TIME REQUIRED BY NORTH YORK DENTAL TEAMS TO CARRY OUT VARIOUS DENTAL PROCEDURES

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The North York Public Health Department (NYPHD) operates a school-based dental program that provides basic dental care to children identified as requiring treatment. It employs dentists, dental hygienists, and dental assistants who are divided into dental teams of one hygienist and one assistant, or one dentist and one assistant. The hygienist teams screen all children in the North York schools to identify those who require preventive or treatment services and are also responsible for carrying out the bulk of the preventive procedures. The dentist teams provide basic dental treatment services, including dental examinations, radiographs, restorative care, surgery, and endodontics.

The Canadian Dental Association (CDA) has developed numeric codes to identify different dental procedures, along with specific descriptions of each procedure or item of service (Canadian Dental Association 1965). The Ontario Dental Association (ODA) has adopted these codes, accompanied by estimates of the time required to provide the procedure and the relative responsibility (difficulty) of the procedure, in its suggested fee guide (Ontario Dental Association 1994). In the NYPHD dental program all dental procedures provided by the dental teams are recorded using the ODA procedure codes, along with patient, provider, and date codes. These codes are entered into a computer data file in North York's Dental Management Information System (DMIS) as a means of storing records of services provided in the program.

The DMIS is a comprehensive microcomputer based information system, custom designed to support the administration of the dental program. The system is written in INFORMIX-4GL and INFORMIX-SQL and is presented as a user friendly, menu driven system. Manipulation of the service records in the DMIS facilitates such management responsibilities as the monitoring of program delivery activities, quality assurance analyses, program and staff performance analyses, and the preparation of management reports. Statistics provided by DMIS are used in trend analysis and strategic planning. In addition to patient service records, the DMIS also incorporates an inventory control system for equipment and supplies, and records equipment repair and maintenance cost data.

The NYPHD pays its dentists, hygienists, and assistants an hourly wage. Therefore, the cost of providing a specific dental procedure is the product of the amount of time required to complete that procedure and the time-costs of the provider. Common to both the ODA's billing system and the NYPHD is the notion that more difficult procedures will generally take more

time. Thus, more difficult procedures will cost more. Responsibility however, is dealt with differently in the two dental care systems. Although the ODA's responsibility factor can vary by procedure, the notion of responsibility in the NYPHD is captured by the higher hourly rate of pay for dentists versus dental hygienists.

In order to most appropriately allocate its limited resources, the NYPHD should know the average time and time-costs required to provide each dental procedure the department offers. This would allow the directors of the dental program to estimate costs and likely effects when planning programs, allocating staff to schools, and evaluating the overall efficiency of staff and the program.

The dental literature contains very few estimates of dental procedure times. Those that do exist are specific to a study or clinic and often concerned with the placement of restorations (Leverett *et al.* 1983, Bevan and Braham 1989, Advokaat *et al.* 1992). Therefore, dental program managers have been forced to use their intuition based on their own clinical experience, the times published in the ODA fee guide, and staff input, to estimate procedure times. However, these may not have been appropriate to the NYPHD for a number of reasons:

(1) the NYPHD clinicians have relatively fewer support staff than private dentists;

(2) the NYPHD has single chair clinics compared to an allegedly more efficient two or three chair set-up found in private practice;

(3) the NYPHD clinicians practice in a school environment which has been reported as inefficient (Bohannan 1985);

(4) the current ODA time and responsibility estimates may be inaccurate (Shosenberg 1994).

Purpose

The purpose of this study was to use data from the DMIS to calculate the time required for North York's dentist teams and the dental hygienist teams to provide various dental procedures.

Methods

An ASCII data file listing all dental procedures provided by the NYPHD in the 1992-93 school year was obtained from the NYPHD DMIS. The procedures were arranged according to the dental/hygienist team that provided them and the date they were provided. The number of hours worked by each team on each of the dates they worked, i.e. provided at least one service,

was also included in the data file. These data were translated into an SPSS/PC system file and cleaned using SPSS/PC (Norusis 1990).

The cleaned data were then arranged to summarize the number of times each procedure was provided by each team on each date that they worked along with the total number of hours they worked on that date. This resulted in a data file that contained a count of the number of times each procedure, listed according to ODA procedure codes, was provided by each team on each date they worked plus the number of hours worked on each of these dates.

To manage the analysis of procedure codes that occurred very infrequently, the codes were collapsed into procedure variables. These new variables were created based on the type of procedure (eg. diagnostic, restorative, etc.) and the time that the procedure required relative to other procedures based on the ODA estimates. A list of the procedure variable names, definitions, and methods of calculation is provided in Appendix 1.

Data analysis was then carried out on the procedure variables using the data analysis package SPSS/PC. The data set was divided up into two sub-sets according to provider type (dentist team or hygienist team). For each provider type, the data set consisted of cases representing the one day record of a team; each case consisted of the total hours worked on that day and the number of times each of the procedure variables was carried out on that day.

If we assume that a procedure requires a fixed time to perform, each case can be expressed as an algebraic equation with the time worked equalling the sum, over all of the procedure variables, of the number of times each procedure was performed multiplied by the time required to perform the procedure:

$$\text{time worked} = \sum_{i=1}^{n} \text{number of times procedure i was performed x time required to perform procedure i}$$

The mathematical solution of this system of equations gives the time estimate for each procedure. However, we must expect that some variation will occur in the performance time for each procedure among the dental teams and within each dental team, even if the same dental team performs the same procedure twice on the same day. Therefore, statistical techniques, i.e. multiple regression, had to be employed to solve the equation system.

Two multiple regression analyses were carried out, one using data from dentist teams and

the other using data from hygienist teams. Only those procedure variables that occurred at least 10 times in total over the 1992-93 school-year were included in each multiple regression analysis. For both analyses the regression was directed through the origin (y=0, x=0) to indicate that if no procedures were provided on a specific date the total number of hours worked should be 0.

The partial regression coefficients of the equations provided by the two multiple regression analyses are estimates of the average amount of time required to carry out each procedure (variable). For example, a partial regression coefficient 0.40 is equal to two fifths of an hour or 24 minutes. The 95% confidence limits (CL) for the estimated time per procedure, representing the combined intra-team plus inter-team variability, were also calculated from the regression analyses.

The 95% CL is related to the variability surrounding each time estimate and represents the range of values that we can be certain includes the true value. Our degree of certainty however, depends upon the proportion of the distribution the confidence interval covers. For example, if repeated samples of a population are selected, the mean of each repeated sample has a probability of 0.95 that it will fall within the 95% CL. This statistic can also be used to estimate if two means are significantly different at the 0.05 level; if the means do not fall within each others 95% CL, they may be considered significantly different.

Results

According to the ODA codes entered in to the DMIS, North York dental teams provided 139 different dental procedures over the 1992-93 school year. The total number of procedures provided by the 21 dentist teams and 6 hygienist teams was 14,130 which were provided over 2177 team days i.e. the sum of the total number of days (dates) worked by each dental team. Of the 2,177 team days worked, 1,886 were worked by dentist teams and 291 were worked by hygienist teams. A summary of the frequency of each of the 139 procedures is listed in Appendix 2.

Many of the 139 procedures were rarely performed and were collapsed into 31 procedure variables by grouping similar procedures. For example, four codes existed for the placement of a single surface amalgam restoration in a permanent tooth (21211, 21221, 22201, 22211), of which code 21221 occurred 1,666 times, code 21211 occurred 60 times, and codes 22201 and 22211 occurred only once and seven times respectively. These four codes were collapsed into

a single procedure variable for a single surface amalgam in a permanent tooth. Table 1 summarizes the frequency of the 31 procedure variables according to the two provider types.

Tables 2 and 3 show the results of the multiple regression for dental procedures carried out by dentist teams and hygienist teams. The tables list the partial regression coefficients for each procedure variable (B), along with its standard error (SE B), t value, and significance. The multiple correlation coefficient (r) and coefficient of determination (r^2) for dentist teams (r=0.90, r^2=0.81) were very similar to the results for the hygienist teams (r=0.90, r^2=0.81), and both regression results were highly significant ($p < 0.0001$). Because we limited the analyses to procedure variables that occurred at least ten times, some variables were not included. For the dentist teams, the multiple regression included all variables except the variables summarizing prophylaxis and fluoride treatment. This resulted in six cases being excluded from the regression analysis. For the hygienist teams the multiple regression included only 4 procedure variables, scaling, pit and fissure sealants, fluoride, and prophylaxis. All other services were not provided over the 1992-93 school year.

Tables 4 and 5 summarize the estimated time in minutes required for the two types of providers to carry out the various dental procedures, along with the 95% CL. Hygienist teams carried out the bulk of the preventive services and scaling. This is not surprising as the NYPHD assigns these duties to these teams specifically. The majority of the care provided by the dentist teams consisted of examinations, radiographs, amalgam restorations, and extractions. Although not possible in terms of actual time, some of the 95% CL's have a lower limit of less than zero indicating that the variability surrounding the procedure time is relatively large compared to the procedure time itself.

Discussion

The results of the regression analyses showed that the most common procedures had the best results in terms of the size of the confidence limits. When the number of procedures was relatively small, the time estimates had large confidence limits indicating that the time estimate is not very accurate. This was not the case however, for radiographs where sample sizes were relatively large but the confidence limits were also large. These large confidence limits may be due to a high degree of inherent variability in the time required to complete this procedure.

The variability surrounding the procedure times found for dentist teams and hygienist

teams is a combination of intra- and inter-team variation. Intra-team, or within team, variability is the variation in the time required for one team to repeatedly carry out the same procedure. Inter-team variability represents amount of time variation that exists among teams when they carry out the same task. Separate estimates for the intra and inter-team variability will not be discussed here but are the subject of another report in this series.

A comparison of the more accurate North York times to the ODA times shows the two to be quite similar (Table 6). However, when comparing the procedure times for North York and private practice dentists, one should be aware that the North York times are comprised of more than just the time required to carry out the named procedure; North York times include other non-procedural and administrative tasks as well. Because the North York procedure times are based on the length of each teams work day, they include time allocated to administration of the program, such as changing clinic location, summoning children to the clinic from their classrooms, completing forms required by the NYPHD administrative office and the Ontario Ministry of Health, completing patients' charts, and delays imposed by the schools time schedule. These additional time-costs are not included in the ODA time estimates (Ontario Dental Association 1994).

Most of the ODA times, or range of times, fall within, or overlap, the 95% CL of the North York times suggesting that no significant difference exists between the two. Differences do appear to exist for five procedures however, with North York requiring less time for mixed dentition exams, two surface amalgams in primary teeth, and three or more surface composite restorations in permanent teeth. ODA times appear to be lower than North York's for the application of topical fluoride and the placement of pit and fissure sealants.

The increased time required by North York hygienists to provide topical fluoride and pit and fissure sealants may be explained by the difference in the operation of the two clinic types. When North York provides sealants or topical fluorides to a patient, quite often this is the only procedure carried out. Thus, the non-procedural and administrative time is added to only one procedure. However, the ODA time estimates are specific to a procedure itself and do not include administrative time (Ontario Dental Association 1994). Even if some non-procedural tasks, such as seating and making the patient comfortable, were included in the ODA procedure times, most preventive procedures in a private dental practice would usually be one of several

services in a comprehensive recall examination and preventive package. This package often includes an examination, dental radiographs, a prophylaxis, a professionally applied topical fluoride, and possibly pit and fissure sealants. Therefore, any additional time would be spread over a number of procedures, reducing the amount of time added to each individual procedure.

North York times for two surface amalgams in primary teeth and three or more surface composites in permanent teeth were found to be slightly less than the ODA time estimates. However, in practice, we expect that some variation also exists in the ODA times. Therefore, we do not consider the time difference for placing a two surface amalgam in the primary dentition to be clinically significant. The difference in the time required to place three or more surface composite in the permanent dentition may be due to our relatively small sample size for this procedure. However, one other difference also exists in the times for placing composite restorations. Whereas the ODA times increase as the number of surfaces increase, the North York times remain relatively constant. The fairly constant procedure time for composite resin restorations may be due to their method of placement. Because composite restorations are bonded to the tooth surface they may require somewhat less surface preparation than amalgam restorations. Thus, only a very small difference may exist in the time required to prepare and restore a tooth for a two surface versus a three surface composite restoration.

Very few estimates of dental procedure times have been published in the dental literature. Those that do exist have commonly established their estimates by repeatedly timing a procedure and calculating the mean. Based upon 292 children treated in a portable dental clinic, Leverett *et al.* (1983) reported that a sealant, a one surface restoration, a two surface restoration, and a three surface restoration required a mean of approximately 5, 12, 15, and 16 minutes, respectively, to be placed. Advokaat *et al.* (1992) recently reported the mean procedure time for seven university clinic operators to be approximately 24 minutes for a two surface amalgam and 30 minutes for a three surface amalgam. The authors also reported a high degree of variation within and among operators, resulting in confidence limits of 11.3-46.5 minutes for two surface restorations and 15.6-59.0 minutes for three surface restorations. These times, especially those of Leverett *et al.* (1983) appear slightly less than those calculated for North York and those reported by the ODA, but do not include the non-procedural and administrative times included in North York's estimate, except seating of the patient.

Based upon only 12 amalgam restorations and 19 composite restorations placed in 9 children, Bevan & Braham (1989) reported that composite restorations required more time to complete than amalgam restorations. However, the authors only reported the mean times required for inserting and shaping (working time) one and two surface amalgam and composite restorations, excluding data on the patient and tooth preparation. They found that a one and two surface amalgam required a mean of 50 seconds and 70 seconds, respectively, to be placed. For composite restorations, they reported mean working times of 190 seconds for a one surface restoration and 275 seconds for two surfaces.

The close similarities between the North York time estimates and those of the ODA and published studies, along with the low degree of variability surrounding some of the North York procedure times, suggest that the North York results are valid. The importance of calculating valid procedure times to the NYPHD is evident from their numerous possible applications. Knowing the time-cost of each procedure plus its expected or known benefit allows researchers to carry out technology assessments of procedures to evaluate their relative utility. The procedure times will be helpful to program managers for planning and evaluating their programs. Because they are relatively easy to calculate, annual variations in procedure times within and among teams could also be analyzed to assess any changes in the program.

Conclusion

Although a few differences do exist, in general the North York dental procedure times are very similar to other estimates we have found. However, due to the nature of North York's school-based dental program, its procedure times also include administrative and non-procedural tasks. The results suggest that our methods and results are valid and may be very useful for managing and evaluating public dental programs.

Table 1. Total number of each of the 31 procedure variables provided by dentist and hygienist teams.

Procedure	Dentist Team	Hygienist Team
Examination		
primary dentition	836	0
mixed dentition	2867	0
permanent dentition	256	0
recall/special	531	0
Radiographs		
1 film	469	0
2 films	563	0
3+ films	120	0
Prevention		
prophylaxis	4	714
fluoride	2	1289
sealant	15	1974
spacers	40	0
OHI/consultation	33	0
Restorative		
pain control	40	0
amalgam, 1° dentition		
1 surface	1827	0
2 surfaces	2716	0
3 surfaces	766	0
4+ surfaces	285	0
composite, 1° dentition		
1 surface	163	0
2 surfaces	85	0
3+ surfaces	156	0
amalgam, 2° dentition		
1 surface	1734	0
2 surfaces	431	0
3+ surfaces	120	0
composite, 2° dentition		
1 surface	82	0
2 surfaces	52	0
3+ surfaces	91	0
Endodontics		
Pulpotomy plus restoration	321	0
Pulpotomy/ectomy	56	0
Root Canal	19	0
Extractions/Surgery	1203	0
Scaling	19	548

Table 2. Results of the multiple regression analysis for procedures carried out by dentist teams (B = partial regression coefficient, SE B = standard error of B, T = t value of B).

Procedure	B	SE B	T	p
Examination				
primary dentition	0.190	0.032	5.921	<.0001
mixed dentition	0.189	0.012	15.186	<.0001
permanent dentition	0.449	0.068	6.560	<.0001
recall/special	0.116	0.030	3.817	.0001
Radiographs				
1 film	0.141	0.052	2.713	.0067
2 films	0.082	0.041	1.992	.0466
3+ films	0.519	0.112	4.632	<.0001
Prevention				
sealant	0.150	0.210	0.712	.4767
spacers	0.085	0.179	0.477	.6337
OHI/consultation	0.245	0.200	1.225	.2209
Restorative				
pain control	0.326	0.178	1.826	.0680
amalgam, 1° dentition				
1 surface	0.267	0.023	11.539	<.0001
2 surfaces	0.367	0.019	19.173	<.0001
3 surfaces	0.466	0.045	10.283	<.0001
4+ surfaces	0.598	0.077	7.748	<.0001
composite, 1° dentition				
1 surface	0.356	0.087	4.075	<.0001
2 surfaces	0.522	0.117	4.456	<.0001
3+ surfaces	0.489	0.083	5.885	<.0001
amalgam, 2° dentition				
1 surface	0.293	0.024	12.445	<.0001
2 surfaces	0.539	0.059	9.182	<.0001
3+ surfaces	0.945	0.111	8.511	<.0001
composite, 2° dentition				
1 surface	0.453	0.115	3.949	.0001
2 surfaces	0.642	0.139	4.625	<.0001
3+ surfaces	0.417	0.112	3.706	.0002
Endodontics				
Pulpotomy plus restoration	0.323	0.073	4.408	<.0001
Pulpotomy/ectomy	0.655	0.170	3.854	.0001
Root Canal	0.934	0.310	3.009	.0027
Extractions/Surgery	0.277	0.028	9.775	<.0001
Scaling	0.625	0.310	2.016	.0440

Table 3. Results of the multiple regression analysis for procedures carried out by hygienist teams (B = partial regression coefficient, SE B = standard error of B, T = t value of B).

Procedure	B	SE B	T	p
prophylaxis	0.414	0.073	5.704	<.0001
fluoride	0.340	0.027	12.748	<.0001
sealant	0.192	0.016	11.698	<.0001
scaling	0.137	0.088	1.555	.1212

Table 4. Number of dental procedures provided by dentist teams and the average time per dental procedure (CL = confidence limits).

Procedure	Number Provided	Time (min)	95% CL (min)
Examination			
primary dentition	836	11.4	7.6 - 15.2
mixed dentition	2867	11.3	9.8 - 12.8
permanent dentition	256	26.9	18.8 - 35.0
recall/special	531	7.0	3.4 - 10.6
Radiographs			
1 film	469	8.4	2.3 - 14.5
2 films	563	4.9	0 - 9.8
3+ films	120	31.1	17.9 - 44.3
Prevention			
sealant	15	9.0	-15.8 - 33.8
spacers	40	5.1	-16.0 - 26.2
OHI/consultation	33	14.7	-8.9 - 38.3
Restorative			
pain control	40	19.5	-1.5 - 40.5
amalgam, 1° dentition			
1 surface	1827	16.0	13.3 - 18.7
2 surfaces	2716	22.0	19.7 - 24.3
3 surfaces	766	27.9	22.6 - 33.2
4+ surfaces	285	35.9	26.8 - 45.0
composite, 1° dentition			
1 surface	163	21.4	11.1 - 31.7
2 surfaces	85	31.3	18.0 - 44.6
3+ surfaces	156	29.3	19.5 - 39.1
amalgam, 2° dentition			
1 surface	1734	17.6	14.8 - 20.4
2 surfaces	431	32.4	25.5 - 39.3
3+ surfaces	120	56.7	43.6 - 69.8
composite, 2° dentition			
1 surface	82	27.2	13.7 - 40.7
2 surfaces	52	38.5	22.2 - 54.8
3+ surfaces	91	25.0	11.8 - 38.2
Endodontics			
Pulpotomy and restoration	321	19.4	10.8 - 28.0
Pulpotomy/ectomy	56	39.3	19.3 - 59.3
Root Canal	19	56.0	19.5 - 92.5
Extractions/Surgery	1203	16.6	13.3 - 19.9
Scaling	19	37.5	1.0 - 74.0

Table 5. Number of dental procedures provided by hygienist teams and the average time per dental procedure (CL = confidence limits).

Procedure	Number Provided	Time (min)	95% CL (min)
Prophylaxis	714	24.8	16.3 - 33.3
Fluoride	1289	20.4	17.3 - 23.5
Sealant	1974	11.5	9.5 - 13.5
Scaling	548	8.2	-2.2 - 33.4

Table 6. Comparison of ODA and North York procedure times.

Procedure	ODA Time (min)	North York 95% CL (min)
Examination		
primary dentition	15.0	7.6 - 15.2
mixed dentition	22.5	9.8 - 12.8
permanent dentition	30.0	18.8 - 35.0
recall/special	7.5 - 30.0	3.4 - 10.6
Prevention		
prophylaxis	15.0 - 30.0	16.3 - 33.3
fluoride	9.0	17.3 - 23.5
sealant	7.5	9.5 - 13.5
Restorative		
amalgam, 1° dentition		
1 surface	15.0	13.3 - 18.7
2 surfaces	26.25	19.7 - 24.3
3 surfaces	30.0	22.6 - 33.2
4+ surfaces	30.0 - 45.0	26.8 - 45.0
composite, 1° dentition		
1 surface	26.25 - 30.0	11.1 - 31.7
2 surfaces	33.75 - 41.25	18.0 - 44.6
3+ surfaces	37.5 - 63.75	19.5 - 39.1
amalgam, 2° dentition		
1 surface	15.0 - 18.75	14.8 - 20.4
2 surfaces	26.25 - 30.0	25.5 - 39.3
3+ surfaces	30.0 - 60.0	43.6 - 69.8
composite, 2° dentition		
1 surface	26.25 - 41.25	13.7 - 40.7
2 surfaces	33.75 - 45.0	22.2 - 54.8
3+ surfaces	41.25 - 67.5	11.8 - 38.2
Endodontics		
Pulpotomy concurrent with restoration	15.0	10.8 - 28.0
Extractions/Surgery	15.0	13.3 - 19.9

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APPENDIX 1
Definition and Calculation of Procedure Variables,
and Methods of Grouping Rare Procedure Codes

Procedure Variable Definitions

Procedure Variable	Definition
examprim	examination of primary dentition
exammix	examination of mixed dentition
examperm	examination of permanent dentition
examspec	special, recall, emergency, periodontic examination, or orthodontic observation
xray1	one xray
xray2	two xrays
xray3	three or more xrays, including full mouth series
prophy	prophylaxis
fluoride	fluoride treatment, topical or self-administered
sealant	pit and fissure sealants
spacers	space maintenance, retainer repair, orthodontic adjustment
prevmisc	miscellaneous prevention i.e. oral hygiene instruction, discing, or patient consultation
paincont	pain, caries, trauma control; crown removal
amal11	one surface amalgam, primary tooth
amal12	two surface amalgam, primary tooth
amal13	three surface amalgam, primary tooth
amal14	four or more surface amalgam, primary tooth
amal21	one surface amalgam, permanent tooth
amal22	two surface amalgam, permanent tooth
amal23	three or more surface amalgam, permanent tooth
comp21	one surface composite, permanent tooth
comp22	two surface composite, permanent tooth
comp23	three or more surface composite, permanent tooth
comp11	one surface composite, primary tooth
comp12	two surface composite, primary tooth
comp13	three or more surface composite, primary tooth
endoplus	pulpotomy concurrent with restoration
endomisc	all other pulpotomies & pulpectomies
scaling	scaling, periodontal infection treatment, antimicrobial treatment
rootcanl	root canals, porcelain crown
surgery	extractions & surgical care

ODA Codes Included in Each Procedure Variable

Procedure Variable	ODA Codes
examprim	01101, 04911
exammix	01102
examperm	01103, 02412
examspec	01202, 01203, 01204, 01205, 80601, 80602
xray1	02111, 02131, 02141
xray2	02112, 02142
xray3	02101, 02102, 02113, 02114, 02115, 02116, 02117, 02118, 02124, 02144, 02146
prophy	11101, 11102, 11103
fluoride	12101, 12102
sealant	13401, 13409
spacers	15101, 15102, 15401, 15601, 15603, 15604, 66301, 81121
prevmisc	05201, 13211, 13221, 13231, 13301, 13701, 13901
paincont	20111, 20119, 20121, 20129, 20131, 29301
amal11	21111, 21121
amal12	21112, 21122
amal13	21113
amal14	21114, 21115, 22201, 22211
amal21	21211, 21221, 21401, 21402
amal22	21212, 21222
amal23	21213, 21214, 21223, 21224, 21225, 21243, 22311
comp21	23101, 23111, 23211, 23221, 23321
comp22	23102, 23112, 23322
comp23	23103, 23113, 23114, 23115, 23314, 23323
comp11	23401, 23411, 23501, 23511
comp12	23402, 23412, 23512
comp13	23403, 23404, 23405, 23413, 23414, 23415, 23513, 23514
endoplus	32232
endomisc	32221, 32222, 32231, 32311, 32312, 32313, 32321, 32322, 33402, 34141, 39201
scaling	41221, 43411, 43412, 43511
rootcanl	33111, 33121, 33131, 33135, 33141, 27211
surgery	71101, 71109, 71201, 71209, 72119, 72311, 72321, 72329, 75111, 79601, 79602

Special Groupings of Rare Codes

- radiopaque dyes (02412) with **examperm** because it requires 2 ODA time units and are diagnostic in nature
- diagnostic casts, unmounted (04911) with **examprim** because it requires 1 ODA time unit
- group consultation (05201), discing (13701), recontouring (13901), and oral hygiene instruction (13211, 13221, 13231, 13301) = **prevmisc**
- retentive pins (21401, 21402) with **amal21** based on ODA costs converted to ODA time units
- metal restorations (22311) with **amal23** based on ODA time units
- crown removal (29301) with **paincont** based on ODA time units
- periodontal infection management (41221), scaling (43411, 43412), anti-microbial (43511) based on ODA time units and all are periodontal services = **scaling**
- orthodontic observation (80601, 80602) with **examspec** based on ODA time units
- space maintenance (15101, 15102, 15401, 15601, 15603, 15604), retainer repair (66301), and orthodontic appliance removal (81121) = **spacers**
- porcelain crown (27211) with **rootcanl** based on ODA time units

APPENDIX 2
TOTAL NUMBER OF PROCEDURES PROVIDED BY DENTIST AND HYGIENIST TEAMS COMBINED

Total Number of Procedures=14310

Total Number of Team Days=2177

ODA Code	Minimum per Team per Day	Maximum per Team per Day	Total Number Provided by All Teams
01101	.00	14.00	823.00
01102	.00	26.00	2867.00
01103	.00	6.00	255.00
01202	.00	20.00	91.00
01203	.00	10.00	47.00
01204	.00	7.00	304.00
01205	.00	4.00	75.00
02101	.00	1.00	3.00
02102	.00	1.00	1.00
02111	.00	6.00	409.00
02112	.00	4.00	124.00
02113	.00	2.00	41.00
02114	.00	4.00	49.00
02115	.00	2.00	14.00
02116	.00	1.00	4.00
02117	.00	1.00	1.00
02118	.00	1.00	3.00
02124	.00	1.00	2.00
02131	.00	1.00	3.00
02141	.00	6.00	57.00
02142	.00	12.00	439.00
02144	.00	1.00	1.00
02146	.00	1.00	1.00
02412	.00	1.00	1.00
04911	.00	2.00	13.00
05201	.00	1.00	1.00
11101	.00	3.00	23.00
11102	.00	10.00	602.00
11103	.00	6.00	93.00
12101	.00	22.00	1288.00
12102	.00	2.00	3.00
13211	.00	2.00	2.00
13221	.00	1.00	2.00
13231	.00	2.00	2.00
13301	.00	1.00	11.00
13401	.00	8.00	1976.00
13409	.00	1.00	13.00
13701	.00	1.00	14.00

13901	.00	1.00	1.00
15101	.00	2.00	22.00
15102	.00	2.00	5.00
15401	.00	1.00	3.00
15601	.00	1.00	2.00
15603	.00	1.00	1.00
15604	.00	1.00	4.00
20111	.00	1.00	25.00
20119	.00	1.00	1.00
20121	.00	1.00	7.00
20129	.00	1.00	1.00
20131	.00	1.00	5.00
21111	.00	4.00	1826.00
21112	.00	3.00	2715.00
21113	.00	2.00	766.00
21114	.00	1.00	233.00
21115	.00	1.00	44.00
21121	.00	1.00	1.00
21122	.00	1.00	1.00
21211	.00	2.00	60.00
21212	.00	1.00	14.00
21213	.00	1.00	11.00
21214	.00	1.00	3.00
21221	.00	3.00	1666.00
21222	.00	2.00	417.00
21223	.00	1.00	67.00
21224	.00	1.00	27.00
21225	.00	1.00	10.00
21243	.00	1.00	1.00
21401	.00	1.00	5.00
21402	.00	1.00	3.00
22201	.00	1.00	1.00
22211	.00	1.00	7.00
22311	.00	1.00	1.00
23101	.00	1.00	3.00
23102	.00	1.00	4.00
23103	.00	1.00	1.00
23111	.00	1.00	39.00
23112	.00	1.00	45.00
23113	.00	1.00	37.00
23114	.00	1.00	33.00
23115	.00	1.00	15.00
23211	.00	1.00	1.00
23221	.00	1.00	4.00
23314	.00	1.00	1.00
23321	.00	2.00	35.00
23322	.00	1.00	3.00
23323	.00	1.00	4.00
23401	.00	1.00	19.00
23402	.00	1.00	9.00
23403	.00	1.00	3.00

23404	.00	1.00	2.00
23405	.00	1.00	1.00
23411	.00	2.00	124.00
23412	.00	1.00	60.00
23413	.00	1.00	90.00
23414	.00	1.00	37.00
23415	.00	1.00	7.00
23501	.00	1.00	1.00
23511	.00	2.00	19.00
23512	.00	1.00	16.00
23513	.00	1.00	10.00
23514	.00	1.00	6.00
27211	.00	1.00	1.00
29301	.00	1.00	1.00
33135	.00	1.00	1.00
32221	.00	1.00	1.00
32222	.00	1.00	7.00
32231	.00	1.00	16.00
32232	.00	2.00	321.00
32311	.00	1.00	2.00
32312	.00	1.00	1.00
32313	.00	1.00	1.00
32321	.00	1.00	7.00
32322	.00	1.00	10.00
33111	.00	1.00	4.00
33121	.00	1.00	2.00
33131	.00	1.00	9.00
33141	.00	1.00	2.00
33402	.00	1.00	9.00
34141	.00	1.00	1.00
39201	.00	1.00	1.00
41221	.00	1.00	7.00
43411	.00	9.00	438.00
43412	.00	4.00	120.00
43511	.00	1.00	2.00
66301	.00	1.00	2.00
71101	.00	2.00	1006.00
71109	.00	1.00	142.00
71201	.00	1.00	30.00
71209	.00	1.00	2.00
72119	.00	1.00	1.00
72311	.00	1.00	1.00
72321	.00	1.00	13.00
72329	.00	1.00	1.00
75111	.00	1.00	4.00
79601	.00	1.00	2.00
79602	.00	1.00	1.00
80601	.00	2.00	11.00
80602	.00	2.00	3.00
81121	.00	1.00	1.00