

Role of Orthodontist in the Continuum of Craniofacial Microsomia Care: Survey of Craniofacial Teams

2023 Orthodontic Faculty Development Fellowships (OFDFA)

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FollowUp Form

Award Information

In an attempt to make things a little easier for the reviewer who will read this report, please consider these two questions before this is sent for review:

- Is this an example of your very best work, in that it provides sufficient explanation and justification, and is something otherwise worthy of publication? (We do publish the Final Report on our website, so this does need to be complete and polished.)*
- Does this Final Report provide the level of detail, etc. that you would expect, if you were the reviewer?*

Title of Project*

Role of Orthodontist in the Continuum of Craniofacial Microsomia Care: Survey of Craniofacial Teams

Award Type

Orthodontic Faculty Development Fellowship Award (OFDFA)

Period of AAOF Support

July 1, 2023 through June 30, 2024

Institution

The Board of Trustees of the University of Illinois

Names of principal advisor(s) / mentor(s), co-investigator(s) and consultant(s)

Veerasathpurush Allareddy, Min Kyeong Lee, Priya Shah

Amount of Funding

\$30,000.00

Abstract

(add specific directions for each type here)

Abstract

Craniofacial microsomia (CM) is a birth defect that typically presents as asymmetric development of craniofacial structures.¹ It is the second most common congenital anomaly of the face after cleft lip and palate.¹ Because CM is a complex condition that requires therapy over a lengthy span of a patient's life, care

is managed by a multidisciplinary healthcare team, often including plastic surgeons, oral and maxillofacial surgeons, orthodontists, pediatric dentists, and general dentists.^{1,2} The orthodontist plays a pivotal role in the continuum of craniofacial microsomia care and is involved in the provision of complex multi-disciplinary interventions. The craniofacial team constructs a treatment plan depending on the severity of the various defects; however, management tends to vary from patient-to-patient as well as from team-to-team.

There is great variation in treatment protocols and timing among clinicians, particularly in the preference of surgical intervention before or after skeletal maturity.^{1,3}

There is a diverse array of therapeutic protocols and great variation in how patients with craniofacial microsomia are treated from clinician to clinician. In order to ensure patients with craniofacial microsomia are receiving optimal health care, it is important to identify an ideal approach and define a standard of care. This study aims to conduct a nationwide survey of craniofacial teams to determine a common treatment protocol for the management of craniofacial microsomia. As a first step, we will identify craniofacial team related factors that are associated with the treatment protocol that they use. Following this, we will identify commonalities in various treatment protocols and establish a standardized treatment approach that can be used to treat patients with craniofacial microsomia.

Respond to the following questions:

Detailed results and inferences:*

If the work has been published, please attach a pdf of manuscript below by clicking "Upload a file".

OR

Use the text box below to describe in detail the results of your study. The intent is to share the knowledge you have generated with the AAOF and orthodontic community specifically and other who may benefit from your study. Table, Figures, Statistical Analysis, and interpretation of results should also be attached by clicking "Upload a file".

Oubaidin Final Report June 2025.pdf

Please see attached PDF

Were the original, specific aims of the proposal realized?*

Yes, our study, revealed a statistically significant association between status of academic accreditation and number of active orthodontic cases, where non-academically accredited centers had fewer active orthodontic cases of CFM (p-values <0.05). No other statistically significant associations were obtained. Therefore, we failed to reject the null hypotheses that there is no significant difference in treatment protocols used by craniofacial teams across the country, and craniofacial team related factors, such as location and academic accreditation, have no association with the protocol used. In order to define a standard of care and delineate the role of orthodontist in the continuum of CFM care, future studies will be required.

Were the results published?*

No

Have the results of this proposal been presented?*

Yes

To what extent have you used, or how do you intend to use, AAOF funding to further your career?*

The AAOF funding has played a pivotal role in advancing my career as an early-career faculty member with aspirations to grow as a clinician-scientist in academic orthodontics. This generous support enabled me to enroll in specialized courses that would have otherwise been inaccessible, providing advanced knowledge and skills essential to my professional development. Additionally, the funding supported the successful completion of our research project, which holds important implications for the orthodontic community—particularly in improving care for patients with craniofacial microsomia by helping to identify ideal treatment approaches and define a consistent standard of care.

The OFDFA award has also been a tremendous asset to my professional growth and has further enhanced my ability to contribute meaningfully to both the field and the broader orthodontic community.

Accounting: Were there any leftover funds?

\$0.00

Not Published

Are there plans to publish? If not, why not?*

Yes, we anticipate submitting a manuscript to a peer-reviewed journal by November 2025

Presented

Please list titles, author or co-authors of these presentation/s, year and locations:*

Title

“The Role of Orthodontists in the Continuum of Craniofacial Microsomia Care: A Survey of Craniofacial Teams”

This Study has been presented:

- The results of this project were presented in Clinic & Research Day at University of Illinois Chicago in February 27th 2025 (Chicago, IL)
- The results of this project were presented in Priya Shah public thesis defense December 16th 2024 (Chicago, IL)
- The results of this project presented in E-poster presentation at AAO Annual Session in Apr 2025 (Philadelphia, PA).

Title, authors and co-authors of these presentations:

Shah P, Oubaidin M, Viana G, Lee MK, Allareddy S. Diagnostic and Treatment Protocols for Craniofacial Microsomia Care: Survey of Craniofacial Teams.

Was AAOF support acknowledged?

If so, please describe:

AAOF support was acknowledged in every presentation and will be acknowledged in the future publication. In addition to that, we would like to discuss the results of this research project at future orthodontic meetings if good opportunity arises.

Internal Review

Reviewer comments

Reviewer Status*

File Attachment Summary

Applicant File Uploads

- Oubaidin Final Report June 2025.pdf

The Role of Orthodontists in the Continuum of Craniofacial Microsomia Care: A Survey of Craniofacial Teams

Background: Craniofacial microsomia is a developmental defect that presents as an asymmetric development of craniofacial structures derived from first and second branchial arches. There is a wide variety of clinical presentations and severities to the condition. It may present as deformities of the skull and orbit, ear, mandibular condyle and ramus, the facial and trigeminal nerves, soft tissue and masticatory muscles, as well as anomalies outside of the head and neck region. There is great variation in treatment protocols and timing among clinicians, particularly in the preference of surgical intervention before or after skeletal maturity.^{1,3} This controversy is due to a lack of consensus as to whether facial asymmetry advances or remains fixed as the patient grows up, and whether early surgical treatment decreases the likelihood of the development of secondary deformities.^{1,3} While timing of surgery remains a debated topic, the treatment of CFM is customized to the specific types and severity of craniofacial defects present.⁴

Rationale: There is a diverse array of therapeutic protocols and great variation in how patients with craniofacial microsomia are treated from clinician to clinician. To ensure patients with craniofacial microsomia are receiving optimal health care, it is important to identify an ideal approach and define a standard of care.

Aims of the study This study aims to conduct a nationwide survey of craniofacial teams to determine a common treatment protocol for the management of craniofacial microsomia. As a first step, we will identify craniofacial team related factors that are associated with the treatment protocol that they use. Following this, we will identify commonalities in various treatment protocols and establish a standardized treatment approach that can be used to treat patients with craniofacial microsomia.

Materials and Methods: University of Illinois Chicago (UIC) Institutional Review Board (IRB) approval was sought prior to conduct of this study. A 15-item questionnaire was distributed electronically to 121 craniofacial teams across the United States via Qualtrics Survey Software (Qualtrics LLC). The survey included 3 major blocks: Demographics, Diagnosis, and Treatment of CFM. The questions explored craniofacial center demographics, case load, diagnostic tools and systems, as well as preferences in surgical and orthodontic treatment methods. 22 respondents completed the full survey (18% response rate).

The list of craniofacial teams across the United States was obtained from the American Cleft Palate Association list of accredited Cleft/Craniofacial teams ([www link is https://acpa-cpf.org/acpa-family-services/find-a-team/acpa-approved-teams/](https://acpa-cpf.org/acpa-family-services/find-a-team/acpa-approved-teams/)). 138 craniofacial teams are in the United States. Valid contact information was obtained for 121 craniofacial teams. A team leader or team coordinator was contacted via email. The informed consent and survey questionnaire was shared via Qualtrics Survey Software (Qualtrics LLC). Four reminders at 2-week intervals were sent via email, requesting to complete the survey. Prior to the fourth reminder, an IRB approved modification was made to the recruitment email to allow the recipient to forward the questionnaire to any official team member that may be equipped to answer the questions.

Sample Size and Statistical analysis: A sample size of 26 total responses, and 22 complete responses were obtained (18% response rate). Descriptive statistics, including frequency distributions (%), were calculated to summarize the data. To examine potential associations between selected survey questions, crosstabulations, Chi-Square tests, and Fisher's Exact tests were conducted. A statistical significance level of $p < 0.05$ was used. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 29.0.

Results:

Craniofacial Center Demographics:

a. Location and Academic Accreditation: Our descriptive statistics revealed that 80.8% (21 of 26) of respondents reported the location of their craniofacial center was in an urban area, and 19.2% (5 of 26) of respondents reported that the location was in a suburban area (Figure 1). 26.9% (7 of 26) of respondents reported that their craniofacial center offers an accredited fellowship program in craniofacial orthodontics and/or craniofacial surgery (Figure 2)

b. In-House Specialists within the Craniofacial Team: The frequency distribution of specialists within craniofacial teams is illustrated in Figure 3 and Table III

c. Case Volume: The median number of CFM cases treated per year at a particular craniofacial center was 17.0 cases. 47.8% (11 of 23) of respondents reported treating greater than 17 cases per year, and 52.2% (12 of 23) of respondents reported treating less than or equal to 17 cases per year (Figure 4)

d. Active Cases: The median number of currently active orthodontic cases of CFM at a particular craniofacial center was 10.0 cases. 40.9% (9 of 23) of respondents reported having greater than 10 active cases, and 59.1% (13 of 23) of respondents reported having less than or equal to 10 active cases (Figure 5).

e. Location of Orthodontic Treatment: (Figure 6) illustrate the frequency distribution of the percentage of patients undergoing orthodontic treatment in-house at the craniofacial center.

CFM Diagnosis:

a. Diagnostic Records for Orthodontic Treatment: 24 respondents reported using clinical 2D photos; 12 respondents reported using 3D photos; 20 respondents reported using models/dental casts, 24 respondents reported using CBCTs; 14 respondents reported using standard radiographs such as panoramic radiographs and cephalograms, and 1 respondent reported using biospecimen such as saliva or tissues (Figure 7).

b. Diagnostic terminology: A variety of terminology is used to describe CFM. Amongst all respondents, 31.8% (7 of 22) use *Craniofacial Microsomia*, 59.1% (13 of 22) utilize the term *Hemifacial Microsomia*, 4.5% (1 of 22) use *Oculo-Auriculo-Vertebral Spectrum*, 0% used *First and Second Branchial Arch Syndrome* and 4.5% (1 of 22) use *other* terminology (Figure 8).

c. Diagnostic Classification Systems: Amongst all respondents, 13.6% (3 of 22) use the Pruzansky system, 40.9% (9 of 22) use the Pruzansky system with Kaban modification, 9.1% (2 of 22) use the OMENS system, 22.7% (5 of 22) use the OMENS plus system, 4.5% (1 of 22) use the FACIAL system, 0% use the ICHOM system, and 9.1% (2 of 22) use another system (Figure 9).

d. Orthodontic Record Follow-Up Rate: Amongst all respondents, frequency of orthodontic record follow-up was reported as annual by 54.5% (12 of 22), biannual by 4.5% (1 of 22), in a structured schedule at 6, 9, 12, 15 and 18 years of age by 13.6% (3 of 22), and in another schedule by 27.3% (6 of 22) (Figure 10).

CFM Treatment:

a. Timing of Mandibular Surgery: Amongst all respondents, surgery to correct mandibular asymmetry or deficiency was reported to be performed during growth by 9.1% (2 of 22), after the pubertal growth spurt by 45.5% (10 of 22), and other by 45.5% (10 of 22) (Figure 11).

b. Frequency of Orthognathic Surgery: Respondents indicated that 40-100% of their CFM cases require orthognathic surgery. The frequency distribution of percentage of patients requiring orthognathic surgery is illustrated by Figure 12).

c. Frequency of Distraction Osteogenesis: Respondents indicated that 0-50% of their CFM cases require distraction osteogenesis. The frequency distribution of percentage of patients requiring orthognathic surgery is illustrated by Figure 13).

d. Internal versus External Distractors: Amongst all respondents, internal distractors were preferred by 81.8% (18 of 22) while external distractors were preferred by 18.2% (4 of 22) (Figure 14).

e. Non-Surgical Orthodontic Treatment: 6 respondents reported using removable functional appliances, 9 reported using fixed functional appliances, 21 reported using traditional orthodontic brackets, and 11 reported using mini-implants or other bone-anchors in the orthodontic treatment of patients with CFM (Figure 15).

Discussion and Key Findings:

In our study, Fisher's exact test revealed a statistically significant association between status of academic accreditation and number of active orthodontic cases, where non-academically accredited centers had fewer active orthodontic cases of CFM (p -values <0.05). In a study by Brown et al., a relationship was found between the quality of dental education for underserved patients and patients with craniofacial anomalies and the professional attitudes and behavioral indicators of orthodontists and orthodontic residents; it was found that orthodontists and residents did not feel well prepared to treat underserved patients or patients with craniofacial anomalies, and this could lead to lower confidence in providers to treat these patients. These barriers may play a role in the reduced number of active orthodontic cases of CFM patients in non-academically accredited centers.

No other statistically significant associations were obtained. Therefore, we failed to reject the null hypotheses that there is no significant difference in treatment protocols used by craniofacial teams across the country, and craniofacial team related factors, such as location and academic accreditation, have no association with the protocol used.

Our study's descriptive statistics revealed that the majority of responding teams were in urban craniofacial centers and non-academic centers. The majority of teams use the terms Craniofacial Microsomia and Hemifacial Microsomia to describe the condition, however one respondent noted that they use the term Hemifacial Microsomia if the condition presents unilaterally and Craniofacial Microsomia if the condition presents bilaterally. Most respondents reported using the Pruzansky-Kaban

and the OMENS plus diagnostic classification systems. The majority of respondents reported completing orthodontic records on an annual basis or as needed by the orthodontic and orthognathic treatment objectives.

The majority of respondents reported performing mandibular surgery after the pubertal growth spurt or at skeletal maturity. However, several participants reported an exception where early surgery may be considered during growth to control or improve facial asymmetry if the patient is experiencing significant psychosocial challenges compromising their quality of life. This sheds valuable light on the potential indications of early versus late surgical intervention.

Most respondents reported using traditional orthodontic brackets with functional appliances and mini-implants as adjunctive treatment modalities to achieve orthopedic and orthodontic treatment objectives.

Limitations and future directions:

Recruitment of participants was one of the primary challenges in the implementation of this study. Possible reasons for this difficulty could include unique participant-related factors such as insufficient time to complete the survey, inability to access detailed patient information, survey fatigue and burnout, and lack of expertise required by the questionnaire topic. After 3 reminder emails to complete the questionnaire, the number of responses had plateaued at 22. However, in an effort to mitigate this limitation, and IRB approved modification was made to the recruitment email to allow the recipient to forward the survey to any official team member that is equipped to complete the questionnaire accurately. This modification was implemented in the fourth and final reminder email, which increased the total sample size by 4, resulting in the final, but still limited, sample size of 26. Employing this modification earlier or at the beginning of the recruitment process would likely have helped to increase the sample size.

Incomplete survey responses was another challenge we faced. While the total sample size was 26, there were only 22 complete responses. We attempted to prevent this issue by requiring all questions to be answered through the Qualtrics software, however some questions, especially free-text questions, were still skipped by several participants. Alternatively, limiting the number of free-text questions and offering questions with specific answer choices instead may have helped to prevent this limitation.

Conclusions:

In our study, Fisher's exact test revealed a statistically significant association between status of academic accreditation and number of active orthodontic cases, where non-academically accredited centers had fewer active orthodontic cases of CFM (p -values <0.05). No other statistically significant associations were obtained. Therefore, we failed to reject the null hypotheses that there is no significant difference in treatment protocols used by craniofacial teams across the country, and craniofacial team related factors, such as location and academic accreditation, have no association with the protocol used. In order to define a standard of care and delineate the role of orthodontist in the continuum of CFM care, future studies will be required.

References

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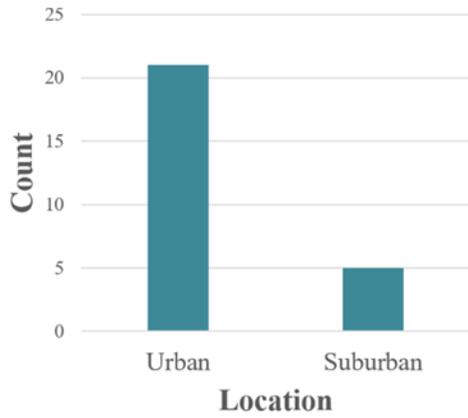


Figure 1. Descriptive Frequency Distribution of the Craniofacial Center Location.

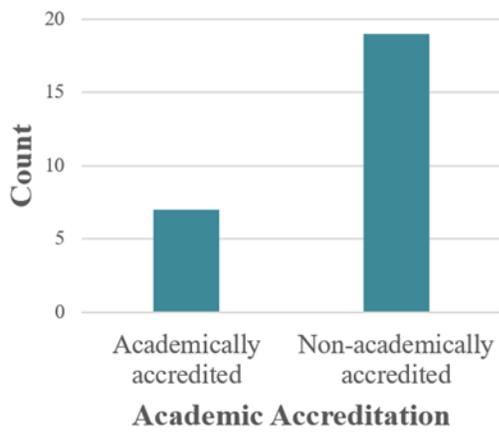


Figure 2. Descriptive Frequency Distribution of the Craniofacial Center Academic Accreditation

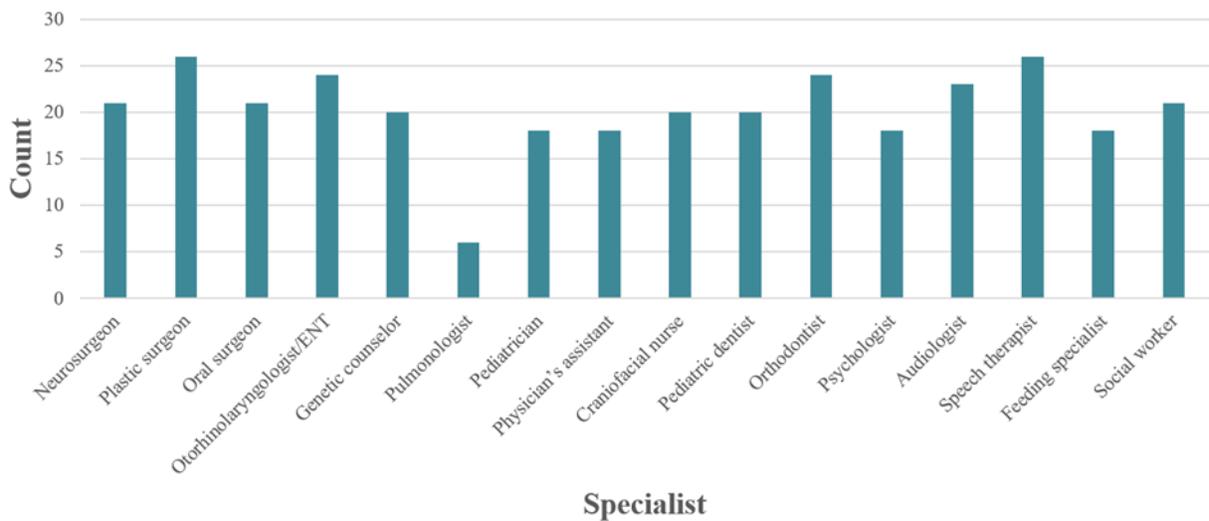


Figure 3. Descriptive Frequency Distribution of the Craniofacial Team Specialists

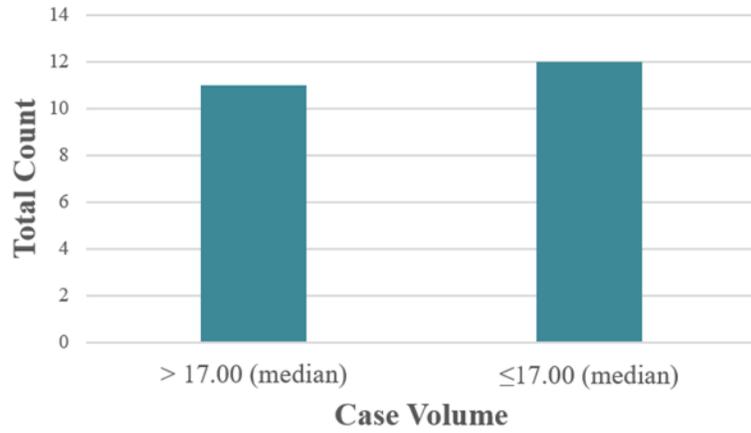


Figure 4. Descriptive Frequency Distribution of the Annual CFM Case Volume.

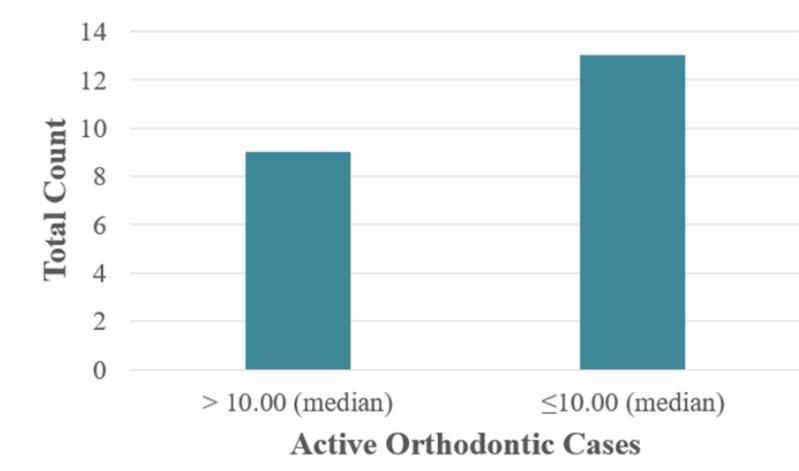


Figure 5. Descriptive Frequency Distribution of Active Orthodontic Cases.

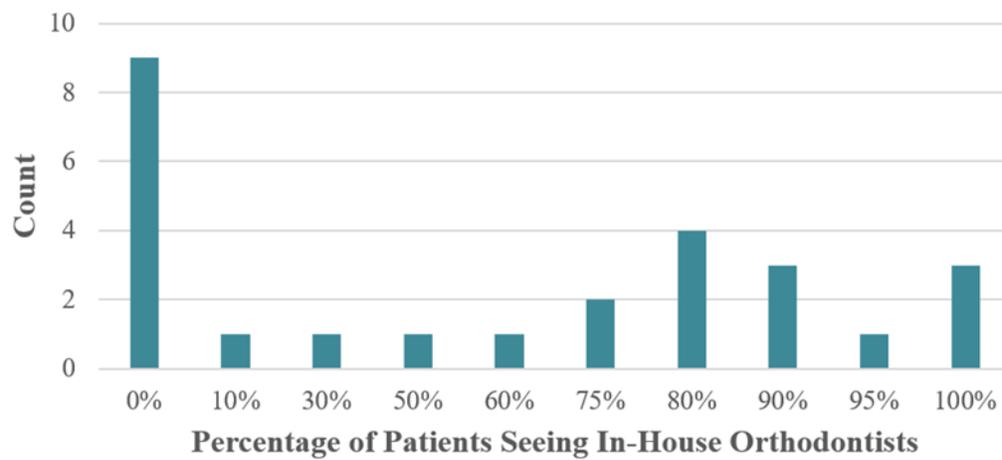


Figure 6. Descriptive Frequency Distribution of Percentage of Patients Seeing In-House Orthodontists.

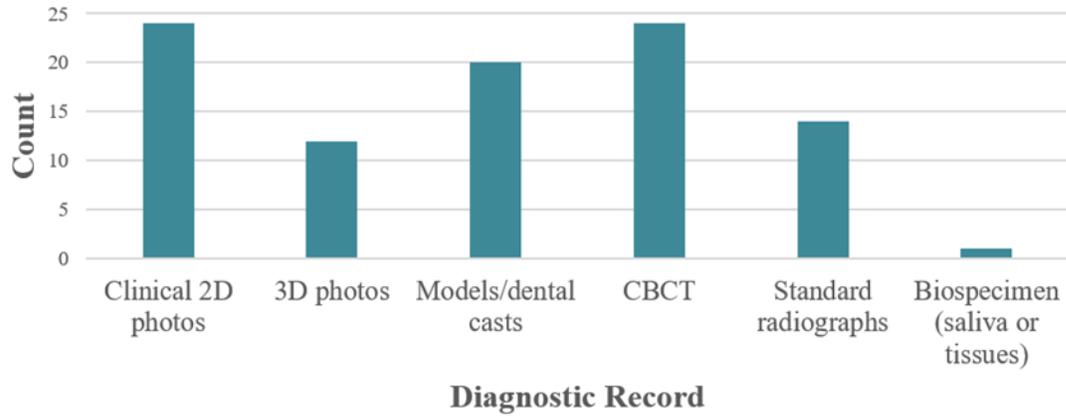


Figure 7. Descriptive Frequency Distribution of Diagnostic Records for Orthodontic Treatment.

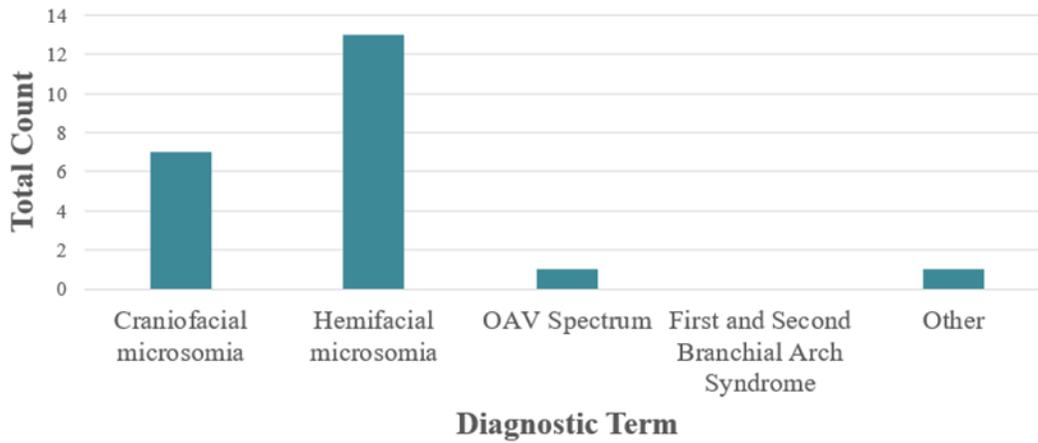


Figure 8. Descriptive Frequency Distribution of Diagnostic Terms.

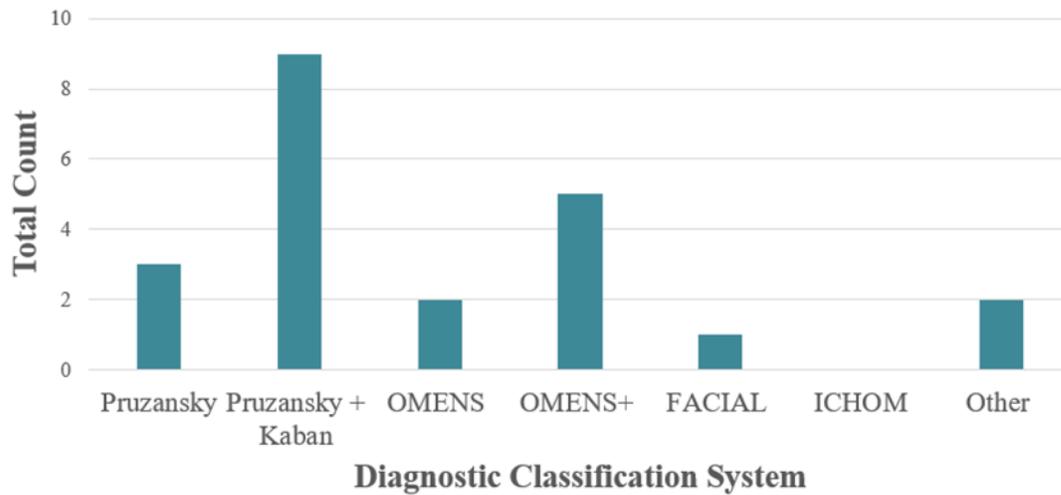


Figure 9. Descriptive Frequency Distribution of Diagnostic Classification.

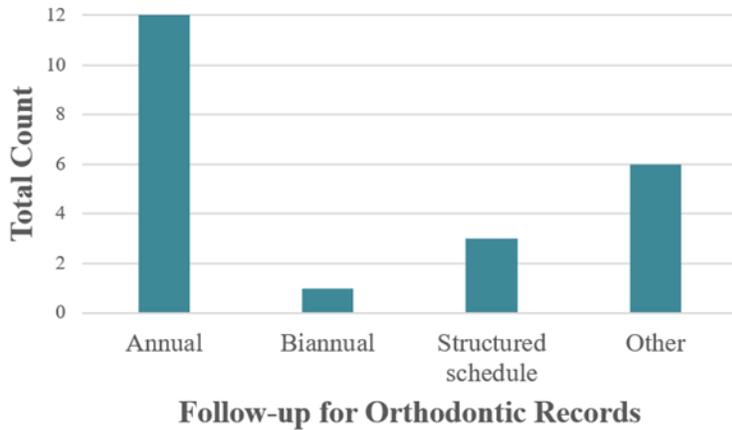


Figure 10. Descriptive Frequency Distribution of Follow-up for Orthodontic Records

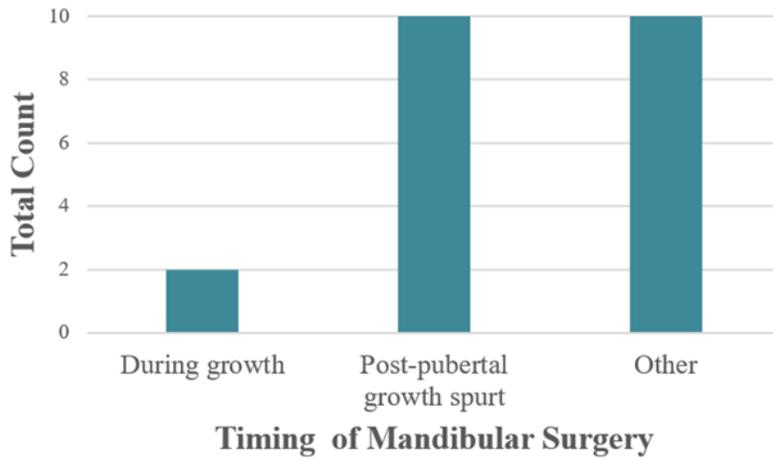


Figure 11. Descriptive Frequency Distribution for Timing of Mandibular Surgery.

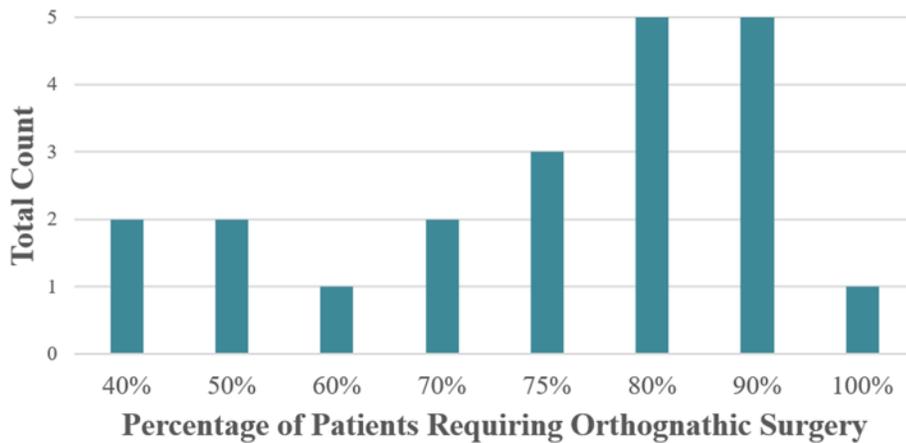


Figure 12. Descriptive Frequency Distribution of Percentage of Patients Requiring Orthognathic Surgery.

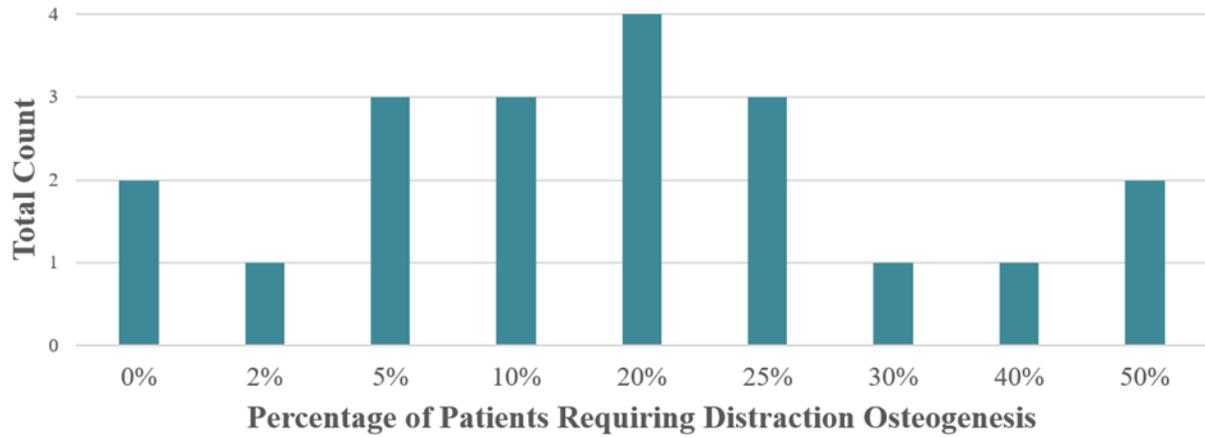


Figure 13. Descriptive Frequency Distribution of Percentage of Patients Requiring Distraction Osteogenesis.

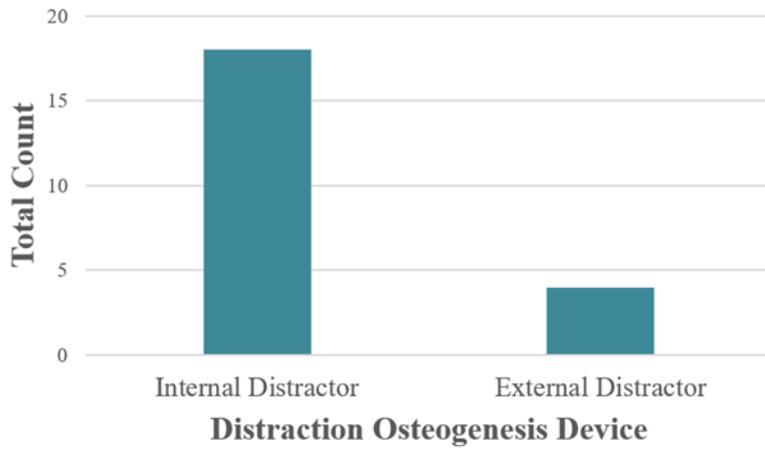


Figure 14. Descriptive Frequency Distribution of Distraction Osteogenesis Devices.

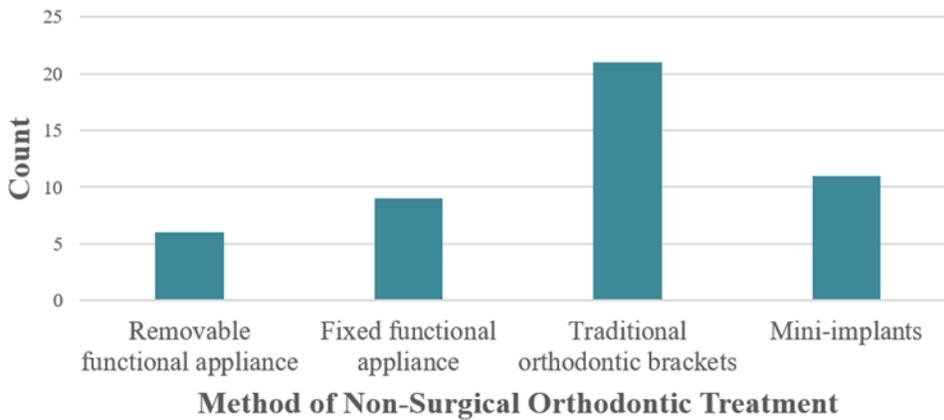


Figure 15. Descriptive Frequency Distribution of Non-Surgical Orthodontic Treatment Methods.