Das to release the following medical records containing your Personal Health Information. Your Personal Health Information includes health information in your medical records and information that can identify you. For example, Personal Health Information may include your name, address, phone number or social security number.

☐ Entire Medical Record ☐ Radiology Reports ☐ Laboratory Reports

☐ Outpatient Clinic Records	☐ Radiology Images	☐ Psychological Tests
☐ Progress Notes	☐ Diagnostic Imaging Reports	☐ Dental Records
☐ Consultations	☐ Operative Reports	☐ Discharge Summaries
☐ History & Physical Exams	☐ Pathology Reports	☐ Health Care Billing
☐ EKG	☐ Emergency Medicine Center Reports	

☐ Other:_____

C. Do I have to give my permission for certain specific uses?

Yes. The following information will only be released if you give your specific permission by putting your initials on the line(s).

____ I agree to the release of information pertaining to drug and alcohol abuse, diagnosis or treatment.

____ I agree to the release of HIV/AIDS testing information.

____ I agree to the release of genetic testing information.

____ I agree to the release of information pertaining to mental health diagnosis or treatment as follows:

_____

D. How will my Personal Health Information be used?

Your Personal Health Information may be released to these people for the following purposes:

1. To the research team for the research described in the attached Consent Form;
2. To others at UC who are required by law to review the research;
3. To others who are required by law to review the quality and safety of the research, including: U.S. government agencies, such as the Food and Drug Administration, the research sponsor or the sponsor's representatives, or government agencies in other countries. These organizations and their representatives may see your Personal Health Information. They may not copy or take it from your medical records unless permitted or required by law.

E. How will my Personal Health Information be used in a research report?

If you agree to be in this study, the research team may fill out a research report. (This is sometimes called a "case report".) The research report will ***not*** include your name, address, or telephone or social security number.

The research report may include your date of birth, initials, dates you received medical care, and a tracking code. The research report will also include information the research team collects in the study. The research team and the research sponsor may use the research report and share it with others in the following ways:

1. To perform more research;
2. Share it with researchers in the U.S. or other countries;
3. Place it into research databases;
4. Use it to improve the design of future studies;
5. Use it to publish articles or for presentations to other researchers;
6. Share it with business partners of the sponsor; or
7. File applications with U.S. or foreign government agencies to get approval for new drugs or health care products.

F. Does my permission expire?

This permission to release your Personal Health Information expires when the research ends and all required study monitoring is over. Research reports can be used forever.

G. Can I cancel my permission?

You can cancel your permission at any time. You can do this in two ways. You can write to the researcher or you can ask someone on the research team to give you a form to fill out to cancel your permission. If you cancel your permission, you may no longer be in the research study. You may want to ask someone on the research team if canceling will affect your medical treatment. If you cancel, information that was already collected and disclosed about you may continue to be used. Also, if the law requires it, the sponsor and government agencies may look at your medical records to review the quality or safety of the study.

H. Signature

If you agree to the release and use of your Personal Health Information, please sign below. You will be given a signed copy of this form.

_____
_____
Name of Subject (print)

_____ _____
_____ ___
Signature of Subject Date

Note: if the subject is a minor, an individual signing with an "X", an adult incapable of giving consent, or is unable to read the authorization, fill out and attach the "special signatures" page (sections "I" and "J").

University of California
Permission to Use Personal Health Information for Research

SPECIAL SIGNATURES PAGE

I. If the subject is a minor, or an individual signing with an "X", or an adult incapable of giving consent (where IRB approved), the legally authorized representative or witness signs here:

_____	_____
Name of Legally Authorized Representative or Witness to the "X" (print)	Relationship to the Subject
_____	_____
Signature of Representative or Witness	Date

J. If the subject is unable to read the authorization, the translator or reader and a witness sign here:

I have accurately and completely read this Authorization to _____ (subject's name) in _____(language), the subject's primary language. **The subject has verbally affirmed his/her Authorization to me and to the witness.**

_____
Name of Translator or Reader (print)

_____	_____
Signature of Translator or Reader	Date

_____
Name of Witness (print)

_____	_____
Signature of Witness	Date

Appendix E: Permission for Personal Health Information (Spanish)

Universidad de California
Permiso para Usar Información de Salud Personal para Investigación

Study Title (or IRB Approval Number if study title may breach subject's privacy): _**13-11998**_____

Sponsor/Funding Agency (if funded):

_____

_____

A. ¿Cual es el propósito de este formulario?

Las leyes estatales y federales de privacidad protegen el uso y la publicación de los datos sobre la salud de usted. Bajo estas leyes, ni la Universidad de California ni su proveedor de asistencia médica puede difundir sus datos de salud al equipo de investigación sin su permiso. El equipo de investigación incluye los investigadores y las personas empleados por la Universidad o por el patrocinador para hacer la investigación. Si usted decide dar su permiso y participar en el estudio, usted tiene que firmar este formulario tanto como el Formulario de Consentimiento. Este formulario describe las diferentes maneras en que el investigador, el equipo de investigación y el patrocinador de la investigación pueden utilizar sus datos de salud para el estudio de investigación. El equipo de investigación usará y protegerá sus datos tal como se describe en el Formulario de Consentimiento adjunto. Sin embargo, una vez divulgada la información de su salud, puede que no esté protegida por las leyes de privacidad y pudiera ser compartida con otros. Si tiene alguna pregunta diríjala a un miembro del equipo de investigación.

B. ¿Qué Información Personal de Salud se divulgará?

Si usted da su permiso y si firma este formulario, usted está permitiendo a _____ [*insert UC campus or name of health care provider(s) releasing medical records]* que comparta los siguientes expedientes médicos conteniendo su Información Personal de Salud. Su Información Personal de Salud incluye datos sobre su salud que se encuentran dentro de sus expedientes médicos e información que puede identificarle a usted. Por ejemplo, la Información Personal de Salud puede incluir su nombre, su dirección, su número telefónico o número de seguro social.

☐ Expediente médico completo	☐ Reportes de Laboratorio	☐ Reportes de Centros de Urgencias
☐ Estados de Cuenta de cuidado médico	☐ Expedientes Dentales	☐ Exámenes físicos

 Reportes de Patología
 Reportes Quirúrgicos
 Reportes de Imagen Diagnóstica
 Electrocardiograma
 Reportes de Radiología
 Consultas
 Notas de Progreso
 Imágenes de Resonancia Magnética
 Expedientes Clínicos Ambulatorios
 Resumen del Alta
 Exámenes Psiquiátricos

 Otros (describa) _____

C. ¿Tengo que dar mi permiso para algún uso específico?

Sí. La siguiente información solamente será divulgada si usted específicamente da su permiso al escribir sus iniciales sobre la(s) línea(s).

_____ Consiento a la divulgación de datos pertinentes al diagnóstico o tratamiento de abuso de alcohol o de drogas.

_____ Consiento a la divulgación de datos de la prueba de VIH/SIDA.

_____ Consiento a la divulgación de datos sobre estudios genéticos.

_____ Consiento a la divulgación de datos pertinentes al diagnóstico o tratamiento de salud mental de acuerdo con lo siguiente:

_____.

D. ¿De qué manera será utilizada mi información personal de salud?

Su información personal de salud puede divulgarse a estas personas por las razones siguientes:

4. Al equipo de investigación descrita en el Formulario de Consentimiento adjunto.
5. A otras personas en la Universidad de California quienes por ley se requiere que revisen la investigación.
6. A otras personas o entidades con la obligación legal de examinar la calidad y la eficacia de la investigación, incluyendo: Agencias del gobierno de los Estados Unidos, tales como la "FDA" (Dirección de Alimentos y Medicamentos), el patrocinador de la investigación o los representantes del patrocinador, o agencias gubernamentales en otros países. Estas organizaciones y sus representantes

pueden ver su Información de Salud Personal. Ellos no pueden fotocopiarla ni sacarla de su expediente médico a menos que sea permitida o mandada por la ley.

E. ¿De qué manera será utilizada mi información personal de salud en un reporte de investigación?

Si usted consiente participar en este estudio, el equipo de investigación puede llenar un reporte de investigación. (Esto a veces se llama un "reporte de caso.") El reporte de investigación **no** incluirá su nombre, dirección, número telefónico, ni su número de seguro social. El reporte de investigación puede incluir su fecha de nacimiento, las iniciales de su nombre, las fechas cuando recibió atención médica y un código de seguimiento. El reporte también incluirá datos que el equipo de investigación recaba para el estudio. El equipo investigativo y el patrocinador de la investigación pueden utilizar el reporte de investigación y compartirlo con otros de las siguientes maneras:

8. Para llevar a cabo más investigación;
9. Compartirla con otros investigadores en los Estados Unidos u otros países;
10. Colocarla dentro de fondos de datos investigativos;
11. Utilizarla para mejorar el diseño de estudios en el futuro;
12. Utilizarla para publicar artículos o para presentar a otros investigadores;
13. Compartirla con socios del patrocinador; o
14. Entregar solicitudes con los Estados Unidos o con agencias de otros gobiernos para obtener autorización para nuevas drogas o nuevos productos de cuidado de salud.

F. ¿Se vence mi permiso?

Este permiso para divulgar su Información Personal de Salud se vence cuando se acaba la investigación y cuando se haya terminado todo el monitoreo. Los reportes de investigación pueden ser usados para siempre.

G. ¿Puedo cancelar mi permiso?

Usted puede cancelar su permiso en cualquier momento. Esto lo puede hacer de dos maneras. Usted puede escribir al investigador o puede pedir que alguien del equipo de investigación le dé un formulario para llenar para cancelar su permiso. Si usted rescinde su permiso, puede ser que ya no podrá participar en el estudio de investigación. Tal vez usted debiera preguntar a alguien del equipo de investigación si al cancelar se le afecta su tratamiento médico. Si usted cancela, cualquier información que ya había sido recabada y divulgada se podrá continuar usando. Además, si la ley lo requiere, las agencias gubernamentales y patrocinadoras pueden continuar teniendo acceso a sus expedientes médicos para revisar la calidad o la seguridad del estudio..

H. Firma

Si usted está de acuerdo con el uso y la divulgación de su Información Personal de Salud, por favor firme a continuación. Usted recibirá una copia firmada de este formulario.

_____

Nombre del Participante (letra de molde)

_____ _____

Firma del Participante Fecha

H. Si el participante es menor de edad, o si es un individuo firmando con una "X", o un adulto incapaz de dar su consentimiento (en casos autorizados por el IRB), el representante o testigo legalmente autorizado firma aquí:

_____ _____

Nombre del Representante Legalmente Autorizado o del Testigo a la marca "X" (letra de molde)

Parentesco con el Participante

_____ _____

Firma del Representante o Testigo

Fecha

H. Si el participante es incapaz de leer la autorización, el traductor o lector y un testigo firman aquí:

Yo he leído completamente y con exactitud a _____ (nombre del participante) en _____(idioma), el idioma principal del participante. **El participante ha declarado su Autorización a mí y al testigo.**

_____
Nombre del Traductor o Lector (letra de molde)

_____ _____
Firma del Traductor o Lector Fecha

_____
Nombre del Testigo (letra de molde)

_____ _____
Firma del Testigo Fecha

Appendix F: Test Messages (English)

Text Messages (<140 Characters Each)

Week 3
Children need help brushing their teeth until age 6 or 7 – an adult should always help the child brush in the morning & at night

Week 6
Your child is sweet enough! Give your child tap water when they are thirsty. Sweet drinks like juice contain sugar and cause cavities

Week 9
Please use a smear of fluoride toothpaste when brushing your child's teeth – it makes their teeth strong and helps prevent cavities

Week 12
Brushing alone does not clean teeth well. Flossing once a day is very important to clean plaque and prevent cavities in between teeth

Week 15
Tooth healthy snacks are cheese, veggies & nuts. Avoid starchy/sticky snacks like chips, cookies & crackers that cause cavities

Week 18
Please remember to brush your child's teeth after they snack! When this is not possible, have your child rinse their mouth with water

Week 21
Dental check ups are very important! Your child is due for theirs in 3 weeks. Please call 4154763276 to schedule an appointment

Appendix G: Text Messages (Spanish)

Text Messages (<140 Characters Each)

Semana 3
Los niños necesitan ayuda cepillarse los dientes hasta la edad de 6 o 7. Un adulto debe siempre ayudar a que el niño se cepilla en la mañana y noche

Semana 6
Su hijo es lo suficientemente dulce. Déle a su hijo agua del grifo cuando tenga sed. Bebidas dulces como jugo tienen azúcar y causan caries.

Semana 9
Utilice un poco de pasta con fluoruro cuando se cepilla los dientes de su niño – hace los dientes fuertes y ayuda a prevenir las caries

Semana 12
El cepillado solo no limpia dientes bien. Necesita pasar hilo dental una vez al día para limpiar la placa y prevenir caries entre dientes

Semana 15
Queso, verduras y nueces son bocadillos saludables para los dientes. Bocados amiláceos/pegajosos como patatas fritas y galletas causan caries.

Semana 18
Por favor cepille los dientes de su niño después de que come bocadillos! Cuando esto no es posible, su hijo puede enjuaguar su boca con agua

Semana 21
Chequeos dentales son muy importantes! Su hijo es debido para suyo en 3 semanas. Por favor llame 415-476-3276 para programar una cita

Appendix H: Baseline Questionnaire (English)

UCSF PEDIATRIC DENTISTRY SURVEY

Do you have another dentist or dental clinic for your child's dental care, other than UCSF?

☐ Yes ☐ No

How often are your child's teeth brushed?

- ☐ Never
- ☐ Sometimes, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ More than twice a day
- ☐ Don't know

When your child's teeth are brushed, is fluoride toothpaste used?

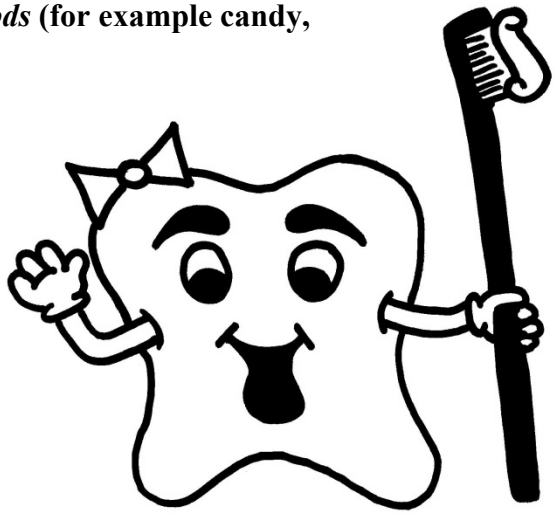
☐ Yes ☐ No ☐ Don't know

Do you or another adult help your child brush his or her teeth?

- ☐ No, my child brushes alone
- ☐ Yes, sometimes
- ☐ Yes, most of the time
- ☐ Yes, always
- ☐ Don't know
- ☐

How often does your child eat sweet or sugary *foods* (for example candy, cookies, donuts, ice cream)?

- ☐ Never
- ☐ At least once per week, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ Three times a day
- ☐ Four or more times a day
- ☐ Don't know



How often does your child have sweet or sugary *drinks* (for example juice, soda pop, Kool-Aid, Gatorade, Coke, lemonade, chocolate milk)?

- ☐ Never
- ☐ At least once per week, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ Three times a day
- ☐ Four or more times a day
- ☐ Don't know
- ☐

If your child is at high risk for getting cavities, how often should they come to UCSF for a check up and fluoride treatment?

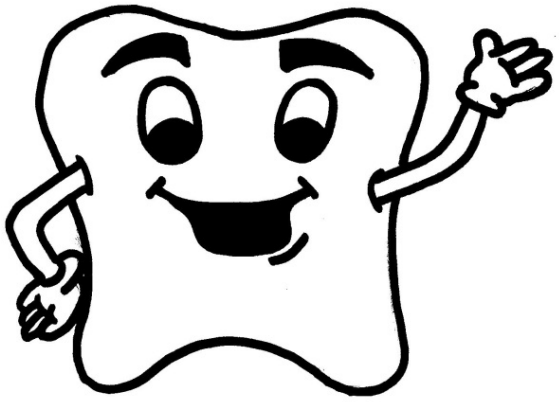
- ☐ Only when they have a problem
- ☐ Every 12 months
- ☐ Every 6 months
- ☐ Every 3 months
- ☐ Don't know
- ☐

At what age can a child brush his/her teeth by himself/herself?

- ☐ 1-2 year old
- ☐ 3-4 years old
- ☐ 5-6 years old
- ☐ 7 years old or older
- ☐ Don't know
- ☐

What should you give your child to drink when s/he is thirsty? Choose the best answer.

- ☐ Milk
- ☐ Juice
- ☐ Water
- ☐ Soda
- ☐ Don't know
- ☐



Appendix I: Baseline Questionnaire (Spanish)

UCSF PEDIATRIC DENTISTRY SURVEY

¿Tiene otro dentista o clínica dental para el cuidado dental de su hijo, además de UCSF?

☐ Sí ☐ No

¿Con qué frecuencia se cepillan los dientes de su hijo?

- ☐ Nunca
- ☐ A veces, pero no cada día
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Mas de dos veces al día
- ☐ No sé

¿Cuándo se cepillan los dientes de su hijo, se usa la pasta de dientes con fluoruro?

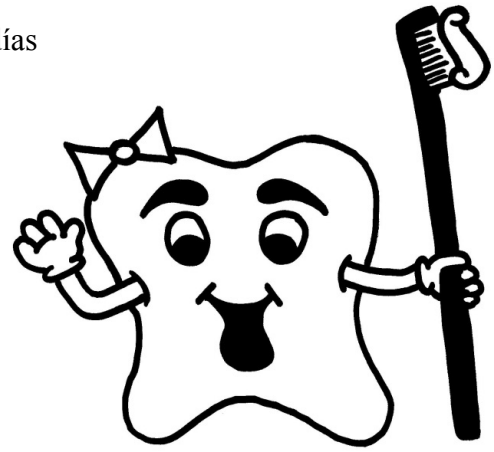
☐ Sí ☐ No ☐ No sé

¿Cuándo los dientes de su hijo se cepillan, se usa la pasta pasta dental con fluoruro?

- ☐ No, mi hijo se cepilla solo
- ☐ Sí, a veces
- ☐ Sí, casi todo el tiempo
- ☐ Sí, todo el tiempo
- ☐ No sé
- ☐

¿Cuántas veces come su hijo alimentos dulces o azucarados (por ejemplo, dulces, galletas, donas, helados)?

- ☐ Nunca.
- ☐ Por lo menos una vez por semana, pero no todos los días
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Tres veces al día
- ☐ Cuatro o más veces al día
- ☐ No sé



¿Con qué frecuencia tiene su hijo bebidas dulces o azucaradas (por ejemplo jugo, soda, Kool-Aid, Gatorade, Coca Cola, limonada, chocolate con leche).

- ☐ Nunca.
- ☐ Por lo menos una vez por semana, pero no todos los días
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Tres veces al día
- ☐ Cuatro o más veces al día
- ☐ No sé

¿Si su hijo está en el alto riesgo para conseguir caries, con qué frecuencia deberían venir a UCSF para un chequeo y tratamiento del fluoruro?

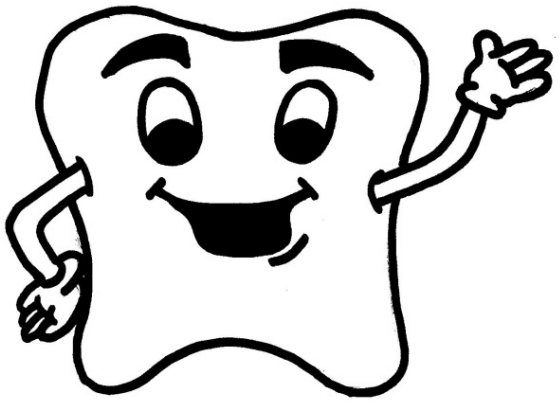
- ☐ Sólo cuando tienen un problema
- ☐ Cada 12 meses
- ☐ Cada 6 meses
- ☐ Cada 3 meses
- ☐ No sé

¿A qué edad puede un niño cepillar sus/sus dientes solo/a?

- ☐ 1-2 años de edad
- ☐ 3-4 años de edad
- ☐ 5-6 años de edad
- ☐ 7 años de edad o mas
- ☐ No sé

¿Qué debería dar a su hijo para beber cuando tiene sed? Elija la mejor respuesta.

- ☐ Leche
- ☐ Jugo
- ☐ Agua
- ☐ Soda
- ☐ No Se



Appendix J: Six Month/One Year Questionnaire (English)

UCSF PEDIATRIC DENTISTRY SURVEY
6/12 Month Questionnaire

Did you receive text messages from UCSF Pediatric Dental Clinic about caring for your child's teeth?

☐ Yes ☐ No ☐ Don't know

Did you *read* the text messages that were sent to you from UCSF Pediatric Dental Clinic about caring for your child's teeth?

☐ Always
☐ Sometimes
☐ Rarely
☐ Never

Did you use the information that was sent to you in the text messages to help you care for your child's teeth?

☐ Always
☐ Sometimes
☐ Rarely
☐ Never

How do you prefer most to be reminded for your child's dental appointments?

☐ Text message
☐ Phone call
☐ Email
☐ Postcard
☐ Other (Please describe: _____)
☐ I do not want a reminder

How often are your child's teeth brushed?

- ☐ Never
- ☐ Sometimes, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ More than twice a day
- ☐ Don't know

When your child's teeth are brushed, is fluoride toothpaste used?

☐ Yes ☐ No ☐ Don't know

Do you or another adult help your child brush his or her teeth?

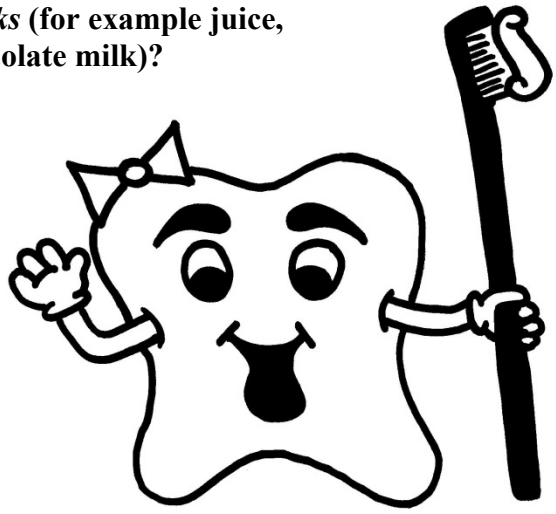
- ☐ No, my child brushes alone
- ☐ Yes, sometimes
- ☐ Yes, most of the time
- ☐ Yes, always
- ☐ Don't know
- ☐

How often does your child eat sweet or sugary *foods* (for example candy, cookies, donuts, ice cream)?

- ☐ Never
- ☐ At least once per week, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ Three times a day
- ☐ Four or more times a day
- ☐ Don't know

How often does your child have sweet or sugary *drinks* (for example juice, soda pop, Kool-Aid, Gatorade, Coke, lemonade, chocolate milk)?

- ☐ Never
- ☐ At least once per week, but not every day
- ☐ Once a day
- ☐ Twice a day
- ☐ Three times a day
- ☐ Four or more times a day
- ☐ Don't know
- ☐



If your child is at high risk for getting cavities, how often should they come to UCSF for a check up and fluoride treatment?

- ☐ Only when they have a problem
- ☐ Every 12 months
- ☐ Every 6 months
- ☐ Every 3 months
- ☐ Don't know

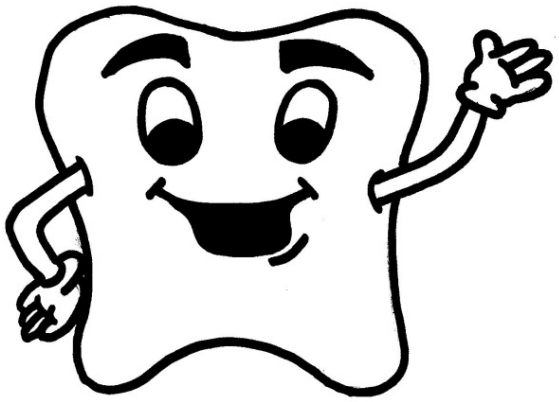
At what age can a child brush his/her teeth by himself/herself?

- ☐ 1-2 year old
- ☐ 3-4 years old
- ☐ 5-6 years old
- ☐ 7 years old or older
- ☐ Don't know

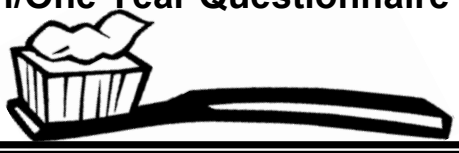
What should you give your child to drink when s/he is thirsty? Choose the best answer.

- ☐ Milk
- ☐ Juice
- ☐ Water
- ☐ Soda
- ☐ Don't know

Thank you for your participation!



Appendix K: Six Month/One Year Questionnaire (Spanish)



UCSF PEDIATRIC DENTISTRY SURVEY
6/12 Month Questionnaire

¿Recibió mensajes de texto de UCSF Clinica Dental pediátrica sobre el cuidado de los dientes de su niño?

☐ Sí ☐ No ☐ No sé

¿Leyó los mensajes de texto que se enviaron a usted de la Clínica Dental Pediátrica UCSF sobre cuidando los dientes de su hijo?

☐ Siempre
☐ A veces
☐ Raramente
☐ Nunca

¿Usó la información que se le envió en los mensajes de texto para ayudar cuidar los dientes de su niño?

☐ Siempre
☐ A veces
☐ Raramente
☐ Nunca

¿Cómo prefiere más a ser recordado para citas dentales de su hijo?

☐ Mensajes de texto
☐ Llamada
☐ Email
☐ Tarjeta postal
☐ Otro (Por favor, describa: _____)
☐ No quiero avisos

¿Con qué frecuencia se cepillan los dientes de su niño?

- ☐ Nunca
- ☐ A veces, pero no todos los días
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Mas de dos veces al día
- ☐ No sé

¿Cuándo se cepillan los dientes de su hijo, se usa la pasta de dientes con fluoruro?

☐ Sí ☐ No ☐ No sé

¿Usted u otro adulto ayuda su hijo cepillar sus dientes?

- ☐ No, mi hijo se cepilla solo
- ☐ Sí, a veces
- ☐ Sí, casi todo el tiempo
- ☐ Sí, todo el tiempe
- ☐ No sé

¿Con qué frecuencia su niño come alimentos dulces o azucarados (por ejemplo, dulces, galletas, donas, helado)?

- ☐ Nunca
- ☐ Por lo menos una vez por semana, pero no todos los días
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Tres veces al día
- ☐ Cuatro o mas veces al día
- ☐ No sé

¿Con qué frecuencia toma su hijo bebidas dulces o azucaradas (por ejemplo jugo, soda, Kool-Aid, Gatorade, Coca Cola, limonada, chocolate con leche).

- ☐ Nunca
- ☐ Por lo menos una vez por semana, pero no todos los días
- ☐ Una vez al día
- ☐ Dos veces al día
- ☐ Tres veces al día
- ☐ Cuatro o mas veces al día
- ☐ No sé

¿Si su hijo está en el alto riesgo para conseguir caries, con qué frecuencia deberían venir a UCSF para un chequeo y tratamiento del fluoruro?

- ☐ Solamente cuando tienen problema
- ☐ Cada 12 meses
- ☐ Cada 6 meses
- ☐ Cada 3 meses
- ☐ No sé

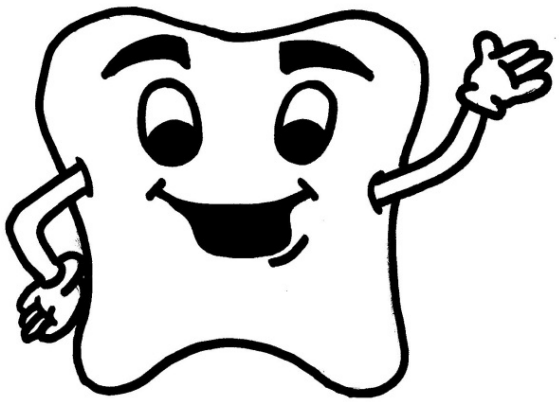
¿A qué edad puede un niño cepillar sus dientes solo/a?

- ☐ 1-2 años de edad
- ☐ 3-4 años de edad
- ☐ 5-6 años de edad
- ☐ 7 o más años de edad
- ☐ No sé

¿Qué debería dar a su hijo para beber cuando tiene sed? Elija la mejor respuesta.

- ☐ Leche
- ☐ Jugo
- ☐ Agua
- ☐ Soda
- ☐ No sé

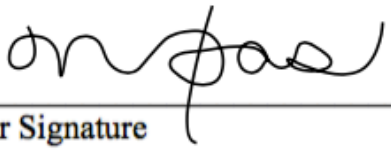
¡Gracias por su participación!



LIBRARY RELEASE FORM

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

5/30/16

Date