

AN IN-DEPTH ANALYSIS OF AFTER-HOURS PEDIATRIC EMERGENCY DENTAL CARE

Erica Ann Brecher

A thesis submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillments of the requirements for the degree of Master in Science in the School of Dentistry (Pediatric Dentistry).

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Approved by:

Martha Ann Keels

Rocio B. Quiñonez

Michael W. Roberts

William Clay Bordley

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ABSTRACT

Erica Ann Brecher: An In-Depth Analysis of After-Hours Pediatric Emergency Dental Care
(Under the direction of Michael W. Roberts and Martha Ann Keels)

Objectives: To examine after-hours emergency dental care guidelines and assess related practice patterns of pediatric dentists (PD) and general dentists (GD).

Methods: State and national guidelines were examined for language pertaining to after-hours emergency care. A 29-item survey was distributed to PD and GD in North Carolina, assessing demographics and after-hours practice patterns. Respondents were called to validate reported after-hours protocol.

Results: Most states followed American Dental Association guidelines, suggesting dentists make reasonable arrangements for the emergency dental care of patients. Eighty-six(46%) PD and 1199(36%) GD completed the survey. More PD than GD had after-hours protocol, practiced in a group, and shared call. Telephone and survey responses significantly differed for GD but not PD.

Conclusions: Current after-hours emergency guidelines are nonspecific and open to interpretation. More PD than GD provided comprehensive, continuously accessible dental care. These results highlight gaps in emergency dental practice and a breakdown in the dental home.

To my husband, Brad, thank you for supporting me every step of the way and believing in me.
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LIST OF ABBREVIATIONS

AAPD	American Academy of Pediatric Dentistry
ADA	American Dental Association
CDT	Current Dental Terminology
CODA	Commission on Dental Accreditation
ED	Emergency Department
GD	General Dentists
NC	North Carolina
NCBDE	North Carolina Board of Dental Examiners
NCDS	North Carolina Dental Society
PD	Pediatric Dentists

INTRODUCTION

The Dental Home and Ethical Considerations

The concept of the dental home was modeled after the medical home concept proposed by the American Academy of Pediatrics in 1992. It was concluded that the medical care of children is best managed when there is an established relationship between child and practitioner. First defined by Nowak and Casamassimo in 2002, the dental home is defined as the “ongoing relationship between dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated and family-centered way.”^{1,2} “Continuously accessible” is a key term in the definition of the Dental Home. It cannot be considered adherence to American Academy of Pediatric Dentistry (AAPD) guidelines if dentists fail to provide emergency services for their patients, as this fall under the category of comprehensive care.

Considerations in Emergency Pediatric Dental Treatment

Over the past decade there has been a rise in the number of patients seeking health care in emergency departments (ED) across the USA, and specifically a disproportionate increase in dental-related ED visits (41% dental vs. 13% overall).³ Specifically for the pediatric population, A 5-year retrospective study found a 121% increase in dental ED visits from 1997-2001, disproportionate to the overall increase in ED visits (28%).⁴

The population of pediatric patients seen in the ED is somewhat divided between those with and without a dental home. Rowley and colleagues determined that of those pediatric

patients utilizing the ED for traumatic injuries 38% had no dentist of record; in 33% of cases the dentist was unavailable and in 6% of cases the dentist refused to see the patient. For non-traumatic dental conditions 35% had no dentist of record; in 21% of the cases the dentist was unavailable and in 8% of cases the dentist refused to see the patient.⁵

For patients with a dental home, scarce literature exists on the availability of private practice dentists for after-hours care. Friedland et al conducted a survey of after-hours emergency coverage by private practitioners in Massachusetts that most closely resembles the proposed study. In a survey of all specialties, the study found pediatric dentists to have the 3rd highest prevalence of providing emergency care and/or referral instructions (83.9%), following endodontists and oral surgeons. Overall they concluded that 30.8% of dentists (all specialties) provided no emergency contact information. A typical answering machine message was: “You have reached Dr. X’s office. Our hours are 8:30am to 5:00pm. Please call back during office hours.”⁶

Patients without access to their dental homes after-hours are forced to seek dental care elsewhere when in need of treatment or assessment outside of normal business hours. Primarily, these patients tend to seek dental care in the ED where they can fail to obtain the highest standard of care. Most EDs are not staffed with a dentist and are woefully unequipped to handle any dental emergency. In a recent study conducted in Massachusetts it was found that 50% of ED’s had onsite dental coverage, however only 12.5% (1 out of the 8 EDs that had coverage) was by a pediatric dentist. Off-site 24-hour dental coverage was available at 43.8% of the hospitals surveyed. None of the EDs had a written protocol for handling traumatic dental injuries.⁷

When faced with dental emergencies, medical ED doctors are forced to triage and manage these situations to the best of their abilities. In a survey of ED physicians Needleman et al found that they overall had a poor understanding of dental trauma management. While physicians had a solid comprehension of luxation and avulsion, answering 61-89% of questions correctly, their knowledge of dental fractures, both uncomplicated and complicated was poorer (55.4%).⁷

In addition to the likely compromised dental care rendered in the ED setting, there is also an unnecessary increase in health care costs incurred. These dental patients represent a highly inefficient use of limited hospital resources, taking time away from more appropriate care that needs to be managed in the ED.⁸ The ED may not be the most efficacious or cost-effective locale for management of dental problems.

Timing of Emergencies

The literature shows clear patterns concerning when patients may utilize the ED for dental treatment. Trauma is most frequent during the spring and summer months, while caries and non-traumatic conditions show little monthly variation.⁵ Outside of normal office hours, the busiest time tends to be in the evening, from 5:30-8:30pm.⁹ Only a small fraction (27%) of dental ED visits tend to occur during times when dental offices are typically open.¹⁰ The majority of after-hours visits tend to occur during the week rather than on the weekend.¹¹⁻¹²

Types of Dental Problems Seen in the Emergency Department

According to the literature, 26-51% of ED dental utilization is due to trauma.^{4,5} Ladrillo et al reported that those who came to the ED after-hours were more likely to be diagnosed with

traumatic conditions than those who visited during normal office hours.⁴ Subjects older than 5 years were less likely to be diagnosed with traumatic conditions than those younger than 5 years.⁴ Regarding non-traumatic conditions, studies have reported up to 79% of ED dental visits are due to non-traumatic conditions, namely dental caries.^{4,13} When patients presented to the ED for non-traumatic conditions, pain was the most common chief complaint (53%) followed by facial swelling (26%).¹¹

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SPECIFIC AIMS

Overall the gaps in knowledge are quite striking. It would be beneficial to have a better understanding of the standards set forth by our governing, national organizations and of the ethical obligations required by dentists regarding after-hours emergency care for their patients. The literature is somewhat varied in terms of defining the patient population who seeks dental care in the ED. We would like to obtain a better understanding of how patients, specifically those with a dental home, obtain after-hours emergency care. And finally, in order to comprehend possible barriers to obtaining after-hours care for patients with a dental home, we must also understand how private practice offices provide after-hours care for their patients.

1. To examine the professional guidance given by state and national organizations regarding the accessibility of after-hours emergency dental care.
2. To investigate the current policies of private dental offices in North Carolina regarding after-hours emergency dental care for children.
3. To investigate the reported practices of private dental offices in North Carolina regarding the delivery of after-hours emergency dental care.

A Policy Review of After-Hours Emergency Dental Care Responsibilities

INTRODUCTION

Over the past decade there has been a rise in the number of patients seeking dental care in hospital emergency departments (ED) across the United States, which is disproportionate to ED visits for other health conditions.¹⁻³ Dental-related ED visits have nearly doubled from 2000 to 2010.⁴ When examined by age, the most significant increase occurred in young adults, while visits for children have remained relatively stable. A decrease in visits for those age 19-25 years has been attributed to the Affordable Care Act and the alleviation of some cost barriers.¹ However, an earlier study found a 121% increase in pediatric dental-related ED visits from 1997-2001 that could not be explained by insurance status because 78% of the study subjects had insurance.² It is estimated that up to 79% of dental-related ED visits could be managed outside of a hospital, in the dental home.⁵

The dental home is defined as the “ongoing relationship between dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated and family-centered way.” The concept of the dental home was modeled after the medical home, proposed by the American Academy of Pediatrics in 1992. It was concluded that the medical care of children is best managed when there is an established relationship between child and practitioner.⁶ When patients cannot access their dentist for emergency care, we have failed to achieve the continuously accessible goal of the dental home.^{3, 7} Scarce literature exists on the availability of private practicing dentists for after-hours care of patients with a dental

home. A previous study found that approximately one third of dentists do not provide after-hours emergency contact information.⁸

The purpose of this brief communication was to examine professional guidelines and/or requirements of state and national dental organizations regarding the responsibility of dentists for after-hours emergency dental care. The communication of these guidelines has important implications for the standards of dental care for the public as it relates to the delivery of emergency care.

METHODS

We examined after-hours emergency care guidelines established by (1) National professional organizations, (2) Specialty boards, and (3) State dental boards. The after-hours emergency dental care policies outlined by national dental professional organizations and all 9 specialties recognized by the American Dental Association (ADA) were examined. The state dental board guidelines pertaining to after-hours emergency care of all 50 states were also examined. Information was obtained from publicly available guidelines and bylaws. Pertaining to state guidelines, information was obtained from the following three sources: (1) “Requirements for the Practice of Dentistry and Dental Hygiene,” as found in the state specific Board of Registration in Dentistry, (2) “Code of Ethics” for the state’s dental society; or (3) other online sources including websites for state dental societies and/or state board of dental examiners. If specific language addressing after-hours emergency care was not found in one of these resources, it was assumed that no specific guidelines were in place. The language of any existing written guidelines for each state was categorized as (1) no specific written guidelines, (2) specific language regarding ethical guidelines that defers to the ADA guidelines obtained

from the national professional organization review, and (3) Specific written guidelines, apart from the ADA guidelines, pertaining to the management of after-hours emergency care.

Descriptive statistics were calculated. The after-hours emergency policies of the national professional organizations, dental specialties, and states were summarized and compared.

RESULTS

Table 1.1 indicates the after-hours emergency statements for national professional dental organizations and specialties, showing the variability among them. The policies dictated by the ADA and American College of Dentists are listed in Table 1.1 and represent the responsibilities of members regardless of specialization. Among the 9 ADA-recognized specialties Oral and Maxillofacial Radiology, Prosthodontics, and Public Health have no specific guidelines. Oral and Maxillofacial Surgery has the most stringent guidelines.

The remainder of Table 1.1 describes the after-hours emergency care policies of the 11 states with specifically outlined guidelines, apart from the ADA. Of these, only 4 states (Arizona, Arkansas, Colorado and Florida) have policies that are not re-statements of the ADA Code of Ethics, albeit the concepts are highly similar. Figure 1.1 depicts after-hours emergency dental care guidelines for all 50 states.

DISCUSSION

This brief communication is the first comprehensive examination of national after-hours emergency protocols and guidelines for dentists and it serves as an important basis for future policy implications. Our findings expose inconsistencies between states. Many states have chosen to defer to the ADA guidelines, which are nonspecific, leaving “reasonable

arrangements” open to interpretation. Additionally, many of the state-specific guidelines tend to be highly similar to the ADA guidelines, simply reiterating the ADA statements.

There was a wide variation among the after-hours emergency guidelines outlined by the ADA recognized specialties. It is not surprising that Radiology and Public Health lack specific guidelines, as these specialties are not often called upon for an emergency dental response. It is surprising, however, that prosthodontists do not have specific after-hours emergency care guidelines in their Code of By-Laws, as their discipline involves the delivery of specialized appliances that may require after-hours attention. Oral and maxillofacial surgeons have the strictest guidelines, as would be expected, as they are often called upon to handle trauma and infection. Pediatric dentists, who also often manage urgent dental needs, have guidelines that go beyond those outlined by the ADA, to include arranging emergency dental care for patients not of record.

Previous research has examined how dentists incorporate the qualities of the dental home into practice. Although the majority of dentists incorporated or intended to incorporate aspects of the dental home into their practice, pediatric dentists were significantly more familiar with the dental home concept. All pediatric and general dentists offered emergency care for patients of record during office hours and 94% and 86% of pediatric and general dentists, respectively, offered the same service after-hours.⁹ For full execution of the concept of the dental home there should be 100% coverage after-hours.

Relying on the ADA as a resource for establishing ethical obligations for after-hours emergency care of patients is problematic, as membership has decreased. As of 2014, only 64.5% of active licensed dentists were members of the ADA. ADA membership by specialty ranges from 17.5% for Endodontists to 51.3% for Dental Radiologists.¹⁰ According to the

AAPD, pediatric dentists have some of the highest membership in their specialty organization at 92-94% (S. Wester, e-mail communication, Feb 2015). While there may be other drivers of the dental home, such as insurance companies and malpractice guidelines, our analysis reveals that many states defer to the ADA as the authority regarding ethical behavior and standard of care. Therefore, while each component may have its own input, there is overall lack of consistency. The dental profession needs greater clarification and consistency of expectations and responsibilities for the after-hours emergency care of patients. Conflicting language among state, national, and specialty organizations promotes confusion, and ultimately the inability to meet our obligations to our patients.

In addition to policy implications there are potential legal implications for dentists failing to perform after-hours emergency dental treatment. While some states, like North Carolina, define malpractice in accordance to the standards of care as it relates to professionals with similar training and experience located in similar communities under similar circumstances (N.C. Gen. Stat. § 90-21.12, Standard of Health Care) other states like New York have more specific laws related to malpractice that seem to indicate that a lack of after-hours emergency care could imply malpractice (NY CLS Educ § 6530(30), Definitions of Professional Malpractice). While this study does not examine nor discuss dental liability in each state, it is important to note that dentists must be aware of their legal and ethical responsibilities when treating patients and operating as a practitioner in a private practice setting.

Study limitations include the ability to gather data from publicly available sources as some states and specialties may have policies only visible to members. But, we performed the steps that a reasonable dentist may pursue to determine what their ethical obligations are to their patients. Additionally, although there is no clear pattern among the states, it may be of value to

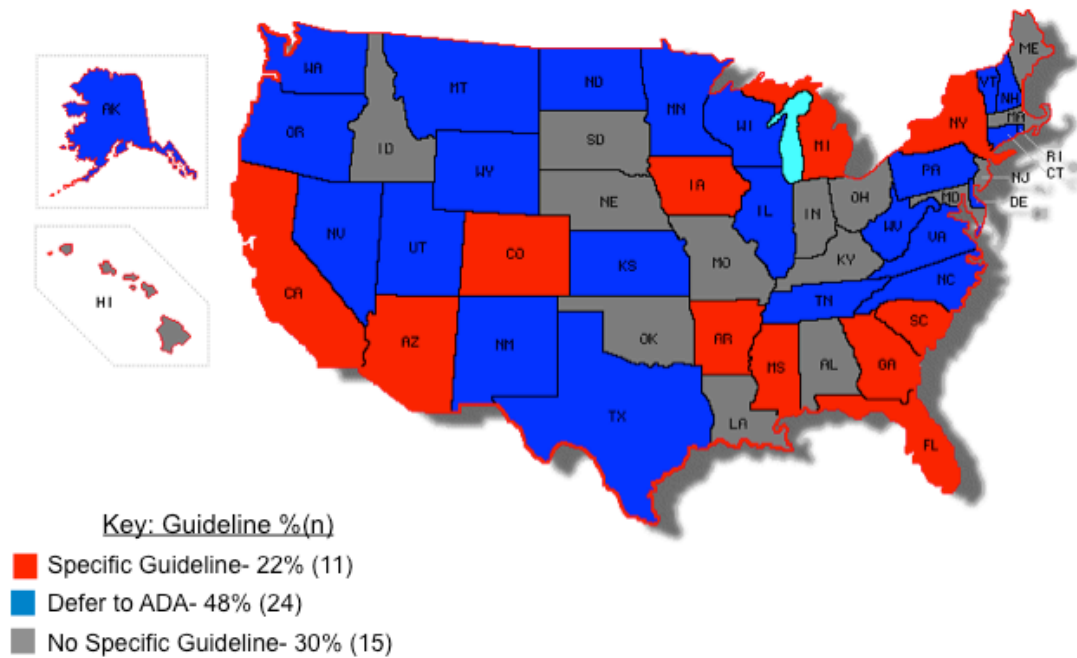
determine if the state guidelines vary by population size, number of emergency medical facilities, number of active dentists, or other associated factors. For future studies, it would be prudent to examine if there is any correlation between dental-related ED visits and states lacking specific after-hours emergency dental care guidelines.

These findings serve as an important basis for future policy recommendations, as all patients deserve a comprehensive and continuously accessible dental home. Therefore, a national policy should address the standardization of after-hours emergency dental care protocols regardless of the specific provider's affiliation. On a practice level, it may be prudent for providers to implement and regularly examine their practice after-hours protocols as part of quality improvement for practice management. Consistent messaging regarding the responsibilities of dentists, regardless of professional affiliation, is critical for a reliable and continuously accessible dental home and decrease dental-related ED costs.

TABLE 1.1: After-Hours Emergency Dental Policies

	National Organization	After-Hours Emergency Care Policy
National Organization	American Dental Association (ADA)	Dentists are obliged to make reasonable arrangement for the emergency care of their patients of record.
	American College of Dentists (ACD)	A dentist should be available, within reason, to address acute dental conditions...the patient's health and comfort must be the dentist's primary concern, not compensation or convenience.
Specialty Organization	American Academy of Oral and Maxillofacial Pathology (AAOMP)	The ethical and professional conduct of the Members or Fellows shall be governed by the Codes of Ethics of the American Dental Association and of the Academy.
	American Academy of Oral and Maxillofacial Radiology (AAOMR)	No Specific Guidelines
	American Academy of Pediatric Dentistry (AAPD)	When consulted for patients of record and not of record, the dentist should make reasonable arrangements for emergency dental care. Dentists shall provide instructions to the parent for accessing emergency care.
	American Academy of Periodontology (AAP)	Abide by the American Dental Association's Principles of Ethics and Code of Professional Conduct.
	American Association of Endodontists (AAE)	The principles of ethics and professional conduct of this Association shall be the Principles of Ethics and Code of Professional Conduct of the American Dental Association.
	American Association of Oral and Maxillofacial Surgery (AAOMS)	An oral and maxillofacial surgery office...provides 24 -hour coverage by an oral and maxillofacial surgeon who is within a reasonable distance and/or response time of the facility for the administration of emergency care.
	American Association of Orthodontists (AAO)	Abide by the Principles of Ethics and the Code of Professional Conduct of the American Dental Association and of the American Association of Orthodontics.
	American Association of Public Health Dentistry (AAPHD)	No Specific Guidelines
	American College of Prosthodontists (ACP)	No Specific Guidelines
State-Specific Policies	Arizona	A dentist of record shall be available to the patient through the dentist's office, an emergency number, an answering service, or a substituting dentist.
	Arkansas	An operator shall maintain an official telephone of record that shall be accessible 24 hours per day.
	California	A dentist has the obligation to make reasonable arrangements for the emergency care of his or her patients of record. A dentist has the obligation, when consulted in an emergency by a patient not of record, to make reasonable arrangements for emergency care of that patient.
	Colorado	The Colorado Board of Dental Examiners defines access to after hours care and emergency care as the availability of the professional by the protocols consistent with the character of the practice and standards within the local community.
	Florida	It is the responsibility of every dentist practicing in this State to provide, either personally, through another licensed dentist, or through a reciprocal agreement with another agency, reasonable 24 hour emergency services for all patients under his continuing care.
	Georgia	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. For purposes of this rule, a "patient of record" is defined as a patient who has received dental treatment on at least one occasion within the preceding year.
	Iowa	Dentists shall make reasonable arrangements for the emergency care of their patients of record. Dentists shall, when consulted in an emergency by patients not of record, make reasonable arrangements for emergency care.
	Michigan	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. Dentists shall be obliged when consulted in an emergency by patients not of record to make reasonable arrangements for emergency care.
	Mississippi	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. Dental shall be obliged when consulted in an emergency by patients not of record to make reasonable arrangements for emergency care.
	New York	Dentists shall be obligated to make reasonable arrangements for the timely emergency care of their patients by a licensed dentist. Dentists are obligated, when consulted in an emergency by persons who are not their patients, to recommend reasonable arrangements for emergency care.
	South Carolina	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. Dentists shall be obliged when consulted in an emergency by patients not of record to make reasonable arrangements for emergency care.

FIGURE 1.1: State Guidelines of After-Hours Emergency Dental Care



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Dental Emergency Practice Patterns Among Pediatric and General Dentists

INTRODUCTION

Emergency department (ED) use for dental care has risen disproportionately to ED visits for other health-related conditions.¹⁻³ According to a research brief released by the American Dental Association (ADA), dental-related ED visits have nearly doubled from 2000 to 2010.⁴ It has been estimated that up to 79% of dental-related ED visits could be managed outside of a hospital.⁵ The population of pediatric patients seen in the ED is somewhat divided between those with and without a dentist of record. Rowley and colleagues determined that of those pediatric patients utilizing the ED for traumatic injuries, 38% had no dentist of record; in 33% of cases the dentist was unavailable and in 6% of cases the dentist refused to see the patient. For non-traumatic dental conditions 35% had no dentist of record; in 21% of the cases the dentist was unavailable and in 8% of cases the dentist refused to see the patient.⁶

The concept of the dental home is defined by the American Academy of Pediatric Dentistry (AAPD) as the “ongoing relationship between dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated and family-centered way.”⁷⁻⁸ Scarce literature exists on the availability of private practicing dentists for after-hours care of patients with a dental home. A previous study found that approximately one third of dentists do not provide after-hours emergency contact information.⁹ When patients cannot access their dentists for emergency care, we have failed to achieve the comprehensive goal of the dental home.^{3,10-11} These dental patients represent a highly inefficient

use of limited hospital resources, taking time away from more appropriate care that needs to be managed in the ED.¹²

The purpose of the study was to investigate how patients of record obtain after-hours emergency dental care and the ability of dentists to provide a comprehensive, continuously accessible dental home as defined by the AAPD.

METHODS

A cross sectional survey was electronically distributed to pediatric dentists (PD) and general dentists (GD) in North Carolina (NC) to assess the after-hours accessibility of emergency dental care for children. The study population was limited to actively practicing dentists in NC who provide dental care for children under 12-years-old. We validated our survey findings with telephone calls to a random sample of the study population. This study was approved by the Institutional Review Board of the University of North Carolina at Chapel Hill (UNC-CH), study #14-0758. The study methodology is outlined in Figure 1.

Study population.

The study population consisted of all PD and GP with an active NC dental license. Email addresses were obtained from the AAPD, North Carolina Academy of Pediatric Dentistry, and the North Carolina Board of Dental Examiners (NCBDE). Inclusion criteria were outlined and confirmed in the survey. Inclusion criteria consisted of an active NC dental license, a current e-mail address listed in one of the three sources previously stated, dentists who report treating children under the age of 12, and dentists who are designated as a PD or GD with the NCBDE. Exclusion criteria included: full-time faculty members at UNC-CH, dentists who practice with

the Indian Health Service or military, are retired, provide locum tenens work, and those currently completing a post-graduate program such as specialty residency, general practice residency or advanced education in graduate dentistry program.

Part I: Survey Development and Design

The survey was pilot tested by 3 PD and 3 GD. The final survey instrument consisted of 29 items and took approximately 5-10 minutes to complete, assessing demographic information, dental practice characteristics, after-hours emergency dental care protocols, membership in various dental care organizations, and familiarity with the respective ethical codes and guidelines. The dental care organizations assessed were the North Carolina Dental Society (NCDS), ADA, and AAPD; the ethical codes and guidelines are specified in Figure 2.

Survey distribution and data collection occurred from September through November 2014. The survey was sent electronically via email using Qualtrics Survey Software, ©2014. After initial e-mail contact in September 2014, 2 additional reminder e-mails were sent to non-responders in October and November 2014.

Part II: Telephone Call Follow-up

To validate the actual responses of PD and GD to an after-hours dental emergency for a patient of record, telephone calls were made to randomly selected PD and GD who completed the survey (Figure 1). Survey subjects consented to follow-up telephone calls during the written survey, and only those were included. Telephone numbers were obtained from public records including telephone directories, practice websites, and the NCBDE.

Telephone calls were completed from March through April 2015 and were made at a consistent time and day of week, outside of business hours. Although we expected to reach a voicemail recording, a script was prepared in the event that an actual person, such as from a live answering service, answered the phone. If a voicemail recording was reached, no message was left. The type of response for each subject was documented and categorized (Figure 1). The responses were further categorized as favorable or unfavorable. A response was considered favorable if it was likely to yield dental treatment or consultation, and unfavorable if it was unlikely to produce instruction or care by a dentist.

Statistical Analysis

Since our survey was sent to all PD and GD dentists in NC, power and sample size calculations were not required. Statistical analysis was completed using SPSS (version 22.0). Descriptive statistics, Chi-Square and Mann-Whitney tests were used to compare the PD and GP groups. Post-hoc Chi-square tests were used to analyze specific pair-wise comparisons. Concordance between survey and telephone responses for PD and GD was analyzed. Post-hoc tests were used to assess all pairwise comparisons for the survey and telephone responses. Due to the high number of variables and associations examined, the level of significance was set at $P<.01$.

RESULTS

Part I

Surveys were sent to 3496 dentists; 1289 surveys were returned, yielding an overall response rate of 36%. The response rates for the PD and GD groups were 46% and 36%,

respectively. Eighty-six PD (100%) and 1015 GD (85%) met the inclusion criteria and were included in the analysis (Figure 1). Partially completed surveys were included in the analysis.

Table 1 presents the demographic information of survey respondents. The practice setting of PD and GD was significantly different: the majority of PD practiced in a group setting as compared to GD (PD-71.1%, GD-40.9%; $P<.001$). Most GD (71.7%) had no formal training beyond dental school. PD, not surprisingly, saw significantly more pediatric patients per day ($P<.001$). There was no difference in proximity to emergency medical facilities between the two groups ($P=.07$).

The professional affiliations of the PD and GP are also presented in Table 1, and their respective after-hours emergency guidelines are presented in Figure 2. At the state level, there was no difference in membership ($P=.01$) or familiarity with the NCDS code of ethics ($P=.11$). Few respondents stated they were very familiar with the NCDS code of ethics. Significantly more PD were members of the ADA (PD-95.2%, GD-83.8%, $P=.006$) and AAPD (PD-98.8%, GD-1.6%, $P<.001$). Although most dentists responded that they were moderately familiar with the ADA Code of Ethics (PD-36.1%, GD-46.8%), PD were significantly more familiar with the AAPD policy on emergency oral care for infant, children, and adolescents ($P<.001$).

The dental emergency management characteristics of the sample are presented in Table 2. Significantly more PD had an after-hours emergency protocol in place compared to GD (PD-95.3%, GD-56.7%; $P<.001$). The majority of GD managed call by themselves, in contrast to PD who shared call with other PD in their practice or community; although most shared call with fewer than 5 other dentists. Few PD and GD—2.3% and 6.1%, respectively—stated that they did not take call for the patients of record; of these, 25% practiced in a public health setting. For dentists with an after-hours emergency protocol, the majority allowed patients to contact them

via pager, cellphone, or specific emergency voicemail (PD-82.1%, GD-72.8%). There were no statistically significant associations between the size of the call group and type of after-hours emergency response to a patient of record. Most dentists allowed patients to send clinical photos via email or text message although more were receptive to photos via text message (PD-80.2%, GD-55.6%) than email (PD-47.7%, GD-37.0%).

Part II

The results of the telephone follow-up analysis are presented in Table 3. Following receipt of the survey, the responses to the survey question displayed in Figure 3 were re-categorized because some dentists stated that they previously provided their patient with an after-hours contact number. Further, the results of the telephone calls yielded a new category: some dentists did not allow voicemail recordings. Telephone responses significantly differed from survey results for GD ($P<.001$) but not PD ($P=.14$). Ninety-two percent of PD had a favorable response to patients of record when contacted via telephone after-hours, compared to only 63% of GD.

DISCUSSION

This study is the first to capture the after-hours dental emergency patterns of practicing dentists and to report on after-hours emergency dental care management outside of a hospital setting. The primary focus was to determine how pediatric patients, with a dentist of record, obtain after-hours emergency dental care, as outlined by the AAPD dental home definition and policy on emergency oral care for infant, children, and adolescents⁷⁻⁸. Children are at risk to experience dental trauma and infections that may require attention outside of business hours,

therefore emphasizing the importance of a dental home for the pediatric population^{2,6}. While there has recently been an abundance of studies examining the recent surge of hospital ED use for dental care,^{1,4-5} this study examined how these behaviors manifest in clinical practice for patients with a dental home.

The results of this study illustrate that more PD than GD provided a comprehensive, continuously accessible dental home. Although most dentists have an emergency protocol in place and make themselves available to patients of record for after-hours dental emergencies, the proportion is significantly higher for PD. Because there was no difference in proximity to an emergency medical facility or practice location between PD and GD, access cannot explain differences in the emergency care practice patterns between the two groups.

Aside from gender, the composition of PD and GD were somewhat different. The GD had been practicing longer, which may help to explain some of the differences within the sample. According to an ADA survey, the percentage of solo practitioners has decreased from 67% to 59%, with specialists accounting for a smaller proportion¹³. New dentists are three times more likely to be employed in a group practice¹⁴. Considering, it is not surprising that PD, who represented younger dentists in the study sample, were more likely to practice in a group. Following this pattern, GD were more likely to take call by themselves, and PD were more likely to share call within their practice or community. Although the size of the practice and call group is a critical consideration that may have implications regarding how after-hours dental emergencies are managed, no association was found.

When a patient of record is able to communicate with their dentist after-hours, the office response and management characteristics differed between PD and GD. The ability of a patient to contact their dentist after-hours via a cell phone, pager, or after-hours emergency voicemail

was the most popular method for all dentists surveyed. Although not statistically significant, more GD responded that they managed after-hours dental emergencies by providing instructions to go to the ED, or allow patients to leave a message on their regular office voicemail which is likely not checked until the next business day. There is significant literature to support the rising trend of individuals seeking dental care in the ED^{1,4-5}. Most EDs do not have dentists on staff nor do the ED physicians have adequate dental training¹¹⁻¹². Referring patients to the ED for dental treatment that can be managed in the office contributes to rising healthcare costs and is an inefficient use of resources⁵.

Although the ineffective use of resources is an important consideration when patients are forced to seek care in the ED, the ethical obligation to patients is one that cannot be overlooked. The NCDS, ADA, and AAPD all have guidelines that address the responsibilities of dentists to their patients of record in the event of a dental emergency. The more significant involvement of PD in organized dentistry at the state and national levels is consistent with findings in the literature. Although there has been an overall decline in the market share of ADA membership—as of 2014, only 64.5% of active licensed dentists reported as members of the ADA—membership for both PD and GD is higher in NC than the national average, with PD involvement higher than GD¹⁵. Although it is not surprising that the study showed a significantly higher proportion of PD AAPD membership, the difference in familiarity with the AAPD policy on emergency oral care for infant, children, and adolescents is disconcerting. In contrast to the 59% of PD stating strong familiarity with the AAPD policy, 79% of GD were not or slightly familiar. It is important to note that this group of GD was solely comprised of dentists that treat children under the age of 12, therefore lack of familiarity and awareness of pediatric guidelines may be a major barrier that explains some dentists' inability to follow through with the ethical

and professional guidelines that dentists agree to uphold¹⁶. Only after increasing awareness of these guidelines can we hope to change attitudes towards our responsibilities to our patients for after-hours care and ultimately affect behavior.

Although not currently in place, with the rising use of telemedicine the ADA has discussed implementing a Current Dental Terminology (CDT) code for services provided via telecommunication (S. Starnes, personal communication, 2 Dec 2015). This CDT could have important implications for after-hours emergency dental management. Utilizing teledentistry via telephone triage services for after-hours emergency care has been tested in Scotland and Japan with promising results¹⁷⁻¹⁸. These studies examined an urgent care center that required patients to call before arriving and found that after consultation by phone, 60.7% of children came in for an exam, whereas 32.3% were managed with only telephone advice¹⁸. It therefore seems that being accessible by telephone is an important consideration, and telephone consultation could contribute to cost containment as well as improved patient satisfaction.

The results of the telephone follow-up analysis supported the results of the survey, indicating that the majority of dentists appeared to be accessible for after-hours dental emergencies. The PD, again, comprised a higher proportion of favorable responses. Not only was there more consistency for PD between the written survey and telephone follow-up, but 92% of PD had a favorable response—in line with a comprehensive, continuously accessible dental home per the AAPD definition—when contacted after-hours. Patients of these PD could reach their provider via pager/cell/emergency voicemail, live answering service or previously provided contact information; in contrast only 63% of GD could be contacted in the same manner. The remaining GD could either not be contacted or referred patients to the ED. This highlights that many pediatric patients are still not afforded access to after-hours emergency dental care and

may be forced to obtain care in the ED, driving up healthcare costs and possibly receiving inadequate care.

The different practice patterns of PD and GD cannot solely be explained by a supposed superior clinical and ethical performance by PD. When examining inconsistencies between survey and written responses, not all of the discordance can be accounted for by shifts in responses from favorable in the survey to unfavorable in the telephone calls. In fact, 18% of GD who responded in the survey that they record a voicemail actually had emergency calls forwarded to a pager, cell phone, or emergency voicemail when confirmed by telephone. While this does reveal some of the inherent difficulties in survey studies, it supports our conclusion that, similar to the survey results, most dentists are available to their patients after-hours.

Study limitations include the survey format. With the rise in popularity of online surveys, survey fatigue is a considerable problem for practicing dentists and can lead to low response rates, non-generalizable results, and selection bias. While a higher response rate would be favorable, the results already highlight significant gaps in access to after-hours emergency dental care. Survey participation was voluntary and those who completed the survey are more likely to be fulfilling their ethical obligations to their patients. Additionally, the survey results can only assess intended or reported after-hours treatment management rather than actual practice in the event of a dental emergency. The telephone follow-up, however, brings us one step closer to evaluating actual practice by validating the written survey results.

In contrast, numerous strengths are noteworthy. This is the first study to capture the reported and actual practice patterns of dentists regarding after-hours dental emergency care. The combination of a survey and follow-up telephone call validate the results. Furthermore, it focuses on patients with a dental home who, ideally, have access to a dentist that could manage their

needs outside of an emergency care facility. Due to the potential to reduce ED utilization and financial burden, the results of this study have important future implications for policy and guideline recommendations. Further research should focus on the motivations for differences in practice patterns and management of after-hours emergencies, with the goal of providing a comprehensive, continuously accessible dental home for all pediatric patients. Now that different after-hours practice patterns regarding the delivery of emergency pediatric dental care have been identified, we need to better understand influences on these behaviors. According to the Commission on Dental Accreditation (CODA) standards for dental education programs, there are no guidelines for teaching emergency dental care responsibility¹⁹. Pediatric dentistry, on the other hand, has specific CODA guidelines outlining experiences in emergency care²⁰. Considering that 72% of the GD who responded to the survey that treat children had no formal training beyond dental school, more education guidance in the predoctoral curriculum addressing emergency care and ethical responsibility would be a critical improvement in dental training. National organizations such as the ADA and AAPD, which provide ethical guidance to dentists, have vague, non-specific guidelines regarding the provision of after-hours emergency care. Increased awareness and great specificity of these guidelines would initiate steps towards broader access to emergency dental care.

This study reveals the need for improvement in access to after-hours emergency dental care in the pediatric population, and also demonstrating that many PD and GD already provide a comprehensive, continuously accessible dental home for their patients of record. Making the dental home accountable for all aspects of care is crucial to reverse the trend of increasing ED use for dental emergencies that can be managed outside of a hospital setting, in the dental home. Pediatric patients have a greater potential to receive appropriate management of dental problems

from a dentist than from an ED physician, which will ultimately lead to higher quality, more cost-effective care.

Conclusions

1. Few dentists have strong familiarity with state and national dental organization after-hours emergency guidelines.
2. The majority of dentists state they provide some form of after-hours emergency care for pediatric patients of record.
3. More pediatric dentists provide a comprehensive, continuously accessible dental home compared to general dentists who report providing dental care to children.

FIGURE 2.1: Overview of Study Methodology

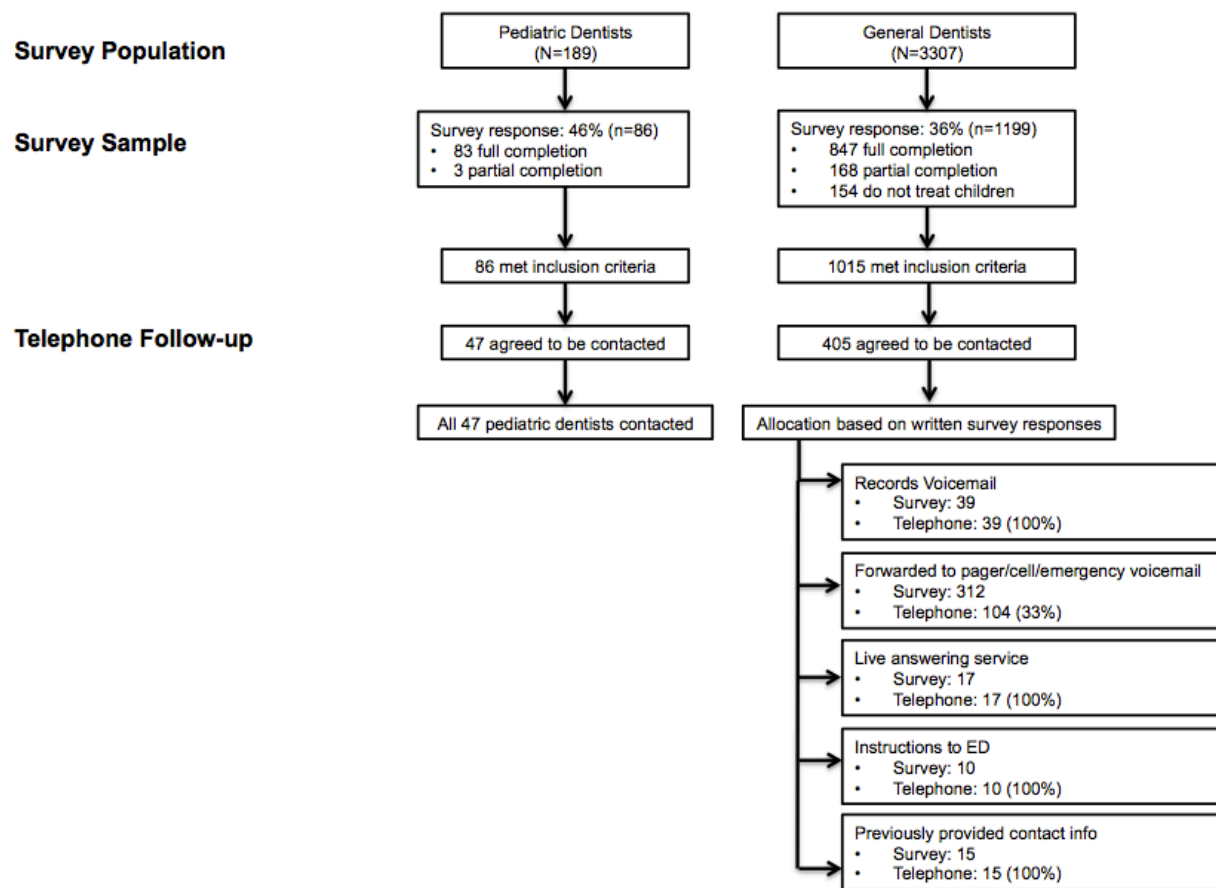


Figure 2.2: Professional Associations and Ethical Guidelines

Professional Association	Emergency Dental Care Guideline
North Carolina Dental Society (NCDS) ¹	Members are expected to adhere to the ADA Principles of Ethics and Code of Professional Conduct.
American Dental Association (ADA) ²	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. Dentists shall be obliged when consulted in an emergency by patients not of record to make reasonable arrangements for emergency care.
American Academy of Pediatric Dentistry (AAPD) ³	Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. Dentists should provide instructions to the parent for accessing emergency care. When consulted for a dental emergency by patients not of record, the dentist should make reasonable arrangements for emergency dental care.

¹Article IX Principals of ethics and code of professional conduct. Constitution of the North Carolina Dental Society, Revised May 2014.

²American Dental Association. Principles of ethics and code of professional conduct. Section 4B: Emergency Service. Revised April 2012.

³American Academy of Pediatric Dentistry. Policy on emergency oral care for infants, children and adolescents. Revised 2012.

Figure 2.3: Survey Question Administered in Survey and Validated in Telephone Follow-up

Question: If a **patient of record** calls your office after-hours with an emergency, what best describes the response of your office?

- A. Office phone records voicemail messages
- B. Office phone provides caller with pager/cell phone #/emergency voicemail
- C. Phone is connected to a live answering service
- D. Voicemail instructions to go to a hospital with Emergency Department for care
- E. Other (please specify) _____

Table 2.1: Demographic Characteristics of the Survey Sample

	All respondents		Pediatric Dentists		General Dentists		
	N	col. %	N	col %	N	col %	p-value*
Total	947	100%	83**	100%	864**	100%	
Gender							.03
Male	651	68.7%	48	57.8%	603	69.8%	
Female	296	31.3%	35	42.2%	261	30.2%	
Practice Type							<.001
Group Practice	412	43.5%	59	71.1%	353	40.9%	<.001
Solo Practice	509	53.7%	23	27.7%	486	56.3%	<.001
Public Health	26	2.7%	1	1.2%	25	2.9%	.30
Years in Practice							.006
Less than 5 years	129	13.6%	20	24.1%	109	12.6%	.002
5-10 years	166	17.5%	18	21.7%	148	17.1%	.22
11-20	229	24.2%	22	26.5%	207	24.0%	.67
21-30	198	20.9%	10	12.0%	188	21.8%	.22
More than 30 years	225	23.8%	13	15.7%	212	24.5%	.04
Insurance Type- mean %							
Private		59.1%		53.8%		59.6%	.01
Self Pay		25.9%		19.5%		26.5%	<.001
Medicaid		13.8%		26.1%		12.6%	<.001
Other		1.2%		0.6%		1.3%	.33
Closest Emergency Medical Facility							.07
Less than 5mi	702	74.8%	69	83.1%	633	74.0%	
5 or more mi	236	25.2%	14	16.9%	222	26.0%	
Pediatric patients per day							<.001
≤10 patients	719	82.3%	0	0%	719	90.1%	
>10 patients	155	17.7%	76	100%	79	9.9%	
Professional Affiliations							
NCDS-member	758	81.1%	76	91.6%	682	80.0%	.01
NCDS Familiarity							.11
Not/Slight familiar	362	38.3%	36	43.4%	326	37.9%	
Mod familiar	395	41.8%	26	31.3%	369	42.9%	
Very familiar	187	19.8%	21	25.3%	166	19.3%	
ADA-member	793	84.8%	79	95.2%	714	83.8%	.006
ADA familiarity							.13
Not/Slight familiar	286	30.2%	27	32.5%	259	29.9%	
Mod familiar	435	45.9%	30	36.1%	405	46.8%	
Very familiar	227	23.9%	26	31.1%	201	23.2%	
AAPD-member	96	10.3%	82	98.8%	14	1.6%	<.001
AAPD Familiarity							<.001
Not/Slight familiar	686	73.1%	11	13.3%	675	78.9%	<.001
Mod familiar	173	18.4%	23	27.7%	150	17.5%	.01
Very familiar	79	8.4%	49	59.0%	30	3.5%	<.001

*Calculated using Chi-square test

**Not all numbers total to 86 (PD) and 1015(GD) due to missing data

Table 2.2: After-hours Dental Emergency Management Characteristics

	All respondents		Pediatric Dentists		General Dentists		
	N	col. %	N	col %	N	col %	p-value*
Total	1090	100%	86**	100%	1004**	100%	
After-Hours Emergency Protocol							<.001
Yes	651	59.7%	82	95.3%	569	56.7%	
No	439	40.3%	4	4.7%	435	43.3%	
Emergency Management							<.001
On call by yourself (solo)	655	60.9%	29	33.7%	626	63.2%	<.001
Share call in practice/community	353	32.8%	55	64.0%	298	30.1%	<.001
Telephone triage service	2	0.2%	0	0%	2	0.2%	.57
Other	4	0.4%	0	0%	4	0.4%	.10
Do not take call	62	5.8%	2	2.3%	60	6.1%	.88
Size of call group							.02
Less than 5 people	244	73.5%	28	58.3%	216	76.1%	.006
5-10 people	47	14.2%	9	18.8%	38	13.4%	.25
More than 10 people	41	12.3%	11	22.9%	30	10.6%	.009
Office Response- Patient of Record							.003
Voicemail recording	136	13.2%	3	3.6%	133	14.1%	.004
Pager/Cell phone/Emergency voicemail provided	756	73.5%	69	82.1%	687	72.8%	.04
Live answering service	67	6.5%	11	13.1%	56	5.9%	.006
Previously provided w/ phone #	35	3.4%	0	0%	35	3.7%	.23
Instructions to ED	31	3.0%	1	1.2%	30	3.2%	.68
Other	3	0.3%	0	0%	3	0.3%	.04
Charge Additional Fee- Patient of record							<.001
Yes	441	43.4%	53	64.6%	388	41.6%	
No	574	56.6%	29	35.4%	545	58.4%	
Allow E-mail and/or Cell Photos							
No	373	37.2%	12	14.3%	361	39.3%	<.001
Yes	630	57.2%	72	83.7%	558	55.0%	<.001
Yes- Text Message	580	57.8%	69	80.2%	511	55.6%	<.001
Yes- E-mail	381	38.0%	41	47.7%	340	37.0%	.04

*Calculated using Chi-square test

**Not all numbers total to 86 (PD) and 1015(GD) due to missing data

Table 2.3: Telephone Follow-up Results

Telephone Response								Total
Survey Response		Favorable Response			Unfavorable Response			
		Forwarded to pager/cell/emerg ency voicemail	Live answering service	Previously provided patient with contact info	Instructions to ED	Record Voicemail	Other- cannot leave voicem ail	
Forwarded to pager/cell/eme rgency voicemail	PD	37	0	0	0	3	0	40
	GD	90	1	1	1	11	0	104
Live answering service	PD	6	0	0	1	0	0	7
	GD	8	6	0	0	3	1	18
Previously provided patient with contact into	PD	0	0	0	0	0	0	0
	GD	2	0	1	0	11	1	15
Instructions to ED	PD	0	0	0	0	0	0	0
	GD	0	1	0	5	4	0	10
Record Voicemail	PD	0	0	0	0	0	0	0
	GD	7	0	0	2	23	1	33
Total		150	8	2	9	55	3	227

Pediatric Dentist (PD): Favorable Response- 92%; Unfavorable Response- 9%

General Dentist (GD): Favorable Response- 63%; Unfavorable Response- 37%

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APPENDIX: SURVEY INSTRUMENT

1. Do you treat children less than 12 years of age in your practice?

- ☐ Yes- please proceed to next question
- ☐ No- SKIP TO END OF SURVEY Thank you for your time!

After-Hours Protocol

2. Do you have a protocol for after-hours urgent/emergent care?

- ☐ Yes
- ☐ No

3. What best describes how you typically manage after-hours dental emergencies in your practice for **patients of record**?

- ☐ On call by yourself
- ☐ Share call with other dentists in your practice or community
- ☐ Other (please specify) _____
- ☐ Do not take call

4. What best describes how you typically manage after-hours dental emergencies in your practice for **patients NOT of record**?

- ☐ On call yourself (solo)
- ☐ Share call with other dentists in your practice or community
- ☐ Other (please specify) _____
- ☐ Do not take call

5. If a **patient of record** calls your office after-hours with an emergency, what best describes the response of your office?

- ☐ Office phone records voicemail messages
- ☐ Office phone provides caller your pager or cell phone #
- ☐ Phone is connected to live answering service
- ☐ Voicemail instructions to go to a hospital with Emergency Department for care
- ☐ Other (please specify) _____

DISPLAY Q6 IF Q3=SHARE CALL OR Q4=SHARE CALL
--

6. How large is your call group?

- ☐ Less than 5 people
- ☐ 6-10 people
- ☐ More than 10 people

DISPLAY Q7 THROUGH Q15 IF Q3 IS NOT "DO NOT TAKE CALL"

7. Do you charge an additional fee to see **patients of record** after-hours?

- ☐ Yes
- ☐ No

8. Do you charge an additional fee to see **patients NOT of record** after-hours?

- ☐ Yes
- ☐ No
- ☐ I do not see patients NOT of record after-hours

9. Do you allow patients of record to send you photos after-hours to triage emergencies? (*Check all that apply*)

☐ No ☐ Yes- Text Message ☐ Yes- E-mail

10. When **patients of record** are seen in your office after-hours, which additional persons are typically present, aside from the patient and their guardians/family?

☐ I am alone, no one else is present ☐ Associate
☐ Assistant ☐ Your friend/family member

11. What best describes the significance of your concern for your own **personal safety**, as a provider, when seeing patients after-hours?

☐ Not at all concerned ☐ Slightly concerned
☐ Moderately Concerned ☐ Very Concerned

12. What best describes the significance of your concern for **having a legal witness**, as a provider, when seeing patients after-hours?

☐ Not at all concerned ☐ Slightly concerned
☐ Moderately Concerned ☐ Very Concerned

13. How would you categorize the proportions of your after-hours emergencies in the past 12-month period? (*Total must equal 100%*)

_____ % Trauma
_____ % Caries-related
_____ % Orthodontic-appliance related
_____ % Other (i.e. Teething, Ulcers, Primary herpetic gingivostomatitis, exfoliating primary teeth)

PLEASE CONTINUE TO NEXT QUESTION

For questions #14 and 15: Please select the answer that best describes your response to each clinical scenario if you are contacted by a **patient of record** after-hours.
(If you share call, please assume that YOU are the dentist on call)

14. PRIMARY DENTITION Case Scenarios

For cases #1-7, the patient is a healthy 2-year-old child

Clinical Scenario	Response		
	See Urgently	Refer to emergency medical facility	Provide instructions over the phone/Defer care to next clinic day
Case #1 Fracture, incisor (enamel only)			
Case #2 Fracture, incisor (exposed dentin)			
Case #3 Fracture, incisor (pulp exposure)			
Case #4 Palatal displacement, incisors			
Case #5 Intrusion, incisors			
Case #6 Avulsion, incisor			
Case #7 Sub-gingival bleeding, erythematous gingiva and fever >101 degrees			
For cases #8-10, the patient is a healthy 4-year-old child			
Case #8 Molar with localized swelling, NO signs systemic infection			
Case #9 Molar with extraoral swelling and fever >101 degrees			
Case #10 Loose band and loop			

15. PERMANENT DENTITION Case Scenarios

For cases #11-19, the patient is a healthy 9-year-old child

Clinical Scenario	Response		
	See Urgently	Refer to emergency medical facility	Give homecare instruction over the phone/Defer care to next clinic day
Case #11 Fracture, incisor (enamel only)			
Case #12 Fracture, incisor (exposed dentin)			
Case #13 Fracture, incisor (pulp exposure)			
Case #14 Palatal displacement, incisors			
Case #15 Intrusion, incisors			
Case #16 Avulsion, incisor			
Case #17 Loose lower lingual holding arch			
Case #18 Molar with localized swelling, NO signs systemic infection			
Case #19 Molar with extraoral swelling and fever >101 degrees			
For case #20, the patient is a healthy 12-year-old child			
Case #20 Soreness in the lower right posterior when chewing			

Guidelines

16. Which of the following organizations are you a member of, if any? (*Check all that apply*)

- ☐ American Dental Association (ADA)
☐ American Academy of Pediatric Dentistry (AAPD)
☐ North Carolina Dental Society (NCDS)
☐ None of the above

17. How familiar are you with the following Codes/Polices?

	Not familiar	Slightly familiar	Moderately familiar	Very familiar
ADA Code of Ethics				
AAPD policy on emergency oral care for infants, children, and adolescents				
NCDS Code of Ethics				

Additional Information

18. What is your gender? ☐ Male ☐ Female

19. Which of the following best describes your primary practice type?

- ☐ Group practice ☐ Solo private ☐ Public Health
☐ Other (please specify) _____

20. How many years have you been in practice?

- ☐ Less than 5 years ☐ 6-10 years ☐ 11-20 years ☐ 21-30 years
☐ 31-40 years ☐ More than 40 years

20. Please indicate your designation.

- ☐ General Dentist ☐ Pediatric Dentist (specialist)

21. Please indicate any formal training you have received post-dental school. (*Check all that apply*)

- ☐ No additional training beyond dental school
☐ AEGD
☐ GPR
☐ Pediatric Dental Residency-Hospital-based
☐ Pediatric Dental Residency-University/Hospital Combined

22. Approximately how many children are seen in your practice in a typical day?

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23. What percentages of patients in your practice fall into the following categories?

(Total must equal 100%)

_____ % Private insurance

_____ % Self-pay

_____ % Medicaid

_____ % Other

24. What is your primary practice location?

☐ Urban

☐ Rural

☐ Suburban

☐ Small town/city

25. Please indicate the distance, in miles, of the closest emergency medical facility to your practice

☐ Less than 5 mi

☐ 5-10 mi

☐ 11-20 mi

☐ More than 20 mi

26. Is there a dentist on call at the closest emergency medical facility?

☐ No

☐ Yes

☐ I don't know

27. [DISPLAY Q27 ONLY IF Q25=LESS THAN 5 MI OR 5-10 MI] What is the highest-level emergency medical care facility within 10 miles of your practice?

☐ Urgent Care Facility

☐ Community Hospital

☐ Tertiary Care Facility

28. May we contact you to follow-up on your responses to the survey?

☐ Yes

☐ No

DISPLAY Q29 IF Q28=YES

29. How should we reach you?

E-mail : _____

Phone: _____

If by phone, please indicate your preferred days/times to reach you:

THANK YOU FOR YOUR PARTICIPATION IN THE SURVEY