2020 survey of Australian orthodontists' procedures

Peter Miles,[*] Elissa Freer[†] and Desmond Ong[†]
Private Practice, Caloundra[*] and School of Dentistry, Oral Health Centre, University of Queensland, Brisbane,[†] Australia

Aim: This second survey of Australian Society of Orthodontists members was conducted to assess their treatment preferences and compare with the results of the 2013 survey.
Methods: Invitations to participate in an online survey were sent to a total of 481 members of the Australian Society of Orthodontists (ASO) and 142 replies were received (29.5% response).
Results: There is an average of one ASO member orthodontist per approximately 48,653 people in Australia. The average age of orthodontists is decreasing (median age = 49) but there is an increasing proportion of female orthodontists (25% up from 16%). Although practitioners preferred to wait and treat later for Class II cases, the Twin Block remained the most popular appliance for early intervention. TAD supported distalisers showed the biggest increase in popularity of Class II correction appliances although TAD use in general had declined slightly. The median extraction rate decreased from 23% in 2013 to 20% in this survey. Clear aligners were being used in a median 10% of cases (range 0% – 97%) with 18% of respondents producing in-house fabricated aligners. The most common clinical research question ASO members would like examined related to clear aligners.
Conclusion: Orthodontics in Australia has evolved since 2013 with an increase in the use of clear aligners and associated technology.
(Aust Orthod J 2020; 36: 138-145)

Received for publication: June 2020
Accepted: September 2020

Peter Miles: pmiles@newwaveorthodontics.com.au; Elissa Freer: e.freer@uq.edu.au; Desmond Ong: d.ong@uq.edu.au

Introduction

This article describes a second nationwide survey conducted of Australian orthodontists and their use of various clinical techniques. As orthodontics is an evolving specialty, some questions regarding newer technologies were added to a survey conducted in 2013.[1] Due to privacy issues, the method of contact was less direct than in 2013.

Methods

In 2013, members of the Australian Society of Orthodontists (ASO) were contacted directly using email addresses listed in a directory of the ASO. Email addresses are no longer listed and so ASO members were contacted indirectly by advertising the current survey and a link on the ASO website or related to other emails. In addition, links to the survey were posted on three occasions on the ASO Member Facebook page and the author (PM) directly emailed colleagues in his personal email. The number of questions increased from the previous survey of 30 questions to 48, two of which were identifier questions. As done previously, the online survey tool SurveyMonkey (https://www.surveymonkey.com) was used to gather the data from respondents. Whenever a potential discrepancy was noted, this is discussed.

Statistical analysis

The median or estimated median for grouped data is reported (Estimated Median = $L + [(n/2) - B]/G \times w$, where: L is the lower class boundary of the group containing the median, n is the total number of values, B is the cumulative frequency of the groups before the median group, G is the frequency of the median group, and w is the group width). Responses are reported as percentages but when examining for

 © Australian Society of Orthodontists Inc. 2020

possible associations between variables the data were plotted to identify associations and a Pearson Product Moment Correlation was calculated.

Results and discussion

Demographics

There were 146 responses to the questionnaire. However, one was from a retired orthodontist and three answered the survey twice and so the second response was removed. The ASO database included 481 members (343 male, 138 female) and the survey received a total of 142 individual responses or 29.5% over the 63 days that the survey was open (March 8, 2020 to May 10, 2020). This compares favourably with the Journal of Clinical Orthodontics[2] (JCO) response performance of 1.9% (also using SurveyMonkey) but is less than the 36% response performance for the 2013 Australian survey. This may have been influenced by the less direct method of contact and the unfortunate impact of COVID-19 and practice closures during the time of the survey. The response percentages from all states and territories ranged from 16.3% for South Australia to 58.3% from the ACT (Table I). As the number of responses from the Northern Territory (1) and Tasmania (2) were too small to be assessed individually they were combined. When relating the number of ASO orthodontists to the 2016 census survey data,[3] the Northern Territory had the largest population per ASO orthodontist (113,135) with the second highest weekly household income ($1,943), while the ACT had the smallest population per ASO orthodontist at 33,071 but with the highest weekly income of $2,070. Tasmania had the lowest weekly household income and the third largest population per ASO orthodontist at 50,898.

The median age of respondent orthodontists in Australia was 49, which was marginally lower than the previous survey at 53 (Table II). Unfortunately, the ASO database did not have data available on the ages of all members for comparison. South Australia had the youngest median age at 39 while Tasmania/Northern Territory had the oldest at 60 years of age. The calculated median length of time in practice was 18 years, which was slightly less compared with the previous Australian and JCO surveys and matches the younger age of the respondents of this survey. Most (75%) were trained in Australia while 11% trained in the UK, 6% in the USA, 3% in New Zealand and the remainder elsewhere. The majority of responding ASO orthodontists are males (75%); nonetheless there was an increase in female orthodontists from 16% in 2013 to 25% in the current survey. As the ASO database has 343 of 481 members as male (71%), it supports a slightly higher response to the survey from male orthodontists but still close enough to be representative of the population. Ninety-three per cent of the respondents primarily worked in private practice while 6% were employed in government clinics and 1% in academia. The median number of offices operated by orthodontists was two, although the median for both South Australia and the ACT was three. However, one-third of orthodontists practiced from only one location. The calculated median number of hours worked per week was 33 hours and the median number of patients seen was 170. However, 3.5% of practices saw over 400 patients in a week and 22% less than 100. The median percentage of adult cases under treatment was again 20%.

Table I. Responses per state and territory.

State/Territory	ASO members	Number of responses	Per cent responses	Population per ASO orthodontist*	Median household income per week
AUSTRALIA	481	142	29.5%	48,653	$1,438
NSW	138	37	26.8%	54,112	$1,521
VIC	120	31	25.8%	49,325	$1,849
QLD	100	43	43.0%	46,905	$1,403
WA	56	14	25.0%	44,071	$1,589
SA	43	7	16.3%	38,925	$1,202
ACT	12	7	58.3%	33,071	$2,070
TAS	10	2	25.0%	50,898	$1,094
NT	2	1		113,135	$1,943

* Based on population from 2016 Australian census data

Table II. Demographics (medians).

	2020	2013	JCO 2014 (summed)
Age (years)	49 years	53 years	52 years
Gender			
Male	75%	84%	81%
Female	25%	16%	19%
Years in practice	18 years*	22 years*	22 years
Training			
Australia	75%	78%	NA
UK	11%	9%	NA
USA	6%	6%	NA
New Zealand	3%	2%	NA
Canada	1%	1%	NA
South Africa	1%	2%	NA
Other	1%	1%	NA
Office locations	2*	NA	NA
Hours per week	33 hrs*	NA	NA
Patients per week	170*	NA	NA
Adult cases	20%*	20%	24%

* Calculated medians

Table III. Early treatment.

	2020	2013	JCO 2014
Youngest patient	6	6	7
Early intervention	15%	15%	15% (2 phase)
Class II functional	10%	15%	
Functional appliances			
Activator	4%	9%	4%
Aligner bite ramp	3%	NA	NA
Bionator	9%	16%	10%
Carriere	1%	<1%	4%
Frankel	0%	<1%	4%
Forsus/Jasper/etc.	62%	60%	65%
Headgear	15%	37%	40% (unclear)
Herbst & variations	37%	32%	57%
Mara	1%	NA	17%
Myofunctional	4%	NA	
Nance anchor (e.g. Pendulum/Distal Jet)	6%	11%	49%
TAD anchored (e.g. Beneslider)	20%	6%	48%
Twin Block	59%	70%	11%
X-bow (Higgins)	<1%	NA	NA
None	4%	2%	NA

Early intervention

The median youngest child undergoing treatment was six years although the youngest having treatment was two years old (Table III). Fifteen per cent of patients were receiving early intervention, although in Western Australia the median was 25% and in Tasmania/Northern Territory, early intervention was 5%. Only 3.5% of surveyed ASO orthodontists use myofunctional appliances and only in 1% of mixed dentition cases. Of the eligible Class II children, a median of 10% received early treatment, which was lower than the 15% reported in 2013. Consistently, the most popular removable functional appliance for Class II correction was the Twin Block at 59%, although this had dropped from the 70% determined in 2013. Headgear use had dropped from 37% in 2013 to 15% in the current survey while fixed spring Class II correctors (e.g. Forsus, Jasper jumper, etc.) remained relatively stable at 62%. The biggest increase was in the use of TAD anchored distalisers, increasing from 6% to 20%. Early treatment varied between the states with South Australian ASO orthodontists reporting using functional appliances a median 50% of the time for early Class II treatment while only 5% did in Queensland and 3% in Tasmania/Northern Territory. The responding South Australian orthodontists also preferred the Twin Block appliance but refrained from using headgear or spring-type functional appliances.

Fixed appliance treatment

When questioned regarding alignment systems (Table IV), ASO orthodontists' reported median treatment time using fixed appliances remained the same at 20 months, with Western Australia reporting 18 months and South Australia reporting 24 Months. The most common appointment interval remained at six weeks (50%) although there was an increase in the number of respondents using eight-week intervals (up from 25% to 37%). The median extraction rate had dropped slightly from 23% in 2013 to 20%. This ranged from 5% to 70% with South Australia having the highest median extraction percentage of 30%, which was the same as the 2013 survey. It might be considered that the higher extraction percentage in South Australia may explain the longer treatment times reported; however, there was only a low correlation (Pearson Product Moment Correlation, South Australia r = -0.06, National r = 0.27). Similarly, there was no association between the age of the respondents and the extraction percentage (Pearson Product Moment Correlation, South Australia r = 0.28, National r = -0.08). The pre-adjusted edgewise bracket was the most popular appliance (86%) followed by aligners (6%). Only 2% used Tip-Edge and no one surveyed used Begg brackets. The preferred slot size used by clinicians was 0.022" (79% up from 73%) in preference to an 0.018" slot (20% down from 24%). This varied by state as a 0.018" bracket slot was used by respondents in Queensland, New South Wales, Victoria and the ACT. The preferred prescription was dominated by MBT (62% up from 45%). The Roth prescription had a reduced use from 34% in 2013 to 16% while the Damon prescription increased from 5% to 11%. As noted in the 2013 survey, the preference for the 0.022" slot over the 0.018" slot may be also influenced by prescription as both the MBT and Damon systems recommend 0.022" slot brackets.

Consistent with the 2013 survey, the preferred bracket material was stainless steel (stable at 94%) whereas ceramic brackets dropped from 83% to 40% in the current survey. Plastic brackets were no longer used, while gold brackets had dropped from 8% to less than 1%. Self-ligating bracket use was reduced slightly from 47% in 2013 to 42% (23% Active, 19% Passive). Most operators still preferred the direct bonding of brackets (84%) while 9% reported using indirect bonding and 6% used computer aided positioning and indirect bonding. Indirect bonding, both manual and digital, was used in every state and territory except for the Northern Territory and South Australia. Reported bond failures were 5%, in keeping with the JCO survey,[2] although South Australia and the combined Tasmania/Northern Territory reported 3% bond failures.

Clear aligners

The use of clear aligners was reported by 92% of the respondents (up from 73% in 2013) and was the preferred alignment system compared with fixed appliances by 9%. The median number of cases treated using aligners was 10% (range 0% to 97%) although this was higher in Western Australia (20%) and lower in South Australia and the ACT (5%, Table V). Many brands of aligners have appeared since the 2013 survey and many had been trialled by respondents. The preferred aligner systems were Invisalign (82%) followed by SPARK (7%), In-House fabricated (5%),

Table IV. Comprehensive fixed appliance treatment.

	2020	2013	JCO 2014
Median treatment time	20 months	20 months	NA
% cases treated with fixed	90%	NA	NA
Appointment intervals			
4 weeks	6%	7%	19%
5 weeks	2%	7%	8%
6 weeks	50%	57%	45%
8 weeks	37%	25%	25%
10 weeks	3%	3%	2%
12 weeks	2%	1%	1%
Extractions (not 8's)	20%	23%	15%
Preferred system			
Preadjusted edgewise	86%	89%	NA
Tip-Edge	2%	6%	NA
Aligners	9%	1%	NA
Customised/Digital brackets	1%	NA	NA
Bracket Slot			
0.022″	79%	73%	70%
0.018″	20%	24%	25%
Bidimensional	1%	3%	5%
Preferred prescription			
Alexander	2%	3%	4%
Andrews	2%	1%	2%
Damon	11%	5%	16%
Hilgers	1%	3%	NA
MBT	62%	45%	41%
Orthos	2%	5%	3%
Roth	16%	34%	31%
Other	3%	4%	3%
Bracket material/type			
Stainless steel	94%	94%	96%
Ceramic	40%	83%	70%
Plastic	0	7%	4%
Gold	<1%	8%	13%
Titanium	4%	3%	12%
Ligation			
Modules	73	NA	NA
Ligatures	36	NA	NA
Active self-ligating	23%	47% combined passive/active	15%
Passive self-ligating	19%	47% combined passive/active	17%
Direct bonding	84%	83%	89%
Indirect bonding	9%	17%	18%
Indirect (Computer aided)	6%	NA	NA
Bond failures	5%	5%	5%

SureSmile fabricated (3%), Clarity Aligners (2%) and ClearSmile (less than 1%). The median treatment time for clear aligners was 18 months although this ranged from 15 months in Queensland and New South Wales to 22 months in South Australia. Compared with the 2013 survey, the median treatment time was slightly less than fixed appliances, which may indicate that clear aligners were being used to treat simpler cases. However, there was only a low negative correlation between the percentage of extraction cases and the use of clear aligners (Pearson Product Moment Correlation r = -0.28). Respondents felt that they required fixed appliances to help complete treatment in 5% of cases but 55% would sometimes treat 'hybrid' cases in which it was planned from the outset to start using fixed appliances and finish using aligners, or one arch in fixed and the other in aligners.

Aligners are more reliant on newer technologies such as intraoral scanners and 79% of ASO respondents reported having a scanner in at least one office. Although In-House aligners comprised only 5% of the 'routine' aligner systems, they would seem to be more commonly used at least for simpler cases. This was suggested by the use of design software and 3D printers, with 18% of respondents possessing a 3D printer at one or more offices and 18% reporting manufacturing aligners at one or more practice locations. The most popular software for designing aligners was SureSmile (43%) followed by OrthoAnalyzer (29%) while 14% manually repositioned teeth on plaster models (the question specifically asked about software usage and so there may have been more members using this method but the question was not asked).

Retention

Clear plastic/invisible appliances were the most frequently used maxillary retainer (86% up from 80%) ahead of bonded palatal wires (62% up from 53%) while Hawley retainer use was on the decline (47% in 2013 to 28% in this survey, Table VI). This trend was also reflected in the lower arch by an increase in the attachment of bonded lingual wires (from 81% to 88%) and also in clear plastic/invisible retainers (up from 47% to 59%) while lower Hawley or spring aligner appliance use was declining (down from 27% to 14%). Other strategies that were occasionally employed to improve stability had dropped substantially, with interproximal stripping falling from 83% to 32%, over-correction reducing from 41% to 22%, and circumferential supracrestal fibreotomy (CSF)/pericision reducing from 27% to only 8%. The recommendation of lifetime retention had increased from 68% in 2013 to 83%, which was substantially higher than the 65% reported in the JCO survey of orthodontists in the USA.

Adjunctive procedures

The use of cone beam computerised tomography (CBCT) was not assessed in the 2013 survey and was recommended in a median 5% of cases (Table VII). However, 6% of respondents used CBCT scans in 50% or more of their patients and 3% of respondents used scans routinely on every patient. Temporary anchorage devices (TADs) were used in a median 2% of cases, which reduced from 5% in 2013. Western Australia reported the highest use of TADs at 5% and the lowest failures at 10% while the national median failure rate was 20%, which was higher than the 10% reported in the 2014 JCO survey. The incorporation of orthognathic surgery had not been asked previously and the national median was 5% of cases while Victoria and Western Australia reported a median 10% of cases, and Queensland 2%. The use of techniques to accelerate orthodontic tooth movement had also not been asked previously and 96% of ASO orthodontists did not use any technique while only 3% used vibration and less than 1% used either piezocision or micro-osteoperforations (MOPs). This is in stark contrast to the USA JCO survey in which vibration was reported being used by 62% of respondents and MOPs in 25% of cases along with other procedures.

Research questions

ASO members were asked to suggest research questions on clinical topics and although the responses varied, many could be grouped into categories. The most popular clinical research topic ASO members would like investigated was aligner effects (17 of 57 responses or 30%) compared with 10% in 2013. This is not surprising considering systematic reviews conclude the quality of the studies investigating aligners is not sufficient to draw evidence-based conclusions.[4,5] The second most popular topic was retention (eight of 57 or 14%), which had dropped from its status as the most popular topic in 2013 (25%). It would seem pertinent that further research into retention is

Table V. Aligner treatment.

	2020	2013
Median treatment time	18 months	18 months
% cases treated with aligners	10%	NA
Aligners used most often		
Angelalign	0%	NA
Clarity aligners	2%	NA
ClearSmile	<1%	NA
In house	5%	NA
Invisalign	82%	NA
SPARK	7%	NA
SureSmile	3%	NA
% of aligner cases requiring fixed	5%	NA
Hybrid cases (fixed and aligners)	55%	NA
Intraoral scanner	79%	NA
3D printer	18%	NA
In house aligners	18%	NA
Aligner design software		
ARCAD	5%	NA
BlueSkyPlan	5%	NA
Orchestrate 3D	5%	NA
OrthoAnalyzer	29%	NA
SureSmile	43%	NA
Manual (plaster)	14% (not asked)	NA

Table VI. Retention strategies.

	2020	2013	JCO 2014
Retention period			
1-2 years	2%	4%	NA
3-5 years	8%	22%	NA
6-10 years	3%	3%	24%
11+ years	4%	3%	NA
Lifetime	83%	68%	65%
Maxillary retainers			
Hawley/plate	28%	47%	45% Routinely
Plastic/invisible	86%	80%	NA
Bonded	62%	53%	NA
Mandibular retainers			
Plate/spring aligner	14%	27%	7% Routinely
Plastic/Invisible	59%	47%	NA
Bonded 3-3	88%	81%	NA
Other retention strategies			
Fiberotomy/CSF	8%	27%	1% Routinely
Stripping	32%	83%	34%
Over-correction	22%	41%	NA

Table VII. Adjunctive procedures.

	2020	2013	JCO 2014
CBCT referred	5%	NA	11% Routinely
TADs/Miniscrews	2%	5%	NA
TAD/Miniscrew failure	20%	20%	10%
Orthognathic surgery cases	5%	NA	NA
Accelerated orthodontics			
Corticotomies	0	NA	4%
Laser/LED	0	NA	21%
MOPs/Propel	<1%	NA	25%
Piezocision	<1%	NA	9%
Vibration	3%	NA	62%
None	96%	NA	NA

performed given that the Cochrane review from 2016 on retention procedures revealed a lack of high-quality evidence on this topic.[6] Accelerated treatment was the next suggested research question (four of 57 or 7%), while Class II growth modification, gingival health/recession, and airway related topics were reported by three of 57 (5% each). Finally, CAD/CAM, GP versus specialist orthodontics, and 'resistance to change' by the profession was suggested by two respondents each (3.5%), and there were 13 various unrelated topics.

Conclusion

This is the second published survey of the Australian orthodontic workforce following a 2013 survey.[1] The ASO orthodontist membership has increased with more younger members and a higher proportion of female orthodontists since the 2013 survey. Although Twin Block therapy remained the most popular functional appliance, its use was declining since the previous survey. The Herbst appliance (and variations) held its popularity in second place while TAD anchored distalisers had become significantly more popular since 2013. The average extraction case percentage had reduced slightly to 20% from 23% in 2013. Aligner usage had increased, with 10% of cases being treated with aligners rather than fixed appliances. Intraoral scanners were owned by 79% of ASO orthodontists, 18% owned a 3D printer and 18% fabricated in-house aligners. The increasing use of clear aligners was also reflected by the increased desire by members for research on the efficacy of aligners.

Corresponding author

Peter Miles
Private Practice
10 Mayes Ave., Caloundra
QLD 4551

Email: pmiles@newwaveorthodontics.com.au

References

1. Miles P. 2013 survey of Australian orthodontists' procedures. Aust Orthod J 2013;29:170-5.
2. Keim RG, Gottlieb EL, Vogels III DS, Vogels PB. 2014 JCO study of orthodontic diagnosis and treatment procedures, Part 1 results and trends. J Clin Orthod 2014;48:607-30.
3. Australian Bureau of Statistics, 2016 Census QuickStats. Viewed May 2020 <https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/036?opendocument>.
4. Rossini G, Parrini S, Castroflorio T, Deregibus A, Debernardi CL. Efficacy of clear aligners in controlling orthodontic tooth movement: a systematic review. Angle Orthod 2015;85:881-9.
5. Papageorgiou SN, Koletsi D, Iliadi A, Peltomaki T, Eliades T. Treatment outcome with orthodontic aligners and fixed appliances: a systematic review with meta-analyses. Eur J Orthod 2020;42:331-43.
6. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Retention procedures for stabilising tooth position after treatment with orthodontic braces. Cochrane Database Syst Rev 2016;2016:CD002283.