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Date: August 13, 1999

PRETREATMENT OCCLUSAL DIFFERENCES BETWEEN PATIENTS TREATED BY ORTHODONTISTS AND GENERAL DENTISTS

by

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Submitted in partial fulfillment of the requirements

for the degree of Master of Science in Dentistry

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August 13, 1999

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Abstract

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Published reports estimate that about one-half of all orthodontic treatment performed in the United States is done by dentists who are not specialists in orthodontics. However, little is known about the types of malocclusion treated by non-specialists. The present study compared 405 pretreatment study models from ten general dentists and 365 pretreatment study models from ten orthodontists practicing in Cuyahoga County, Ohio. The occlusal characteristics were evaluated using the Peer Assessment Index (PAR) and the Index of Orthodontic Treatment Need (IOTN). Age and gender was abstracted from the patient's dental record. Results showed that both provider groups treated slightly more females (general dentists 59%, orthodontists 55%) with similar mean ages (general dentists 15.4 ± 8.6, orthodontists 14.7 ± 8.6). The mean pretreatment PAR score for cases treated by general dentists and orthodontists was 21.6 ± 9.3 and 22.2 ± 9.3, respectively. The difference was not statistically significant. The mean IOTN Aesthetic Component score was 5.2 ± 2.0 for general dentists and 5.9 ± 2.0

for orthodontists; the mean IOTN Dental Health Component score was 3.5 ± 1.0 for general dentists and 3.8 ± 1.0 for orthodontists. Differences for both the Aesthetic Component and the Dental Health Component were statistically significant ($p \leq 0.001$). In conclusion, although both provider groups were similar in some measures, orthodontists appear to treat patients with slightly greater aesthetic and dental health need.

DEDICATION

To my wife, the love of my life, who has stood by me through thick and thin with unwavering support and utmost understanding.

To my parents, who gave me life and provided direction in my formative years.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to the following people who have made a difference in my life thus far:

To my classmates, Jon, Roland, Manish, and Soon-Jung, whom I regarded as my family away from family during my residency. Roland, there will always be a place for you in my practice should you ever decide to come back to the United States.

To my thesis committee members, Dr. Hans, Dr. Phelps, Dr. Broadbent, and Dr. Nelson, who served so ably and patiently as my mentors on this research project.

To my wife and family, on whom I depended time and again for support and advice.

To all my teachers in high school and at UC Berkeley, who taught me how to think critically and for myself.

To my professors at UCLA, who made me a dentist.

Last but not least, to the best orthodontic faculty in the world, who made me an orthodontist. Thank you from the bottom of my heart for this very special gift.

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INTRODUCTION

Recent decades have seen major changes in the practice of orthodontics in America, both from a business standpoint and a clinical standpoint. Despite relative economic prosperity in recent years, previous recessionary times in the late 1970's and 1980's might have served as the impetus for general dentists who were facing a slowdown in their practices to expand their services to include comprehensive orthodontic treatment. Other factors, such as a decrease in the prevalence of tooth decay and a decrease in birth rate, may have also contributed to the ongoing concern in the orthodontic specialist community about non-specialists providing orthodontic care. In addition, from a clinical standpoint, with the advent of various pre-adjusted appliance systems, the clinical practice of orthodontics has become less technically demanding (Wolsky and McNamara 1996).

Past studies in the literature have focused on the characteristics of general practitioners who devote a portion of their practice to providing orthodontic treatment. These studies have generally looked at the types of orthodontic treatment provided, the educational background of the general dentists, and the economic impact of the provision of orthodontic treatment on the practices (Jacobs et al. 1991; Lawrence et al. 1995; Manasse and Dooley 1980). However, few, if any, studies have looked carefully at the type of

patients that are being treated orthodontically by general dentists. In particular, little is known about the characteristics of the dentition of these patients. It is often assumed that general dentists tend to perform minor, adjunctive orthodontic procedures in the broader scheme of restorative dental treatment plans, such as molar uprighting in preparation for a posterior fixed bridge or single tooth extrusion to expose a deep root decay. The literature has been contradictory regarding this notion and has found a small, yet significant, percentage of general dentists who provide comprehensive orthodontic treatment (i.e., fully banded cases) (Wolsky and McNamara 1996).

The specific aim of the present study was to evaluate pretreatment occlusal characteristics of orthodontic patients treated by general dental practitioners, and to compare these occlusal characteristics with those from patients treated by specialists in orthodontics in Cuyahoga County, Ohio. The indices that will be used to measure the occlusal characteristics were the Peer Assessment Index (PAR) and the Index of Orthodontic Treatment Need (IOTN).

LITERATURE REVIEW

Who Does Braces And Who Gets Braces?

Orthodontics is unequivocally unique among the dental and medical specialties with the exception of perhaps plastic surgery because the majority of patients that seek treatment do not have a true disease. Malocclusions are variations of dentofacial anatomy. In order to competently treat malocclusions, the orthodontist needs knowledge of both basic and clinical sciences. But possession of hard scientific facts alone are inadequate--it must be tempered with an understanding of the humanities. Because the orthodontist treats deviations from "normal" in the majority of cases, he must also have an artist's eye for the esthetics. For each patient, he must know whether to attempt to treat to "ideal standards," or to accept and render treatment in such a way as to camouflage the variations. Because of this duality between science and art, orthodontics counts among its most outstanding clinicians men and women who have excelled not only in clinical sciences but in liberal arts endeavors such as philosophy and painting. As truth be told, the simple act of proper placement of a bracket on a tooth requires, at the very least, knowledge of dental anatomy. However, orthodontic treatment requires knowledge of growth and development of dentofacial structures, biomechanics, and spatial geometry.

Logic seems to dictate then that those who provide orthodontic treatment should have a thorough understanding of the art as well as the science of orthodontics. Numerous studies, both in the United States and abroad, have attempted to delineate the provision of orthodontic treatment by the dental profession. In 1980, Manasse and Dooley surveyed a random sample of 330 general dentists in the Chicago metropolitan area, with a net yield of 202 valid responses, to determine the extent of orthodontic referrals and treatment performed by general dentists. Approximately one-third of the respondents reported providing orthodontic treatment limited to minor tooth movement using mainly removable appliances, whereas two-thirds provided no orthodontic treatment. Also, almost all general dentists in the sample routinely made orthodontic referrals. Other findings included a general trend toward an increased number of referrals among younger general dentists, as well as a tendency for general dentists who received clinical training in orthodontics during dental school to continue treating orthodontic patients in their practice.

In 1983, the Association of Pedodontic Diplomates in 1983 looked at the provision of orthodontic treatment by pedodontists. They found that 99% of the pedodontists in the sample provided some orthodontic treatment, with one-third providing comprehensive care, i.e., full-banding. While this rate may seem high, it should be pointed out that most graduate pedodontic programs cover orthodontics at a more intensive level than most

undergraduate dental programs. In addition, a small percentage of pedodontists (4%) were dual-trained in orthodontics, and it is safe to assume that these specialists provided comprehensive orthodontic treatment. Despite providing comprehensive orthodontic treatment, pedodontists were also found to be a major referral source for orthodontists, and 87% routinely made referrals. However, an alarming number of pedodontists (59%) reported a decline in traditional pedodontic care in their practices. Whether or not this decline had a direct impact on the patient flow to orthodontic practices remained unclear and is a different area to study.

In 1988, Koroluk, Jones, and Avery performed a survey of both general dentists and pedodontists in Indiana and found comprehensive treatment provided by both groups to be 17.9% and 62.1%, respectively. Both of these percentages were higher than previously reported by Manasse and Dooley in 1980 and the Association of Pedodontic Diplomates in 1983. In addition, the percentage of general dentists who provided some orthodontic treatment was 62%, an almost two-fold increase over the figures reported by Manasse and Dooley in 1980. Interestingly, the finding in the Manasse and Dooley study that younger general dentists tended to make more referrals was corroborated in this study. Possible explanations for this finding will be addressed later.

In 1991, Jacobs et al. surveyed the entire population of general dentists in Iowa with a return rate of 62.8% (728 out of 1159). This study

attempted not only to characterize volume, scope, and other correlates of orthodontic services in general practice, but it was also designed to study the referral patterns and scope of treatment of general dentists who provided a significant amount of orthodontic treatment (10% or more of their patient population). Approximately one-third of the respondents provided no orthodontic treatment; two-thirds provided some orthodontic treatment. Those respondents who provided some orthodontic treatment were then divided into two groups: low-volume providers (45.7% of the sample population) versus high-volume providers (20.4%). The criterion used in this study to separate low-volume from high-volume providers was 10% or more of the patient base being treated orthodontically. From this data, it appeared that high-volume providers tended to treat more comprehensive cases and referred fewer patients to orthodontists than the rest of the sample.

In 1996, Wolsky and McNamara surveyed a stratified random sample of general dentists in Michigan to determine the amount and scope of orthodontic treatment provided by general dentists. Compared to previous studies (Manasse and Dooley 1980, Koroluk et al. 1988, Jacobs et al. 1991), there was an increase in the provision of some orthodontic treatment by general dentists (76.3%), but a similar percentage of general dentists providing comprehensive treatment (19.3%).

It is interesting to contrast this temporal trend in increased provision of orthodontic treatment by American general dentists with the international

dental community. In 1985, Taylor and Kerr surveyed one hundred general dentists in Glasgow, Scotland and found that 45% provided some orthodontic treatment, a figure that, according to the authors, appeared relatively unchanged since 1969. However, this figure pales in comparison with the finding of 85% in a study by Stephens et al. conducted in England and Wales. Furthermore, Taylor and Kerr found that a number of provider characteristics, namely the number of years since graduation, perception of orthodontic training at the undergraduate level, and participation in orthodontic continuing education courses, did not have an influence on whether or not a particular general dentist provided orthodontic treatment. This is in sharp contrast to the American studies. Lawrence, Wright, and D'Adamo in 1995 surveyed a random sample of 307 general dentists in Victoria, Australia and found that about 60% provided some orthodontic treatment, with 26% providing comprehensive treatment.

The next interesting correlate of orthodontic treatment in general dentistry to be examined involves the scope of orthodontic treatment. Can a temporal trend also be observed in the complexity of and clinical time devoted to orthodontic treatment rendered by general dentists? Manasse and Dooley (1980) found that Chicago general dentists, who treated orthodontic patients, generally used removable appliances to perform limited treatment, involving eruptive guidance for children and correction of simple crossbites and molar uprighting for adults. Koroluk et al. (1988) found that an overwhelming

majority of general dentists in Indiana (86.3%) spent less than 10% of their clinical time providing orthodontic services. However, the usage of various orthodontic techniques and appliances was diverse, ranging from space management and removable appliances to headgears and fixed appliances.

Jacobs et al. (1991) addressed the question of how much clinical time general dentists devote to orthodontic care from a slightly different perspective. They found that nearly 80% of general dentists provide orthodontic care to less than 10% of their patient pool. While 10% of the patient pool does not necessarily translate to 10% clinical time, it is a rough estimate. One might perhaps even make the argument that since a general practice setup is not as efficient as an orthodontic office setup, general dentists who chose to provide orthodontic services would spend a disproportionate amount of clinical time doing so. The 20% of general dentists who expended more than 10% of clinical time to provide orthodontic care were placed in the high provider group. This group used more fixed appliances, more functional appliances, and more headgears. Wolsky and McNamara (1996) reported that 96% of the general dentists in their sample spent less than 25% of their practice time providing orthodontic services. This compares to 98.7% in the Koroluk et al. study of 1988.

Therefore, the temporal trend that more general dentists nowadays are providing more orthodontic treatment in some form using a broader range of appliances appears to be valid. It is also valid that only a small percentage of

general dentists (roughly 20%) provide comprehensive orthodontic treatment, and only a fraction of these general dentists devote a significant amount of clinical time toward orthodontic care. Nevertheless, the fact remains that general dentists provide comprehensive treatment to a portion of the population. The number of actual patients being treated is related to a number of factors, the most obvious of which is the number of general dentists in the population.

Manpower Analysis

In 1997, the American Dental Association in 1997 reported the following distribution of general dentists and orthodontists in the United States as indicated on Table 1:

Table 1.--Number of General Dentists and Orthodontists in Designated Geographic Area.

PRACTITIONER TYPE	UNITED STATES	OHIO	CUYAHOGA COUNTY
General Dentists	122,001	4760	618
Orthodontists	8869	369	55
GP/Ortho Ratio	13.8	12.9	11.2

Of these 8,869 orthodontists, 8,304 were classified as private practitioners, and 565 were classified as non-private practitioners. The non-

private practitioners included educators, administrators, researchers, armed forces orthodontists and orthodontic residents. Waldman (1996) analyzed the dynamics of orthodontic manpower and observed that between 1987 and 1991, the number of private practicing orthodontists increased by 304. However, between 1991 and 1995 that figure decreased by thirty-eight for a net gain of 266 between 1987 and 1995. Using data from the U.S. Bureau of the Census, Waldman concluded that the ratio of private practicing orthodontists to 100,000 youngsters (defined as between the ages of 5 and 19 years) has decreased from 15.2 in 1987 to 14.8 in 1995. The primary reason for this decrease was a mild population boom between the mid 1980s and the mid 1990s of 3.2 million youngsters between five and nineteen years of age. The increase in population of youngsters was most concentrated in the Pacific and South Atlantic Regions, with California leading the way with an increase of 1.3 million youngsters.

Two other trends contribute to this decreasing ratio of orthodontists to youngsters. First, the annual number of orthodontists produced from U.S. graduate programs increased from 278 in 1987 to a peak number of 303 in 1989, and then gradually decreased to 247 in 1995. One possible explanation is that many programs increased their duration from twenty-four months to thirty months or greater during this period. In 1997, Rudolph and Sinclair reported that in 1983, two-year programs comprised 90%; in 1989, 60%; and in 1994, only 43%. Secondly, the number of foreign graduate

residents has steadily increased (Waldman 1995), comprising 17% of orthodontic program graduates in the late 1980s to 25% in 1995. Rudolph and Sinclair in their 1997 survey looked at the country of origin of graduate residents and found that in 1983, 16% were of foreign origin; in 1989, 13.4%; and in 1994, almost 20%. While it is true that not all foreign graduates return to their country of origin to practice, Rudolph and Sinclair calculated that the majority (75%) return.

In the November 1998 estimate of the U.S. population from the Bureau of the Census, there were 270.9 million people, a 21.5 million or 8.7% increase over the reported figure in the 1990 census. The median age was 35.3 compared to 32.8 in 1990. A closer examination of the data from the U.S. Bureau of the Census reveals a few interesting trends. First of all, the ethnic make-up of the population appears to continue to shift, with minority groups such as Hispanic and Asian showing the largest gains. This ethnic make-up of the population is not mirrored by the existing provider pool, with the largest inequities residing within the African-American (12.7% of the population versus 2.8% of providers), Hispanic (11.4% versus 4.1%), and Asian subsets (3.9% versus 7.1%). Second, a mild population boom occurred in the past decade. The Bureau of the Census projects that between 1993 and 2020 there will be an increase of 10.4 million people between the ages of five and nineteen.

The American Association of Orthodontists periodically conducts a patient census survey based on its entire membership roster to identify trends and track changes in the market. The surveys are carried out approximately every other year with the first survey being done in 1981. The 1996 Patient Census Survey was distributed in the January/February 1997 issue of the Bulletin to a total of 8,593 U.S. and Canadian orthodontists who were members of the AAO. A one-in-six response rate (n = 1,440) was obtained. Data from the 1996 Patient Census Survey showed a number of trends that were not only consistent with data from previous surveys, but contradict conclusions from some previous studies in the literature that forecast a gloomy future for orthodontics.

Table 2.--Market Trends in Orthodontic Practice.

	1986	1989	1992	1994	1996	% CHANGE 1994-1996	% CHANGE 1986-1996
Number of practicing orthodontists	7898	8183	7803	8407	8593	2.2%	8.8%
Number of new patient exams	239	261	275	294	296	0.7%	23.8%
Number of starts	154	164	174	191	200	4.7%	29.8%
% of starts under 18	NA	74.8	77.1	82.8	80.1	-2.7%	+5.3%
% of starts over 18	NA	25.2	22.9	17.2	19.9	+2.7%	-5.3%
% of starts under 18 who are female	NA	60.0	60.0	59.0	60.0	1.0%	0.0%
% of starts over 18 who are female	NA	70.0	70.0	70.0	68.0	-2.0%	-2.0%
Adults per doctor	NA	41	40	42	40	-	-
% of patients from dental referrals	57.6	60.1	59.6	58.3	58.0	-0.3%	+0.4%
% of new patients with health insurance	48	54	52	54	54	0.0%	+6.0%
% of patients covered by managed care		16.4	15.7	12.2	9.0	-3.2%	-7.4%

First, while the number of orthodontists has increased from 7,898 in 1986 to 8,593 in 1996, the available pool of orthodontic patients as suggested by the number of new patient exams and starts appears to have expanded. Since the dental referral rate and the number of adult patients have remained stable over the past decade at around 58-60% and forty per orthodontist respectively, the bulk of the increase seems to have come from younger patients. In other words, orthodontists may be starting their cases earlier and/or performing more early treatment procedures. Nevertheless, the majority of patients of a typical orthodontic practice, regardless of age, are still female. Other encouraging trends include the continued widespread availability of orthodontic health insurance, and a decline in the percentage of patients who are enrolled in managed care programs.

Why Do More General Dentists Provide Orthodontic Services?

The amount of orthodontic training that a general practitioner receives at the undergraduate level appears to be inadequate in preparing him to treat anything beyond space management and limited tooth movement procedures such as molar uprighting and single-tooth anterior crossbite. According to the 1992 Accreditation Standards for Dental Education Programs set forth by the Commission on Dental Accreditation, dental graduates must be "competent to recognize malocclusions in the primary, mixed, and permanent dentition and treat limited developmental and acquired abnormalities," and "each graduate must be exposed, through active participation, to single tooth or segmental

arch tooth movement utilizing active appliance therapy." Further, the Commission on Dental Accreditation stresses the role of general dentists "in the appropriate treatment and referral of patients needing advanced therapies." These guidelines are admittedly loosely defined and leave much discretion to the individual dental schools to incorporate orthodontic instruction into their curriculum content.

The variability of exposure to orthodontic didactic and clinical instruction at the undergraduate level can be deduced from a number of studies. McDuffie and coworkers (1985) reported a total instructional time of 140 clock hours, ninety of which is devoted to clinical treatment, at the University of Florida College of Dentistry, compared to a national average of 110 hours. The objective of this study was to determine the effect of orthodontic exposure at the undergraduate level on the amount of orthodontic treatment by recent graduates from the University of Florida compared to recent graduates of other programs. Interestingly, these two groups of recent graduates, despite different curricula, tended to provide the same amount and scope of orthodontic treatment. According to Moore and Erickson (1988), predoctoral instruction at the University of Nebraska includes orthodontic records and analysis, growth and development, and clinical duties every other week for juniors and seniors. Lowe (1987) reported one of the most extensive undergraduate orthodontic programs at the University of British

Columbia in Canada, with over two hundred combined hours of didactic and clinical instruction with each dental student starting at least two new cases.

At the University of California, Los Angeles, sixty hours are devoted to didactic instruction, and sixty hours are devoted to clinical instruction. In comparison, Case Western Reserve University allots fifty-six hours to didactic instruction and sixty-eight hours to clinical instruction. At both Case Western Reserve University and UCLA, dental students have the option of providing limited treatment to a single patient as part of a comprehensive dental treatment plan, or assisting orthodontic residents for a total of thirty clock hours to fulfill the undergraduate clinical requirement.

There is little argument that predoctoral orthodontic instruction at most dental schools provides graduates with the knowledge to recognize dentofacial malocclusions and the clinical skills to provide limited treatment for their patients. General dentists who wish to increase their orthodontic knowledge must pursue continuing education in various forms. These include university-based postgraduate programs leading to specialty certification in orthodontics, seminars and lectures at meetings, or proprietary "weekend" motel courses. Jacobs and coworkers (1991) found that general dentists in Iowa who provided orthodontic treatment to 10% or more of their patients took significantly more hours of continuing education in orthodontics than their peers who provided orthodontic treatment to less than 10% of their patients. This finding was corroborated by Lawrence and coworkers (1995) using a

sample of general dentists in Melbourne, Australia. Koroluk and coworkers (1988) used a sample of general dentists in Indiana and reached the same conclusion. However, the correlation between the amount of orthodontic treatment rendered and the referral level is not consistent. Jacobs and coworkers found that high-volume orthodontic providers made fewer orthodontic referrals, whereas Lawrence et al. (1991) and Wolsky and McNamara (1996) found the opposite to be true.

Given the disparity between predoctoral and postdoctoral orthodontic didactic and clinical instruction, not only on the basis of clock hours (about 110 versus a minimum of 4,000) but breadth and variety of clinical cases as well, the fact that some general dentists choose to render comprehensive treatment can be viewed as rather disheartening. Although the percentage of general dentists who render comprehensive treatment has remained relatively constant around 15-20%, the percentage of limited orthodontic treatment has gone up. Surely there must be other reasons why more general dentists nowadays render orthodontic services. Gottlieb suggested a number of socioeconomic factors ranging from declining birth rates to poor economic conditions in the 1970s and 1980s. It is difficult to establish a correlation between economic conditions and the amount of orthodontic treatment rendered by general dentists. Rather, it is easier to speculate that changes in the prevalence of caries and periodontal disease have led more general dentists to provide orthodontic care.

Patterns of Dental Disease

In 1987, Kunzel studied the prevalence of caries among industrialized countries during the period of 1971-1983, and found a dramatic decrease in the caries rate in children and young adults as measured by the DMFT index. There was also a concomitant increase in the number of children with caries-free dentitions. He attributed these findings to a number of factors, including the wide availability of fluoride in both topical and systemic forms, enhanced awareness of oral health, reduction in sugar consumption and increased use of dental services. Because these reductions were based on a better understanding of the etiology of dental disease, this trend of decreasing prevalence of caries and periodontal disease has continued (World Health Organization 1998).

To summarize, many factors contribute to the current trend of increased orthodontic services among general practitioners and, as a result, a general feeling among orthodontists that the orthodontic patient pool is shrinking. First, current undergraduate dental curricula include more orthodontic instruction. Second, more orthodontic treatment is performed by younger general dentists compared to older general dentists. Third, technological advancements in appliances and the onslaught of "weekend motel" straightwire courses have perhaps given the general practitioner a somewhat exalted perception of his or her competence in rendering comprehensive care. Furthermore, a continuing decline in the prevalence of

caries and periodontal disease due to fluoridation and public awareness of oral health has eroded the need for traditional restorative dentistry. Finally, compromising socioeconomic conditions in the past may have pushed many general practitioners into other areas of dentistry to maintain previous production levels.

Treatment Need Versus Treatment Demand

An individual's decision to seek orthodontic treatment is undoubtedly based on a variety of factors, including economic, psychological, social, and physical. For a child, it can merely be the constant harassment from schoolmates as a result of an excessive overjet. For an adult, it can be the inability to maintain adequate oral hygiene due to severe crowding. For the parent, or the financially responsible party, it may be the affordability of orthodontic treatment. Finally, for the community at large, it may be the availability of such treatment. It has been said many times over that orthodontic treatment can bring about improvement in function, periodontal health, and esthetics of an individual's dentition. Nevertheless, in the eyes of the lay public, it is most often the promise of a dazzling "Hollywood" smile that motivates most people to seek treatment.

In 1994, Pietila and Pietila conducted a study to determine the correlation between an orthodontist's assessment of treatment need and the parents' view on their own child's treatment need. A group of seven to eight-year-old Finnish children (N = 261, 55% boys and 45% girls) were examined

by an orthodontist and given an assessment of treatment need on the basis of occlusal and functional deviations and craniomandibular signs and symptoms. A questionnaire was then sent to the parents asking their views on their child's dental appearance and function, their own dental appearance, history of orthodontic treatment in the family, and the best age for starting orthodontic treatment for children. As might be expected, there was a statistically significant association between parents' level of concern and their opinion on the child's dental appearance and function. In other words, most of the parents (77%) who considered their child's dental appearance to be good were not concerned about their child's teeth, whereas all parents who considered their child's dental appearance poor were concerned about the alignment of their child's teeth. When parents' opinions were compared with an orthodontist's assessment of treatment need, agreement was found 60% of the time. Further, agreement was found to be stronger for malocclusions affecting the anterior teeth. Most parents thought seven to eight years to be the best ages for starting orthodontic treatment.

Wheeler and coworkers in 1994 examined orthodontic need and demand in 6,696 third and fourth grade children in Florida. Data including age, sex, race, orthodontic status, socioeconomic status, availability of specialist treatment services, and occlusion were collected. The orthodontic status was determined based on a thorough exam that included trauma history, skeletal relationships, overbite, overjet, molar relationship, anterior

crowding, mandibular function (joint sounds and maximum vertical opening), interlabial gap, and incisor exposure. From these findings, the child's orthodontic status was classified as "demand," "need," or "no need." Orthodontic demand was defined was any child who had a history of previous or current treatment. Need was defined as those children determined to have a need based on the orthodontic examination. No need was defined as those children with either an optional orthodontic need or no need. Based on these categories, orthodontic demand was found to be significantly higher in girls than boys (9.5% compared to 6.8%), whereas need had the inverse relationship (41.8% in girls compared to 44.2% in boys). Demand was greater in white than black children (11.8% compared to 1.2%), but need was less in black than in white children (35.3% compared to 47.2%). Demand was positively associated with higher socioeconomic status and proximity to specialist care. All in all, children in this sample who were most likely to have had or were currently under treatment were more likely to live in areas where there was specialist care available, to be in higher socioeconomic groups, and to be female students.

In 1998, Le (MSD thesis 1998) and Armogan (MSD thesis 1998) examined the utilization of orthodontic services in Cuyahoga County, Ohio. The sample in this study consists of tenth graders attending high school in Cuyahoga County. The following high schools were used in the Le study.

Table 3.--Location of High Schools.

HIGH SCHOOL	CITY
Beachwood High	Beachwood
Lakewood High	Lakewood
Richmond Heights High	Richmond Heights
Health Careers Center	Cleveland City
Solon High	Solon
Shaw High	East Cleveland
John Hay High	Cleveland City
Fairview Park High	Fairview Park
Cleveland Heights/University Heights	Cleveland Heights
Brooklyn High	Brooklyn
Cuyahoga Heights High	Cuyahoga Heights

A total of 2,808 students were enrolled in the study. The mean age was 15.5 years with a standard deviation of 0.8 years. The male-to-female ratio was 1:1. Several interesting findings came out of this study. First, it appeared that the general dentists played an important role in the referral process, but not necessarily in the direct provision of orthodontic care. Eighty four percent of the students reported having visited a dentist last year, with 78% of these citing checkup or prophy as the reason for going to the dentist. Seventy two percent of the students reported having a family dentist. When asked if they have been told that they needed braces, 42% responded positively, and 45% responded negatively. Among the 42% that were told they needed braces, 71% followed through with the recommendation and obtained treatment; among the 45% that were not told they needed braces, only 7% eventually received orthodontic treatment by 10^{th} grade. Of those that received orthodontic treatment, 87% were treated by orthodontists. In

addition, these investigators found socioeconomic status to be an important cofactor in the utilization of orthodontic services. Socioeconomic impact on utilization of dental services was substantially less. Students from higher socioeconomic groups were more likely to have a family dentist, to have worn braces, to have visited a dentist in the previous year, and to have been more compliant in terms of following through on a dentist's recommendation for orthodontic treatment.

Assessment of Treatment Complexity

Given the wide range of clinical presentation of malocclusion at various developmental stages, a clinician faces a daunting task in attempting to assess the complexity of a given case, especially when the clinician needs to factor in the patient's expectations and level of compliance. As an illustration, the treatment of a class II division 1 malocclusion in a growing child may include growth modification with a headgear, when in an adult it may require extraction of teeth. Furthermore, most patients are happy with a straight smile at the conclusion of treatment, while some may also be concerned about the amount of gingival display when smiling.

All subjective factors aside, the clinician has a number of guidelines to assess complexity at the onset of treatment. Angle's classification of the molar relationship and millimeters of overbite and overjet have long been used by the dental community as quantitative measures of malocclusion in the anteroposterior and vertical dimensions. Though time-honored and

respected, Angle's classification is limited in scope because it does not convey information about other equally important occlusal characteristics in other planes of space such as tooth crowding. Other examples of occlusal indices that attempt to provide a more comprehensive analysis of occlusal characteristics include the Occlusal Index (Summers 1966), the Treatment Priority Index (Grainger 1967), the Handicapping Malocclusion Assessment Record (Salzmann 1968), and the Dental Aesthetic Index (Cons, Jenny, and Kohout 1986).

More than ten years ago, two occlusal indices were developed in Europe, namely the Index of Treatment Need (IOTN) (Brook and Shaw 1989) and the Peer Assessment Rating Index (PAR) (Richmond et al. 1987). Both these indices have been tested and found to have good intra- and inter-examiner reliability. The IOTN was developed to assign treatment priority, or need, whereas the PAR Index was designed to assess treatment outcome.

Since both the PAR Index and the IOTN have only been recently introduced, there have been only a few studies that apply these indices to large samples of patients. Richmond et al. (1997) invited a random selection of specialists and non-specialists in England to submit cases. A total of eight orthodontists and thirty-three general dentists participated, with a resulting sample size of 280. The mean age was thirteen years, with a standard deviation of thirty-six months. The pretreatment mean PAR score for general dentists was 28.7 compared to 31.1 for orthodontists, and a significant

difference was detected in mean PAR scores. However, Fox et al. (1997) used a sample of 375 study models from forty-one specialists and non-specialists in England, and did not find differences in either pretreatment mean PAR scores or IOTN scores between provider groups.

The present study proposes to use the IOTN and the PAR Index to determine if there exists a difference in pretreatment occlusal characteristics of patients treated by general dentists compared to those treated by orthodontists.

MATERIALS AND METHODS

Study Sample

The design of the study was cross-sectional. The sample pool of general dentists and orthodontists was derived from a list of providers available from a previous outcome assessment study at Case Western Reserve University, Department of Orthodontics (Le, 1998). In that study, a survey was performed on a representative sample of the tenth grade high school population in Cuyahoga County, Ohio to determine the level of orthodontic utilization and to assess treatment outcome based on the PAR Index. From those tenth grade students who were undergoing orthodontic treatment or had completed treatment, a list of orthodontic providers was constructed and divided on the basis of provider education (i.e. orthodontists versus non-orthodontists). A letter requesting participation (Appendix 2) was mailed out to a total of seventy-eight general dentists and ninety orthodontists. This letter was carefully drafted to explain the unobstrusive nature of the data collection, and a self-addressed stamped envelope was provided for the doctor's convenience. Providers who responded positively within a three-week period from the mailing date were eligible to be included in the sampling population. A follow-up telephone call was placed to providers who responded "MAY BE" to determine their status in the study.

The initial tally of the available practitioners included fifteen general dentists and nineteen orthodontists. Of these fifteen general dentists, two were eliminated because their practices were outside of Cuyahoga County, and two subsequently declined involvement for personal reasons. Of the nineteen orthodontists, five were eliminated because their practices were outside of Cuyahoga County, one was eliminated because he had been retired for some time and therefore his patient pool might not reflect the current patient pool, one group was eliminated because of a potential conflict of interest (patients treated by CWRU Orthodontic Residents), and one was eliminated because he did not take pretreatment records on all patients who presented for treatment. Eleven general dentists and eleven orthodontists met the inclusion criteria. Using a random number table, ten general dentists and ten orthodontists were selected. Office visits were then made to collect demographic, PAR, and IOTN data from a minimum of thirty pretreatment study models at each office over a period of five months.

Calibration

The primary investigator was calibrated in both the PAR Index and the IOTN in August 1998 by Drs. Kevin O'Brien and Katherine Vig at the Ohio State University College of Dentistry. Calibration was undertaken to ensure both precision and accuracy in scoring pretreatment study models, thereby minimizing potential systematic bias and random error.

Estimation of Sample Size

A pilot study was conducted in October 1998 to estimate the sample size given an expected effect size of 2 (or 10% of a mean PAR score of 20) and a standard deviation of 9. The estimated standardized effect size (the ratio of the expected effect size to the standard deviation) was calculated to be 2/9, or 0.22. With $\alpha = 0.05$ and $\beta = 0.20$, the sample size was estimated at 322 for each provider group.

Similar calculations were also done to estimate the sample size for both components of the IOTN based on results of the pilot study. For IOTN AC, the expected effect size was 0.5 (or 10% of a mean IOTN AC of 5.0) and the estimated standard deviation was 1.8. The estimated standardized effect size was therefore 0.5/1.8, or 0.28. With $\alpha = 0.05$ and $\beta = 0.20$, the sample size was estimated at 251 for each provider group.

Similarly, for IOTN DHC, the expected effect size was 0.33 (or 10% of a mean IOTN DHC of 3.3) and the estimated standard deviation was 1.0. The estimated standardized effect size was 0.33/1.0, or 0.33. With $\alpha = 0.05$ and $\beta = 0.20$, the sample size was estimated at 174 for each provider group.

Data Collection

IRB Approval (Appendix 1) was given by the Review Committee for Human Studies at Case Western Reserve University in February 1997 with an extension granted in February 1998 to collect data for the study. Appendix

3 shows a summary of the schedule for office visits during the data collection period.

Before visiting each office, a telephone call was placed to confirm the visit and to review the purpose and the approximate amount of time required to collect data on a minimum of thirty pretreatment study models. The practitioners were all informed in the letter requesting participation, by phone, and again in person that data collection was to be done on consecutive pretreatment study models or randomly selected pretreatment study models. The rationale for giving the practitioners these two options was to make the data collection process as convenient as possible for the practitioners, thereby increasing cooperation, but at the same time, not allowing the practitioners to "pick and choose" ahead of time the pretreatment study models to be examined.

At each office prior to data collection, the primary investigator reviewed the data collection sheet (Appendix 4) with the practitioner and examined a minimum of thirty pretreatment study models. Consecutively treated pretreatment study models were examined in offices that had less than one hundred models available. In offices with greater than five hundred study models available, stratified random sampling was done. Specifically, eight study models were randomly chosen from each year during the period between 1994 to 1998. Coincidentally, all offices of general dentists had less than one hundred available study models, and all offices of orthodontist had

more than five hundred available study models. A total of 405 study models were examined at offices of ten general dentists, and 365 study models were examined at offices of ten orthodontists. The data collection process at each office took roughly three hours, with each study model taking approximately five minutes. The following data were collected:

> Biographic data (name, gender, date of birth, date of treatment start) and miscellaneous occlusal data including molar and cuspid Angle's classification and presence of deciduous dentition
>
> PAR data
>
> IOTN data

The Peer Assessment Rating Index was specifically developed to assess orthodontic treatment outcome (Richmond et al. 1993). The technique of using the PAR Index to score dental study models have been described (Richmond et al. 1993). Essentially, the PAR Index is composed of six occlusal features with different weights that reflect the degree of complexity or difficulty in correcting the occlusal feature. The occlusal features along with their assigned weights are as follows:

> 1) Upper Anterior Crowding (weight = 1)--measures the contact point displacement from the mesial of the upper right cuspid to the mesial of the upper left cuspid
>
> 2) Right and Left Buccal Occlusion (weight = 2)--measures the intercuspation of all teeth posterior to and including cuspids in all three planes of space (anteroposterior, transverse, and vertical)
>
> 3) Overjet (weight = 5)--measures the degree of overjet or anterior crossbite

4) Overbite (weight = 3)--measures the degree of deep bite or open bite

5) Midline Deviation (weight = 3)--measures the discrepancy between the upper dental midline and the lower dental midline

The scores of the six occlusal features are added up to give a PAR score that reflects the "crookedness" of the teeth. As shown in Figure 1, a PAR ruler is used to measure the occlusal features and also serves as a convenient summary of PAR guidelines.

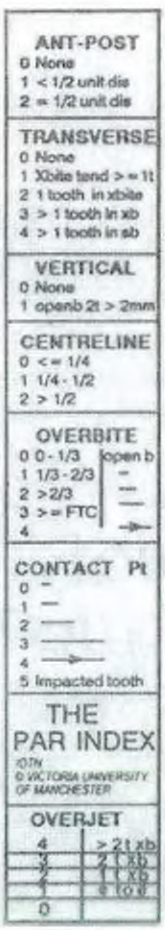


Figure 1.--The PAR Ruler. Summary rules for each segment of the PAR Index are described in separate sections of the ruler.

According to Proffit (1998), the range of malocclusion as measured by the PAR Index is as follows:

0: Ideal occlusion

1-5: Near ideal

6-15: Generally acceptable

>50: Severe malocclusion

The Index of Treatment Need (IOTN) attempts to classify malocclusion in terms of the significance of various occlusal characteristics for an individual's dental health and perceived esthetic compromise. It was specifically developed as a treatment need index to identify patients who would most likely benefit from orthodontic treatment. The IOTN incorporates an Aesthetic Component and a Dental Health Component (Brook and Shaw, 1989).

The Aesthetic Component (AC) consists of a scale of ten color photographs showing different levels of dental attractiveness (refer to Figure 2). For use on dental study models, monochrome photographs are used instead to minimize clinical bias due to oral hygiene, gingival conditions, or presence of anterior restorations (Woolass and Shaw 1987). Grade 1 represents the most and Grade 10 the least attractive arrangements of teeth. According to the guidelines, patients with Grades 1, 2, 3, or 4 would have little or no need for orthodontic treatment; patients with Grades 5, 6, or 7 would

have borderline or moderate need for treatment; and patients with Grades 8, 9, or 10 would have a definite need for orthodontic treatment.

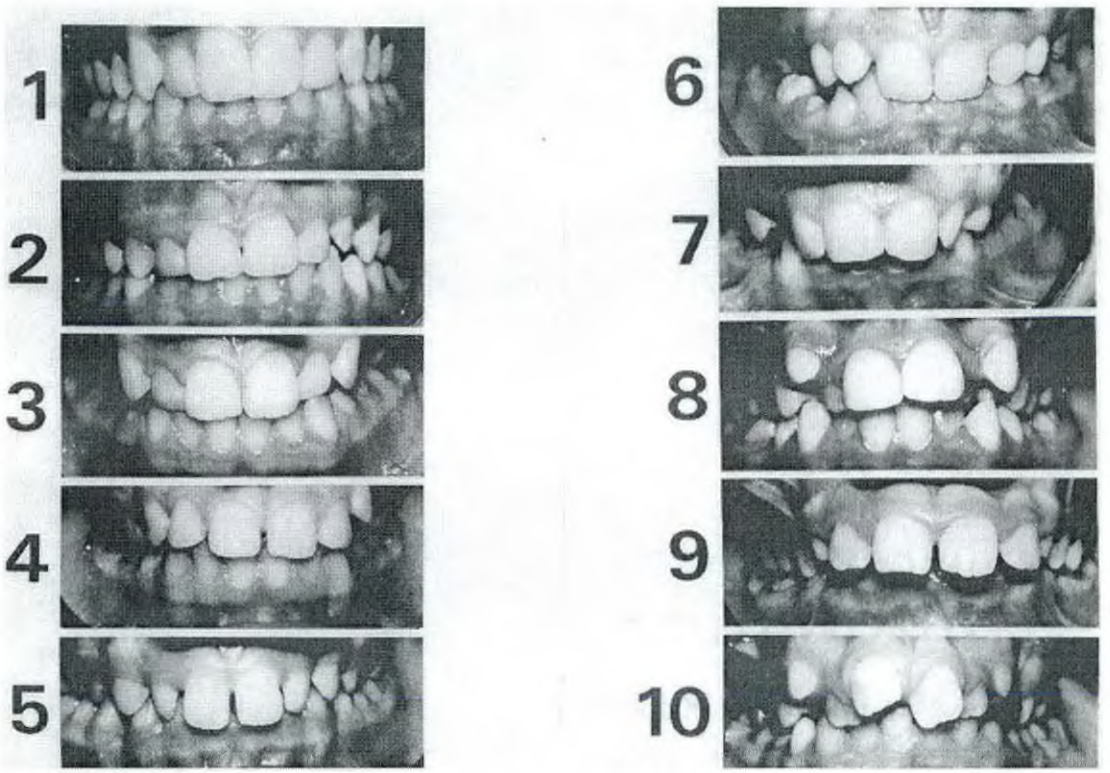


Figure 2.--Ten Photos for the Aesthetic Component of the IOTN. Patients with an Aesthetic Component score between 1 and 4 have no or little need for treatment. Patients with an Aesthetic Component score between 5 and 7 have borderline or moderate need for treatment. Patient with an Aesthetic Component score between 8 and 10 have a definite need for treatment.

The Dental Health Component synthesizes current understanding of the detrimental effects of various features of malocclusion and specifies 5 grades in order of severity. Grades 5 and 4 indicate need for treatment; Grade 3 indicates borderline need; Grade 2 indicates little need; and Grade 1

indicates none. Given any malocclusion with a variety of features, only the worst occlusal trait is recorded. A hierarchial scale of occlusal anomalies is used to help identify the worst occlusal trait in a systematic manner. The hierarchial scale is as follows:

1. Missing teeth (including congenital absence, ectopic and impacted teeth)
2. Overjets (including reverse overjets)
3. Crossbites
4. Displacements of contact points
5. Overbites (including open bites)

Data Entry

A database of all collected data was constructed using Microsoft Access 97® (Microsoft Inc., Seattle, WA). Data integrity was checked by entering all data twice and by using software validation rules.

Data Analysis

Statistical analysis was performed with Microsoft Excel 97® (Microsoft Inc., Seattle, WA) and SPSS for Windows® (SPSS Inc., Chicago, IL) Descriptive statistics including means and standard deviations were calculated for all variables. ANOVA was used to test for within-group differences among means in age and pretreatment PAR and IOTN scores of patients treated by each provider group. The Student's t-test was used to test for differences in mean PAR scores of pretreatment study models from

general dentists compared to those from orthodontists. Chi-square statistic was used to test the significance in IOTN scores with respect to provider education. A p-value of 0.05 was used to assign statistical significance. Correlation between PAR and IOTN scores was assessed using Pearson Correlation Coefficients.

RESULTS

A cross-sectional sample of a minimum of thirty pretreatment study models was drawn from private offices of ten general dentists and ten orthodontists in Cuyahoga County, Ohio. The resulting sample included dental study casts from 405 patients treated by general dentists and 365 patients treated by orthodontists. In the sample taken from general dentists, there were 168 males and 237 females, or a male-to-female ratio of 41:59. In the sample taken from orthodontic offices, there were 165 males and two hundred females, or a male-to-female ratio of 45:55. The mean age of orthodontic patients treated by general dentists was 15.4 with a standard deviation of 8.6, compared to a mean age of 14.7 with a standard deviation of 8.4 for patients treated by orthodontists. The median ages for patients treated by general dentists and orthodontists were 12.6 and 12.2 respectively; the mode ages were 11.8 and 11.7 for general dentists and orthodontists respectively. The ages of patients treated by general dentists ranged from 7.0 to 66.4; those treated by orthodontists range from 7.1 to 55.2. Table 4 shows a summary of the demographic information for orthodontic patients treated by general dentists and orthodontists.

Table 4.--Demographics of Patients Sampled.

PROVIDER	PATIENT SAMPLE SIZE	PATIENT MEAN AGE	% MALE PATIENTS	% FEMALE PATIENTS
General Dentists	405	15.4 ± 8.8	41	59
Orthodontists	365	14.7 ± 8.4	45	55

The practices of orthodontic providers were located in the following cities (practitioners 1 through 10 were general dentists, and practitioners 11 through 20 were orthodontists).

Table 5.--Practice Location.

PRACTITIONER	CITY
1	Olmsted
2	Solon
3	Parma Heights
4	Middleburg Heights
5	Seven Hills
6	Mayfield Heights
7	Cleveland
8	Parma
9	Middleburg Heights
10	Westlake
11	Berea
12	Strongsville
13	Lyndhurst
14	Berea
15	Westlake
16	Lakewood
17	Cleveland
18	North Olmsted
19	Mayfield Heights
20	Independence

The mean PAR score and standard deviation of pretreatment study models from offices of general dentists was 21.6 ± 9.3. These figures were very close to the mean PAR score and standard deviation of pretreatment study models from orthodontic offices (22.2 ± 9.3). In fact, a paired t-test failed to find a statistically significant difference between the provider groups. The median, mode, and range for PAR scores of study models from offices of general dentists and orthodontists are also in close agreement (see Table 6).

Table 6.--Descriptive Statistics for Pretreatment PAR Scores by Provider Group.

PROVIDER	MEAN	MEDIAN	MODE	RANGE	P VALUE
General Dentists	21.6 ± 9.3	21	20	1 to 47	0.360
Orthodontist	22.2 ± 9.3	22	20	0 to 49	

Table 7 reports the means and standard deviations of the six PAR components by provider education. Again, the differences between orthodontic patients treated by general dentists and those treated by orthodontists were small. The only difference in means that showed statistical significance was Midline discrepancy.

Table 7.--Weighted PAR Component Scores by Provider Group.

PAR	GENERAL DENTISTS	ORTHODONTISTS	P VALUE
UAS	4.1 ± 2.8	4.2 ± 2.8	0.502
RBO	3.2 ± 2.0	3.3 ± 2.2	0.420
LBO	3.0 ± 2.1	3.3 ± 2.3	0.179
OJ	6.6 ± 5.9	6.9 ± 5.7	0.480
OB	3.6 ± 2.6	3.7 ± 2.7	0.545
Midline ***	1.1 ± 1.8	0.9 ± 1.5	0.025
Total	21.6 ± 9.3	22.2 ± 9.3	0.360

*** significant at $P < 0.05$

Table 8 shows the percentage of cases for each IOTN Aesthetic Component score for pretreatment study models from offices of general dentists and orthodontists. Orthodontists appear to be treating higher percentages of patients with more severely compromised dental attractiveness than general dentists.

Table 8.--Frequencies of IOTN Aesthetic Component Scores by Provider Group. ***

PROVIDER	AC I	AC 2	AC 3	AC 4	AC 5	AC 6	AC 7	AC 8	AC 9	AC 10
General Dentists (n=405)	1.5	6.4	12.3	21.0	19.0	11.1	12.1	10.1	4.4	2.0
Orthodontists (n=365)	1.1	4.1	6.8	15.6	17.5	13.1	19.2	12.9	6.3	3.3

*** significant at $P \leq 0.009$

Similarly, Table 9 shows percentages of IOTN Dental Health Component scores for general dentists and orthodontists. Again, orthodontists appear to be treating cases in which patients present with higher treatment need.

Table 9.--Frequencies of IOTN Dental Health Component Scores by Provider Group. ***

PROVIDER	DHC 1	DHC 2	DHC 3	DHC 4	DHC 5
General Dentists (n=405)	1	15	30	35	18
Orthodontists (n=365)	0.3	10	24	36	29

*** significant at $P \leq 0.001$

The means and standard deviations for the IOTN AC and DHC by provider group are listed in Table 10.

Table 10.--Descriptive Statistics for Pretreatment IOTN Scores by Provider Group.

PROVIDER	IOTN AC	IOTN DHC
General Dentists (n=405)	5.2 ± 2.0	3.5 ± 1.0
Orthodontists (n=365)	5.9 ± 2.0	3.8 ± 1.0

The complexity of treatment need in the IOTN DHC 5 category ranges from severe overjets or severe anterior crossbites to unusual developmental and genetic anomalies such as impeded eruption, extensive hypodontia, excessive overjet, severe anterior crossbite, submerged deciduous teeth, and craniofacial conditions. The frequencies of these occlusal traits are listed in Table 11.

Table 11.--Frequencies of Occlusal Traits in the DHC 5 Category by Provider Group.

OCCLUSAL TRAIT	GENERAL DENTISTS N=73	ORTHODONTISTS N=105
Impeded eruption	59%	70%
Extensive hypodontia	8.2%	5.7%
Excess overjet > 9mm	23.3%	11.4%
Anterior crossbite > 3.5mm	0%	0%
Craniofacial anomalies	0%	3.8%
Submerged deciduous teeth	12.3%	14.3%

Tables 12 gives the means and standard deviations for age, PAR, and IOTN on an office-by-office basis for general dentists. When ANOVA was performed, significant differences were found ($P \leq 0.05$) for means in age,

PAR and both components of the IOTN. However, if data from Practitioners 5 and 7 were to be eliminated, there would be no significant differences in means for PAR and IOTN AC and DHC.

Table 12.--Distribution of Correlates of Offices of General Dentists (Practitioners 1 to 10).

CORRELATE	1	2	3	4	5	6	7	8	9	10
Sample Size	49	33	42	45	39	38	46	40	31	42
Age Mean ***	13.2 ± 5.2	16.7 ± 10.9	18.8 ± 10.3	13.6 ± 6.0	14.0 ± 3.3	19.3 ± 13.1	19.3 ± 12.6	14.4 ± 6.3	13.2 ± 7.5	12.0 ± 4.1
PAR Mean ***	23.0 ± 8.6	21.3 ± 8.7	20.5 ± 9.3	22.9 ± 9.3	**26.4 ± 11.0 ***	18.9 ± 9.1	**26.0 ± 10.1 ***	19.9 ± 7.1	19.8 ± 8.1	16.1 ± 6.2
% IOTN AC 1-4	46.9	33.3	40.5	40.0	20.5	60.5	28.3	42.5	48.4	52.4
% IOTN AC 5-7	32.7	45.5	35.7	53.3	51.3	29.0	43.5	45.0	45.2	42.9
% IOTN AC 8-10	20.4	21.2	23.8	6.7	28.2	10.5	28.3	12.5	6.5	4.8
% IOTN DHC 1	2.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	3.2	2.38
% IOTN DHC 2	10.2	18.2	21.4	20.0	5.1	13.2	6.5	7.5	16.1	35.7
% IOTN DHC 3	30.6	39.4	31.0	20.0	15.4	36.8	30.4	47.5	19.4	33.3
% IOTN DHC 4	36.7	42.4	33.3	37.8	59.0	26.3	34.8	27.5	41.9	16.7
% IOTN DHC 5	20.4	0.0	11.9	22.2	20.5	23.7	28.3	17.5	19.4	11.9
IOTN AC Mean ***	5.2 ± 2.2	5.5 ± 2.2	5.0 ± 2.2	5.0 ± 1.8	**6.1 ± 2.0 ***	4.3 ± 2.0	**6.0 ± 2.3 ***	5.3 ± 1.8	4.9 ± 1.7	4.8 ± 1.5
IOTN DHC Mean ***	3.6 ± 1.0	3.2 ± 0.8	3.3 ± 1.0	3.6 ± 1.1	**3.9 ± 0.8 ***	3.6 ± 1.0	**3.8 ± 0.9 ***	3.6 ± 0.9	3.6 ± 1.1	3.0 ± 1.1

*** significant difference found for ANOVA at $P \leq 0.05$

* outliars for PAR and IOTN AC and DHC

Tables 13 gives the means and standard deviations for age, PAR, and IOTN on an office-by-office basis for orthodontists. When ANOVA was performed, a significant difference was found ($P \leq 0.05$) for mean age but not for means in PAR and IOTN AC and DHC.

Table 13.--Distribution of Correlates of Offices of Orthodontists (Practitioners 11 to 20).

CORRELATE	11	12	13	14	15	16	17	18	19	20
Sample Size	33	33	38	46	39	31	34	36	41	34
Age Mean ***	14.1± 6.4	13.9± 6.7	**17.9± 13.8**	14.3± 8.3	12.5± 3.0	16.9± 6.6	**21.2± 12.6**	11.9± 6.0	13.6± 5.0	11.7± 5.9
PAR Mean	23.3± 10.3	21.8± 9.2	19.1± 10.2	22.4± 9.7	21.6± 9.7	20.6± 6.6	22.0± 9.3	21.7± 8.8	22.5± 8.3	27.4± 9.0
% IOTN AC 1-4	24.2	15.2	42.1	37.0	20.5	32.3	41.2	16.7	36.6	5.9
% IOTN AC 5-7	51.5	66.7	36.8	50.0	61.5	41.9	41.2	55.6	48.8	44.1
% IOTN AC 8-10	24.2	18.2	21.1	13.0	17.9	25.8	17.6	27.8	14.6	50.0
% IOTN DHC 1	0.0	0.0	2.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% IOTN DHC 2	9.1	9.1	10.5	17.4	2.56	9.7	8.8	16.7	12.2	2.9
% IOTN DHC 3	21.2	27.3	28.9	17.4	35.9	25.8	23.5	22.2	26.8	14.7
% IOTN DHC 4	45.5	42.4	28.9	37.0	25.6	38.7	41.2	30.6	29.3	50.0
% IOTN DHC 5	24.2	21.2	28.9	28.3	35.9	25.8	26.5	30.6	31.7	32.4
IOTN AC Mean	6.1 ± 2.1	5.9 ± 1.8	5.2 ± 2.3	5.6 ± 1.8	5.7 ± 1.8	5.8 ± 2.0	5.3 ± 2.0	6.4 ± 1.8	5.5 ± 2.2	7.3 ± 1.8
IOTN DHC Mean	3.8 ± 0.9	3.8 ± 0.9	3.7 ± 1.1	3.8 ± 1.1	3.9 ± 0.9	3.8 ± 0.9	3.9 ± 0.9	3.8 ± 1.1	3.8 ± 1.0	4.1 ± 0.8

*** significant difference found for ANOVA at $P \leq 0.05$

* outliars for age

Pearson correlation coefficients were calculated to assess the magnitude of correlation of PAR, IOTN AC, and IOTN DHC against one another. The results are displayed in Table 14.

Table 14.--Pearson Correlation Coefficients for PAR and IOTN.

COMPARISON	R VALUE
PAR with IOTN AC ***	0.710
PAR with IOTN DHC ***	0.533
IOTN AC with IOTN DHC ***	0.550

*** significant at $P < 0.001$

DISCUSSION

Demographics

The offices selected for this study were derived from a pool of practitioners who were known to have treated or are treating a cross-sectional sample of tenth graders in Cuyahoga County high school (Le 1998). Indeed, upon close examination, the offices covered a wide geographic and economic range within the county, from offices located in inner city areas to those that were in more affluent, suburban areas. However, the majority of practices were located in suburban areas, reflecting the fact that the majority of high schools surveyed in the Le study were suburban.

Seven out of ten high schools in the Le study were located in suburban areas, which is consistent with the locations of practices in this study. There are several reasons why the sample of providers in this study is not perfectly matched with the high school sample in the Le study. First of all, inner city areas, although heavily populated, may have mainly heavy industry and large companies. Therefore, many practitioners may find surrounding suburbs more attractive environments to set up a practice. Second, Cuyahoga County is a fairly small metropolitan area that spans approximately thirty miles East-West and fifteen miles North-South. With efficient highway systems, most

patients would not necessarily find it inconvenient to go outside of their immediate neighborhood for treatment.

Since Cuyahoga County is diverse in terms of just about any socioeconomic measures, the sample chosen in this study should be representative of the U.S. orthodontic patient population at large. This was indeed the case. For example, the AAO's 1996 Patient Census Survey reported that 80.1% of orthodontic patients are under eighteen years of age, compared to 85.1% in the present study. The male-to-female in the Survey was 38:62, compared to 43:57 in the present study.

It appears that general dentists and orthodontists in Cuyahoga County are treating the same types of patients with respect to age and gender. This is not surprising considering the fact that the majority of patient referrals are from general dentists. If one believes in the notion that general dentists who provide orthodontic treatment still only treat simple cases and refer out more complex cases, then age and gender should not vary much between the two provider groups.

Nevertheless, there was a significant within-group difference in the mean age among patients treated by the ten general dentists and among patients treated by the ten orthodontists. There were several practitioners from both provider groups that treated a significantly older or younger patient pool. For example, among the general dentists, Practitioners 1, 9, and 10 treated younger patients, whereas Practitioners 3, 6, and 7 treated older

patients. Among orthodontists, Practitioners 15, 18, and 20 treated younger patients, and Practitioners 13, 16, and 17 treated older patients. These differences in mean age can be attributed at least in part to differences in treatment philosophy among practitioners. Some general dentists might have a predominantly pediatric patient pool and therefore would tend to provide orthodontic treatment to younger patients. Other general dentists might have a cosmetic emphasis in their practice and would therefore tend to treat older patients. Among orthodontists, there was one practitioner that did not offer two-phase treatment (Practitioner 16). Another practitioner (Practitioner 17) provided treatment within a hospital setting to mainly older patients. Practitioner 13 was known to treat many adult surgical cases. Practitioners 18 and 20 were strong proponents of early treatment. In light of these facts, it is not surprising that there were within-group differences with respect to mean age.

PAR and Provider Group

With respect to the overall PAR scores, again a similarity between patients treated by general dentists and patients treated by orthodontists is observed in all measures of central tendency. Student t-tests confirmed the insignificance in differences of mean PAR scores with respect to provider education. Richmond et al. (1997) were able to demonstrate a significant difference ($p < 0.05$) in pretreatment mean PAR scores between specialists and non-specialists using a sample of 280 consecutively treated study models

from eight specialists and thirty-three general practitioners in England. The mean age in this sample was 13 ± 3. The pretreatment mean PAR score for specialists was 31.1, compared to 28.7 for general practitioners.

Fox et al. (1997) collected pretreatment PAR data on 375 consecutive pretreatment study models of patient treated by forty-one specialists and non-specialists (no delineation of provider group was given) from two geographic regions. In Region A, the pretreatment mean PAR score for specialists was 30.0 compared to 28.1 for non-specialists. In Region B, the pretreatment mean PAR score for specialists was 29.8 compared to 28.9 for non-specialists. Importantly, no differences were found in pretreatment PAR scores across different regions and practitioner groups.

The findings in this study were consistent with Fox et al. but not with Richmond et al.. These contradictory results may be explained at least in part by the different sampling protocols used. First, the sample size in this study is much larger than either of the previous two studies which helped to minimize random sampling error. In addition, at least thirty study models were collected for each office in this study, whereas in either the Fox et al. study or the Richmond et al. study, practitioners were "invited" to send up to five consecutive cases for non-specialists and up to twenty consecutive cases for specialists. It is conceivable for a practitioner to "select" twenty consecutive difficult cases or five consecutive simple cases. On the other hand, no case selection by the practitioner was allowed in this study.

The mean pretreatment PAR score for patients treated by either general dentists or orthodontists in this study was substantially lower than previous reports. Orthodontic providers in Cuyahoga County are apparently treating malocclusions of lesser severity than their counterparts in England. Since the health care system in England is socialized, perhaps only individuals with severe malocclusions may qualify for treatment. In the United States, where managed care is only a small part of the overall orthodontic delivery system, the majority of patients who want treatment and can afford it, do so. In addition, as stereotypical as it may be, there may be some truth in the notion that greater importance is placed on straight teeth in the United States. Therefore, orthodontic providers in the United States may be treating more patients with mild malocclusions than their counterparts in England, resulting in lower pretreatment PAR scores.

Even when the components of PAR are individually tested for difference in means, no significant difference was found except for Midline ($p = 0.025$). Here, type 1 error might have occurred, i.e., a significant difference was found when in fact one did not exist. The greatest contribution to the overall PAR score was the Overjet relationship, perhaps highlighting the importance orthodontic providers place on correcting Class II malocclusions as well as its frequency in the population. The second largest contribution was from Upper Anterior Segment, even though this segment was unweighted. This is not altogether surprising considering that many

orthodontic patients present with the chief complaint of "crooked front teeth." The unsightly anterior crowding cannot be underestimated as a motivating factor in treatment decisions for both patients and clinicians alike. The smallest contribution to the total mean PAR score is from the Midline discrepancy due to its relative low occurrence in the sample.

Within-group differences in mean pretreatment PAR scores were found among patients treated by general dentists, but not among patients treated by orthodontists. In other words, orthodontists treated a more homogeneous patient population than general dentists. The rationale for this finding may lie in the comfort level of general dentists in providing orthodontic treatment. Some general dentists may only choose to treat minor malocclusions and refer more difficult cases out, whereas other general dentists may enjoy treating cases with severe crowding or overjet. Orthodontists, on the other hand, were specifically trained to deal with all types of malocclusion.

Another related issue is the homogeneity in training among orthodontists. Specialty training is for the most part similar across all programs in the United States. On the contrary, most general dentists who provide orthodontic treatment received their orthodontic training through a variety of continuing education courses that are often taught by general dentists. The contents of these continuing education courses are usually not approved by the American Association of Orthodontists, and therefore course participants may not be exposed to all orthodontic treatment modalities. It is

not surprising then that there was a greater variation in mean pretreatment PAR scores among patients treated by general dentists compared to those treated by orthodontists.

IOTN and Provider Education

With respect to the Aesthetic Component of the IOTN, both provider groups were found to be treating mostly patients who have at least a moderate/borderline need for treatment. Fifty-nine percent of patients treated by general dentists had an IOTN AC score of 5 or higher, compared to 72% of patients treated by orthodontists. Furthermore, all practitioners in Cuyahoga County are providing orthodontic treatment to a significant portion of their patients who have little or no treatment need based on either components of the IOTN. In fact, 35% of all orthodontic patients treated by both provider groups have an IOTN AC score of 4 or lower, and 14% have an IOTN DHC score of 2 or lower. One possible explanation for this is a heightened consumer awareness of the cosmetic and health benefits of orthodontic treatment combined with strong economic conditions. A less optimistic line of reasoning would be business-driven diagnosis or, worse yet, misdiagnosis. In all fairness, however, most practitioners are compassionate doctors who will yield to a mother's complaint about her daughter's crooked front teeth and provide treatment in the absence of any vertical, transverse, or anteroposterior discrepancies.

The difference in the IOTN AC 1-4 (41% versus 28%) between general dentists and orthodontists may be attributed to the referral of more severe cases to orthodontists. This is consistent with the current accepted referral system in which general dentists act as the "gatekeepers". In other words, most patients with a dental problem go to their family dentist, who then will decide which procedures can be provided in his office and which procedures need to be referred to a specialist.

The Dental Health Component data similarly show that general dentists treat proportionately more patients with borderline need for treatment or less, i.e., patients with Grades 1, 2, or 3. On the other hand, orthodontists treat proportionately more patients with more complex treatment needs than general dentists. The greatest percentage difference is in the IOTN DHC 5 category (29% versus 18%). Patients within this category present with the most unusual and complex malocclusions, ranging from cleft lip and palate to impacted canines.

A few conclusions can be made regarding the frequencies of dental attributes in Grade 5 of the DHC by provider group. First of all, orthodontists treat a significantly higher percentage of patients who present with problems of dental development in conjunction with a malocclusion. These developmental problems most often involve delayed or unusual patterns of eruption, including submerged deciduous teeth and impeded eruption of teeth. Secondly, patients with cleft lip and palate and other craniofacial

anomalies were treated solely by orthodontists. The best explanation for these differences in patient characteristics as measured by the IOTN DHC among orthodontists and general dentists probably lies in the extent of training in growth and development of teeth and surrounding craniofacial structures. The amount of exposure to concepts in craniofacial growth and development that the average dental student in the average undergraduate dental curriculum receives pales in comparison to that received by orthodontic residents. Furthermore, continuing education courses, due to time constraints, tend to focus more on orthodontic treatment techniques rather than orthodontic theory and basic sciences.

However, general dentists were not hesitant in treating patients with excessive overjets. A possible rationale for this may lie in the treatment philosophy, as about half of the general dentists in the study used the Begg technique. In addition, general dentists who took orthodontic continuing education courses were most likely familiar with the treatment mechanics for class II malocclusions.

Lastly, general dentists treated a significantly higher percentage of patients with extensive hypodontia. Since patients with missing teeth would most likely go to their family dentist first for treatment, the family dentist who might also provide orthodontic treatment would be in a situation to treat these patients himself. Economic benefits notwithstanding, from a treatment

coordination standpoint, the overall treatment plan would probably be better executed by one dentist as opposed to by two dentists.

The paucity of IOTN data on large populations of patients makes it difficult to compare the current IOTN data. Fox et al. (1997) collected IOTN data on a sample of 375 patients treated by forty-one specialists and non-specialists in two geographic regions. However, the IOTN data was reported as means and therefore is less useful. Nevertheless, it appears that the patients treated in England by either provider groups had worse smiles and more serious dental health problems overall. Since there is no reason to suspect that the prevalence of malocclusion in England is any different than the prevalence of malocclusion in the United States, it may be concluded that treatment demand is probably higher in the United States than in England, even though treatment need is probably similar. The same line of logic was previously upheld in comparing pretreatment PAR data of patients treated in England and in the United States.

The results of the Chi-square test show that there was a significant difference for both the AC and the DHC between general dentists and orthodontists. This is in contradiction to the results of the paired t-test for the PAR scores which failed to show a significant difference. On the surface, this revelation may seem counterintuitive since the PAR Index and the IOTN are both occlusal indices. Beyond this fact, however, these indices are very different. The PAR Index was originally developed to measure treatment

outcome. It is the sum of the various components of occlusion that in turn measure how straight the teeth are and how well they fit together. Each component is given a weight that, in the opinion of the developers of the PAR index, reflects the "deleterious nature" of the occlusal trait. The IOTN, on the other hand, is an index of treatment priority or need. The scores of the components are derived independently and with different objectives. The AC measures the dental attractiveness in reference to a retracted full frontal smile or a frontal view of occluded study models, whereas the DHC records the worst occlusal characteristic even if all other features are within normal limits. And since the range of features of malocclusion is so broad, there are many instances in which PAR scores and IOTN scores contradict each another. For example, a patient with severely crooked incisors and high cuspids but excellent posterior occlusion will have a relative low PAR score but high IOTN AC and DHC scores. On the other hand, a patient with straight front teeth but moderate overjet and overbite and midline deviation may have a high PAR score but a low IOTN AC score and probably a low IOTN DHC score. In this study, the sample size is probably large enough to rule out erroneous assignment of significance due to chance variations alone. The following cases illustrate instances where PAR and IOTN data did not concur.

> LEA34: This 13.3 year-old female subject had no upper anterior crowding, end-on molar relation bilaterally, normal overjet, a moderately deep bite, and no midline discrepancy, resulting in a rather innocuous PAR score of 11. The AC score, being mostly affected by the alignment of the anterior teeth, was only 1. However, she had an impacted tooth, and correspondingly the

DHC score was 5. The impacted tooth was not PAR scored because the space between adjacent teeth were more than 4mm.

KOZ29: This 13.4 year-old male had severe anterior crowding, end-on cuspid relation bilaterally, normal overjet, moderate overbite, and no midline discrepancy. His total PAR score was 16, indicating some malocclusion is present but not to any great degree. However, the AC score was 8 due to the severe anterior crowding, and the DHC score was 5 due to the ectopic eruption of the cuspids.

MIL06: This 13.9 year-old male had mild anterior crowding, Class 3 molar relation bilaterally, anterior crossbite, excessive overbite, and midline asymmetry, resulting in a high PAR score of 35. The AC score was only 3 because the mild anterior crowding did not greatly detract from his smile. However, one premolar in the lower arch was severely displaced, resulting in a high DHC score of 4.

Within-group differences in mean IOTN AC and DHC scores were found among patients treated by general dentists. However, there were two general dentists (Practitioners 5 and 7) who treated patients with IOTN AC and DHC scores that were significantly higher than their peers. If these two practitioners were eliminated from the sample, there would be no significant within-group differences in mean IOTN AC and DHC scores. These two practitioners were also found to treat patients with higher mean PAR scores than the remaining general dentists. As PAR was found in this study to be strongly correlated to both components of the IOTN, this finding was consistent.

For patients treated by the ten orthodontists, there were no significant within-group differences in mean pretreatment IOTN AC and DHC scores. As

explained previously, orthodontists are trained to treat a more diverse range of malocclusion and therefore cannot select cases to the same degree that general dentists can. Furthermore, even if some orthodontists in the study chose to emphasize a particular aspect of orthodontic treatment in their practice, such as cleft palate or TMJ, patients with these conditions probably constituted a small percentage of these practices. The finding that there were no within-group differences in pretreatment IOTN scores supports these lines of reasoning.

Correlation between PAR and IOTN

The correlation between PAR and IOTN was positive and significant. The correlation between PAR and IOTN AC was highest at 0.710, which suggests that PAR measures mainly occlusal features in the anterior region. In fact, four out of six PAR components can be categorized as anterior occlusal features, namely Upper Anterior Alignment, Overjet, Overbite, and Midline Discrepancy. Only the Right and Left Buccal Occlusion segments deal specifically with the posterior region. As a percentage, the four anterior components of PAR in the present study constituted 71% of the mean total PAR score.

The DHC component of the IOTN was also found to be significantly correlated to both the AC and the PAR scores. The correlation was not as strong, possibly owing to the fact that the DHC score is derived based on the worst occlusal trait, whereas PAR and, to a lesser degree, IOTN AC tend to

be additive. As stated before, the total PAR score is a sum of six occlusal segments. Analogously, the IOTN AC is based on the dental attractiveness of anterior teeth, which in turn is dependent on a number of factors, including the amount of crowding, hypodontia, overjet, or overbite. Even though the IOTN AC score may be affected by any one factor that is present in the most extreme form, more often than not the IOTN AC is an overall assessment of the degree of attractiveness of anterior teeth.

Limitations And Bias

Randomization was used at every step of data sampling and collection. First of all, the orthodontic providers were chosen randomly from a list of participating providers. Secondly, data were collected on random study models, or where appropriate, on consecutively treated study models. Still, possible sources of error exist that may affect the internal and external validity. The low response rate (fourteen out of ninety general dentists and fourteen out of seventy-eight orthodontists) might have been due to the fact that the majority of orthodontic providers did not routinely take pretreatment study models on all patients. Also, even though Cuyahoga County should be representative of most major metropolitan areas in the United States, there may be subpopulation groups for which the results of this study do not apply.

Systematic error was minimized in this study by having the principal investigator calibrated in both the IOTN and the PAR Index, observing strict protocol on data sampling and collection, and selection of a large sample

size. Nevertheless, the principal investigator was not blinded to the provider education level, and this could introduce bias into the study. Random error was minimized by choosing a large sample size for this study.

Using the results from this study, the sample size was rechecked. The expected effect size was 2.2 (10% of a mean PAR score of 22) and the standard deviation was 9.3. The standardized effect size (the ratio of the expected effect size to the standard deviation) was 2.2/9.3, or 0.24. Since this value was larger than the estimated standardized effect size of 0.22 (please refer to Sample Size Estimation in Materials and Methods), it can be concluded that the sample size in this study was adequate to observe a 10% difference in pretreatment mean PAR scores of patient treated by general dentists compared to patients treated by orthodontists (with α = 0.05 and β = 0.20).

The null hypothesis for mean pretreatment PAR scores by provider education was accepted, leading to the possibility of type II error. In other words, there was a chance that the mean pretreatment PAR scores were different between general dentists and orthodontists, but the power of the study was inadequate to detect this difference. The chance that this event might have occurred is termed beta error. Using the sample size, β error was calculated to be 9.5%. Therefore, there was at least a 90% chance (power = 1 - β) that if the pretreatment mean PAR scores between provider groups varied by 10% or more, the study would have detected this difference.

The null hypothesis for IOTN scores by provider education was rejected. Here, the possibility of type I error looms. In other words, there was a chance that IOTN scores were not different between general dentists and orthodontists. However, the p-values for both the AC and the DHC were very small. For example, the chance that IOTN AC scores were not significantly different among general dentists and orthodontists was 0.9% or less; for IOTN DHC, that chance was 0.1% or less.

The quality of study models varied greatly from practice to practice, and particularly between general dentists and orthodontists, with the orthodontist generally having study models of higher quality. As an example, some practices did not use vacuum-mixed stone to pour up impressions, resulting in surface defects that might in turn bias IOTN Aesthetic Component scores. Many study models were not trimmed with the posterior aspect of the upper cast and the lower cast parallel, leaving the exact articulation up to the discretion of the primary investigator. PAR scores from these study models might not be as reliable, particularly with regard to overjet.

Even though every effort was made to collect consecutively started or random pretreatment models, there was no complete assurance of this important criteria. When in doubt, data was collected on all pretreatment study models available, particularly at offices of general dentists who obviously did not treat as many cases as orthodontists.

SUMMARY AND CONCLUSIONS

The pretreatment occlusal characteristics of a cross-sectional sample of orthodontic patients treated by general dentists and orthodontists in Cuyahoga County, Ohio were evaluated using the IOTN and the PAR Index. Ten general dentists and ten orthodontists were randomly selected from a pool of practitioners who were named as orthodontic providers for a representative sample of tenth grade students in Cuyahoga County who have had or were in treatment in 1998. Four hundred and five pretreatment study models were evaluated from general dental practices, and 365 were evaluated from specialists' practices.

Descriptive statistics were reported for demographics, PAR, and IOTN data. A paired t-test or Chi square test was used to test the level of significance for PAR and IOTN with respect to provider education. Pearson correlation coefficients were calculated to assess the correlation between PAR and IOTN. The results of the study showed the following:

1. General dentists and orthodontists are treating similar patients with respect to age and gender.

2. There was no significant difference in mean PAR scores of pretreatment study models of patients treated by general dentists compared to orthodontists.

3. There was a significant difference in both IOTN component scores of pretreatment study models of patients treated by general dentists compared to orthodontists.

4. The PAR Index and the IOTN probably measure similar occlusal characteristics of malocclusion but with different objectives.

In conclusion, the null hypothesis that mean PAR scores are not significantly different with respect to provider education is accepted, while the null hypothesis that IOTN scores are not significantly different is rejected.

CASE WESTERN RESERVE UNIVERSITY
REVIEW COMMITTEE FOR HUMAN STUDIES
NOTICE OF APPROVAL

TO: **Hans, Mark G.**

Dept/School: **Dentistry**

Subject: Notice of (X) Review and approval
( ) Exemption

The committee has reviewed and approved your proposal entitled:
Effect of Provider Education on Orthodonic Outcome

Please be advised that with respect to: (1) the rights and welfare of the individual(s) involved, (2) the appropriateness of the methods to be used to secure informed consent, and (3) the risks and potential benefits of the investigation, the Committee considers your project:

( ) Exempt
(**X**) Fully acceptable
( ) Acceptable with reservations noted
( ) Not acceptable for reasons noted

Follow-up: The Committee wishes to have a status report on this project on **1/21/2000**

SIGNED FOR THE COMMITTEE BY:

Approval Date:
2/04/1999

Christian L. LaMantia
Associate Director
Office of Research Administration

CZ

ORA USE ONLY**********

Type Project: ( ) NEW (**X**) RENEWAL
Human Risk: ( ) Yes (**X**) No
Source of Support:(**X**) Outside Funding ( ) Department/other
Agency (Potential): **Amer Assn of Orthodo** Agency No.

Are any of the following involved: (**X**) Yes ( ) No
If yes, which category(ies):

(**X**) Minors () Fetuses () Abortuses () Pregnant Women
() Prisoners () Mentally Retarded () Mentally Disabled

cc: Dean
Department Chairman
Follow-up (Book)
File

APPENDIX 2. Letter Requesting Participation

February 8, 1999

Dr. ABC
555 XYZ Street
Somewhereville, OH 44139

Dear Dr. ABC,

My name is William Nguyen, and I am a graduate student at Case Western Reserve University in the Department of Orthodontics. I am writing to request your participation in the research project entitled: "Orthodontic Outcomes – Pretreatment Model Assessment." It would involve allowing me and another student to come out to your office to examine at least 30 consecutive pretreatment orthodontic study models. We will be collecting data such as tooth alignment, molar relationship, overbite, overjet, etc., and the process will take roughly 3-4 hours. However, little, if any, of either your or the staff's time will be needed.

The purpose of this research project is to understand the pretreatment occlusal characteristics of orthodontic patients treated by general dentists and orthodontists in Cuyahoga County, and we welcome the involvement of the dental community in our data collection. Would you be so kind as to give us your response at your earliest convenience? Please use the included check-off form and self-addressed stamped envelope.

Thank you for your consideration and prompt reply.

Sincerely,

William D. Nguyen
Graduate Student
Department of Orthodontics
Case Western Reserve University

APPENDIX 2. Letter Requesting Participation (cont.)

Dr. ABC
555 XYZ Street
Somewhereville, OH 44139

☐ Yes, I am interested in participating in your research project.

☐ No, I am not interested in participating.

☐ Maybe – please call to discuss further at this phone number:

_____

APPENDIX 3. Schedule of Office Visits

Schedule of Office Visits

Office	Date
Practitioner 4	11/13/98
Practitioner 1	11/20/98
Practitioner 9	11/22/98
Practitioner 6	2/2/99
Practitioner 7	3/12/99
Practitioner 5	3/16/99
Practitioner 8	3/17/99
Practitioner 14	3/19/99
Practitioner 3	3/20/99
Practitioner 19	3/22/99
Practitioner 15	3/23/99
Practitioner 10	3/23/99
Practitioner 13	3/24/99
Practitioner 20	3/24/99
Practitioner 2	3/25/99
Practitioner 11	4/2/99
Practitioner 16	4/6/99
Practitioner 17	4/9/99
Practitioner 18	4/10/99
Practitioner 12	4/13/99

APPENDIX 4. Data Collection Form

ID: **Gender: M / F**

Date of Birth: **Date of Treatment Start:**

Doctor:

Angle's Classification:

R6	**I**	**II**	**III**		**L6**	**I**	**II**	**III**
R3	**I**	**II**	**III**		**L3**	**I**	**II**	**III**

Deciduous Teeth Present:

E	**D**	**C**	**B**	**A**	**A**	**B**	**C**	**D**	**E**
E	**D**	**C**	**B**	**A**	**A**	**B**	**C**	**D**	**E**

Examiner: **Date:**

PAR Index

Component Score

Upper Anterior (3-2 ___, 2-1 ___, 1-1 ___, 1-2 ___, 2-3 ___)..... x 1 _____

Right Buccal Occlusion.....AP___..... Trans___..... Vert___. x 2 _____

Left Buccal Occlusion.....AP___..... Trans___..... Vert____ x 2 _____

Overjet.....Positive___.. Negative___..... x 5 _____

Overbite.....Positive___.. Negative___..... x 3 _____

Midline..... x 3 _____

Total _____

IOTN Index

Aesthetic Component _____

Dental Health Component _____

Last Name	City	Returned Letter	Response
LD	Olmsted	☑	Y
PKM	Seven Hills	☑	Y
MJH	N Olmsted	☑	Y
DAG	Barberton	☑	Y
FG	Solon	☑	Y
DRK	Broadview Hts	☑	Y
BRJ	Parma Hts	☑	Y
RHD	Brunswick	☑	Y
RCL	Middleburg Hts	☑	Y
RWO	Cleveland	☑	Y
RLO	Richmond Hts	☑	Y
NJP	Middleburg Hts	☑	Y
JCO	Parma	☑	Y
JMP	Independence	☑	Y
DLM	Rocky River	☑	N
KB	Beachwood	☑	N
JEH	Strongsville	☑	N
TJL	Fairview Park	☑	N
WFK	Beachwood	☐	N
EHM	Beachwood	☑	N
JAH	Shaker Hts	☑	N
JPJ	West Chester	☑	N
JNM	Elyria	☑	N
IMJ	Maple Hts	☑	N
JBH	Cleveland	☐	N
BC	Parma	☐	N
SA	Brecksville	☑	N
RJB	Westlake	☑	N
DBB	Parma	☐	N
WAB	Westlake	☐	N
WUB	Chillicothe	☐	N
WFB	Westlake	☐	N
JGH	Parma	☐	N
SDC	Westlake	☑	N
MAI	N Royalton	☑	N
SC	Cleveland Hts	☑	N
MWD	Parma	☑	N
FAF	Cleveland	☐	N
KF	Middleburg Hts	☐	N
FTG	Lakewood	☐	N
CPN	Cleveland	☑	N
GFH	Brunswick	☐	N
JWC	Parma	☑	N
GAS	Cleveland	☑	N

Last Name	City	Returned Letter	Response
SRM	North Olmsted	☐	N
JDS	Cleveland	☐	N
JNS	Beachwood	☑	N
JMS	Parma Hts	☐	N
JSS	E Cleveland	☐	N
LRS	Lorain	☐	N
PFS	Cleveland	☐	N
EDS	Maple Hts	☑	N
TFS	Cuyahoga Falls	☐	N
DHS	Cleveland	☐	N
ET	Broadview Hts	☑	N
SAT	Cleveland	☐	N
GJV	Parma	☑	N
IV	Parma	☐	N
FCW	Shaker Hts	☐	N
HJW	Fairview Park	☑	N
MAW	Cleveland	☐	N
WHY	Chesterland	☑	N
RRS	Solon	☑	N
JCR	Lyndhurst	☑	N
DAM	Westlake	☐	N
MY	Middleburg Hts	☑	N
VN	Cleveland	☐	N
RLP	Independence	☑	N
MJP	Fairview Park	☑	N
AGP	Parma	☐	N
BSR	Cleveland	☑	N
AR	Cleveland	☐	N
DTR	Richmond Hts	☑	N
LAR	Cleveland Hts	☐	N
CR	Fairview Pk	☐	N
RES	Cleveland	☐	N
JCS	Olmsted Falls	☐	N
HNS	Woodmere	☑	N
JRS	Chesterland	☑	N
BKS	Lakewood	☐	N
LMA	Westlake	☑	?
KEH	N Royalton	☑	?
RCW	Westlake	☑	?
DAK	Cleveland Hts	☑	?

Last Name	City	Returned Letter	Response
SA	Cleveland	☐	N
KA	Westlake	☑	Y
TLA	Lima	☑	?
BDA	Vermilion	☑	Y
NRA	Beachwood	☑	N
RSA	Cleveland	☐	N
IA	Beachwood	☑	N
JWB	Rocky River	☑	N
ARB	N Olmsted	☐	N
CHB	Parma	☐	N
BBB	Garfield Heights	☑	N
CPC	Lorain	☐	N
LRC	Cleveland	☐	N
ND	Cleveland Hts	☐	N
CRC	Dublin	☐	N
RWD	Strongsville	☑	Y
TGD	Lakewood	☐	N
DD	Willoughby	☑	N
SLD	Parma	☐	N
JD	University Hts	☑	N
CTE	Findlay	☑	Y
WVF	Lorain	☑	Y
CPF	S Euclid	☐	N
WTF	Cleveland	☐	N
HDF	Willoughby	☐	N
MTF	Lyndhurst	☑	Y
BHF	Cleveland	☐	N
DSF	Medina	☑	N
RSG	Chagrin Falls	☑	N
TAG	Euclid	☑	N
REH	Shaker Hts	☐	N
GMG	Woodmere Village	☐	N
GCG	Solon	☐	N
MLG	Cleveland	☑	N
RJG	Brooklyn	☐	N
JJH	Seven Hills	☑	N
MGH	Berea	☑	Y
BTH	Cleveland	☑	Y
TAH	Elyria	☑	Y
VK	Cleveland Hts	☐	N
KK	Bainbridge	☐	N
AK	Lorain	☑	N
DAK	Cleveland Hts	☐	N
NMK	Westlake	☐	N

Last Name	City	Returned Letter	Response
BLK	Solon	☐	N
GK	Parma Hts	☐	N
HEK	Mentor	☐	N
DJK	Lakewood	☑	Y
ESL	Mayfield Hts	☐	N
KHL	Mentor	☑	Y
KTM	Richmond Hts	☑	N
MSM	Strongsville	☐	N
MS	Strongsville	☐	N
RM	Cleveland	☑	Y
CO	N Ridgeville	☑	Y
SGP	N Royalton	☑	?
SHP	Highland Hts	☐	N
RAP	Twinsburg	☐	N
AEP	Cleveland	☑	Y
BPR	Westlake	☐	N
CWR	Cleveland	☑	Y
RAR	Parma	☐	N
MRS	Parma	☐	N
SS	Beachwood	☐	N
GAS	N Olmsted	☑	Y
WDS	Fairview Park	☑	N
DDS	Northfield	☑	N
MNT	Cleveland	☑	N
JCT	Willoughby	☐	N
JTW	Pepper Pike	☐	N
DMW	Avon Lake	☐	N
JSW	Strongsville	☐	N
IHW	Beachwood	☐	N
TLW	Mayfield Hts	☑	Y
JCW	Aurora	☑	Y
SLW	Aurora	☑	?
RAZ	Parma	☑	N

TABLE I THE DENTAL HEALTH COMPONENT
OF THE INDEX OF ORTHODONTIC TREATMENT NEED (IOTN)

GRADE 5 (Need treatment)

5.i Impeded eruption of teeth (except for third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.

5.h Extensive hypodontia with restorative implications (more than 1 tooth missing in any quadrant) requiring pre-restorative orthodontics.

5.a Increased overjet greater than 9mm.

5.m Reverse overjet greater than 3.5mm with reported masticatory and speech difficulties.

5.p Defects of cleft lip and palate and other craniofacial anomalies.

5.s Submerged deciduous teeth.

GRADE 4 (Need treatment)

4.h Less extensive hypodontia requiring prerestorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.

4.a Increased overjet greater than 6mm but less than or equal to 9mm.

4.b Reverse overjet greater than 3.5mm with no masticatory or speech difficulties.

4.m Reverse overjet greater than 1mm but less than 3.5mm with recorded masticatory and speech difficulties.

4.c Anterior or posterior crossbites with greater than 2mm discrepancy between retruded contact position and intercuspal position.

4.l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.

4.d Severe contact point displacements greater than 4mm.

4.e Extreme lateral or anterior open bites greater than 4mm.

4.f Increased and complete overbite with gingival or palatal trauma.

4.t Partially erupted teeth, tipped and impacted against adjacent teeth.

4.x Presence of supernumerary teeth.

GRADE 3 (Borderline need)

3.a Increased overjet greater than 3.5mm but less than or equal to 6mm with incompetent lips.

3.b Reverse overjet greater than 1mm but less than or equal to 3.5mm.

3.c Anterior or posterior crossbites with greater than 1mm but less than or equal to 2mm discrepancy between retruded contact position and intercuspal position.

3.d Contact point displacements greater than 2mm but less than or equal to 4mm.

3.e Lateral or anterior open bite greater than 2mm but less than or equal to 4mm.

3.f Deep overbite complete on gingival or palatal tissues but no trauma.

GRADE 2 (Little)

2.a Increased overjet greater than 3.5mm but less than or equal to 6mm with competent lips.

2.b Reverse overjet greater than 0mm but less than or equal to 1mm.

2.c Anterior or posterior crossbite with less than or equal to 1mm discrepancy between retruded contact position and intercuspal position.

2.d Contact point displacements greater than 1mm but less than or equal to 2mm.

2.e Anterior or posterior openbite greater than 1mm but less than or equal to 2mm .

2.f Increased overbite greater than or equal 3.5mm without gingival contact.

2.g Pre-normal or post-normal occlusions with no other anomalies (includes up to half a unit discrepancy).

GRADE 1 (None)

1. Extremely minor malocclusions including contact point displacements less than 1mm.

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
DAV01	M	15.6	Y	1	2	2	2	2	3	2	4	0	9	0	18	6	5
DAV02	F	14.6	Y	1	2	2	1	2	6	6	6	5	0	0	23	3	3
DAV03	F	14.3	N	1	1	2	1	2	4	4	4	5	3	0	20	4	3
DAV04	M	8.2	N	1	2	2	2	2	3	4	4	20	0	0	31	9	4
DAV05	F	11.5	Y	1	1	2	1	0	5	4	4	0	9	0	22	6	4
DAV06	F	9.0	N	1	3	0	3	0	3	4	8	5	0	0	20	6	3
DAV07	F	12.0	N	1	1	1	1	1	0	0	0	0	6	0	6	3	2
DAV08	M	13.0	Y	1	1	1	1	1	2	4	4	5	6	0	21	3	4
DAV09	F	11.2	N	1	2	0	1	0	1	4	0	0	3	3	11	3	3
DAV10	M	13.7	Y	1	1	1	1	2	6	2	8	0	9	0	25	8	4
DAV11	M	14.2	N	1	2	2	1	2	7	6	6	10	3	6	38	8	4
DAV12	F	9.9	N	1	2	2	1	2	1	4	2	5	6	0	18	3	2
DAV13	M	15.3	Y	1	2	2	2	2	8	6	6	15	3	3	41	10	5
DAV14	F	14.7	Y	1	2	2	2	2	5	4	8	0	9	0	26	8	4
DAV15	M	12.4	Y	1	2	2	3	3	3	2	2	0	6	3	16	10	4
DAV16	M	14.0	N	1	2	2	2	2	5	4	0	10	3	3	25	6	5
DAV17	F	10.2	Y	1	1	1	1	1	0	0	2	0	3	0	5	2	1
DAV18	F	12.2	N	1	1	0	1	0	3	4	8	10	3	3	31	6	5
DAV19	F	12.2	Y	1	2	2	2	2	4	2	2	5	3	3	19	3	4
DAV20	F	11.5	N	1	1	1	2	2	0	2	4	5	6	0	17	4	3
DAV21	F	10.0	Y	1	2	2	2	2	2	4	2	10	6	0	24	5	4
DAV22	F	12.6	N	1	1	2	1	2	6	4	4	10	3	3	30	8	4
DAV23	F	18.9	Y	1	1	1	1	1	1	2	6	0	3	3	15	3	3
DAV24	F	10.7	N	1	2	2	2	2	1	4	4	0	6	3	18	3	3
DAV25	F	13.6	N	1	2	2	2	2	2	4	4	0	3	0	13	2	3
DAV26	F	13.7	N	1	1	3	3	0	6	6	8	0	0	0	20	3	4
DAV27	F	11.1	N	1	2	2	2	2	4	4	4	10	6	3	31	5	3
DAV28	M	10.0	N	1	0	0	0	0	2	4	0	5	3	0	14	4	3
DAV29	M	12.3	Y	1	2	2	2	2	1	4	4	10	6	0	25	5	4
DAV30	F	12.5	Y	1	1	2	2	2	3	4	4	5	3	0	19	4	2
DAV31	M	12.1	N	1	2	2	3	3	3	4	4	5	6	6	28	4	3
DAV32	F	12.4	Y	1	1	1	1	1	1	6	8	10	0	0	25	2	2
DAV33	F	15.1	Y	1	1	0	2	2	4	6	6	15	3	3	37	6	5
DAV34	F	12.1	N	1	2	2	1	1	4	4	2	25	3	0	38	8	4
DAV35	M	11.7	N	1	2	2	2	2	2	0	4	15	3	0	24	4	4
DAV36	F	13.5	Y	1	1	2	1	1	2	6	4	0	3	0	15	3	2
DAV37	M	12.6	N	1	2	2	2	2	8	2	4	15	9	6	44	9	5
DAV38	F	15.2	N	1	2	2	2	2	5	4	4	0	3	0	16	4	5
DAV39	F	12.5	N	1	1	1	1	2	5	2	4	10	3	3	27	3	5
DAV40	M	10.8	N	1	2	2	2	2	2	2	4	5	3	0	16	5	3
DAV41	F	14.2	N	1	1	1	1	1	0	2	4	0	9	3	18	4	3
DAV42	M	10.9	N	1	2	2	2	2	2	4	4	5	6	0	21	6	5
DAV43	F	45.9	Y	1	2	2	0	1	2	2	2	5	9	0	20	7	5
DAV44	M	11.9	Y	1	2	2	2	2	2	4	6	5	9	3	29	5	3
DAV45	F	12.7	N	1	1	2	1	2	3	2	2	0	6	0	13	4	3
DAV46	F	10.3	N	1	2	2	2	2	1	4	4	10	6	0	25	7	4
DAV47	F	9.8	N	1	2	2	2	2	9	2	4	10	9	0	34	8	4
DAV48	F	15.7	N	1	2	2	2	2	1	4	4	5	9	0	23	5	4
DAV49	M	13.5	N	1	2	2	1	2	7	4	2	15	3	3	34	7	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
GLI01	M	10.8	Y	2	1	1	1	1	3	6	6	0	0	0	15	3	3
GLI02	M	12.7	Y	2	2	2	2	2	0	2	4	5	6	3	20	4	3
GLI03	F	54.8	Y	2	2	2	2	2	8	2	2	15	3	0	30	9	4
GLI04	M	12.3	N	2	1	1	1	1	8	0	0	15	3	0	26	8	4
GLI05	F	10.7	N	2	1	1	3	0	3	2	4	15	3	0	27	5	3
GLI06	F	13.9	Y	2	1	2	2	2	4	2	4	5	3	0	18	6	4
GLI07	F	15.2	Y	2	1	1	2	2	0	4	2	5	3	0	14	4	2
GLI08	M	13.3	N	2	2	0	1	1	2	4	2	5	3	0	16	5	3
GLI09	F	33.8	Y	2	1	1	1	2	0	0	2	0	3	3	8	2	2
GLI10	F	12.3	Y	2	2	2	2	2	10	4	4	20	3	0	41	8	4
GLI11	M	10.9	N	2	1	1	2	2	4	4	4	5	3	3	23	5	3
GLI12	F	11.5	N	2	2	2	2	2	2	4	2	15	6	0	29	9	4
GLI13	F	10.0	N	2	1	1	3	3	0	0	6	5	0	0	11	3	2
GLI14	M	11.3	N	2	2	0	2	0	3	2	2	0	3	0	10	5	3
GLI15	M	13.3	N	2	2	1	2	2	1	4	2	5	6	3	21	3	4
GLI16	F	12.5	Y	2	2	2	2	2	4	4	4	10	3	0	25	6	4
GLI17	F	9.0	N	2	2	0	2	0	1	4	4	0	9	3	21	6	3
GLI18	F	14.5	Y	2	1	2	2	2	5	6	4	10	3	0	28	7	4
GLI19	M	14.1	Y	2	2	2	2	2	6	2	2	20	6	3	39	10	4
GLI20	F	41.8	Y	2	1	1	1	1	6	4	2	15	3	3	33	8	4
GLI21	F	12.8	Y	2	2	2	2	2	3	4	4	5	6	0	22	5	3
GLI22	F	8.5	N	2	1	1	2	2	2	0	4	0	0	0	6	2	2
GLI23	F	13.1	Y	2	1	1	3	1	3	4	6	0	0	0	13	2	2
GLI24	F	15.8	N	2	2	2	2	2	0	4	2	10	6	0	22	5	3
GLI25	F	11.1	Y	2	1	2	1	0	8	0	4	15	0	6	33	8	4
GLI26	F	12.6	Y	2	1	2	1	2	5	2	2	10	3	0	22	7	4
GLI27	F	25.3	Y	2	2	2	2	2	1	6	2	5	6	0	20	5	3
GLI28	F	43.5	Y	2	2	2	1	2	4	4	6	0	9	0	23	4	3
GLI29	F	11.0	Y	2	2	2	2	1	1	4	2	0	0	0	7	3	2
GLI30	F	8.9	N	2	1	0	2	0	2	6	6	5	3	0	22	7	3
GLI31	M	14.9	Y	2	2	2	1	2	5	2	4	10	3	3	27	7	4
GLI32	F	18.5	Y	2	1	2	1	2	1	2	2	0	3	6	14	6	4
GLI33	F	15.3	Y	2	2	2	2	2	3	4	4	5	0	0	16	3	3

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
JAF01	F	28.8	Y	3	1	1	1	1	3	2	2	10	0	3	20	4	3
JAF02	M	22.8	Y	3	2	2	2	2	1	4	4	0	9	0	18	5	4
JAF03	M	12.7	Y	3	2	2	2	2	8	4	4	10	6	0	32	8	3
JAF04	M	12.9	Y	3	1	1	1	2	1	2	4	5	6	0	18	5	3
JAF05	F	15.5	Y	3	3	1	3	1	5	2	4	5	0	0	16	4	4
JAF06	M	9.1	Y	3	2	2	2	2	1	2	0	10	6	3	22	5	4
JAF07	F	11.8	N	3	1	1	1	1	8	0	4	15	0	6	33	8	4
JAF08	M	37.5	Y	3	2	2	2	2	5	4	4	5	3	3	24	5	4
JAF09	M	14.8	N	3	1	2	1	2	6	4	2	25	6	0	43	10	4
JAF10	M	12.5	N	3	2	0	2	0	7	6	6	15	3	0	37	9	5
JAF11	M	10.5	Y	3	1	2	2	2	9	2	6	10	3	0	30	8	4
JAF12	F	9.4	N	3	2	2	1	1	3	4	0	5	3	6	21	5	5
JAF13	M	14.1	Y	3	2	2	1	1	1	4	2	0	3	3	13	2	2
JAF14	M	14.8	Y	3	2	2	2	2	5	4	4	5	3	0	21	4	3
JAF15	F	14.2	Y	3	1	1	1	1	2	2	4	0	3	0	11	1	2
JAF16	M	8.0	N	3	1	1	1	1	2	0	0	0	3	0	5	3	2
JAF17	M	29.0	Y	3	1	1	1	1	3	0	2	0	0	0	5	5	2
JAF18	F	9.0	N	3	2	2	1	0	5	4	4	10	3	3	29	8	4
JAF19	M	11.2	N	3	1	1	2	2	2	0	2	5	3	0	12	4	3
JAF20	M	13.8	N	3	1	2	1	2	9	2	8	20	3	0	42	8	4
JAF21	M	16.4	Y	3	2	2	2	2	3	2	4	0	9	0	18	5	3
JAF22	M	14.6	Y	3	1	2	1	1	5	2	2	5	3	3	20	4	3
JAF23	F	17.2	Y	3	1	1	1	1	2	0	2	5	0	0	9	1	2
JAF24	F	39.8	Y	3	1	1	1	1	4	2	2	0	3	0	11	2	2
JAF25	M	13.1	Y	3	1	1	1	1	4	2	2	5	0	0	13	5	3
JAF26	F	39.0	Y	3	2	1	1	1	1	6	4	5	3	6	25	4	4
JAF27	F	8.2	N	3	2	1	1	1	2	4	0	10	0	3	19	6	3
JAF28	F	34.4	Y	3	2	2	1	1	2	2	8	0	3	0	15	5	3
JAF29	F	11.2	N	3	2	2	2	2	2	4	2	10	3	0	21	4	3
JAF30	F	22.8	Y	3	3	1	2	0	6	6	8	0	6	0	26	5	5
JAF31	F	17.2	N	3	1	2	2	2	8	2	2	10	3	6	31	8	5
JAF32	F	31.6	Y	3	1	1	3	1	1	0	2	0	3	0	6	1	1
JAF33	F	44.2	Y	3	2	2	2	2	1	4	4	0	3	0	12	2	2
JAF34	F	39.1	Y	3	1	1	1	2	3	2	8	0	3	0	16	3	4
JAF35	F	32.0	Y	3	1	1	1	1	5	4	0	5	3	0	17	5	3
JAF36	F	21.7	Y	3	1	2	1	1	5	4	2	5	3	3	22	5	3
JAF37	M	7.5	N	3	2	0	2	0	2	6	4	10	0	0	22	8	4
JAF38	F	15.7	Y	3	1	1	1	1	4	4	0	0	3	0	11	4	2
JAF39	F	11.1	N	3	2	2	2	2	0	4	0	5	6	0	15	5	2
JAF40	F	12.9	Y	3	2	2	1	2	1	4	4	5	6	0	20	4	4
JAF41	M	14.4	N	3	2	2	2	2	6	2	4	10	3	0	25	5	5
JAF42	M	14.6	Y	3	2	2	1	2	9	2	4	15	3	0	33	8	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
LEA01	M	14.8	Y	4	1	2	1	1	4	2	0	5	6	0	17	4	2
LEA02	F	10.2	N	4	1	0	1	0	0	2	0	0	3	0	5	6	4
LEA03	F	11.3	Y	4	2	2	2	2	5	2	6	20	3	3	39	9	5
LEA04	F	12.8	N	4	2	2	1	1	10	4	0	10	3	0	27	8	4
LEA05	M	10.1	N	4	2	2	2	2	4	8	2	5	6	0	25	5	3
LEA06	M	14.6	Y	4	2	2	1	1	5	4	0	5	3	0	17	4	4
LEA07	M	13.0	Y	4	1	1	1	1	1	4	0	0	3	0	8	4	2
LEA08	F	12.5	N	4	2	1	2	1	2	4	4	0	3	0	13	5	5
LEA09	M	12.5	N	4	1	1	1	1	1	0	2	0	3	0	6	2	3
LEA10	M	13.3	Y	4	1	1	1	1	4	2	6	10	3	0	25	6	4
LEA11	F	10.4	Y	4	1	1	1	1	4	0	0	5	12	0	21	5	3
LEA12	F	11.8	Y	4	2	2	2	2	6	4	10	10	3	0	33	6	4
LEA13	M	10.9	N	4	2	2	2	2	0	4	4	0	12	0	20	5	3
LEA14	M	11.9	N	4	1	0	1	0	3	0	2	5	3	3	16	4	3
LEA15	F	10.8	Y	4	2	2	2	2	5	2	4	10	3	0	24	4	2
LEA16	F	28.2	Y	4	2	2	2	2	6	6	8	10	3	3	36	5	4
LEA17	M	11.9	Y	4	1	1	1	1	2	4	0	5	6	0	17	4	2
LEA18	M	12.7	Y	4	2	2	2	2	4	0	0	15	3	0	22	7	4
LEA19	F	13.5	Y	4	1	2	1	2	3	2	4	5	6	3	23	6	2
LEA20	M	10.0	N	4	2	2	2	2	6	4	4	10	3	0	27	7	5
LEA21	F	45.8	Y	4	2	2	2	2	5	4	4	10	3	0	26	6	4
LEA22	F	14.0	N	4	1	1	1	1	4	6	2	5	3	0	20	5	5
LEA23	F	9.8	N	4	2	0	1	0	4	4	0	5	3	0	16	7	2
LEA24	M	12.9	N	4	2	2	2	2	3	8	8	5	6	3	33	7	4
LEA25	F	12.6	N	4	1	1	1	1	6	2	2	10	0	0	20	3	5
LEA26	M	13.6	N	4	2	2	2	2	2	6	6	10	3	0	27	4	5
LEA27	F	10.5	N	4	2	0	2	0	3	4	4	10	3	0	24	5	4
LEA28	F	14.3	Y	4	1	1	1	1	1	4	2	0	3	0	10	2	3
LEA29	M	13.8	Y	4	1	2	2	2	0	4	4	5	3	0	16	4	2
LEA30	F	26.2	Y	4	2	2	2	2	8	4	4	5	0	6	27	6	5
LEA31	M	10.5	N	4	2	2	1	1	4	4	2	15	3	3	31	7	4
LEA32	M	9.0	N	4	1	0	1	0	2	4	4	0	3	0	13	4	2
LEA33	M	13.0	Y	4	2	2	2	2	8	6	4	5	3	3	29	4	4
LEA34	F	13.3	N	4	2	1	2	2	0	4	4	0	3	0	11	1	5
LEA35	F	12.0	Y	4	2	2	1	2	3	10	8	5	3	3	32	3	3
LEA36	M	12.4	Y	4	2	2	2	2	2	6	4	10	3	3	28	5	5
LEA37	M	10.3	Y	4	2	2	1	1	6	4	6	15	6	3	40	8	4
LEA38	F	11.8	Y	4	1	2	1	2	2	2	2	10	9	0	25	6	4
LEA39	F	8.3	N	4	3	0	3	0	2	10	10	20	3	3	48	7	4
LEA40	M	14.2	Y	4	2	2	1	1	3	4	6	5	9	0	27	6	4
LEA41	F	11.8	N	4	2	0	2	0	5	4	4	5	3	0	21	4	3
LEA42	F	11.8	N	4	2	0	2	0	6	4	4	10	6	3	33	7	4
LEA43	F	13.4	N	4	1	2	1	2	7	4	4	5	3	3	26	6	3
LEA44	M	15.4	Y	4	1	1	1	1	1	4	6	0	0	0	11	2	2
LEA45	M	14.6	Y	4	1	2	1	0	5	4	2	0	3	3	17	2	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
MEM01	M	12.1	N	5	2	2	2	2	7	2	4	20	9	3	45	9	5
MEM02	F	23.9	Y	5	1	2	1	2	3	4	4	5	3	0	19	4	4
MEM03	M	13.4	Y	5	1	1	2	2	10	2	4	15	3	0	34	5	4
MEM04	F	13.2	Y	5	1	2	1	2	6	4	4	0	3	3	20	5	3
MEM05	F	13.6	N	5	1	2	2	2	10	2	4	10	0	0	26	8	4
MEM06	F	11.8	N	5	1	1	1	1	2	0	0	5	0	0	7	6	3
MEM07	F	11.9	N	5	1	2	1	2	8	4	4	10	3	0	29	7	4
MEM08	F	11.8	Y	5	1	2	1	1	2	2	2	0	3	0	9	2	2
MEM09	F	11.8	N	5	2	2	1	2	5	4	10	10	6	0	35	7	4
MEM10	F	12.7	Y	5	2	2	1	1	6	4	2	10	3	0	25	5	4
MEM11	F	24.9	Y	5	3	2	3	2	5	2	4	15	3	0	29	7	4
MEM12	M	12.6	Y	5	2	2	2	2	8	2	4	20	3	0	37	9	5
MEM13	M	11.5	N	5	2	2	2	2	6	6	4	20	3	3	42	9	5
MEM14	M	13.3	Y	5	1	2	2	2	9	2	4	15	3	6	39	7	4
MEM15	M	12.1	Y	5	2	2	1	1	8	2	2	15	3	0	30	8	4
MEM16	F	13.5	Y	5	1	1	1	1	9	2	2	20	3	0	36	8	4
MEM17	F	12.0	N	5	1	1	2	2	12	2	8	20	0	3	45	8	4
MEM18	M	14.6	N	5	1	1	2	2	8	0	4	5	3	6	26	6	5
MEM19	F	12.7	Y	5	2	2	2	2	9	4	4	10	3	0	30	8	4
MEM20	M	13.8	N	5	1	1	1	1	3	0	4	0	6	3	16	3	4
MEM21	F	8.6	N	5	1	0	2	2	6	0	4	10	3	0	23	6	4
MEM22	M	12.5	Y	5	1	1	1	2	7	4	4	20	6	3	44	9	5
MEM23	M	15.2	Y	5	1	1	1	1	3	8	4	5	6	0	26	5	4
MEM24	F	11.6	Y	5	2	2	2	2	9	4	4	15	6	6	44	9	5
MEM25	F	15.0	Y	5	2	2	1	2	5	4	2	15	6	0	32	6	5
MEM26	F	12.1	Y	5	1	1	1	1	4	2	2	0	0	0	8	3	3
MEM27	M	14.3	Y	5	1	0	1	0	9	2	0	10	3	3	27	7	4
MEM28	F	13.4	Y	5	1	1	2	2	4	2	4	15	3	6	34	7	4
MEM29	F	14.2	Y	5	1	2	1	1	3	2	0	5	3	0	13	2	3
MEM30	F	19.0	Y	5	1	1	3	2	2	2	4	0	3	0	11	5	4
MEM31	M	15.1	Y	5	1	1	1	1	6	0	0	5	0	0	11	4	3
MEM32	F	18.7	N	5	1	1	1	1	1	2	0	20	3	0	26	7	5
MEM33	M	17.7	Y	5	3	1	2	2	7	4	4	5	3	0	23	7	4
MEM34	F	14.3	N	5	2	1	2	2	0	4	2	5	0	0	11	3	2
MEM35	F	17.6	Y	5	1	1	1	1	4	6	0	10	3	3	26	4	3
MEM36	M	15.0	N	5	1	1	1	2	8	4	2	15	0	3	32	6	4
MEM37	M	13.6	Y	5	2	2	1	2	8	0	2	0	3	0	13	5	4
MEM38	F	9.6	N	5	2	2	2	2	4	4	0	5	3	6	22	8	4
MEM39	F	10.4	N	5	1	1	1	3	1	0	2	15	3	3	24	5	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
MIL01	M	10.8	N	6	2	2	2	2	8	4	2	5	6	6	31	6	5
MIL02	M	14.6	Y	6	2	2	1	2	4	4	2	5	3	0	18	4	3
MIL03	M	46.3	Y	6	1	1	1	1	3	2	0	5	3	6	19	3	3
MIL04	M	16.4	Y	6	1	1	1	1	5	0	2	5	3	0	15	4	3
MIL05	F	13.6	Y	6	2	2	1	2	8	4	2	5	6	0	25	7	5
MIL06	M	13.9	Y	6	3	1	3	1	5	4	4	10	9	3	35	3	4
MIL07	M	12.8	N	6	1	2	2	0	6	6	2	15	0	0	29	8	3
MIL08	M	11.3	N	6	2	2	2	2	12	2	4	20	9	0	47	8	5
MIL09	M	11.8	N	6	1	1	1	1	2	2	2	5	3	0	14	4	3
MIL10	M	12.0	Y	6	1	2	1	1	0	2	2	5	3	0	12	2	2
MIL11	F	12.6	Y	6	1	2	1	1	3	2	0	0	3	3	11	2	2
MIL12	F	32.8	Y	6	1	1	1	1	0	0	0	0	3	0	3	1	2
MIL13	F	8.2	N	6	2	2	1	1	5	4	2	15	0	0	26	8	4
MIL14	M	28.0	Y	6	1	1	2	2	0	2	4	0	6	0	12	4	3
MIL15	F	9.2	N	6	2	1	1	1	0	4	0	0	3	0	7	2	2
MIL16	M	17.3	N	6	2	2	2	2	7	2	4	15	6	0	34	7	5
MIL17	F	9.2	N	6	2	2	2	2	5	2	2	10	3	3	25	5	4
MIL18	M	9.6	N	6	2	1	2	1	1	2	8	0	0	0	11	4	3
MIL19	F	11.4	Y	6	1	2	3	1	4	2	4	0	3	0	13	3	3
MIL20	F	43.5	Y	6	0	1	1	1	1	8	4	5	0	0	18	4	5
MIL21	M	12.7	N	6	1	2	1	1	9	4	0	15	6	0	34	6	4
MIL22	M	30.1	Y	6	1	1	1	1	2	0	0	5	3	0	10	4	3
MIL23	M	11.8	Y	6	1	1	1	1	3	4	2	5	6	0	20	5	3
MIL24	F	48.6	Y	6	1	1	1	2	1	2	2	5	3	0	13	1	5
MIL25	F	56.2	Y	6	2	2	2	2	3	8	2	0	9	0	22	5	4
MIL26	M	23.9	Y	6	3	3	1	1	2	8	2	0	3	0	15	4	3
MIL27	F	15.0	N	6	2	1	1	1	2	2	2	0	0	0	6	2	5
MIL28	F	38.5	Y	6	0	1	1	2	7	0	2	10	0	3	22	6	4
MIL29	M	36.3	Y	6	1	1	1	1	1	0	2	5	6	0	14	3	4
MIL30	M	11.4	N	6	1	2	1	1	9	4	6	5	0	0	24	8	4
MIL31	M	10.8	Y	6	2	2	1	1	1	2	2	5	3	0	13	2	2
MIL32	M	11.3	Y	6	1	1	1	2	3	4	6	0	3	0	16	3	3
MIL33	F	9.9	N	6	2	2	2	2	1	4	2	10	3	0	20	3	3
MIL34	M	11.8	N	6	1	1	1	1	4	0	2	5	6	0	17	4	5
MIL35	F	10.6	N	6	2	2	2	2	3	4	4	0	3	0	14	4	4
MIL36	F	28.6	Y	6	1	2	3	1	4	2	2	10	0	0	18	6	5
MIL37	F	10.3	N	6	2	2	2	2	3	0	2	5	3	0	13	5	3
MIL38	M	9.1	N	6	2	2	2	2	4	2	4	10	3	0	23	5	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
ORR01	M	14.8	Y	7	1	1	1	1	4	0	2	5	3	3	17	4	3
ORR02	F	10.2	N	7	2	0	2	0	13	4	4	0	6	0	27	5	5
ORR03	M	12.6	Y	7	3	3	3	3	3	4	4	10	3	0	24	4	5
ORR04	F	52.0	Y	7	1	1	1	1	7	6	2	5	0	0	20	3	4
ORR05	M	16.7	Y	7	1	1	1	2	0	2	4	0	0	3	9	2	2
ORR06	M	11.4	Y	7	1	1	1	1	7	2	0	15	9	0	33	9	5
ORR07	M	14.4	Y	7	1	2	1	1	7	6	0	5	3	3	24	5	4
ORR08	F	10.8	N	7	2	2	1	0	7	4	2	20	3	0	36	10	5
ORR09	M	7.6	N	7	1	1	2	2	4	0	0	20	6	3	33	10	5
ORR10	F	35.1	Y	7	1	2	1	1	7	8	2	10	3	6	36	4	5
ORR11	F	30.7	Y	7	2	2	1	1	5	8	2	10	3	6	34	5	4
ORR12	M	11.5	Y	7	3	3	3	3	7	4	6	20	0	0	37	8	3
ORR13	F	15.9	Y	7	1	1	1	2	5	2	2	5	6	0	20	5	3
ORR14	F	16.9	Y	7	1	0	1	1	8	8	6	10	0	6	38	5	5
ORR15	F	66.4	Y	7	1	1	1	1	4	2	2	0	6	0	14	6	5
ORR16	M	13.3	Y	7	3	1	3	3	10	2	6	15	3	6	42	9	5
ORR17	M	9.9	N	7	1	2	1	2	10	2	2	15	0	0	29	8	3
ORR18	F	10.3	N	7	2	2	1	0	5	4	0	5	0	3	17	7	3
ORR19	F	14.5	Y	7	2	0	2	0	15	4	6	15	3	0	43	8	5
ORR20	M	10.2	N	7	3	3	1	3	12	6	0	15	6	3	42	8	4
ORR21	F	12.4	Y	7	2	2	1	1	5	4	2	10	6	0	27	5	3
ORR22	M	30.1	Y	7	2	2	2	2	6	6	4	0	3	0	19	3	3
ORR23	M	11.8	N	7	2	0	1	0	5	6	2	15	3	3	34	7	4
ORR24	F	40.1	Y	7	1	2	2	2	5	4	2	15	9	0	35	5	3
ORR25	F	35.7	Y	7	1	1	1	1	1	2	2	5	0	0	10	2	3
ORR26	F	21.2	N	7	1	1	1	1	4	4	4	0	3	0	15	3	5
ORR27	F	12.0	Y	7	2	2	1	2	5	2	2	10	12	0	31	10	4
ORR28	F	9.7	N	7	2	2	2	2	8	4	4	20	6	0	42	9	4
ORR29	F	14.0	Y	7	1	1	1	1	7	2	0	0	9	3	21	6	3
ORR30	M	10.5	Y	7	1	1	1	1	8	2	2	15	6	0	33	9	5
ORR31	F	22.0	Y	7	1	1	2	2	5	2	2	0	3	0	12	3	3
ORR32	F	9.2	N	7	2	1	2	1	4	2	2	5	0	0	13	6	4
ORR33	M	37.3	Y	7	1	1	1	1	4	0	2	15	3	3	27	7	4
ORR34	F	17.0	Y	7	2	2	1	1	2	4	2	0	3	3	14	2	2
ORR35	F	24.3	Y	7	1	1	1	1	5	2	2	0	6	0	15	5	3
ORR36	F	12.3	Y	7	1	1	1	1	3	2	2	0	3	0	10	3	2
ORR37	F	28.2	Y	7	1	1	1	1	4	2	2	5	0	0	13	4	3
ORR38	F	13.9	Y	7	1	1	1	1	8	4	2	10	12	0	36	7	4
ORR39	M	9.3	N	7	2	1	2	1	4	4	2	10	9	3	32	7	4
ORR40	F	14.2	Y	7	1	2	1	1	6	4	2	10	6	3	31	7	3
ORR41	F	24.6	Y	7	1	1	1	1	6	0	0	0	3	0	9	4	4
ORR42	M	10.6	N	7	2	2	2	2	6	2	2	10	3	0	23	7	4
ORR43	F	16.3	Y	7	1	2	2	2	6	2	10	10	3	0	31	5	4
ORR44	M	15.3	Y	7	1	2	1	2	8	2	2	10	3	6	31	8	4
ORR45	F	9.0	N	7	2	0	2	0	6	0	2	20	3	0	31	9	5
ORR46	F	39.8	Y	7	2	2	1	1	3	4	2	10	3	3	25	7	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
OSW01	F	15.0	Y	8	2	2	2	2	3	2	2	5	3	3	18	5	3
OSW02	F	23.8	Y	8	1	1	1	1	8	6	6	0	3	0	23	6	4
OSW03	M	11.8	Y	8	2	2	2	2	3	4	2	5	3	0	17	4	2
OSW04	M	11.7	Y	8	0	0	0	0	9	2	2	15	3	3	34	8	5
OSW05	M	12.1	Y	8	2	2	2	2	4	2	2	5	3	0	16	5	3
OSW06	F	12.8	N	8	1	2	1	1	4	4	4	0	3	3	18	4	3
OSW07	F	12.5	N	8	2	2	2	2	5	4	4	5	3	0	21	4	3
OSW08	M	14.1	Y	8	2	2	1	2	9	4	2	0	6	3	24	7	4
OSW09	F	11.9	Y	8	2	2	2	2	3	4	4	0	3	3	17	4	2
OSW10	M	10.2	Y	8	2	2	2	2	2	4	4	5	9	0	24	9	5
OSW11	F	12.5	N	8	2	2	2	2	4	6	6	5	0	6	27	3	3
OSW12	M	14.5	Y	8	2	2	2	2	3	8	4	10	0	0	25	10	5
OSW13	F	14.7	N	8	1	1	1	2	5	2	2	0	3	0	12	3	4
OSW14	F	47.0	Y	8	1	1	3	1	2	0	2	0	0	0	4	3	3
OSW15	F	28.2	Y	8	2	2	1	1	1	2	2	0	6	3	14	5	3
OSW16	M	14.3	Y	8	2	2	1	2	5	4	2	0	3	3	17	4	4
OSW17	F	13.3	Y	8	2	2	1	2	4	2	2	0	3	0	11	4	3
OSW18	F	13.1	N	8	2	2	1	1	5	2	2	15	3	0	27	7	4
OSW19	M	11.0	N	8	1	1	1	1	2	0	2	5	3	0	12	5	3
OSW20	F	9.0	N	8	1	1	1	1	2	4	0	0	0	0	6	3	3
OSW21	F	12.3	N	8	2	2	2	2	7	4	4	0	3	0	18	5	4
OSW22	M	12.5	Y	8	2	2	2	2	9	4	2	10	3	0	28	7	4
OSW23	M	16.3	Y	8	2	2	2	2	7	4	2	10	6	0	29	7	4
OSW24	M	11.3	Y	8	2	2	1	1	2	2	0	5	3	3	15	4	3
OSW25	F	11.8	Y	8	2	2	2	2	9	2	2	15	3	0	31	8	4
OSW26	M	13.5	N	8	2	2	2	2	3	4	4	5	3	0	19	6	5
OSW27	M	13.2	Y	8	2	2	2	2	3	4	2	0	6	0	15	6	3
OSW28	M	13.0	Y	8	2	2	2	2	4	2	2	0	3	0	11	3	3
OSW29	M	12.0	Y	8	2	2	2	2	7	4	4	5	0	0	20	4	5
OSW30	M	18.0	Y	8	1	1	1	1	6	2	2	0	0	3	13	5	3
OSW31	M	13.0	N	8	2	2	2	2	11	4	2	10	0	3	30	7	5
OSW32	M	13.0	Y	8	2	2	2	2	6	4	4	5	3	0	22	4	3
OSW33	F	17.0	Y	8	2	2	2	2	6	4	4	10	6	0	30	5	3
OSW34	F	10.1	N	8	2	2	2	2	4	4	6	15	0	0	29	7	4
OSW35	M	12.2	Y	8	2	2	2	2	7	6	4	5	3	0	25	6	3
OSW36	M	13.2	Y	8	1	1	1	2	2	2	4	0	6	0	14	4	3
OSW37	F	12.3	Y	8	1	2	1	2	4	2	2	0	6	0	14	3	2
OSW38	F	11.0	N	8	2	2	2	2	7	4	4	5	0	3	23	8	4
OSW39	M	12.9	N	8	1	2	1	2	4	4	4	5	0	0	17	4	3
OSW40	M	13.9	N	8	2	2	2	2	6	4	4	5	3	3	25	5	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
POS01	M	39.0	Y	9	2	2	2	2	5	2	2	10	9	0	28	7	4
POS02	F	29.3	Y	9	2	2	2	2	2	6	4	5	3	0	20	4	4
POS03	F	10.6	N	9	2	0	1	0	0	4	0	0	6	0	10	2	3
POS04	M	8.2	N	9	2	0	2	0	0	4	2	0	0	3	9	4	1
POS05	M	10.4	N	9	2	0	2	0	4	4	4	20	3	0	35	8	4
POS06	M	11.3	N	9	2	0	2	0	12	4	2	0	3	3	24	4	5
POS07	M	8.9	N	9	1	0	1	0	3	0	0	0	3	3	9	4	5
POS08	F	8.8	N	9	1	0	1	0	5	2	0	10	9	0	26	7	3
POS09	F	10.3	N	9	2	0	2	0	4	6	2	10	9	3	34	8	4
POS10	F	10.3	N	9	1	0	1	0	6	0	2	10	3	3	24	7	4
POS11	M	8.4	N	9	1	0	1	0	2	0	0	10	0	0	12	4	2
POS12	F	9.2	Y	9	1	2	1	1	1	2	0	5	3	0	11	2	2
POS13	F	14.8	Y	9	2	2	1	1	1	4	2	0	6	0	13	3	3
POS14	F	11.8	Y	9	2	2	1	2	1	4	4	10	3	3	25	4	2
POS15	F	12.1	Y	9	2	2	2	2	8	4	8	0	3	0	23	6	5
POS16	M	9.0	N	9	1	0	2	0	1	0	6	5	6	0	18	5	2
POS17	M	12.0	N	9	1	1	1	2	5	8	10	5	0	0	28	5	5
POS18	M	11.3	N	9	2	0	2	0	1	4	4	5	6	0	20	4	5
POS19	M	33.8	Y	9	1	1	1	1	2	2	2	0	0	3	9	3	3
POS20	F	21.3	Y	9	2	2	2	2	4	4	4	5	3	0	20	4	3
POS21	F	13.3	Y	9	2	2	1	2	2	4	4	15	6	0	31	5	4
POS22	F	12.1	Y	9	2	2	1	2	1	6	4	0	3	0	14	2	2
POS23	M	10.8	N	9	1	0	1	0	1	2	0	5	9	0	17	5	4
POS24	M	12.9	N	9	2	2	2	0	0	6	4	5	3	3	21	4	5
POS25	F	11.3	N	9	2	0	1	0	1	4	0	5	6	3	19	6	4
POS26	F	10.3	N	9	1	0	1	0	1	0	0	0	3	0	4	4	4
POS27	F	9.3	N	9	2	0	2	0	4	8	2	15	3	0	32	7	4
POS28	F	11.8	N	9	1	0	1	0	5	0	0	15	3	3	26	6	4
POS29	F	9.3	N	9	2	0	2	0	3	4	2	10	0	3	22	7	4
POS30	F	8.7	N	9	2	0	2	0	0	4	4	5	3	0	16	6	3
POS31	F	8.8	N	9	3	0	1	0	1	8	2	0	3	0	14	6	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
WIL01	F	9.6	N	10	2	0	2	0	5	4	4	0	9	6	28	7	5
WIL02	F	9.9	N	10	2	1	1	2	1	2	0	0	3	3	9	4	2
WIL03	F	13.4	Y	10	1	1	2	2	2	2	4	0	3	0	11	4	2
WIL04	M	17.5	Y	10	1	1	1	1	4	2	2	5	3	0	16	4	3
WIL05	F	10.2	N	10	2	0	1	0	1	4	4	0	6	0	15	4	2
WIL08	M	14.1	N	10	2	2	2	2	2	2	4	0	3	0	11	3	2
WIL09	M	13.0	Y	10	1	2	1	2	9	2	2	10	9	0	32	7	4
WIL10	F	12.2	Y	10	2	2	2	2	2	4	2	0	6	0	14	5	3
WIL11	F	10.0	N	10	2	2	2	2	1	2	4	0	0	0	7	3	2
WIL12	F	33.4	Y	10	1	2	1	2	5	2	2	5	3	0	17	5	3
WIL13	F	14.1	N	10	1	0	1	0	2	0	2	5	6	0	15	5	3
WIL14	M	12.3	N	10	1	0	1	0	12	2	2	10	0	3	29	8	4
WIL15	F	13.3	Y	10	2	2	2	2	5	2	2	5	6	0	20	4	3
WIL16	F	13.4	Y	10	2	2	2	2	1	4	4	5	3	3	20	3	2
WIL17	F	13.4	N	10	1	0	1	0	11	2	2	0	6	0	21	4	5
WIL18	M	12.8	Y	10	1	0	1	1	5	0	2	0	3	0	10	5	2
WIL19	F	8.3	N	10	3	0	3	0	3	0	0	0	12	0	15	6	5
WIL20	F	7.0	N	10	2	2	2	2	1	2	4	0	3	3	13	4	3
WIL21	M	11.0	N	10	2	2	2	2	4	0	0	10	9	0	23	7	3
WIL22	F	12.6	N	10	1	0	1	1	3	2	4	0	3	0	12	4	2
WIL23	F	8.1	N	10	2	2	2	2	4	4	0	5	0	0	13	5	3
WIL24	F	12.4	N	10	2	0	2	0	1	2	2	0	3	0	8	4	2
WIL25	F	8.1	N	10	2	2	2	2	0	4	2	0	3	3	12	3	2
WIL26	F	8.8	N	10	2	2	2	2	1	2	4	10	0	0	17	7	4
WIL27	M	9.6	N	10	1	0	1	0	6	0	0	10	0	3	19	6	4
WIL28	F	10.5	N	10	2	2	1	1	4	4	0	5	6	0	19	7	3
WIL29	M	11.2	Y	10	2	0	2	0	0	2	2	5	3	0	12	5	4
WIL30	F	12.8	Y	10	2	2	2	2	0	2	4	15	0	3	24	9	4
WIL31	F	12.6	N	10	1	1	1	1	0	2	0	0	0	0	2	3	1
WIL32	M	14.9	Y	10	2	2	2	2	5	4	4	5	3	0	21	5	3
WIL33	F	11.6	N	10	2	2	2	2	2	2	4	0	3	6	17	3	2
WIL34	F	7.0	N	10	2	0	2	2	0	2	4	5	6	0	17	4	2
WIL35	F	11.1	N	10	2	0	2	2	2	2	2	0	3	0	9	4	5
WIL35	M	11.5	N	10	1	0	2	0	1	2	4	5	3	0	15	5	5
WIL36	F	16.1	Y	10	1	2	1	1	3	2	2	10	0	0	17	3	2
WIL37	F	7.8	N	10	2	0	2	0	1	6	2	0	0	0	9	5	2
WIL38	F	12.2	N	10	1	0	1	0	1	0	4	10	0	3	18	4	2
WIL39	F	10.5	N	10	1	0	1	2	7	0	2	5	3	0	17	6	4
WIL40	F	8.9	N	10	1	1	1	1	4	0	0	5	0	0	9	4	3
WIL41	F	13.5	Y	10	1	1	1	1	2	8	4	5	3	0	22	3	3
WIL42	M	11.0	N	10	2	0	2	0	3	2	4	10	3	0	22	7	3
WIL43	M	12.6	Y	10	2	2	2	2	2	4	4	5	3	0	18	4	3

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
AGR01	F	15.3	Y	11	1	1	1	1	1	10	6	0	0	3	20	4	3
AGR02	F	27.3	Y	11	3	3	3	1	0	10	10	5	0	0	25	2	2
AGR03	M	12.8	N	11	3	0	3	0	17	6	8	15	3	0	49	10	5
AGR04	M	11.0	N	11	2	2	2	0	1	2	6	0	9	3	21	7	4
AGR05	F	38.9	Y	11	1	1	1	1	6	0	0	5	6	0	17	8	4
AGR06	F	18.9	Y	11	1	1	2	2	4	2	2	5	3	0	16	5	4
AGR07	M	9.1	N	11	1	1	1	1	2	0	0	5	6	0	13	6	4
AGR08	F	9.0	N	11	2	0	3	0	7	4	4	10	3	0	28	7	5
AGR09	M	12.8	N	11	2	2	2	2	5	2	4	5	3	0	19	6	3
AGR10	F	16.3	Y	11	2	2	1	1	2	8	4	10	12	6	42	10	4
AGR11	F	11.5	N	11	2	0	2	0	3	2	2	5	6	0	18	8	4
AGR12	F	30.0	Y	11	1	2	1	2	0	6	4	0	9	0	19	8	3
AGR13	F	9.3	N	11	2	0	2	0	1	6	4	5	3	6	25	5	4
AGR14	M	10.9	N	11	2	2	2	2	4	4	2	5	6	3	24	7	4
AGR15	M	12.7	N	11	1	0	1	0	12	2	4	0	0	0	18	3	5
AGR16	F	10.8	N	11	2	2	2	2	1	4	2	5	0	0	12	4	3
AGR17	F	13.2	Y	11	1	2	1	2	7	2	4	0	0	0	13	5	3
AGR18	M	17.9	Y	11	1	1	2	2	4	2	4	10	0	0	20	6	3
AGR19	F	13.1	Y	11	1	1	1	1	1	0	0	5	3	0	9	5	3
AGR20	M	11.5	N	11	2	2	2	2	2	2	4	0	3	0	11	3	2
AGR21	M	9.3	N	11	2	2	2	2	6	4	4	10	6	0	30	10	5
AGR22	F	12.0	N	11	2	0	2	0	0	4	2	0	6	0	12	4	5
AGR23	F	17.6	Y	11	1	2	2	2	7	4	4	15	3	6	39	7	4
AGR24	F	9.4	Y	11	1	3	1	1	2	4	4	15	6	0	31	7	4
AGR25	F	11.6	N	11	2	0	2	0	3	6	4	20	0	0	33	8	5
AGR26	F	10.3	N	11	3	3	3	3	2	4	4	5	0	0	15	4	2
AGR27	F	11.2	N	11	1	0	1	0	2	2	4	0	3	0	11	5	4
AGR28	M	11.4	N	11	2	0	2	0	3	8	4	15	9	0	39	7	4
AGR29	F	14.0	Y	11	1	2	2	2	2	8	6	20	3	0	39	9	5
AGR30	M	12.0	N	11	1	1	1	3	7	4	4	10	3	3	31	5	4
AGR31	F	11.6	N	11	2	2	1	1	4	6	0	15	3	3	31	7	4
AGR32	F	12.0	N	11	2	2	2	2	4	4	4	5	6	0	23	5	4
AGR33	F	11.1	N	11	2	2	1	2	7	4	2	0	3	0	16	3	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
DES01	F	10.5	N	12	2	0	2	0	2	2	2	10	3	0	19	8	4
DES02	F	10.2	N	12	2	2	2	2	5	4	2	10	3	0	24	7	3
DES03	M	15.3	Y	12	2	2	2	2	4	6	4	0	0	0	14	5	4
DES04	M	14.9	Y	12	2	2	2	2	5	4	4	10	3	3	29	7	3
DES05	F	11.3	N	12	2	2	2	2	5	2	2	5	3	3	20	6	3
DES06	F	10.7	Y	12	2	2	2	2	5	4	4	10	3	0	26	6	4
DES07	M	15.3	Y	12	2	2	2	2	9	6	2	15	3	0	35	9	4
DES08	F	33.3	Y	12	2	1	2	3	2	2	4	10	3	3	24	3	4
DES09	M	12.5	N	12	1	1	1	1	5	0	0	5	0	0	10	6	3
DES10	M	11.7	N	12	2	0	2	0	11	4	4	10	6	0	35	5	5
DES11	M	10.4	N	12	1	0	1	0	3	2	2	0	0	0	7	4	2
DES12	F	13.3	Y	12	1	2	1	2	8	2	2	15	3	0	30	8	4
DES13	F	8.6	N	12	1	0	1	0	5	2	2	5	3	0	17	5	3
DES14	M	8.6	N	12	3	0	3	0	11	4	4	15	0	3	37	5	5
DES15	M	9.2	N	12	1	0	1	0	7	2	2	0	0	3	14	6	5
DES16	M	12.5	Y	12	2	2	2	2	3	6	6	5	3	0	23	5	3
DES17	F	8.8	N	12	2	2	2	2	4	4	4	15	3	0	30	7	4
DES18	F	11.7	N	12	1	0	1	0	2	0	0	0	6	0	8	3	2
DES19	F	10.4	N	12	2	0	2	0	2	2	4	15	0	0	23	9	5
DES20	F	25.7	Y	12	1	1	1	1	1	4	0	0	0	0	5	2	2
DES21	M	13.9	Y	12	1	1	1	1	5	2	2	5	0	0	14	6	4
DES22	M	11.0	N	12	2	0	2	0	1	2	2	5	3	0	13	6	4
DES23	M	10.9	N	12	2	2	2	0	7	4	2	5	6	0	24	7	5
DES24	F	11.3	N	12	2	1	2	2	0	6	2	5	3	6	22	6	3
DES25	F	10.8	N	12	1	0	2	0	5	0	2	0	3	6	16	5	5
DES26	F	9.6	N	12	1	0	2	0	7	4	4	15	0	0	30	6	5
DES27	F	11.0	N	12	1	0	1	0	5	0	0	20	3	0	28	8	4
DES28	M	12.1	N	12	2	0	2	0	1	8	8	5	6	0	28	7	3
DES29	F	9.0	N	12	1	0	1	0	4	4	4	20	0	0	32	6	4
DES30	F	12.2	Y	12	2	2	1	2	5	2	2	0	3	3	15	7	4
DES31	F	28.0	Y	12	1	1	1	1	0	0	0	5	0	0	5	2	3
DES32	F	34.7	Y	12	1	1	1	1	7	2	2	20	3	0	34	8	4
DES33	F	18.8	Y	12	1	2	1	2	4	4	2	15	3	0	28	6	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
FRI01	M	13.1	Y	13	2	1	2	2	3	4	2	0	9	3	21	5	4
FRI02	F	44.2	Y	13	1	1	1	1	0	4	4	0	3	0	11	2	3
FRI03	M	10.9	N	13	1	1	1	1	4	2	0	5	0	0	11	3	5
FRI04	F	51.6	Y	13	1	1	1	2	5	6	10	15	3	3	42	8	4
FRI05	F	11.2	N	13	2	2	1	2	9	4	4	10	3	0	30	7	5
FRI06	F	47.1	Y	13	1	1	1	1	1	2	2	0	0	0	5	3	2
FRI07	F	14.2	N	13	2	2	1	0	4	4	2	5	6	6	27	6	5
FRI08	M	10.4	N	13	2	2	2	2	6	0	4	10	6	0	26	8	4
FRI09	F	34.8	Y	13	2	2	2	2	3	4	2	5	3	3	20	4	3
FRI10	F	13.9	Y	13	1	1	1	1	5	4	0	0	0	0	9	4	3
FRI11	F	9.8	N	13	2	1	2	1	4	2	2	5	6	0	19	8	4
FRI12	F	10.2	N	13	1	1	2	2	2	4	2	10	6	0	24	7	4
FRI13	F	7.8	N	13	2	2	2	2	1	4	4	5	6	0	20	5	4
FRI14	M	9.3	N	13	2	1	2	0	2	2	2	0	3	0	9	4	2
FRI15	F	8.3	N	13	2	2	2	1	2	4	2	5	3	0	16	4	4
FRI16	F	11.8	N	13	2	2	2	2	0	4	2	5	9	0	20	4	4
FRI17	M	9.3	N	13	2	2	2	2	4	4	2	10	6	0	26	5	3
FRI18	M	27.3	Y	13	1	1	2	2	0	0	4	0	3	0	7	2	3
FRI19	M	11.4	N	13	2	0	1	0	7	2	2	5	6	0	22	8	5
FRI20	F	8.9	N	13	1	0	1	1	0	2	2	0	0	0	4	4	2
FRI21	M	14.2	Y	13	1	1	1	1	1	4	2	0	3	0	10	2	3
FRI22	F	8.9	N	13	2	1	2	2	2	4	2	5	3	3	19	5	3
FRI23	F	14.1	Y	13	2	2	2	2	7	6	12	15	3	0	43	8	5
FRI24	F	12.9	Y	13	1	1	1	1	2	0	2	0	3	0	7	2	2
FRI25	M	7.4	N	13	2	2	1	2	9	4	0	10	0	0	23	9	5
FRI26	F	47.4	Y	13	2	2	1	1	4	4	2	5	3	3	21	3	3
FRI27	M	15.6	Y	13	1	1	1	1	6	2	2	5	3	0	18	5	3
FRI28	F	8.5	N	13	2	0	1	1	2	4	0	0	0	0	6	4	4
FRI29	F	28.0	Y	13	1	1	1	1	0	0	0	0	0	0	0	1	1
FRI30	M	7.7	N	13	3	0	1	0	12	2	2	15	3	3	37	10	5
FRI31	F	7.7	N	13	2	2	2	2	4	2	4	10	3	0	23	6	4
FRI32	M	8.9	N	13	2	2	2	2	1	4	4	5	12	0	26	7	5
FRI33	M	35.7	Y	13	2	2	2	2	5	2	2	15	9	0	33	9	4
FRI34	M	12.4	N	13	2	2	2	2	4	2	6	5	3	0	20	6	5
FRI35	M	13.3	N	13	2	2	1	2	3	4	2	0	6	0	15	5	3
FRI36	F	9.4	N	13	2	2	1	1	3	4	0	0	6	3	16	6	3
FRI37	F	12.2	N	13	1	0	2	0	1	4	2	5	0	0	12	4	5
FRI38	M	51.1	N	13	2	2	2	1	6	2	4	5	6	3	26	5	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
HAN01	F	12.9	N	14	2	2	1	1	4	4	2	0	6	3	19	4	4
HAN02	M	11.9	N	14	2	2	2	2	7	4	8	5	6	0	30	5	5
HAN03	M	14.8	N	14	1	1	1	1	2	2	0	0	0	0	4	3	2
HAN04	F	14.6	Y	14	3	3	3	3	8	10	6	10	3	3	40	8	4
HAN05	M	12.5	N	14	0	0	0	0	7	2	4	0	3	3	19	7	5
HAN06	M	13.7	N	14	2	2	1	1	2	4	2	0	6	3	17	2	5
HAN07	M	14.9	Y	14	1	2	1	2	7	4	6	10	6	0	33	5	4
HAN08	M	20.3	N	14	2	2	2	1	2	4	4	0	3	3	16	3	5
HAN09	F	12.5	Y	14	2	2	2	2	4	4	2	5	6	3	24	4	4
HAN10	F	13.2	Y	14	1	2	1	2	5	6	6	5	3	0	25	4	3
HAN11	F	13.4	Y	14	1	1	1	1	4	2	2	5	3	0	16	4	2
HAN12	F	9.9	N	14	0	0	0	0	8	8	6	15	9	3	49	10	4
HAN13	F	17.8	Y	14	1	0	1	0	3	2	2	0	3	0	10	7	5
HAN14	M	11.3	N	14	2	1	1	1	5	6	6	0	3	0	20	4	4
HAN15	F	11.9	Y	14	1	2	2	1	4	2	2	0	6	0	14	4	3
HAN16	M	15.7	Y	14	1	3	1	3	8	4	8	10	6	0	36	6	4
HAN17	F	13.0	Y	14	1	1	1	1	2	2	0	0	3	0	7	4	2
HAN18	M	10.0	N	14	2	2	2	1	7	4	4	10	3	3	31	7	5
HAN19	M	11.1	N	14	2	2	2	2	7	2	4	5	3	6	27	7	5
HAN20	F	55.2	Y	14	1	2	1	1	6	4	2	5	6	0	23	6	4
HAN21	M	8.3	N	14	2	2	2	2	3	4	2	5	9	0	23	7	3
HAN22	M	13.5	N	14	1	1	1	1	2	2	2	5	3	0	14	7	3
HAN23	F	15.2	N	14	2	2	1	1	3	4	2	0	0	0	9	4	5
HAN24	F	11.9	Y	14	1	1	1	1	2	2	4	0	3	0	11	4	2
HAN25	F	9.6	N	14	2	2	2	2	2	4	4	5	6	0	21	4	2
HAN26	M	9.0	N	14	2	1	1	1	4	2	2	15	3	0	26	7	4
HAN27	F	8.1	N	14	1	3	1	1	2	0	0	10	6	0	18	4	2
HAN28	F	10.6	N	14	1	1	2	2	4	0	4	5	3	0	16	7	3
HAN29	F	15.1	Y	14	1	1	1	1	2	0	2	5	0	0	9	3	3
HAN30	F	14.3	Y	14	2	2	2	2	5	8	4	10	3	0	30	6	4
HAN31	F	41.7	Y	14	3	1	1	2	2	8	10	10	3	3	36	7	4
HAN32	M	11.5	N	14	2	2	1	1	1	2	2	5	3	6	19	4	2
HAN33	M	13.8	N	14	2	2	2	3	6	2	2	0	3	0	13	7	5
HAN34	F	7.9	N	14	2	2	2	2	6	8	8	15	0	0	37	8	5
HAN35	F	10.2	Y	14	1	0	1	2	2	2	2	10	6	3	25	8	4
HAN36	M	18.5	Y	14	1	1	1	1	5	2	2	0	3	0	12	5	3
HAN37	F	10.8	N	14	1	2	1	2	16	4	4	0	3	0	27	8	5
HAN38	F	10.4	N	14	1	0	1	0	7	2	2	0	3	3	17	5	2
HAN39	M	11.3	N	14	2	2	2	2	4	2	2	5	9	0	22	5	4
HAN40	F	12.8	N	14	2	2	1	2	6	4	4	10	3	0	27	5	4
HAN41	F	10.7	N	14	2	2	2	2	8	10	2	10	3	0	33	5	5
HAN42	M	12.4	Y	14	2	2	2	2	10	2	4	20	3	0	39	7	4
HAN43	F	29.5	Y	14	2	2	2	1	6	4	4	5	3	0	22	5	4
HAN44	F	12.0	N	14	1	0	1	0	4	4	0	10	6	3	27	4	4
HAN45	M	8.4	N	14	0	0	0	0	4	2	2	5	9	0	22	10	5
HAN46	F	11.4	N	14	1	1	1	1	6	2	0	5	3	0	16	6	3

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
HAR01	M	14.2	Y	15	1	1	1	1	2	2	2	0	3	0	9	4	3
HAR02	M	12.0	N	15	1	0	1	0	4	0	0	5	3	0	12	7	3
HAR03	F	10.8	N	15	2	0	2	1	7	4	2	0	3	0	16	5	5
HAR04	F	13.9	N	15	2	2	2	2	5	4	6	5	6	0	26	5	3
HAR05	F	9.8	N	15	1	1	3	3	3	2	8	10	3	0	26	7	3
HAR06	M	10.3	N	15	2	2	1	1	0	2	2	10	6	0	20	5	4
HAR07	F	12.3	Y	15	1	2	1	2	5	4	4	5	6	0	24	7	4
HAR08	M	10.0	N	15	1	0	1	0	6	0	4	10	9	3	32	8	5
HAR09	F	12.6	N	15	1	2	1	0	3	4	2	5	6	0	20	6	5
HAR10	M	9.9	N	15	2	2	2	2	3	2	2	5	12	0	24	6	3
HAR11	F	24.5	Y	15	2	2	1	1	0	4	0	0	3	3	10	2	2
HAR12	M	15.4	Y	15	3	3	3	3	6	8	4	20	6	3	47	7	3
HAR13	F	11.7	N	15	2	2	2	2	5	4	4	5	3	0	21	6	3
HAR14	M	10.8	N	15	2	1	2	1	4	4	4	5	6	3	26	7	4
HAR15	F	9.2	N	15	1	1	1	1	3	0	0	0	3	0	6	4	3
HAR16	M	11.6	N	15	1	0	1	0	1	2	4	5	0	3	15	5	4
HAR17	F	12.2	Y	15	3	3	3	3	5	8	8	20	0	0	41	7	4
HAR18	M	13.1	Y	15	1	2	1	2	9	6	4	15	3	0	37	8	5
HAR19	M	13.8	Y	15	1	1	1	2	4	2	4	0	3	3	16	4	3
HAR20	M	13.6	N	15	1	0	2	0	9	2	2	5	3	0	21	7	5
HAR21	F	10.2	N	15	2	2	2	2	0	2	0	0	3	0	5	3	5
HAR22	M	10.8	N	15	2	0	1	0	14	2	0	5	0	3	24	5	5
HAR23	F	11.3	N	15	2	2	1	1	4	6	4	20	3	0	37	8	5
HAR24	M	10.8	N	15	2	0	2	0	3	2	2	10	3	0	20	6	5
HAR25	F	14.9	N	15	2	2	1	0	6	4	2	0	3	0	15	3	5
HAR26	M	11.8	N	15	1	0	1	0	3	2	2	10	3	0	20	6	4
HAR27	F	13.0	N	15	1	0	1	1	7	10	6	10	3	0	36	8	5
HAR28	F	11.7	Y	15	2	2	2	2	4	4	4	5	6	0	23	5	4
HAR29	F	12.9	Y	15	1	1	1	1	0	2	2	0	3	0	7	1	3
HAR30	F	10.5	N	15	2	1	1	1	4	4	2	10	3	0	23	8	4
HAR31	M	21.0	Y	15	1	1	3	2	3	2	4	0	0	0	9	4	4
HAR32	M	9.3	N	15	2	2	2	2	0	4	2	15	0	3	24	9	5
HAR33	F	9.1	Y	15	2	1	1	1	5	4	0	5	9	3	26	8	4
HAR34	F	13.1	Y	15	1	2	1	2	5	4	2	5	0	0	16	5	3
HAR35	F	14.0	Y	15	2	2	2	2	3	4	4	5	3	0	19	5	3
HAR36	M	13.7	N	15	2	0	2	2	10	4	4	5	6	3	32	6	5
HAR37	F	13.8	N	15	1	2	1	2	5	2	2	5	0	0	14	5	5
HAR38	F	12.1	Y	15	1	0	1	0	4	4	4	5	9	0	26	5	3
HAR40	M	10.3	N	15	2	2	2	1	6	2	2	5	3	0	18	6	3

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
KOZ01	M	14.2	Y	16	1	1	1	2	0	2	2	5	3	0	12	4	3
KOZ02	F	31.2	Y	16	1	1	1	1	3	2	2	10	0	0	17	4	3
KOZ03	F	14.0	Y	16	2	2	2	2	4	6	8	10	3	0	31	6	4
KOZ04	F	12.3	Y	16	1	1	2	2	3	2	6	0	6	3	20	5	3
KOZ05	M	15.7	Y	16	2	2	2	2	4	2	2	5	9	0	22	8	4
KOZ06	M	17.9	Y	16	2	2	2	2	6	4	2	5	3	3	23	7	3
KOZ07	F	32.3	Y	16	1	2	3	2	6	8	12	5	3	0	34	8	5
KOZ08	M	11.8	Y	16	1	1	1	1	5	0	0	5	6	0	16	6	4
KOZ09	M	12.8	N	16	2	0	0	0	11	4	4	5	3	0	27	7	5
KOZ10	F	15.1	Y	16	2	2	2	2	1	4	4	0	3	0	12	4	2
KOZ11	M	18.4	Y	16	2	2	2	2	5	4	2	15	0	0	26	7	4
KOZ12	M	12.7	Y	16	1	1	2	2	5	4	4	5	9	3	30	7	4
KOZ13	F	10.5	Y	16	1	1	1	1	2	0	2	10	3	0	17	5	3
KOZ14	F	28.6	Y	16	1	2	1	2	2	4	2	5	0	0	13	3	3
KOZ15	F	14.9	Y	16	1	1	1	1	1	0	4	5	3	0	13	3	4
KOZ16	F	13.0	Y	16	2	2	1	2	5	4	4	10	3	3	29	8	4
KOZ17	M	13.3	Y	16	1	0	2	0	11	0	4	0	0	0	15	4	5
KOZ18	F	15.3	Y	16	1	2	1	2	2	2	8	5	3	3	23	5	3
KOZ19	F	12.4	Y	16	1	2	1	2	4	2	6	15	3	0	30	8	5
KOZ20	F	15.4	Y	16	2	2	2	2	4	0	0	15	3	0	22	9	4
KOZ21	F	13.1	Y	16	1	2	1	1	3	2	2	5	3	0	15	5	3
KOZ22	M	13.4	Y	16	1	1	2	2	2	2	4	5	6	0	19	4	4
KOZ23	F	12.3	N	16	2	1	2	1	3	4	4	0	3	0	14	3	2
KOZ24	M	12.9	Y	16	2	2	2	2	2	4	4	5	3	0	18	5	4
KOZ25	F	14.9	Y	16	1	2	1	1	3	4	2	0	3	3	15	4	5
KOZ26	F	14.8	Y	16	1	1	2	2	1	0	8	0	3	3	15	2	2
KOZ27	M	19.8	Y	16	1	1	1	1	7	6	2	5	9	0	29	8	5
KOZ28	F	15.5	Y	16	1	2	1	1	4	2	2	5	3	0	16	6	4
KOZ29	M	13.4	Y	16	1	2	1	2	7	2	4	0	3	0	16	8	5
KOZ30	F	27.5	Y	16	1	1	1	1	5	0	4	5	6	0	20	7	4
KOZ31	F	35.0	Y	16	2	2	1	2	5	4	8	10	3	0	30	10	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
MUS01	F	12.2	Y	17	2	2	2	2	3	2	4	15	6	0	30	8	5
MUS02	F	35.6	Y	17	1	1	1	1	5	4	6	10	3	0	28	5	4
MUS03	M	14.9	Y	17	1	1	1	2	2	8	2	10	3	0	25	3	4
MUS04	F	22.0	Y	17	2	2	2	2	5	2	0	20	0	0	27	8	5
MUS05	F	20.3	Y	17	2	2	2	2	7	4	8	10	0	0	29	5	3
MUS06	M	13.9	Y	17	1	1	1	1	4	0	0	5	3	0	12	4	3
MUS07	F	13.8	Y	17	1	2	1	2	1	4	2	0	3	0	10	2	2
MUS08	M	43.2	Y	17	2	2	2	2	0	4	4	0	3	0	11	4	4
MUS09	M	11.1	N	17	1	1	2	2	5	0	4	10	3	3	25	9	4
MUS10	F	20.4	Y	17	1	1	1	1	2	0	2	5	3	0	12	3	2
MUS11	M	13.0	N	17	2	2	2	2	7	2	4	0	9	0	22	6	5
MUS12	M	14.8	Y	17	2	2	2	2	5	2	0	10	9	0	26	7	4
MUS13	M	46.6	Y	17	2	2	2	2	7	2	2	15	3	3	32	8	4
MUS14	M	13.0	Y	17	2	2	1	1	3	2	0	5	3	3	16	5	4
MUS15	M	43.6	Y	17	1	1	1	1	5	0	0	5	3	0	13	4	4
MUS16	M	39.9	Y	17	3	1	1	3	4	8	10	5	3	3	33	4	4
MUS17	F	18.5	Y	17	2	2	1	2	1	8	2	0	9	0	20	5	4
MUS18	F	14.5	Y	17	1	1	1	1	4	2	0	0	0	0	6	4	3
MUS19	F	11.3	Y	17	2	2	2	2	3	4	4	5	3	0	19	5	4
MUS20	F	14.0	Y	17	1	1	1	2	4	6	2	5	3	0	20	4	3
MUS21	M	8.8	N	17	2	0	2	2	2	4	4	10	0	0	20	6	4
MUS22	M	13.2	Y	17	3	3	3	3	2	6	6	20	3	0	37	7	4
MUS23	M	21.4	Y	17	3	1	1	2	2	10	6	5	0	0	23	4	4
MUS24	M	13.4	Y	17	1	1	1	1	4	0	0	10	0	0	14	3	3
MUS25	M	15.3	Y	17	2	2	2	2	5	4	4	5	3	0	21	5	3
MUS26	F	33.6	Y	17	1	2	1	2	6	4	8	20	6	3	47	9	5
MUS27	M	46.5	Y	17	1	1	2	2	1	0	4	0	0	0	5	1	2
MUS28	F	32.3	N	17	2	2	1	2	1	4	2	0	0	0	7	3	5
MUS29	M	11.5	N	17	3	1	1	1	6	6	2	5	3	3	25	8	3
MUS30	M	12.0	Y	17	2	0	1	0	8	4	4	5	0	3	24	5	5
MUS31	M	12.4	N	17	1	0	1	0	6	4	4	15	0	0	29	4	3
MUS32	F	10.2	N	17	2	2	2	2	5	4	4	10	0	0	23	7	5
MUS33	M	10.8	N	17	2	2	2	2	7	4	8	5	6	0	30	7	5
MUS34		43.4	Y	17	1	1	1	1	5	2	8	10	3	0	28	7	5

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
SOU01	F	7.6	N	18	2	2	2	2	4	0	0	5	6	0	15	6	3
SOU02	F	8.9	N	18	1	1	1	1	9	0	0	15	0	0	24	8	5
SOU03	M	8.0	N	18	2	1	2	1	0	2	2	0	6	3	13	5	4
SOU04	M	9.4	N	18	2	2	2	2	3	0	4	15	3	0	25	7	5
SOU05	M	9.6	N	18	2	1	2	1	5	2	4	5	6	0	22	7	5
SOU06	F	12.8	Y	18	2	2	2	2	0	2	4	10	6	3	25	7	3
SOU07	F	13.1	N	18	2	2	1	1	8	4	2	5	0	3	22	7	5
SOU08	M	16.0	Y	18	1	1	2	1	2	2	4	5	3	0	16	3	3
SOU09	M	14.8	Y	18	2	2	2	2	5	2	2	5	6	0	20	7	4
SOU10	F	10.2	N	18	1	1	1	1	0	2	0	5	3	0	10	4	2
SOU11	M	15.6	N	18	2	1	2	2	3	2	6	10	3	0	24	6	3
SOU12	F	10.7	Y	18	2	2	2	2	3	2	4	5	0	0	14	5	3
SOU13	F	10.9	N	18	2	2	2	2	0	2	2	10	6	0	20	7	4
SOU14	F	10.0	N	18	2	0	2	0	5	4	4	10	9	0	32	9	4
SOU15	F	8.4	N	18	1	1	1	1	3	0	2	5	3	0	13	5	3
SOU16	F	12.0	Y	18	2	0	2	0	11	8	2	0	3	3	27	5	5
SOU17	M	9.6	N	18	1	1	1	1	1	4	4	0	6	0	15	5	3
SOU18	M	9.8	N	18	2	2	2	2	4	6	4	10	3	0	27	8	4
SOU19	M	10.5	N	18	2	0	2	0	2	2	2	5	9	0	20	7	4
SOU20	F	8.5	N	18	2	1	2	1	8	2	2	0	3	3	18	8	5
SOU21	M	11.6	Y	18	2	2	1	1	5	2	2	5	6	0	20	5	4
SOU22	M	10.6	Y	18	2	1	2	2	11	4	4	10	9	0	38	8	5
SOU23	F	9.7	N	18	2	0	2	0	1	4	4	0	0	0	9	3	2
SOU24	M	13.4	N	18	2	2	2	2	2	4	2	10	3	3	24	7	3
SOU25	M	13.7	Y	18	1	1	1	1	6	0	2	0	3	0	11	4	2
SOU26	M	8.0	N	18	2	0	2	0	13	2	8	20	3	3	49	9	5
SOU27	M	9.3	N	18	2	2	2	2	2	0	0	10	6	3	21	7	4
SOU28	F	10.5	N	18	2	0	2	2	2	0	2	5	0	0	9	5	2
SOU29	M	9.0	N	18	1	1	1	1	3	0	2	0	3	3	11	4	2
SOU30	F	10.9	Y	18	1	0	1	0	8	2	2	20	3	0	35	8	5
SOU31	F	16.0	Y	18	2	2	2	2	3	2	6	10	6	0	27	9	4
SOU32	F	12.2	Y	18	2	2	2	2	4	4	4	5	3	0	20	4	2
SOU33	M	8.3	N	18	2	2	2	2	5	2	2	20	0	3	32	10	5
SOU34	F	14.5	Y	18	2	2	2	2	2	4	4	10	3	0	23	6	4
SOU35	F	43.8	Y	18	2	2	2	2	2	6	2	20	3	0	33	9	5
SOU36	M	10.9	Y	18	2	1	2	1	2	4	2	0	6	3	17	6	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
WEN01	M	12.4	Y	19	1	1	1	1	4	4	2	5	0	3	18	4	3
WEN02	M	13.2	N	19	1	0	2	0	7	4	6	10	0	0	27	6	5
WEN03	M	9.3	N	19	1	1	1	1	4	4	0	15	3	0	26	6	3
WEN04	M	11.9	Y	19	2	2	2	2	9	6	4	15	0	0	34	8	5
WEN05	M	18.4	Y	19	1	2	1	1	4	4	6	5	3	3	25	7	4
WEN06	M	16.0	Y	19	1	1	1	1	5	4	4	10	3	0	26	4	3
WEN07	F	9.3	N	19	2	1	1	1	3	2	4	5	3	3	20	6	3
WEN08	F	8.9	Y	19	1	1	1	1	3	0	4	10	6	0	23	6	4
WEN09	F	11.6	Y	19	3	1	3	1	5	6	4	0	3	0	18	5	3
WEN10	M	15.2	Y	19	1	1	1	1	3	4	2	0	3	3	15	2	2
WEN11	F	35.5	Y	19	2	2	1	1	0	4	0	0	3	0	7	1	2
WEN12	M	12.1	N	19	1	0	2	0	12	2	0	5	0	0	19	8	5
WEN13	M	13.4	N	19	2	2	2	2	10	4	4	20	3	0	41	9	5
WEN14	F	26.2	Y	19	1	1	1	1	3	4	6	5	3	0	21	2	2
WEN15	M	11.5	Y	19	1	2	1	2	3	4	4	10	0	0	21	6	4
WEN16	M	12.9	Y	19	1	1	1	1	3	0	2	5	6	0	16	4	4
WEN17	M	12.7	Y	19	2	2	2	2	2	2	4	10	6	3	27	7	4
WEN18	F	14.7	N	19	2	2	2	2	3	6	2	0	3	0	14	2	5
WEN19	F	8.5	N	19	1	1	2	2	1	0	8	0	3	3	15	4	5
WEN20	F	12.4	Y	19	2	2	1	2	7	4	4	5	0	3	23	7	4
WEN21	F	12.3	Y	19	1	2	1	2	3	4	8	5	3	0	23	4	3
WEN22	F	17.1	Y	19	1	1	1	1	1	2	2	0	3	0	8	4	3
WEN23	M	10.3	N	19	2	2	2	2	8	4	2	5	9	6	34	6	3
WEN24	F	12.7	Y	19	1	2	1	2	6	2	4	10	3	3	28	7	4
WEN25	M	14.6	N	19	2	0	1	0	8	6	2	5	3	0	24	7	5
WEN26	M	17.3	Y	19	3	3	3	3	2	6	4	20	3	0	35	7	4
WEN27	M	13.3	Y	19	2	0	1	0	7	8	4	10	0	0	29	6	5
WEN28	F	9.7	N	19	2	2	2	2	2	4	6	5	3	3	23	7	5
WEN29	F	22.6	Y	19	1	1	1	1	1	4	2	5	0	0	12	2	2
WEN30	M	14.4	N	19	1	2	1	2	3	6	8	0	9	3	29	7	4
WEN31	M	14.9	N	19	2	0	1	2	6	6	2	15	3	0	32	10	5
WEN32	M	12.0	N	19	1	1	1	1	3	0	0	0	3	0	6	4	3
WEN33	M	10.2	N	19	2	2	2	2	3	2	6	20	6	0	37	9	5
WEN34	F	12.5	Y	19	1	1	1	1	2	2	2	5	3	0	14	5	2
WEN35	F	9.2	N	19	2	1	1	1	4	2	2	10	0	3	21	6	4
WEN36	M	11.6	N	19	1	0	1	0	10	0	0	0	3	0	13	4	5
WEN37	F	13.8	Y	19	2	2	2	2	4	4	2	0	3	0	13	3	3
WEN38	F	9.0	N	19	2	0	2	0	10	4	0	5	9	0	28	5	5
WEN39	F	11.2	Y	19	1	2	2	2	5	4	8	5	0	0	22	4	3
WEN40	F	11.2	Y	19	2	2	2	2	3	4	6	10	3	0	26	7	4
WEN41	M	13.1	N	19	2	2	2	2	3	4	2	15	6	0	30	9	4

ID	Sex	Age	Perm	Doctor	R6	R3	L6	L3	PAR-UAS	RBO	LBO	OJ	OB	Midline	PAR-Total	IOTN-AC	IOTN-DHC
WHI01	F	9.9	Y	20	1	2	2	2	1	4	4	10	9	0	28	9	4
WHI02	M	7.5	N	20	2	2	2	2	2	4	2	0	6	0	14	6	4
WHI03	F	12.1	N	20	2	0	2	0	1	6	6	5	3	0	21	5	3
WHI04	M	9.5	N	20	2	2	2	2	2	4	4	10	6	3	29	6	4
WHI05	F	10.0	N	20	2	2	2	2	4	4	4	0	9	0	21	8	4
WHI06	M	12.1	N	20	2	2	2	2	1	6	4	10	6	3	30	7	5
WHI07	M	11.1	N	20	2	2	2	2	5	0	2	20	6	0	33	10	5
WHI08	M	33.4	Y	20	1	2	2	2	5	6	10	10	3	0	34	6	5
WHI09	M	13.1	N	20	2	2	2	2	4	4	4	10	9	0	31	9	4
WHI10	F	8.5	N	20	2	2	2	2	6	0	2	15	6	0	29	9	5
WHI11	F	10.2	N	20	1	1	1	1	4	2	2	5	3	0	16	5	3
WHI12	M	12.0	Y	20	2	2	2	2	3	6	10	20	9	0	48	10	5
WHI13	F	9.1	N	20	2	2	2	2	3	2	2	15	9	0	31	8	4
WHI14	F	8.4	N	20	1	0	1	0	4	0	6	10	9	0	29	8	4
WHI15	M	7.7	N	20	2	2	2	2	1	2	4	5	0	0	12	5	2
WHI16	M	13.9	N	20	2	2	2	2	7	2	4	15	9	3	40	7	4
WHI17	M	11.6	N	20	2	2	2	2	3	6	6	5	6	3	29	7	4
WHI18	M	34.6	Y	20	3	3	1	1	1	8	4	20	6	6	45	9	5
WHI19	F	12.7	N	20	2	2	2	2	3	2	6	5	9	0	25	7	4
WHI20	M	12.6	N	20	2	2	2	2	5	4	4	10	9	0	32	7	4
WHI21	F	9.2	N	20	1	1	2	2	3	0	4	20	6	0	33	9	5
WHI22	F	13.1	N	20	2	0	2	2	4	4	4	5	9	3	29	7	4
WHI23	F	9.1	N	20	1	0	1	1	5	0	0	5	3	3	16	7	4
WHI24	F	10.0	N	20	2	2	2	2	4	4	4	10	6	0	28	9	4
WHI25	F	9.1	N	20	1	1	1	1	6	0	2	10	9	0	27	8	4
WHI26	M	10.4	N	20	2	0	2	0	11	4	0	10	9	0	34	8	5
WHI27	M	9.6	N	20	2	2	2	2	6	4	4	10	9	0	33	9	5
WHI28	F	12.7	Y	20	2	2	1	1	1	4	2	0	3	0	10	3	3
WHI29	M	10.3	N	20	2	0	1	0	4	4	2	10	3	0	23	7	5
WHI30	F	7.1	N	20	2	1	2	1	6	4	2	10	9	0	31	8	5
WHI31	M	8.0	N	20	1	0	1	0	3	0	0	5	3	0	11	5	3
WHI32	F	11.7	Y	20	1	1	1	1	6	4	2	5	0	0	17	3	3
WHI33	F	9.6	N	20	1	1	2	2	6	0	8	5	3	6	28	8	4
WHI34	F	9.0	N	20	2	2	2	2	5	2	4	20	3	0	34	10	4

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