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# The Value of Postoperative Appointments following Full Mouth Dental Rehabilitation under General Anesthesia

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# The Value of Postoperative Appointments following Full Mouth Dental Rehabilitation under General Anesthesia

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Dentistry at Virginia Commonwealth University.

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## Abstract

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Purpose: Follow-up appointments after full mouth dental rehabilitation under general anesthesia (GA) have been suggested as a method for preventing future caries and need for repeat treatment under GA. The purpose of this study is to determine current practitioner and parental perceived value of the postoperative GA appointment.

Methods: Three separate surveys were administered for this study. The pre-appointment survey asked about the guardian's desire to have a follow-up appointment. At the follow-up appointment, the post-appointment survey ascertained the level of patient satisfaction with their follow-up appointment and postoperative experience. American Academy of Pediatric Dentistry (AAPD) members were e-mailed a survey asking them to indicate their clinical practice concerning the offering of routine follow-up appointments after general anesthesia.

Results: Most AAPD respondents (72%) reported scheduling a follow-up visit. The most commonly selected challenge was the high no-show rate (46%), followed by the appointment being non-reimbursable (34%). Providers generally agreed or strongly agreed that the postoperative appointments are important (69%) and that it should be a reimbursable visit (73%).

Guardians who attended the follow-up appointment reported pain as the most common symptom (41%). The second most common was bleeding (19%). Before the GA, most frequent answer parents indicated as the topics they would like to discuss at their follow-up appointment was "how to prevent future caries" with 67%. Of those who attended follow-up, 96.3% agreed or strongly agreed that the postoperative visit was useful.

Conclusion: Both pediatric dentists and guardians of patients undergoing FMDR under GA agree the postoperative follow-up visit is valuable. The follow-up appointment may be beneficial for continued patient management of the chronic carious disease process.

## Introduction

The most common chronic disease of children in the United States is dental caries, occurring five times more frequently than asthma.[1] Not only can dental caries cause pain; absences from school; and problems with eating, sleeping, speaking, and self-esteem, but these children are also at a higher risk for developing more dental caries in the future.[2] The American Academy of Pediatric Dentistry (AAPD) defines early childhood caries (ECC) as the presence of one of more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a preschool-age child between birth and 71 months of age.[3] Full mouth dental rehabilitation (FMDR) under general anesthesia (GA) is a common approach for management of ECC. General anesthesia allows pediatric dentists to treat extensive caries on very young patients, who usually have difficulty cooperating for conventional dental appointments. The goal of this method is to surgically treat the caries in a single visit while avoiding the possible trauma associated with multiple dental visits at a young age. However, consistent preventative measures and disease management is necessary in order to provide children with a long-term caries-free childhood.

### *FMDR Follow-up Attendance*

Since patients with ECC are highly susceptible to new carious lesions in both primary and permanent dentitions,[4,5] treatment planning decisions under general anesthesia can become complex. Treatments such as composite resin, sealant, and fluoride under GA require considerably more retreatment due to recurrent or new caries when compared to stainless steel crowns.[6] More aggressive treatment modalities are often considered to reduce the likelihood of additional treatment for this population, often under repeat sedation or GA.[7] However, despite aggressive preventive and treatment efforts by providers to combat ECC, any positive results

achieved may be lost over time due to improper follow-up and persistence of cariogenic habits. One study found that more than half of patients treated under GA presented with new caries within 2 years and suggested that those who failed to attend their follow-up appointment might be more likely to relapse.[8] To further support this, Almeida et al. reported 79% caries recurrence within 2 years after general anesthesia.[7] As low as 39-54% of patients return for their follow-up appointment after GA.[9,10] In addition to the immediate follow-up appointment, it has been shown that many guardians of patients treated under GA do not regularly attend subsequent 6-month recall visits, suggesting that they may not understand the benefits or importance of routine visits.[10–12] One study calculated that out of 278 children, although 88% returned for their follow-up appointment, only 45% of patients attended all recall appointments over 3 years.[13] Caries recurrence has been found to be as high as 68% in children who followed up inconsistently with their dentist or only visited because of pain, compared to 50-59% in compliant patients.[14,15] One study found that the relapse rate for these patients was lower in the short term but higher in the long term.[11] This relapse is attributed to continued noncompliance with at-home oral hygiene and recall visits that may lead patients require dental treatment under GA again.[11,16] 8-17% of patients treated under GA require subsequent retreatment under GA due to caries recurrence.[17–19] In one study, children with irregular dental attendance after GA were four times more at risk of having repeat treatment under GA.[18] In addition to the high cost, GA is associated with risks of morbidity, mortality, and possible neurodevelopment effects on young children. Since risks may increase with prolonged and repeated exposures to general anesthetics,[20] pediatric dentists should make every effort to avoid repeat treatment under GA.

*FMDR Postoperative Experience*

Previous studies have evaluated postoperative complications following pediatric FMDR under GA including duration of pain and bleeding, severity of pain, factors related to discomfort, and other common postoperative symptoms. Studies show that 67-70% of patients report symptoms immediately after the procedure, but the severity and rate of symptoms decreases significantly to 0-35% within 2-3 days.[21–23] 82-95% of children report moderate dental pain that is highest immediately postoperatively,[22,24] and 23% of patients report postoperative bleeding.[22] Due to intraoperative administration of analgesics and/or local anesthetics, some patients' pain may be delayed until reaching home. Other commonly reported symptoms within the first 24 hours include coughing, difficulty eating, agitation, sleepiness, nausea, fever, and sore throat.[21,24,25]

The type of restorative treatment rendered may affect postoperative pain experience as well. Patients who need subgingival treatment such as stainless steel crowns and space maintainers placed have been found to have increased immediate postoperative discomfort.[26,27] Some studies report that patients with multiple extractions or at least twelve dental procedures are more likely to experience postoperative pain/discomfort,[23,24] whereas one study reported that patients experience less pain after extractions only compared to those who require stainless steel crowns.[27] In addition to the dental treatment itself, preoperative discomfort and inadequate postoperative sleep is also predictive of postoperative dental discomfort.[23,26] Overall, postoperative symptoms following FMDR under GA tend to be mild in severity and mainly limited to the first day following treatment.

*Impact of FMDR on Guardians*

Existing literature has established that children receiving FMDR under GA exhibit improvements in their quality of life, oral health, and overall health. Dental general anesthesia treatment has been shown to have a positive impact on the family as well.[28–32] Decreased pain, improved ability to eat, and better sleep are main reasons for enhanced physical quality of life,[28] but these children also have a social quality of life including behaviors and habits that are also positively affected.[14] The overall physical and social well-being of a child is related to, and therefore can lead to an improvement in, parental emotions and daily life as well.[33] Parents report high satisfaction rates of 86-99% with treatment outcomes of FMDR and process of care.[14,25] Interestingly, it has been shown that although postoperative parental ratings remain high at the next 6-month recall visit, 75% of patients still had insufficient oral hygiene and/or development of new caries.[29] This suggests that a more frequent, prevention focused follow-up may be necessary for these patients.

*Postoperative Oral Hygiene and Dietary Instructions*

After FMDR under GA, ideally parents and dentists share the goal of improved oral health care. However, the literature for whether this is the case is mixed. One study reported that after treatment under GA, the most common parental change was increased toothbrushing and decreased sugar consumption.[34] In contrast, a study comparing dental treatment under GA versus passive restraint when a patient is awake, found that diet and oral hygiene improved significantly only in patients treated with passive restraint but not those in the GA group.[35] It seems there may be an immediate parental motivation to take care of their child's oral health, but it is unclear how long term this behavior is. Postoperative care may be a key factor in maintaining a positive outcome after dental general anesthesia.

*FMDR Follow-up Appointment and Study Purpose*

With the high prevalence of disadvantaged children experiencing early childhood caries (85%),[36] a number of different preventive and treatment interventions have been proposed. Follow-up appointments after general anesthesia have been a commonly cited method[8,11,19] as a means of preventing future caries and need for repeat treatment under GA. Despite this clinical relevance, few studies have been conducted to assess the importance and value of the postoperative appointment by both the clinician and the guardian. Therefore, the purpose or aim of this study is to determine current practitioner and parental acceptance of the follow-up GA appointment. There are no guidelines or best practices for postoperative appointments following FMDR under GA, so it is unclear how many pediatric dentists are scheduling these visits. There is no consensus on whether follow-up appointments are medically necessary since only mild postoperative morbidity is generally associated with dental treatment under GA. The results of this study will give insight into how dentists are implementing follow-up examinations after FMDR and the value these visits provide to patient care.

## Methods

Three separate surveys were administered for this study: pediatric dentist survey, guardian pre-appointment survey, and guardian post-appointment survey.

Pediatric dentist survey

Contact information (i.e. email addresses) for pediatric dentist, general dentist, and pediatric dental resident members was obtained by purchasing rights to the email registry of the American Academy of Pediatric Dentistry. All 8,245 current American Academy of Pediatric Dentistry members were e-mailed a unique link to participate in an original survey. Because this was an original survey, several practicing pediatric dentists and members of the research committee reviewed questions and made edits as necessary. The survey (Appendix 1) asked questions regarding the dentists' clinical practice concerning the offering of follow-up appointments to otherwise medically healthy pediatric patients who had undergone FMDR under GA, including questions related to perceived attendance rates, recall compliance, and overall value of the appointment. Approximately two weeks after the original e-mail request, reminder e-mails were sent to the AAPD members who had not responded. Although each participant received a unique link and completion was tracked, the survey responses were all anonymous with no way to identify responses. Surveys were sent and data was managed using Research Electronic Data Capture (REDCap) hosted at Virginia Commonwealth University. REDCap is a secure, web-based application designed to support data capture for research studies.[37]

Guardian pre-appointment survey

An original survey was created and reviewed by several practicing pediatric dentists and research committee. The paper form survey asked about the guardian's desire to have a follow-

up appointment and reasons for the guardian's opinion (Appendix 2). On the day of their GA visit in the preoperative area, parents or guardians of healthy patients who were scheduled for full mouth dental rehabilitation under general anesthesia at the Children's Hospital of Richmond were asked by their pediatric dental resident if they would be willing to participate in a survey. After the patient's appointment in the operating room, guardians were contacted by phone by the VCU Pediatric Dentistry front desk staff and offered a 2-week postoperative follow-up appointment in the VCU Pediatric Dentistry clinic.

Guardian post-appointment survey

Patients and their legal guardians who presented for their 2-week follow-up appointment were administered a paper form questionnaire at the end of the appointment to ascertain the level of patient satisfaction with their follow-up experience, postoperative morbidity, and the incidence of needing to seek postoperative help from either the hospital or their general medical and dental practitioners (Appendix 3). Guardian surveys were modelled after a study from the British Journal of Oral & Maxillofacial Surgery in which they mailed patients questionnaires related to follow-up arrangements and postoperative morbidity after third molar extractions.[38]

Statistical Methods

Provider responses were summarized using descriptive statistics (counts, percentages, median, interquartile range (IQR, $25^{th}$-$75^{th}$ percentile)). Associations between provider characteristics and self-reported utilization of follow-up visits were compared using chi-squared tests. Attendance rates were compared with provider and practice demographics using Kruskal-Wallis test, adjusting for post hoc pairwise comparisons. Guardian responses and attendance rates were summarized using descriptive statistics (counts, percentages) and compared using

Fisher's exact test due to small sample sizes. All analyses were performed in SAS EG v.6.3. The significance level was set at 0.05.

## Results

A total of 8,245 emails were sent and 54 were considered undeliverable. The potential sample size was 8,191 and a total of 661 respondents participated in the survey (8% response rate). Of these, 66 respondents indicated that they did not perform GA procedures and were excluded from the study. Therefore, 595 respondents were included in the analysis. Respondent demographics are given in Table 1. Respondents were 56% female, 43% male. The majority are pediatric dentists (79%), with board certification (61%), and work in private practice (66%). Half of the respondents (n=296, 50%) treated their GA cases in a hospital. Other responses included in office (15%), at a surgery center (12%), or in multiple locations (22%).

Table 1: Demographics of Responding AAPD Members

| | n | % |
|---|---|---|
| Gender | | |
| Male | 257 | 43% |
| Female | 335 | 56% |
| Prefer not to answer | 1 | 0% |
| Years in Practice | | |
| Current Resident | 114 | 19% |
| <=5 | 120 | 20% |
| 6-10 | 90 | 15% |
| 11-15 | 71 | 12% |
| 16-20 | 56 | 9% |
| 21-25 | 53 | 9% |
| 26-30 | 42 | 7% |
| >30 | 49 | 8% |
| Age | | |
| <=35 years | 248 | 42% |
| 36-45 years | 157 | 26% |
| 46-55 years | 105 | 18% |
| 56-65 years | 82 | 14% |
| >65 years | 3 | 1% |
| Practice Type | | |
| Private | 391 | 66% |
| Hospital-based | 82 | 14% |
| Military Service | 4 | 1% |
| Public Health Service | 29 | 5% |
| Academic | 78 | 13% |
| Other | 10 | 2% |
| Provider Type | | |
| Pediatric Dentist | 470 | 79% |
| Pediatric Dental Resident | 124 | 21% |
| Other | 1 | 0% |
| Board Certification | | |
| Not Board Certified | 224 | 38% |
| Board Certified | 361 | 61% |
| Board certified + other specialty board | 9 | 2% |
| Residency Setting | | |
| University based | 85 | 14% |
| Hospital based | 190 | 32% |
| Combined University/Hospital Based | 319 | 54% |
| GA Location | | |
| Hospital | 296 | 50% |
| Surgery Center | 73 | 12% |
| In Office | 91 | 15% |
| Multiple Locations | 130 | 22% |
| Other | 4 | 1% |

Most respondents (72%) reported scheduling a follow-up visit (*Table 2*) Female respondents had a higher rate of scheduling a follow-up (74% vs 63%, p-value=0.0102). Respondents whose residency was hospital-based scheduled follow-ups at a higher rate than those who were at an academic or combined academic/hospital residency (76% vs 65%, p-value=0.0249). Respondents who practice in a private practice setting had a lower rate of scheduling a follow-up than those who practice in hospital-based, military, public health, academic, or other setting (64% vs 86%, p-value<0.0001). There were also significant differences based on where the GA is performed (p-value=0.0057). Those who practice at a hospital reported scheduling a follow-up 77% of the time compared to 68% among those who treat at multiple locations, 59% for those who practice in-office, and 60% for those who go to a surgery center. Scheduling a follow-up was not significantly associated with whether or not the respondents were board certified (p-value=0.4101). Associations with self-reported scheduling of a follow-up appointment are given in Table 3.

Table 2: Utilization of Follow-up Visits

| | **n** | **%** |
|---|---|---|
| Schedule Follow-up | | |
| Yes | 427 | 72% |
| No | 164 | 28% |
| Those Who Schedule Follow-up (n=427) | | |
| Challenges | | |
| Excessive Chair Time | 16 | 4% |
| High no-show rate | 195 | 46% |
| Non-reimbursable | 144 | 34% |
| None | 153 | 36% |
| Other | 19 | 4% |
| | Median | IQR |
| Percent Schedule | 100 | 95-100 |
| Percent Attend | 75 | 50-90 |

Table 3: Factors Associated with Self-Reported Follow-up Appointment Rate

| | Schedule Follow-up | | |
|---|---|---|---|
| | **n** | **%** | **P-value** |
| Gender | | | 0.0102 |
| Male | 139 | 63% | |
| Female | 189 | 74% | |
| Years in Practice | | | 0.5088 |
| <=5 | 80 | 67% | |
| 6-10 | 55 | 61% | |
| 11-15 | 51 | 72% | |
| 16-20 | 36 | 65% | |
| 21-25 | 39 | 74% | |
| 26-30 | 31 | 74% | |
| >30 | 37 | 76% | |
| Board Certification | | | 0.4101 |
| Not Board Certified | 76 | 69% | |
| Board Certified | 245 | 68% | |
| Board certified + other specialty board | 8 | 89% | |
| Residency Setting | | | 0.0249 |
| University or Combined University/Hospital Based | 214 | 65% | |
| Hospital based | 115 | 76% | |
| Practice Setting | | | <0.0001 |
| Private Practice | 246 | 64% | |
| Other | 82 | 86% | |
| GA Location | | | 0.0057 |
| Hospital | 148 | 77% | |
| Surgery Center | 42 | 60% | |
| In Office | 52 | 58% | |
| Multiple Locations | 85 | 68% | |

Among those who reported scheduling a follow-up, the most commonly selected challenge was the high no-show rate (46%), followed by the appointment being non-reimbursable (34%). However, 36% also reported that there were no challenges to scheduling this appointment. When asked what percent of patients are scheduled for a follow-up, the median response was 100%, with an IQR (interquartile range; $25^{th}$-$75^{th}$ percentile/middle 50%) indicating between 95 and 100% of patients. The estimated percent who attend the appointment

was 75% with an IQR (middle 50%) of 50-90%. The perceived attendance rates were significantly associated with practice type (p-value<0.0001) and GA location (p-value=0.0261). The median attendance rate was 80% (IQR: 50-90) for private practice compared to 70% (IQR: 50-80) for other practice types. The highest median attendance was 80% for in-office GA (IQR: 70-95), followed by 75% for hospital and multiple locations (IQR: 50-90), and surgery center with 70% (IQR: 50-90). Attendance rates are presented in Table 4.

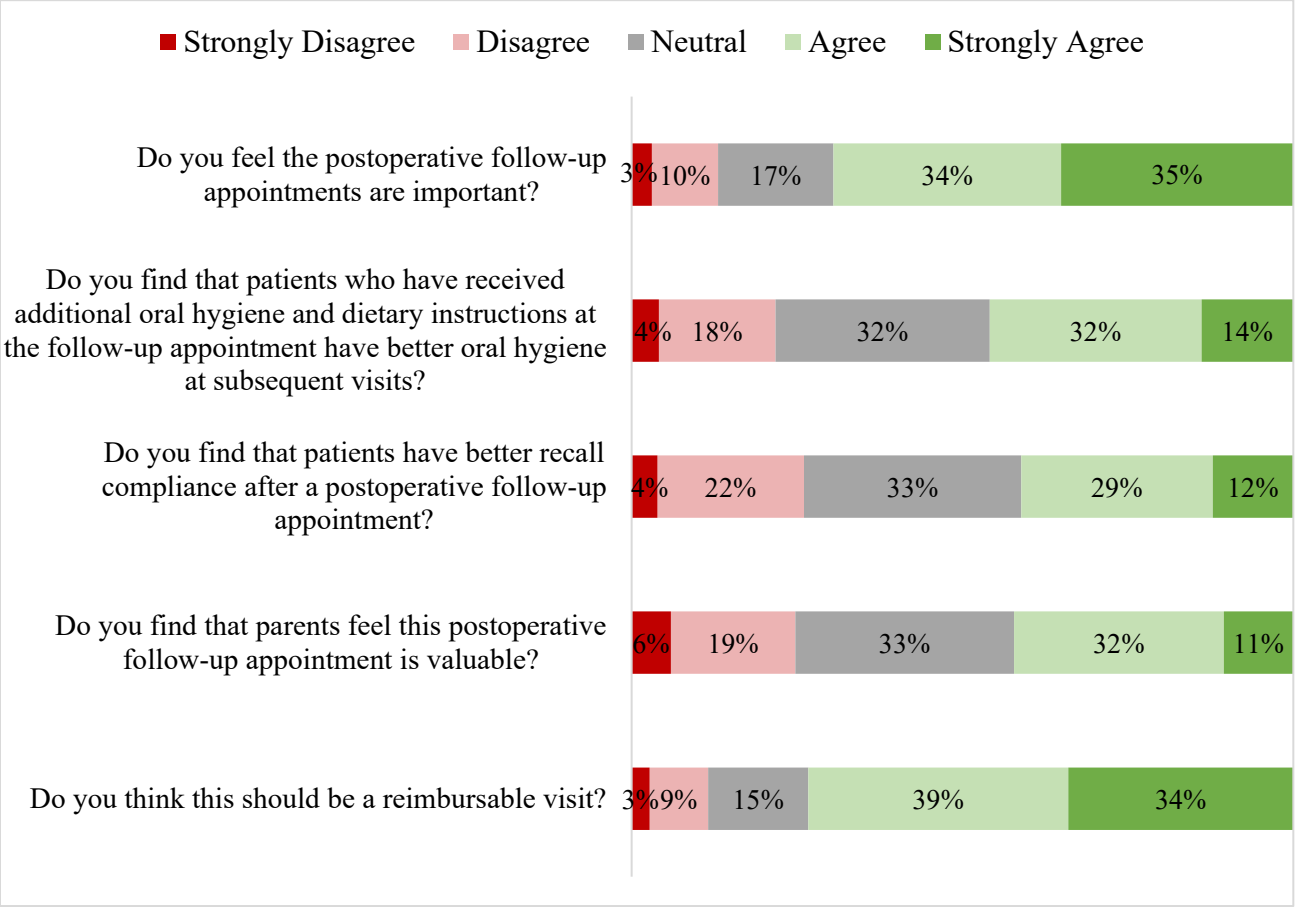
Table 4: Factors Associated with Provider-Perceived Attendance Rates

| | Median | IQR | p-value |
|---|---|---|---|
| Practice Type | | | <0.0001 |
| Private | 80 | 50-90 | |
| Other | 70 | 50-80 | |
| GA Location | | | 0.0261 |
| Hospital | 75 | 50-90 | |
| Surgery Center | 70 | 50-90 | |
| In Office | 80 | 70-95 | |
| Multiple Locations | 75 | 50-90 | |

*IQR: Interquartile Range ($25^{th}$-$75^{th}$ Percentile)

Providers were also asked for their agreement with various statements regarding the postoperative follow-up appointment (Figure 1). Providers generally agreed or strongly agreed that the postoperative appointments are important (69%) and that it should be a reimbursable visit (73%). However, respondents in private practice differed from those in other practice settings (p-value=0.0088). Private practice respondents were more likely to disagree or strongly disagree (13% vs 9%) and less likely to agree or strongly agree (70% vs 79%) that this visit should be reimbursable. There was lack of a consensus on whether patients who attend the visits have better oral hygiene (32% neutral) or better recall compliance for routine visits (33% neutral), and overall dentists were uncertain if parents find the appointment valuable (33% neutral).

Figure 1: Provider Perceptions regarding Follow-up Visits

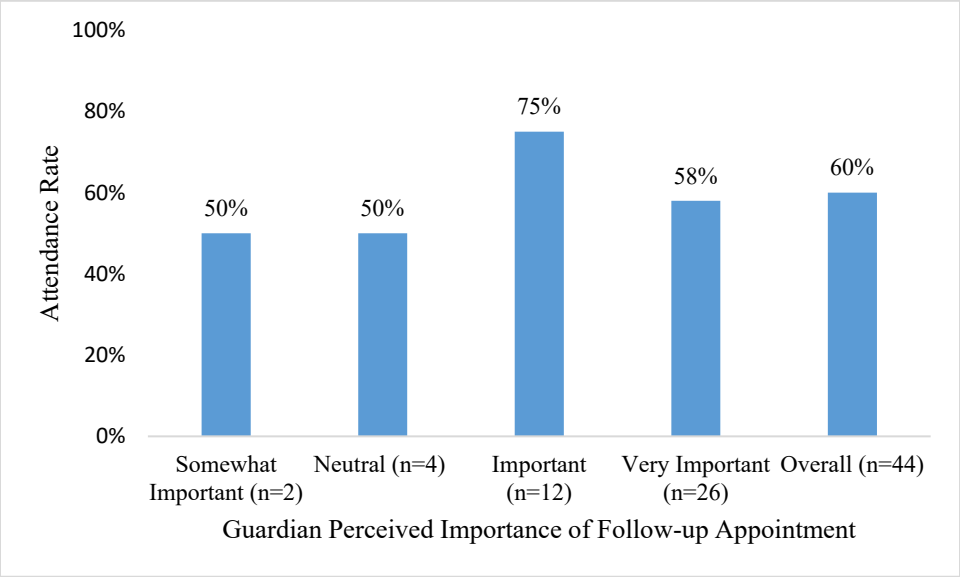



Guardian Responses

Guardians of children who had treatment under general anesthesia were included in a pre/post survey design to assess their opinions of the postoperative appointment. A total of 44 guardians were enrolled in the study and 27 attended the postoperative follow-up visit, a 61% attendance rate, lower than the indicated median perceived attendance rate by providers (75% for GA occurring at hospital). Attendance at the appointment was not associated with the perceived level of importance by the guardians before the GA visit (p-value=0.6776, Figure 2). In the preoperative survey, guardians were asked if distance, schedule, or any other reasons would

present challenges for the postoperative visit. Only 3 guardians indicated distance (7%), 2 indicated schedule (5%), and 2 indicated other reasons (5%). Reporting challenges was not significantly associated with whether or not the guardians attended the follow-up visit. Two of the three who indicated distance did not attend and one of the two who indicated schedule did not attend. Both who indicated other reasons attended.

Figure 2: Guardian Attendance by Perceived Importance of Follow-up Appointment




Guardians who attended the postoperative follow-up appointment reported pain as the most common symptom (n=11, 41%). The second most common symptom was bleeding (n=5, 19%). No guardians reported nausea or infections. There was one instance of numbness and one of swelling. The most common medication utilized after GA was an over the counter (OTC) painkiller or analgesic, which was indicated by 48% of guardians (n=13). One guardian reported their child having a low-grade fever, a common complication after anesthesia. This guardian also reported having to visit the hospital, doctor, or dentist for any of these symptoms. Other than the fever, they only reported bleeding as a postoperative symptom. A summary of reported symptoms is given in Table 5.

Table 5: Guardian-Reported Postoperative Complications

| | n | % |
|---|---|---|
| Symptoms | | |
| Bleeding | 5 | 19% |
| Infection | 0 | 0% |
| Nausea | 0 | 0% |
| Numbness | 1 | 4% |
| Pain | 11 | 41% |
| Swelling | 1 | 4% |
| Other | 2 | 7% |
| Medication | | |
| Painkiller | 13 | 48% |
| Antibiotic | 1 | 4% |
| Other | 0 | 0% |
| Doc Visit | 1 | 4% |

In the pre-operative survey, parents indicated the topics they would like to discuss at their follow-up appointment. The most frequent answer was “How to prevent future caries” with 67%. 70% of guardians reported that this was covered in the follow-up appointment. Other topics were not indicated to be as important for parents (Table 6). Although many of the topics were not indicated as important to more than 15% of guardians, they were reportedly discussed for many appointments. Only 15% indicated they would like to discuss how to brush, but it was reported as a topic discussed by 70% of guardians. Similarly, how to floss was indicated by 11% and discussed with 56%, and how often to see the dentist was indicated by 7% of guardians but discussed for 48% of postoperative visits. At the postoperative appointment, guardians who attended were asked how useful they felt the appointment was. Of the 27 who attended follow-up, 78% strongly agreed (n=21) and 19% agreed (n=5) that the appointment was useful. One guardian indicated that they strongly disagreed (4%).

Table 6: Topics Desired and Discussed at Follow-up Visits

| | What topics would you like to discuss | What topics were discussed |
|---|---|---|
| How to brush | 4 (15%) | 19 (70%) |
| How to floss | 3 (11%) | 15 (56%) |
| How to prevent future cavities | 18 (67%) | 19 (70%) |
| How often to see your dentist | 2 (7%) | 13 (48%) |
| Addressing questions and concerns | 3 (11%) | 10 (37%) |
| Other | 6 (22%) | 5 (19%) |

Table 7: Perceived Value of Follow-up Visit by Guardians who Attended (n=27)

| Did you find today's appointment valuable? | n | % |
|---|---|---|
| Strongly Agree | 21 | 78% |
| Agree | 5 | 19% |
| Neutral | 0 | 0% |
| Disagree | 0 | 0% |
| Strongly Disagree | 1 | 4% |

## Discussion

In this study, we found a 61% overall attendance rate at follow-up visits, which was similar to the 39-54% rates reported in other published studies.[9] However, this rate was slightly lower than the perceived rates reported by responding AAPD members (64-86% depending on practice setting). The practice setting in this study was closest to those categorized as "other," which reported 70% attendance rate compared to the 65% observed in this study. Compared to "other" settings, private practice dentists had a lower scheduling rate (64%) but higher perceived attendance rate (80%), and interestingly, they were less likely to think this visit should be reimbursable. Those in private practice may be more specific about which patients they schedule follow-up visits for, depending on the extent of dental treatment rendered, or give guardians the option of a postoperative visit. If they are scheduling less follow-up patients, then if the patient does not attend, it likely does not affect their schedule significantly. On the other hand, if practitioners in "other" settings (hospital, military, public health, academic) have a higher scheduling rate (86%) and a lower attendance rate (70%), then it is reasonable for them to think this visit should be reimbursable, as missed appointments may impact their daily schedule. In addition, some hospitals may require postoperative visits as protocol for their patients treated under GA. Public health programs, such as federally qualified health centers, usually have a different reimbursement system that is based on number of patient visits, so these settings may be encouraged to schedule postoperative visits. Regardless, most providers agreed that the postoperative appointment is valuable (69%) and should be reimbursable (73%).

Of the guardians who attended the postoperative visit, pain was the most common reported symptom at 41%, which was significantly lower than 82-95% noted in other studies.[22,24] This may be attributed to the extended time of approximately two weeks elapsed between the

GA and follow-up appointment, where recall memory may have been affected, compared to other studies that reported postoperative symptoms within a few days. This study found the second most reported symptom to be bleeding in 19% of patients, similar to the 23% reported in another study, but recall bias may have also affected this number.[22] Despite the relatively mild postoperative symptoms, 96% patients agreed or strongly agreed that the postoperative appointment was valuable. This is consistent with a study from the British Journal of Oral & Maxillofacial Surgery, where Worrall found that despite the lack of objective patient benefit at the follow-up visit, given the choice, the majority (87%) wanted to be examined postoperatively.[38]

The most commonly reported topic guardians wanted to discuss at the follow-up visit was "how to prevent future caries" with 67%. Additional comments were related to future orthodontics, bleaching, and expectations for permanent teeth. Interestingly, guardians chose "how to brush" and "how to floss" only 15% and 11% of the time, respectively, but the provider reviewed this during 70% of appointments. These findings suggest that there is a disconnect between providers and guardians. Guardians chose "how to prevent future caries" most frequently but may not realize the direct connection between how to brush and floss and preventing caries. On the other hand, parents may understand brushing and flossing technique and purpose but are seeking additional suggestions to prevent future caries such as diet counseling, habits, or advice for implementing into a daily routine or with uncooperative children.

It is possible that providers are not aware of what guardians wish to discuss at the postoperative appointment, inadvertently allowing poor habits to continue. This may explain why many AAPD members chose "neutral" for whether or not patients who attend the visits

have improved oral hygiene (32%) or better recall compliance (33%), as well as "neutral" for parents finding the appointment valuable (33%). This disconnect may be addressed if providers tailor the follow-up appointment to each individual patient and guardian. Since the postoperative exam is relatively brief, the remainder of the appointment allows for additional time to fully address and discuss the guardian's specific concerns.

Although studies have shown improvement in a child's quality of life after FMDR, they have also shown an increase in patient dental fear after treatment under GA, especially after extractions.[34,39,40] A previous study showed it can take up to three visits after a traumatic dental experience for a child's response to improve, so some form of behavioral therapy after GA is desirable and recommended.[41] The follow-up can be a relatively easy, desensitizing appointment for patients where they can become accustomed to a dental mirror and explorer, practice opening their mouths wide, and begin to build trust with their dentist.

The postoperative appointment following FMDR under GA may be valuable for a variety of reasons and tailored to each individual patient. During this appointment, providers can discuss specific prevention strategies with the family to prevent future caries. Currently, most dental providers practice a surgical model of caries management by treating signs and symptoms, but the profession is shifting towards the medical model of chronic disease management. The goal of the chronic disease management model is to provide sustainable dental healthcare by focusing on caries prevention, arrest, and remineralization.[42] Surgically treating caries alone without addressing the etiology and underlying risk factors allows the chronic carious disease process to propagate and ultimately leads to failure of dental treatment and/or development of new carious lesions.[19] Since the majority of guardians from this study are most concerned about preventing

future caries, ensuring a proper follow-up protocol allows parents and providers to create a preventive plan together for the child.

Limitations to this study include self-recall biases of AAPD members and guardians, which could have affected their survey responses. Although there was a relatively low response rate, there was a large number of survey respondents that were well representative of United States pediatric dentists as a whole. This survey branched to exclude providers who do not schedule follow-up appointments, so this study cannot report their challenges or reasons for not doing so. Postoperative surveys were only given to those who attended the follow-up visit, so there is missing data on reasons why guardians did or could not attend. This study also excluded medically complex patients, who may be more likely to have postoperative morbidities, and therefore more likely to need a follow-up visit. Due to the coronavirus disease 2019 (COVID-19) pandemic, many patients were hesitant to attend in-person medical and dental visits. The follow-up attendance rate could have been affected as some guardians may not have felt comfortable attending an additional appointment that might put their family at risk.

Future implications of this study include scheduling follow-up visits via teledentistry and evaluating parental and practitioner acceptance. Although this would exclude the clinical exam and patient desensitization aspect of this visit, it might improve the educational discussion between the provider and guardian without the child present. In this study, guardian reported challenges were not significantly associated with whether guardians attended the follow-up visit. A future study might investigate patient related factors such as socioeconomic status, educational level, cultural elements, or previous medical or surgical experience that may influence patient's perceptions of the benefit of receiving a follow-up appointment.

## Conclusion

Although patients generally experienced mild to no symptoms following full mouth dental rehabilitation under general anesthesia, the vast majority of guardians felt that the follow-up appointment was valuable and wanted to discuss how to prevent future caries at this visit. Most U.S. pediatric dentists are scheduling follow-up visits after treatment under general anesthesia and agree that this appointment is valuable. Further research is needed to determine how valuable the postoperative appointment might be in future caries prevention, but the postoperative follow-up appointment may be beneficial for continued patient management of the chronic carious disease process.

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# Appendix

## Appendix 1: Survey for AAPD Members

# The Value of Postoperative Appointments following Full Mouth Dental Rehabilitation under General Anesthesia

*This survey is voluntary and you may choose not to participate or withdraw from the study at any time. We will not collect your name or any other identifying information. It will not be possible to link you to your responses on the survey. You may receive a copy of the study when it is finished.*

You are being invited to participate in this study because you are a pediatric dentist, pediatric dental resident, or a general dentist who is a member of the AAPD. The purpose of this study is to evaluate the value of a postoperative appointment following general anesthesia from the perspective of the patient's guardians and pediatric dentists and residents.

Since guidelines for postoperative appointments following general anesthesia is not specified, this study will give a current expert opinion regarding the desirability and usefulness of postoperative appointments in the specialty.

If you agree to participate in this study, you will be asked to complete an online survey consisting of 11 questions. This will take roughly 5 minutes of your time. Questions will relate to postoperative appointment scheduling and usefulness, as well as a few questions regarding your demographic information.

No compensation is awarded to participants of the study. You do not have to complete the study based on personal preference.

By completing this survey, you indicate that you have read and understand the information provided on this page and agree to participate in this study. Thank you in advance for your time and consideration of this research project. If you have any questions, please e-mail Priyanka Patel at patelp11@vcu.edu.

Sincerely,

Priyanka Patel, DMD
VCU Pediatric Dental Residency

***AAPD Questionnaire***

*This survey is voluntary and you may choose not to participate or withdraw from the study at any time. We will not collect your name or any other identifying information. It will not be possible to link you to your responses on the survey. You may receive a copy of the study when it is finished.*

For all the following questions please assume the patients are under 18 with no previous history of surgical or anesthetic complications who have undergone full mouth dental rehabilitation under general anesthesia in whom you would not expect there to be any problematic sequelae.

1. Do you do treat children for full mouth dental rehabilitation under general anesthesia?

   **[Yes] [No]**

2. Where do you complete GA cases?

   **[Hospital] [Surgery Center] [Other] _____**

3. Do you schedule a follow-up appointment for your GA cases?

   **[Yes] [No]**

4. If yes, what percentage of your GA patients do you schedule for a follow-up?

   **_____%**

5. Approximately what percentage of scheduled patients attend their appointment?

   **_____%**

6. Do you feel the postoperative follow up appointments are important?

   **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**

7. What challenges, if any, do you encounter, with these appointments?

   **[Excessive chair time] [High no show rate] [Non-reimbursable] [None] [Other] _____**

8. Do you find that patients who have received additional oral hygiene and dietary instructions at the follow-up appointment have better oral hygiene at subsequent visits?

   **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**

9. Do you find that patients have better recall compliance after a postoperative follow up appointment?

   **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**

10. Do you find that parents feel this postoperative follow up appointment is valuable?

    **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**

11. Do you think this should be a reimbursable visit?

    **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**

*Demographic Information*

What is your status as a dental practitioner?

**[Pediatric Dentist] [Pediatric Dentistry Resident] [Other] _____**

Age

**[≤35 years] [36-45 years] [46-55 years] [56-65 years] [>65 years]**

Sex

**[Male] [Female] [Prefer not to answer]**

Total Years in Practice

**[Resident] [≤5] [6-10] [11-15] [16-20] [21-25] [26-30] [<30]**

Nature of Primary Practice

**[Private] [Hospital-based] [Military service] [Public Health service]**

**[Academic] [Other] _____**

Pediatric dentistry board certification status

**[Not board certified] [Board certified] [Board certified + other specialty board]**

Type of certificate program attended

**[University-based] [Hospital-based] [Combined University/Hospital Based]**

## Appendix 2: Surveys for Guardians

Study ID: _____

# The Value of Postoperative Appointments following Full Mouth Dental Rehabilitation under General Anesthesia

*This survey is voluntary and you may choose not to participate or withdraw from the study at any time. We will not collect your name for this study.*

You are being invited to participate in this study because you are the guardian of a patient who has undergone comprehensive dental treatment under general anesthesia. The purpose of this study is to understand how much a guardian values a follow up appointment 2 weeks after general anesthesia and why.

If you agree to participate in this study, you will be asked to complete one short survey today and one short survey after your follow up appointment. This will take roughly 5 minutes of your time. Questions will relate to your perception of your child's follow up appointment.

By completing this survey, you indicate that you have read and understand the information provided on this page and agree to participate in this study. Please contact Priyanka Patel at 804-828-9095 with any questions you may have regarding this study. Thank you in advance for your time and consideration of this research project.

Sincerely,

Priyanka Patel, DMD
VCU Pediatric Dental Residency

***Patient Pre-Survey***

*This survey is voluntary and you may choose not to participate or withdraw from the study at any time. We will not collect your name for this study. You may receive a copy of the study when it is finished.*

During your child's dental appointment under general anesthesia today, you will receive an appointment for a follow up visit in the VCU Pediatric Dentistry clinic.

1. How important is the 2-week follow-up appointment to you?

   **[Not Important] [Somewhat Important] [Neutral] [Important] [Very Important]**

2. Would this appointment be difficult for you and your child to make?

   **[Yes] [Maybe] [No]**

3. If you answered "Yes" to question 2, why?

   **[Distance] [Schedule] [Other]** _____

4. What would you like to discuss with your dentist?

   **[How to brush] [How to floss] [Prevention of future cavities] [How often to see your dentist] [Addressing questions and concerns] [Other]**

   _____

   _____

   _____

***Patient Appointment Survey***

*This survey is voluntary and you may choose not to participate or withdraw from the study at any time. We will not collect your name for this study. You may receive a copy of the study when it is finished.*

1. After your child's dental treatment in the operating room, did they experience any of the following symptoms?

   **[Bleeding] [Infection] [Nausea] [Numbness] [Pain] [Swelling] [Other]** _____

2. Did you visit the hospital, your doctor, or your dentist for the symptoms in Question #1?

   **[Yes] [No]**

3. If you answered "Yes" to question 2 who did you visit?

   **[Hospital] [Doctor] [Dentist]**

4. Medication required for comfort?

   **[Painkiller] [Antibiotic] [Other]** _____

5. What did your child's dentist discuss with you at today's visit?

   **[How to brush] [How to floss] [Prevention of future cavities]**

   **[How often to see your dentist] [Addressing questions and concerns] [Other]**

   _____

   _____

   _____

6. Did you find today's appointment useful?

   **[Strongly Disagree] [Disagree] [Neutral] [Agree] [Strongly Agree]**