

2002 JCO Study of Orthodontic Diagnosis and Treatment Procedures

Part 3 More Breakdowns of Selected Variables

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The first article in this three-part series on the 2002 JCO Study of Orthodontic Diagnosis and Treatment Procedures (JCO, October 2002) presented the methodology and basic results of the survey, as well as trends since the first Treatment Study was conducted in 1986. In last month's installment and this concluding article, we break down the routine usage of the most important diagnostic and treatment methods according to number of years in practice, geographic region, and gross income level.

Archwires

In general, the newer practices were more likely to use titanium alloys than stainless steel for initial archwires, with the opposite being true of older practices (Table 35). More than three-quarters of each age group used stainless steel finishing wires, but those who had been in practice less than 16 years used TMA finishing wires more routinely than others did. Older practices were more routine users of chrome cobalt nickel (Elgiloy) archwires in both stages of treatment.

Stainless steel early archwires were used

TABLE 35
ROUTINE USE OF ARCHWIRES BY YEARS IN PRACTICE

	1-5	6-10	11-15	16-20	21-25	26+
Early wires						
Stainless steel	43.3%	36.4%	52.2%	56.0%	48.9%	52.9%
Multistranded/braided stainless steel	12.2	8.4	19.6	18.7	23.3	19.4
Nickel titanium	85.6	88.8	87.0	80.2	77.8	72.3
Multistranded/braided nickel titanium	1.1	0.0	2.9	3.3	2.2	3.7
Chrome cobalt nickel	3.3	6.5	5.8	6.6	11.1	12.8
Titanium molybdenum	11.1	13.1	16.7	12.1	15.6	12.8
Titanium niobium	0.0	0.0	0.7	0.0	1.1	1.2
Thermally activated titanium	31.1	37.4	28.3	24.2	28.9	20.7
Coated	2.2	1.9	0.7	1.1	2.2	0.4
Finishing wires						
Stainless steel	81.1	81.3	75.4	82.4	78.9	79.7
Multistranded/braided stainless steel	6.7	3.7	8.0	6.6	4.4	5.0
Nickel titanium	7.8	8.4	11.6	9.9	11.1	13.2
Multistranded/braided nickel titanium	2.2	1.9	0.0	0.0	1.1	0.4
Chrome cobalt nickel	1.1	3.7	2.2	3.3	2.2	4.1
Titanium molybdenum	20.0	22.4	20.3	13.2	14.4	12.0
Titanium niobium	0.0	0.0	1.4	0.0	0.0	0.0
Thermally activated titanium	2.2	2.8	1.4	4.4	0.0	3.3
Coated	0.0	0.0	0.0	1.1	1.1	1.7

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most routinely in the Mountain region, whereas nickel titanium and superelastic titanium early archwires were most popular in the West North Central region (Table 36). Multistranded and braided stainless steel early archwires were used most routinely in the West South Central and Middle Atlantic regions, and TMA early archwires in the East and West North Central regions. West North Central practices also reported the highest percentages of stainless steel and TMA

finishing archwires. Multistranded and braided stainless steel finishing archwires were used most routinely in New England, and nickel titanium finishing archwires in the South and Middle Atlantic regions.

Respondents with higher gross income were more likely than others to use titanium alloys for both initial and finishing archwires (Table 37). Those with lower gross income were more likely to use stainless steel.

TABLE 36
ROUTINE USE OF ARCHWIRES BY GEOGRAPHIC REGION

	NE	MA	SA	ESC	ENC	WNC	MTN	WSC	PAC
Early wires									
Stainless steel	40.6%	51.2%	45.3%	55.6%	48.4%	45.2%	66.1%	40.5%	48.6%
Multistranded/braided stainless steel	9.4	23.3	13.3	5.6	19.7	16.1	21.4	23.8	12.3
Nickel titanium	68.8	73.3	81.3	80.6	81.1	87.1	73.2	83.3	82.9
Multistranded/braided nickel titanium	0.0	4.7	1.6	0.0	4.1	0.0	3.6	0.0	2.1
Chrome cobalt nickel	6.3	7.0	7.8	5.6	7.4	6.5	7.1	10.7	10.3
Titanium molybdenum	6.3	5.8	11.7	11.1	21.3	19.4	14.3	8.3	13.7
Titanium niobium	3.1	0.0	0.0	0.0	0.8	0.0	0.0	3.6	0.7
Thermally activated titanium	18.8	16.3	28.1	25.0	31.1	45.2	25.0	28.6	21.9
Coated	0.0	2.3	0.0	0.0	3.3	0.0	0.0	1.2	0.7
Finishing wires									
Stainless steel	81.3	73.3	77.3	88.9	74.6	93.5	78.2	89.3	79.5
Multistranded/braided stainless steel	12.5	8.1	7.0	5.6	5.7	3.2	5.4	6.0	3.4
Nickel titanium	3.1	15.1	16.4	13.9	7.4	6.5	8.9	8.3	6.2
Multistranded/braided nickel titanium	0.0	0.0	0.0	2.8	2.5	0.0	1.8	0.0	0.7
Chrome cobalt nickel	3.1	0.0	1.6	8.3	3.3	3.2	1.8	2.4	4.1
Titanium molybdenum	9.4	17.4	14.1	8.3	23.8	25.8	12.5	10.7	17.8
Titanium niobium	6.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Thermally activated titanium	3.1	4.7	0.8	0.0	3.3	3.2	1.8	1.2	2.1
Coated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0

Removable and Functional Appliances

Among the removable and functional appliances surveyed, the newer practices were the more routine users of the Forsus appliance, Herbst with crowns, Hilgers Pendulum, Invisalign, Mandibular Corrector, Mandibular Protrusion Appliance, and MARA (Table 38). Older practices were the more routine users of the activator, bionator, Class II Corrector, Fränkel, removable and fixed-removable Herbsts, and sagittal appliance.

Regionally, the most routine users of the activator, removable Herbst, and Jones Jig were in the East South Central region; of the bionator, bonded and fixed-removable Herbsts, and twin

block in the West North Central region; of bite plates, the Class II Corrector, and the Mandibular Corrector in the Middle Atlantic region; of the Distal Jet, Hilgers Pendulum, and Mandibular Protrusion Appliance in the East North Central region; of the Forsus appliance and Herbst with crowns in the West South Central region; of the banded Herbst in the South Atlantic region; of the Invisalign and Jasper Jumper in the Mountain region; of the MARA and sagittal appliances in New England; and of Schwarz plates in the Pacific region (Table 39).

Many of the removable and functional appliances tended to be used more routinely in practices with higher gross income, including the

TABLE 37
ROUTINE USE OF ARCHWIRES BY GROSS INCOME LEVEL

	Less than \$200,000	\$201,000- 400,000	\$401,000- 600,000	\$601,000- 850,000	\$851,000- 1,100,000	More than \$1,100,000
Early wires						
Stainless steel	53.7%	49.4%	52.0%	52.3%	46.0%	46.0%
Multistranded/braided						
stainless steel	14.6	26.5	17.3	21.6	17.3	10.8
Nickel titanium	70.7	72.3	76.4	82.4	86.3	82.6
Multistranded/braided						
nickel titanium	0.0	1.2	3.9	3.3	2.9	1.9
Chrome cobalt nickel	7.3	13.3	8.7	6.5	8.6	8.0
Titanium molybdenum	7.3	10.8	9.4	16.3	13.7	16.4
Titanium niobium	0.0	2.4	0.8	1.3	0.7	0.5
Thermally activated titanium	12.2	10.8	18.9	26.8	31.7	38.0
Coated	0.0	0.0	0.8	1.3	0.7	2.3
Finishing wires						
Stainless steel	85.4	86.7	78.7	79.7	78.3	76.5
Multistranded/braided						
stainless steel	2.4	3.6	6.3	5.2	4.3	8.0
Nickel titanium	4.9	8.4	13.4	11.1	8.6	13.6
Multistranded/braided						
nickel titanium	0.0	1.2	0.0	1.3	0.7	0.9
Chrome cobalt nickel	4.9	4.8	3.1	1.3	4.3	2.3
Titanium molybdenum	12.2	14.5	13.4	13.7	23.0	18.3
Titanium niobium	0.0	0.0	0.0	0.0	0.7	0.9
Thermally activated titanium	0.0	0.0	2.4	3.9	2.2	2.8
Coated	0.0	0.0	0.0	0.0	0.7	0.0

Class II Corrector, Distal Jet, Forsus, Herbst, Hilgers Pendulum, Invisalign, Jasper Jumper, Mandibular Corrector, Mandibular Protrusion Appliance, and MARA (Table 40).

Headgear

Respondents who had been in practice longer were more likely to use Kloeohn facebows, J-hook headgear, and chin cups, while newer practices were more likely to use high-pull and reverse headgear, facial masks, and safety or breakaway devices (Table 41).

Kloeohn facebows were used most routinely

in the West South Central region (Table 42). East South Central orthodontists were the most frequent users of J-hook headgear and the least frequent users of Kloeohn facebows. Reverse headgear, chin cups, and safety or breakaway devices were most routinely used in the West North Central region. Facial masks were most popular in the East North Central region.

Practices with the lowest gross income were the most likely to use Kloeohn facebows (Table 43). Larger practices were more likely to use high-pull and reverse headgear, chin cups, and facial masks.

TABLE 38
ROUTINE USE OF REMOVABLE AND FUNCTIONAL APPLIANCES
BY YEARS IN PRACTICE

	1-5	6-10	11-15	16-20	21-25	26+
Activator	0.0%	1.0%	0.0%	1.2%	2.3%	1.0%
Bass	0.0	0.0	0.0	0.0	0.0	0.0
Bionator	4.8	1.9	1.5	5.9	4.7	8.6
Bite plates	19.0	17.5	16.5	23.5	17.4	17.6
Class II Corrector	3.6	2.9	3.0	1.2	4.7	4.8
Distal Jet	2.4	3.9	0.8	1.2	3.5	1.9
Forsus	3.6	3.9	3.0	1.2	1.2	1.0
Fränkel	1.2	0.0	0.0	2.4	1.2	3.3
Herbst						
Banded	6.0	8.7	7.5	3.5	14.0	7.6
Bonded	1.2	2.9	0.0	2.4	2.3	1.4
Crowns	29.8	26.2	25.6	21.2	24.4	16.7
Removable	0.0	1.0	0.0	1.2	3.5	1.9
Fixed-removable	1.2	1.9	1.5	2.4	0.0	3.3
Hilgers Pendulum	15.5	19.4	15.8	12.9	8.1	8.6
Invisalign	14.3	10.7	12.0	10.6	12.8	8.6
Jasper Jumper	4.8	3.9	6.8	9.4	1.2	3.8
Jones Jig	0.0	0.0	0.8	0.0	0.0	1.0
Magnets	0.0	0.0	0.0	0.0	0.0	0.0
Mandibular Corrector	0.0	1.0	0.0	0.0	0.0	0.0
Mandibular Protrusion	1.2	1.0	0.0	0.0	0.0	0.0
MARA	4.8	1.9	0.8	3.5	4.7	3.3
Sagittal	4.8	2.9	2.3	2.4	7.0	4.8
Schwarz plates	7.1	5.8	12.8	5.9	12.8	8.1
Twin block	1.2	8.7	6.0	2.4	1.2	4.3

KEY TO GEOGRAPHIC REGIONS

NE = New England (CT, ME, MA, NH, RI, VT)
MA = Middle Atlantic (NJ, NY, PA)
SA = South Atlantic (DE, DC, FL, GA, MD, NC, SC, VA, WV)
ESC = East South Central (AL, KY, MS, TN)
ENC = East North Central (IL, IN, MI, OH, WI)
WNC = West North Central (IA, KS, MN, MO, NE, ND, SD)
MTN = Mountain (AZ, CO, ID, MT, NV, NM, UT, WY)
WSC = West South Central (AR, LA, OK, TX)
PAC = Pacific (AK, CA, HI, OR, WA)

Finishing Procedures

There was no discernible pattern in the use of cosmetic procedures or stripping by number of years in practice (Table 44). Older practices were somewhat more likely than others to routinely prescribe fiberotomies, equilibration, and positioners. “Invisible” types of retainers and fixed bonded retainers were clearly favored by the younger practitioners, while fixed banded retainers were used more routinely by older practitioners.

Cosmetic procedures and stripping were most routinely performed by West South Central area respondents and least routinely performed in

TABLE 39
ROUTINE USE OF REMOVABLE AND FUNCTIONAL APPLIANCES
BY GEOGRAPHIC REGION

	NE	MA	SA	ESC	ENC	WNC	MTN	WSC	PAC
Activator	0.0%	0.0%	0.0%	3.3%	0.9%	0.0%	0.0%	0.0%	1.4%
Bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bionator	3.4	2.6	5.1	6.7	2.6	9.4	5.8	2.7	6.5
Bite plates	17.2	26.9	13.7	20.0	19.0	9.4	15.4	12.0	21.0
Class II Corrector	3.4	7.7	3.4	0.0	2.6	3.1	0.0	5.3	3.6
Distal Jet	3.4	0.0	0.9	0.0	6.0	0.0	0.0	2.7	2.2
Forsus	0.0	0.0	0.9	0.0	1.7	0.0	1.9	6.7	4.3
Fränkel	3.4	2.6	0.9	3.3	3.4	0.0	1.9	0.0	0.0
Herbst									
Banded	0.0	6.4	13.7	0.0	9.5	0.0	5.8	12.0	5.8
Bonded	0.0	2.6	0.9	0.0	1.7	3.1	0.0	2.7	0.7
Crowns	24.1	14.1	24.8	23.3	27.6	21.9	25.0	30.7	17.4
Removable	0.0	2.6	0.0	3.3	0.9	0.0	1.9	2.7	0.7
Fixed-removable	3.4	1.3	0.0	0.0	4.3	6.3	0.0	1.3	1.4
Hilgers Pendulum	10.3	10.3	11.1	6.7	19.0	12.5	13.5	14.7	13.0
Invisalign	6.9	7.7	9.4	6.7	12.9	9.4	15.4	13.3	13.8
Jasper Jumper	3.4	0.0	2.6	3.3	5.2	9.4	13.5	5.3	5.8
Jones Jig	0.0	1.3	0.0	3.3	0.0	0.0	1.9	0.0	0.0
Magnets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mandibular Corrector	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mandibular Protrusion	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0
MARA	6.9	0.0	3.4	3.3	4.3	0.0	1.9	4.0	0.7
Sagittal	6.9	6.4	2.6	6.7	2.6	3.1	5.8	1.3	5.1
Schwarz plates	6.9	9.0	9.4	6.7	8.6	3.1	11.5	4.0	12.3
Twin block	3.4	5.1	2.6	3.3	5.2	6.3	3.8	2.7	5.8

TABLE 40
ROUTINE USE OF REMOVABLE AND FUNCTIONAL APPLIANCES
BY GROSS INCOME LEVEL

	Less than \$200,000	\$201,000- 400,000	\$401,000- 600,000	\$601,000- 850,000	\$851,000- 1,100,000	More than \$1,100,000
Activator	0.0%	1.4%	0.9%	0.0%	2.3%	0.5%
Bass	0.0	0.0	0.0	0.0	0.0	0.0
Bionator	7.7	9.9	1.7	3.5	6.9	3.9
Bite plates	20.5	15.5	11.3	18.4	21.5	20.1
Class II Corrector	0.0	1.4	1.7	7.1	6.2	2.0
Distal Jet	0.0	0.0	1.7	2.8	2.3	2.5
Forsus	0.0	0.0	1.7	2.1	3.8	2.5
Fränkel	2.6	4.2	0.9	0.7	0.8	2.0
Herbst						
Banded	5.1	2.8	3.5	5.0	10.8	12.3
Bonded	0.0	0.0	0.9	3.5	0.8	2.0
Crowns	7.7	12.7	12.2	25.5	29.2	30.9
Removable	0.0	1.4	0.9	2.8	0.8	1.0
Fixed-removable	0.0	1.4	0.9	1.4	2.3	2.9
Hilgers Pendulum	12.8	9.9	8.7	14.2	15.4	14.7
Invisalign	5.1	5.6	10.4	7.1	14.6	15.2
Jasper Jumper	5.1	1.4	4.3	4.3	4.6	6.4
Jones Jig	0.0	1.4	1.7	0.0	0.0	0.0
Magnets	0.0	0.0	0.0	0.0	0.0	0.0
Mandibular Corrector	0.0	0.0	0.0	0.0	0.8	0.0
Mandibular Protrusion	0.0	0.0	0.0	0.0	0.8	0.5
MARA	2.6	2.8	1.7	2.1	3.1	4.9
Sagittal	2.6	2.8	3.5	4.3	6.2	3.9
Schwarz plates	0.0	4.2	9.6	10.6	11.5	9.8
Twin block	2.6	5.6	2.6	6.4	3.8	4.9

TABLE 41
ROUTINE USE OF HEADGEAR BY YEARS IN PRACTICE

	1-5	6-10	11-15	16-20	21-25	26+
Kloehn facebow	16.0%	16.5%	25.4%	21.7%	25.6%	29.8%
J-hook	0.0	1.9	0.8	3.6	3.7	5.8
Cervical-pull	32.1	38.8	33.8	30.1	31.7	29.3
Straight-pull	4.9	5.8	6.9	1.2	4.9	5.3
Variable straight-pull	3.7	0.0	4.6	0.0	1.2	3.4
High-pull	24.7	27.2	23.8	20.5	15.9	16.3
Combi	2.5	5.8	1.5	4.8	6.1	9.1
Reverse	9.9	14.6	10.8	13.3	12.2	9.1
Chin cup	0.0	2.9	2.3	1.2	3.7	3.4
Facial mask	19.8	18.4	14.6	14.5	7.3	7.2
Safety or breakaway	50.6	53.4	51.2	41.0	36.6	38.9

New England (Table 45). Hawley and modified spring retainers were used most routinely in the South Atlantic region, spring retainers in the East South Central region, clear slipover and fixed banded retainers in the West North Central region, Essix and fixed bonded retainers in the West South Central region, and Invisalign retainers in the East North Central region.

Routine use of every finishing procedure increased almost linearly with gross income

(Table 46). The higher-income practices were also more likely to use clear slipover, Invisalign, and fixed bonded retainers, while lower-income practices were more likely to use Essix and fixed banded retainers.

Conclusion

Orthodontic diagnosis and treatment methods have not changed significantly over the 16-

TABLE 42
ROUTINE USE OF HEADGEAR BY GEOGRAPHIC REGION

	NE	MA	SA	ESC	ENC	WNC	MTN	WSC	PAC
Kloehn facebow	20.0%	26.4%	15.3%	3.1%	26.1%	23.3%	28.8%	32.1%	27.5%
J-hook	0.0	0.0	2.7	12.5	3.6	3.3	1.9	6.4	2.2
Cervical-pull	40.0	30.6	27.9	21.9	33.3	43.3	40.4	29.5	34.1
Straight-pull	0.0	2.8	5.4	6.3	4.5	13.3	5.8	7.7	4.3
Variable straight-pull	0.0	1.4	1.8	3.1	2.7	6.7	1.9	0.0	2.9
High-pull	13.3	12.5	18.0	21.9	18.9	40.0	11.5	25.6	27.5
Combi	6.7	2.8	4.5	3.1	3.6	10.0	1.9	7.7	10.1
Reverse	13.3	1.4	9.9	9.4	10.8	23.3	11.5	12.8	13.0
Chin cup	3.3	1.4	2.7	3.1	6.3	6.7	0.0	1.3	0.7
Facial mask	6.7	11.1	13.5	6.3	23.4	20.0	17.3	7.7	7.2
Safety or breakaway	36.7	36.1	42.3	37.5	49.5	60.0	48.1	47.4	47.4

TABLE 43
ROUTINE USE OF HEADGEAR BY GROSS INCOME LEVEL

	Less than \$200,000	\$201,000- 400,000	\$401,000- 600,000	\$601,000- 850,000	\$851,000- 1,100,000	More than \$1,100,000
Kloehn facebow	30.8%	15.4%	27.8%	27.2%	21.3%	24.1%
J-hook	5.1	3.8	0.9	4.4	3.9	2.1
Cervical-pull	28.2	21.8	33.0	37.5	34.6	34.6
Straight-pull	7.7	6.4	5.2	8.1	3.9	3.1
Variable straight-pull	2.6	3.8	2.6	4.4	0.0	2.1
High-pull	17.9	14.1	19.1	22.1	24.4	23.0
Combi	7.7	3.8	5.2	4.4	7.9	5.2
Reverse	5.1	6.4	5.2	9.6	13.4	18.8
Chin cup	0.0	1.3	1.7	3.7	2.4	3.7
Facial mask	7.7	6.4	3.5	16.9	11.0	21.5
Safety or breakaway	43.6	41.0	52.2	54.1	47.2	36.6

TABLE 44
ROUTINE USE OF FINISHING PROCEDURES BY YEARS IN PRACTICE

	1-5	6-10	11-15	16-20	21-25	26+
Cosmetics						
Incisal adjustment	63.3%	77.8%	71.7%	57.1%	69.9%	67.5%
Shaping labial/lingual surface	28.9	27.8	27.5	28.6	29.0	30.4
Porcelain laminate veneers	4.4	7.4	4.3	1.1	3.2	1.7
Composite resin build-up	7.8	11.1	5.1	1.1	7.5	5.0
Anterior stripping (slenderizing)						
With hand instruments	35.6	38.9	29.0	27.5	26.9	37.9
With handpiece	36.7	36.1	33.3	25.3	29.0	26.3
With air turbine	11.1	14.8	13.0	11.0	11.8	14.2
Posterior stripping						
With hand instruments	13.3	13.0	10.9	7.7	9.7	10.4
With handpiece	24.4	18.5	15.9	14.3	23.7	15.0
With air turbine	6.7	10.2	10.1	12.1	15.1	15.4
Fibrotomy	2.2	5.6	5.8	7.7	6.5	11.3
Gingivectomy	1.1	5.6	1.4	2.2	2.2	1.7
Frenulotomy	6.7	12.0	9.4	6.6	8.6	7.9
Zig-zag (up-and-down) elastics	23.3	26.9	32.6	19.8	22.6	25.8
Equilibration	8.9	12.0	11.6	9.9	14.0	20.5
Positioner	2.2	2.8	5.1	7.7	5.4	7.1
Retention						
Removable						
Hawley	63.2	68.0	65.9	59.6	60.0	65.0
Spring retainer	18.4	12.0	12.2	19.1	22.4	11.4
Modified spring retainer	8.0	4.0	11.4	6.7	10.6	8.6
Clear slipover (invisible)	32.2	30.0	31.7	24.7	28.2	30.0
Essix	33.3	24.0	25.2	14.6	21.2	19.1
Invisalign	5.7	5.0	4.1	4.5	0.0	3.6
Fixed banded						
3-3	2.3	4.0	3.3	3.4	7.1	11.4
4-4	0.0	1.0	0.8	0.0	0.0	2.3
5-5	0.0	1.0	0.0	0.0	1.2	1.4
6-6	0.0	0.0	0.0	0.0	0.0	0.5
Fixed bonded						
Maxillary	8.0	6.0	4.9	6.7	5.9	3.2
Mandibular	34.5	41.0	36.6	24.7	29.4	29.1
2-2	6.9	3.0	4.1	2.2	2.4	1.8
3-3	39.1	51.0	39.0	38.2	40.0	35.9
4-4	1.1	1.0	0.8	0.0	2.4	0.9

TABLE 45
ROUTINE USE OF FINISHING PROCEDURES BY GEOGRAPHIC REGION

	NE	MA	SA	ESC	ENC	WNC	MTN	WSC	PAC
Cosmetics									
Incisal adjustment	53.1%	54.7%	61.4%	77.1%	72.8%	48.4%	80.4%	84.5%	67.3%
Shaping labial/lingual surface	9.4	18.6	25.2	34.3	29.6	19.4	30.4	44.0	27.2
Porcelain laminate veneers	0.0	1.2	3.9	0.0	6.4	3.2	5.4	4.8	1.4
Composite resin build-up	3.1	2.3	4.7	0.0	8.0	6.5	10.7	10.7	4.8
Anterior stripping (slenderizing)									
With hand instruments	18.8	40.7	36.2	11.4	35.2	41.9	30.4	42.9	29.9
With handpiece	12.5	25.6	25.2	34.3	28.0	25.8	33.9	39.3	36.1
With air turbine	9.4	12.8	10.2	14.3	10.4	12.9	12.5	22.6	14.3
Posterior stripping									
With hand instruments	3.1	11.6	7.1	5.7	11.2	25.8	8.9	13.1	13.6
With handpiece	6.3	14.0	11.0	14.3	19.2	9.7	19.6	28.6	21.8
With air turbine	12.5	9.3	10.2	8.6	10.4	16.1	14.3	22.6	11.6
Fibrotomy	0.0	2.3	7.1	2.9	4.0	6.5	10.7	13.1	10.9
Gingivectomy	0.0	0.0	3.9	0.0	0.8	3.2	3.6	4.8	1.4
Frenulotomy	6.3	4.7	10.2	5.7	7.2	9.7	14.3	10.7	8.2
Zig-zag (up-and-down)									
elastics	18.8	10.5	24.4	14.3	25.6	16.1	37.5	36.9	31.3
Equilibration	6.3	15.1	18.1	0.0	12.8	6.5	10.7	19.0	14.4
Positioner	3.1	4.7	3.9	5.7	6.4	12.9	7.1	4.8	5.4
Retention									
Removable									
Hawley	67.7	61.0	68.9	65.6	64.7	58.6	62.7	55.7	64.2
Spring retainer	16.1	16.9	20.5	21.9	13.8	13.8	9.8	16.5	9.7
Modified spring retainer	12.9	9.1	13.9	9.4	6.0	10.3	11.8	6.3	3.0
Clear slipover (invisible)	25.8	19.5	33.6	34.4	32.8	37.9	31.4	35.4	23.9
Essix	22.6	27.3	22.1	18.8	21.6	13.8	21.6	34.2	14.2
Invisalign	0.0	3.9	2.5	3.1	9.5	3.4	3.9	2.5	3.0
Fixed banded									
3-3	3.2	7.8	7.4	6.3	5.2	13.8	7.8	5.1	4.5
4-4	0.0	1.3	1.6	3.1	0.9	0.0	0.0	0.0	0.7
5-5	0.0	1.3	0.8	0.0	0.9	0.0	0.0	0.0	1.5
6-6	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Fixed bonded									
Maxillary	3.2	5.2	4.9	6.3	8.6	17.2	3.9	6.3	0.7
Mandibular	12.9	27.3	26.2	28.1	38.8	34.5	39.2	45.6	32.1
2-2	0.0	1.3	3.3	3.1	6.9	10.3	2.0	1.3	1.5
3-3	16.1	31.2	31.1	37.5	44.8	34.5	49.0	60.8	38.1
4-4	3.2	0.0	1.6	0.0	0.0	0.0	0.0	2.5	1.5

year-period covered by the JCO surveys. Nevertheless, several overall trends have emerged since 1986:

- Orthodontists are about five years older on average, and more than twice as many of them are women.
- Fewer diagnostic records are being taken on a

routine basis.

- Many more orthodontists are using digital imaging and analysis.
- Nickel titanium alloys have replaced stainless steel as the material of choice for initial archwires.
- Light-cured adhesives have become much

TABLE 46
ROUTINE USE OF FINISHING PROCEDURES BY GROSS INCOME LEVEL

	Less than \$200,000	\$201,000- 400,000	\$401,000- 600,000	\$601,000- 850,000	\$851,000- 1,100,000	More than \$1,100,000
Cosmetics						
Incisal adjustment	41.5%	66.3%	62.2%	69.9%	72.5%	75.9%
Shaping labial/lingual surface	14.6	18.1	22.0	28.1	32.4	38.2
Porcelain laminate veneers	2.4	1.2	1.6	3.3	4.2	5.2
Composite resin build-up	7.3	1.2	3.9	7.2	7.7	7.5
Anterior stripping (slenderizing)						
With hand instruments	29.3	33.7	26.0	36.6	35.9	36.8
With handpiece	12.2	19.3	22.0	31.4	33.1	42.0
With air turbine	4.9	9.6	10.2	11.8	16.9	17.0
Posterior stripping						
With hand instruments	7.3	10.8	8.7	10.5	12.0	13.2
With handpiece	12.2	12.0	13.4	17.0	22.5	22.2
With air turbine	4.9	8.4	10.2	13.7	17.6	12.7
Fiberotomy	7.3	3.6	7.1	7.8	6.3	9.4
Gingivectomy	0.0	1.2	0.8	2.0	2.1	3.8
Frenulotomy	4.9	3.6	7.9	9.2	8.5	11.3
Zig-zag (up-and-down) elastics	9.8	20.5	23.6	30.7	27.5	29.2
Equilibration	7.3	13.3	12.6	16.4	12.7	17.0
Positioner	0.0	2.4	6.3	3.3	6.3	7.5
Retention						
Removable						
Hawley	60.0	71.1	62.2	62.1	64.1	64.5
Spring retainer	7.5	13.2	16.8	11.4	20.3	15.0
Modified spring retainer	5.0	7.9	2.5	10.0	14.1	8.5
Clear slipover (invisible)	12.5	23.7	22.7	29.3	34.4	37.5
Essix	27.5	13.2	21.8	22.1	25.8	25.0
Invisalign	0.0	1.3	2.5	2.9	4.7	6.5
Fixed banded						
3-3	5.0	7.9	11.8	3.6	6.3	4.5
4-4	2.5	2.6	0.8	1.4	0.8	0.0
5-5	2.5	2.6	0.0	1.4	0.0	0.0
6-6	2.5	0.0	0.0	0.0	0.0	0.0
Fixed bonded						
Maxillary	2.5	3.9	3.4	5.0	9.4	5.0
Mandibular	20.0	18.4	28.6	31.4	38.3	38.5
2-2	7.5	3.9	2.5	2.1	3.1	2.5
3-3	25.0	26.3	34.5	40.0	47.7	45.0
4-4	0.0	0.0	1.7	0.7	3.1	0.5

more popular than chemically cured composites.

- Fixed functional devices are used more routinely than removable appliances, and headgear use is declining.
- The percentage of patients treated with extractions is dropping.
- Cosmetic finishing procedures have become

commonplace.

The next JCO Study of Orthodontic Diagnosis and Treatment Procedures may show a continuation of these trends, as well as the emergence of new technologies that at present can only be imagined. □