The practice of dentistry by Australian- and overseas-trained dentists in Australia: discriminant analysis of key predictors

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Abstract

Introduction: Overseas-trained dentists comprise a significant proportion of the Australian dental workforce. The aim of the study was to examine characteristics and practice variations between Australian- and overseas-trained dentists, with an intent to identify key predictors that best differentiates Australian- and overseas-trained dentists' practice of dentistry in Australia.

Methods: Data for the study were from the Longitudinal Study of Dentist Practice Activity (LSDPA), a survey of a nationally representative random sample of dentists in Australia commencing 1983-84 and followed every five years. Dentists were surveyed on a wide range of items including participant characteristics, practice patterns, practice inputs, direct demand and productivity measures. Data were weighted to national estimates by age, sex and practice type. Discriminant function analysis was used to examine the effects of predictor variables that best separated dentists to Australian- or overseas-trained.

Results: A total of 1148 dentists (response rate =67 %) responded to the survey in 2009-10; 648 complete cases were available for the discriminant analysis. The discriminant functions for the full sample, and each of the three age groups (<35 yrs; 35-50 yrs & 50+ yrs) were found effective to seperate dentists into two groups (Australian and overseas), with the proportion of cases correctly classified being highest for the oldest age group (89.7% for 50+yrs). Gender (being female), type of practice (working in public sector), and SEIFA (working at disadvantaged areas) were significant predictors, with more prominence in the 35-50 yrs age group. Practice inputs, demand and productivity measures offered less discriminative capacity between Australian- and overseas-trained dentists.

Conclusion: Overseas-trained dentists contribute towards providing dental care to underserved population, public sector and in rural and remote locations. This study provided some basis to argue that policies to encourage overseas-trained dentists to contribute towards areas of need locations in Australia have been successful. Key productivity measures of overseas trained dentists mimicked those of Australian-trained dentists.

Introduction

Australia is one of the popular destinations for overseas-trained health professionals, including dentists[1]. Prior studies suggest that dentists with primary overseas dental qualification (such as Bachelor of Dental Surgery, Doctor of Dental Surgery, or Doctor of Dental Medicine) make up of at least one fourth of the overall dental workforce in Australia[1,2]. Historical variations exist in the magnitude and type of dentist migration in Australia, with at least three recognised patterns of migration argued within the academic literature. The first is a steady migration pattern of dentists from countries with a similar historical or cultural proximity to Australia such as United Kingdom, Ireland and New Zealand[3]. This North-North phenomena of migration has remained fairly constant over the last 50 years, but with some spikes of increased inflows especially in the late 1970's and early 1980's[3]. Over the last two decades, however, Australia has witnessed a dramatic increase of dentist migration from low- and middle-income countries[4]. Countries in the Indian subcontinent, Middle East and South Asian countries dominated this influx, also presenting challenges in assessment of qualifications, training to meet standards and monitoring practice activity[4–6]. The third migration pattern is more of a limited selective variant, with focussed recruitment to fill gaps in public service provision, areas of need locations and academic sectors[4].

Overseas-trained dentists in Australia have reported high standards of work, career opportunities and exceedingly high job satisfaction rates[7]. Gender variations have been noticed, with a larger proportion of female dentists migrating to Australia in the recent years[4]. Females dentists in general tend to work more part time and take more career breaks, shaping overall dentist practice activity in Australia[8]. Prior research has suggested a tendency of 'time-based' mobility patterns, with migrant dentists preferring to work more in the public sector or rural/remote or disadvantaged areas in their initial stage of migration to Australia, but gradually preferring to work in the private sector or major cities as they gain acceptance to the Australian way of life[9].

In general, dentistry in Australia has been traditionally practised in solo-practices, where the principal dentist is usually in charge of the entire clinical activity with some assistance from therapists, hygienists, dental assistants and administrative personnel[10]. Collaboration and team work within the dental team comes as a cumulative experience that starts from education[11], professionalism[12], and ethics[13] provides a better understanding of the practice culture in Australia. Overseas-trained dentists could possibly arrive from dissimilar cultural and education environments, which could reflect on their practice activity patterns in Australia.

To date, research on comparing practice patterns of overseas trained dentists to a regular Australian-trained dentists has been very limited. Prior studies have examined a sample of overseas trained dentists, and have offered comparisons to existing national surveys to provide some preliminary evidence[3,4,7]. These studies, however, lacked the ability to offer direct comparisons on practice activity between Australian- and overseas-trained dentists. Such a comparison is important both from an education and professional standpoint. Findings could contribute towards necessary training or support structures to overseas-trained dentists, and could improve the assessment, training and regulation of overseas-trained dentists in Australia[14]. Therefore, the aim of the current study was to examine characteristics and practice variations between Australian- and overseas-trained dentists, with an intent to identify key predictors that best differentiate Australian- and overseas-trained dentists' practice of dentistry in Australia.

Methods

Data were from the Longitudinal Study of Dentist Practice Activity (LSDPA), a survey of a nationally representative random sample of dentists in Australia [15,16]. Ethical approval for the LSDPA was provided by the Australian Institute of Health and Welfare (AIHW).

Sampling and data collection

The LSDPA collections are based on a sample of 10% male and 40% female dentists randomly drawn from the dental registers of each state and territory in Australia in 1983-84. Sample supplementation was achieved in a similar fashion for each successive wave of the study, followed at 5 year intervals. To date, six waves of study collections exist: 1983-84, 1988-89, 1993-94, 1998-99, 2003-04, and 2009-10 [17]. The higher sampling fraction of female dentists was required due to the lower proportion of females in the dental workforce.

The response rates were 73%, 74%, 74%, 71%, 76% an 67% for each of the six waves of the study starting from 1983-84. Dentists were surveyed using the Dillman Total Design Method (TDM) through mailed self-complete postal questionnaires [18]. Participants were approached first through a primary approach letter (including a newsletter incorporating results from previous waves), followed by the actual survey questionnaire and a follow-up reminder card at 2–3 weeks. Following which, four attempts were made to contact non respondents at 3 week intervals. Survey mailout and fieldwork was managed through Microsoft Access database system. The first author of the paper conducted the fieldwork, database development and mail management for the 2009-10 wave of collections. Detailed description on study methods including sampling and data collection methods have been previously described [16,17,19,20].

Data items

Dentists were surveyed on a wide range of items including participant characteristics (demographics, education, family status), practice patterns (area and type of practice), practice inputs (hours worked, allied dental professionals employed and hours contributed) direct demand (waiting time) and productivity measures (patients seen). A service log including patient activity for a typical day was included in the survey, which collected patient details and service provision. Practice measures were collected at up to three practice locations for a dentist.

Data preparation

The place of training i.e. Australian or overseas (dependent) variable was derived by examining the response to the University of graduation question, creating a new dichotomous response. Age was calculated using year of birth. Number of years following the graduation year (primary dental degree) was used in deriving the experience variable. Practice inputs, direct demand and productivity predictors were all calculated for the main location of practice. The postcode of main practice location was linked with Australian Standard Geographic Classification (ASGC) Remoteness Areas and Socio-Economic Indexes for Areas - Index of Relative Socio-Economic Disadvantage (SEIFA–IRSD) data. This provided two new variables relevant to the relative remoteness and socio-economic status of practice location. All data preparation, deriving variables, merging data to other datasets and univariate explorations of data were conducted using R statistical package (including: dplyr, ggplot2, psych and frequency)[21].

Weighting

The data for the 2009-10 wave used in the current analysis were weighted using total number of practising private general dental practitioners from the dental board registration statistics in 2009. The use of weights adjusted the sample to age-specific population distribution of male and female dentists. Therefore, the estimates of practice activity are representative of Australian private practice dentists who were active in the workforce around the time of the LSDPA survey.

Data analysis

Bivariate analysis of predictor variables with the outcome variable (Australian or overseas trained) were first conducted for the full sample. Mean values were examined for the continuous predictor variables, along with t-test for equality of means, with equal variances not assumed. Frequencies were examined for the discrete predictor variables, along with chi-square test for significance. P value was set at 0.05. This analysis was then repeated across the three age groups (less than 35 yrs, 35 to 50 yrs and 50 + yrs).

Discriminant analysis[22,23] was conducted between selected predictor variables and the dependent variable. Differences due to confounding among predictors was examined through correlations and collinearity statistics. Pearson correlation was used to examine correlations between variables; Tolerance and Variance Inflation Factor (VIF) scores were examined for collinearity. In addition, domain knowledge based on the literature of practice activity and migrant dentists in Australia, also informed the selection of predictors for the discriminant analysis. The codes used in the discriminant anlaysis for both the predictor and dependent variables are provided in Tables 1 and 2. The selected predictors for discriminant analysis is available in Table 3.

Table 1

Mean values for continuous independent variables and coding used in discriminant analysis (Aust. trained and overseas trained dentists)

Independent variables	Full sample			< 35yrs			35 to 50yrs		> 50yrs		Codes
	Aust. trained	Overseas trained		Aust. trained	Overseas trained		Aust. trained	Overseas trained	Aust trained	Overseas trained	
Personal characteristics											
Age	45.6	46.1		29.1	30.9	*	42.6	43.3	58.8	58.7	Years
Experience	21.5	22.1		5.6	7.3	*	18.5	19.5	34.2	34.3	Years
Practice inputs (main location)											
Hours worked per week	33.9	32.5		33.3	33.0		34.0	32.4	34.2	32.4	Hours
Chair side assistants	2.1	1.9	*	2.3	2.2		2.1	1.9	2.0	1.8	Number
Allied dental professional	1.7	1.8		1.8	2.0		1.8	1.9	1.5	1.7	Number
Receptionists/secretaries/other staff	1.6	1.6		1.7	1.6		1.7	1.6	1.4	1.6	Number
All chair side assistant hrs.	50.1	42.8		51.8	43.5		51.6	43.8	47.6	40.9	Hours
All allied dental professional hrs.	31.2	35.2		37.5	40.7		30.1	34.9	26.7	32.3	Hours
All receptionist/secretary/other staff hrs.	38.9	35.5		41.3	40.8		39.8	34.6	36.3	32.8	Hours
Direct demand (main location)											
Wait for appointment	4.7	4.9		4.2	5.1		4.1	3.9	5.6	5.9	Weeks
Productivity (main location)											
Patients per week	53.1	57.5		45.4	50.6		54.4	51.7	57.2	68.9	Number

*$p < 0.05$. T-Test for equality of means; Note: Tables present weighted estimates; Australian is abbreviated as Aust.

Table 2

Frequencies of discrete independent variables and codes used in the discriminant analysis (Aust. trained and overseas-trained)

Independent variables	Full sample		< 35yrs		35 to 50yrs		> 50yrs		Codes
	Aust. trained	Overseas trained	Aust. trained	Overseas trained	Aust. trained.	Overseas trained	Aust. trained.	Overseas trained	
Sex		*				*		*	
Male	67.2	54.4	51.0	47.6	60.8	44.2	83.5	70.0	1 = yes
Female	32.8	45.6	49.0	52.4	39.2	55.8	16.5	30.0	2 = yes
Country of birth		*		*		*		*	
Born in Australia	63.4	3.6	48.3	3.6	59.8	2.7	76.3	4.6	1 = yes
Born elsewhere	36.6	96.4	51.7	96.4	40.2	97.3	23.7	95.4	2 = yes
Work status									
Full time	67.8	66.6	74.2	72.0	71.0	67.1	60.8	62.7	1 = yes
Part-time	32.2	33.4	25.8	28.0	29.0	32.9	39.2	37.3	2 = yes
Perceived busyness									Scale
About as busy	63.6	62.9	64.6	62.1	66.8	67.3	59.8	58.3	1
Less busy	17.6	15.0	24.9	23.3	15.1	13.1	15.2	12.0	2
Busier	18.8	22.0	10.5	14.5	18.1	19.6	25.0	29.7	3
Area of practice									
General practitioners	82.0	81.3	92.6	90.0	78.8	85.1	78.2	71.4	1 = yes
Others	18.0	18.7	7.4	10.0	21.2	14.9	21.8	28.6	2 = yes
Type of practice		*				*			
Private	85.5	78.9	81.1	77.4	88.7	77.5	85.2	81.4	1 = yes
Public	14.5	21.1	18.9	22.6	11.3	22.5	14.8	18.6	2 = yes
Remoteness category									
Main cities	79.7	76.1	78.7	72.4	86.5	82.1	73.7	71.7	1 = yes
Rest of State	20.3	23.9	21.3	27.6	13.5	17.9	26.3	28.3	2 = yes
SEIFA Disadvantaged		*							Scale
First Quintile (Most disadvantaged)	8.2	11.4	6.4	14.1	7.1	8.4	10.4	13.0	1
Second Quintile	14.1	19.7	13.9	21.1	10.5	16.9	17.7	22.1	2
Third Quintile	20.9	26.0	22.8	26.0	19.5	24.2	20.8	28.1	3
Fourth Quintile	23.1	13.3	24.1	20.4	25.8	15.7	19.9	6.1	4
Fifth Quintile (Least disadvantaged)	33.7	29.5	32.8	18.4	37.0	34.8	31.1	30.8	5

*$p < 0.05$. Chi-square test for significance; Note: Tables present weighted estimates. Australian is abbreviated as Aust.

Table 3
Discriminant analysis between Aust. trained and overseas-trained dentists

Independent variables	Standardised discriminant coefficients							
	Full sample		< 35yrs		35 to 50yrs		> 50yrs	
	n = 648		n = 222		n = 258		n = 167	
Age	0.17		0.40	*	0.17		-0.28	
Hours worked per week	-0.07		0.02		-0.10		-0.21	
Chair side assistant hours	-0.17		-0.52		-0.13		0.08	
Receptionist/secretaries/other staff hrs.	0.14		0.53		0.13		-0.12	
Waiting time	-0.22		-0.15		-0.10		-0.43	
Patients per week	0.19		0.27		0.12		0.12	
Gender	0.12	*	0.11		0.20	*	-0.07	
Country of birth	0.95	*	0.78	*	0.91	*	0.96	*
Work status	0.05		0.26		0.00		-0.09	
Busyness of practice	0.06		0.06		-0.08		0.10	
Area of practice	-0.01		0.26		-0.22		0.21	
Type of practice	0.25	*	0.27		0.25	*	0.33	
Remoteness category	0.05		0.11		0.04		0.07	
SEIFA Disadvantaged (Quintiles)	-0.10	*	-0.06		-0.14	*	-0.17	
Centroid values								
Australian-trained	-0.32		-0.26		-0.38		-0.42	
Overseas-trained	1.18		1.00		1.24		1.66	
Eigenvalue	0.38		0.26		0.48		0.70	
Wilks' Lambda	0.72		0.79		0.68		0.59	
Percentage of cases correctly classified	79.9		80.8		80.1		89.7	

*p < 0.05. Test of equality of group means. Note: Tables present weighted estimates. Australian is abbreviated as Aust.

The discriminant function analysis creates a linear combination of predictor variables that best separates the groups into Australian or overseas trained dentists. The analysis is both useful in predicting group membership, as well as describing effects of grouping variables[22,24,25].

$D(x)=a+b1x1+b2x2+b3x3+\cdots+bnxn$

D(x) is Discriminant function of observation/case (x)

a = constant

b1,b2,b3…bn = unstandardized discriminant coefficients

x1,x2,x3…xn = predictor variable values

The discriminant analysis procedure calculates a discriminant score for each observation using the above equation.[22] Unstandardized discriminant coefficients used as multipliers of the predictor variables are useful in calculating the centroid values, but have little practical significance. Standardised discriminant coefficients provide good indication of the relative importance of the variables in predicting group classification. The signs of the centroid values seen along with the signs of the standardised coefficients provide sense to the direction of relationship of the predictor variable to the classification groups i.e. similar signs of predictor variable coefficients and centroid values indicate direct relationship, and the opposite is true for inverse relationship. The effectiveness of the discriminant function is identified by the number of cases correctly classified, distance between the group centroids, Eigen values scores and Wilks Lambda. The data for the discriminant analysis only included dentists with no missing values in any of the selected predictor variables. The discriminant analysis procedure was conducted using IBM SPSS Ver 25[26].

Results

A total of 1148 dentists responded to the survey in 2009-10, providing a response rate of 67%.

Table 1 presents bivariate associations of place of training (Australian or overseas) with continuous independent variables including personal characteristics, practice inputs, direct demand and productivity measures of the sample. Mean values are presented for the full sample and across three age groups. In the full sample, number of chairside assistants used showed significant association with place for training. Age and experience (i.e. number of years after graduation) were significantly associated with place of training, but only among the younger age group (less than 35 yrs).

Table 2 presents bivariate associations of place of training with discrete independent variables; frequencies are presented for the full sample and across three age groups. In the full sample, gender, country of birth, type of practice and SEIFA disadvantaged categories were found significantly associated with place of training. Gender and type of practice differences appeared more prominent across all age groups, with a larger proportion of females among overseas trained dentists and more overseas trained dentists working in the public sector, compared with Australian trained dentists.

Discriminant function analysis

A total of 648 complete cases were available for the discriminant analysis, after eliminating dentists with missing values in the predictor variables. The discriminant analysis of selected predictor variables and place of training is provided in Table 3, which includes the standardised canonical discriminant coefficients, group centroid values, Eigen value, Wilks Lambda and the proportion of cases being correctly classified by the discriminant function. Selected predictors had very low correlation scores; VIF scores ranged between 1.07 (for busyness of practice) and 1.97 (hours worked per week) suggesting no collinearity.

The distance between the group centroid values was the smallest for the below 35 years age group (-0.26 to 1.00), and largest for the 50 + year age group (-0.42 to 1.66). This indicates that the ability of the discriminant function to separate the dentists into two groups (Australian and overseas) increased across the three age groups. The number of cases being correctly classified by the discriminant function also appeared highest in the older age groups (89.7% for 50 + yrs; 80.1% for 35 to 50yrs; 80.8% for < 35 yrs). Further the Eigen values for the 50 + years age group (λ = 0.70) suggests an effective discriminant function for this age group; while the Eigen values for the 35 to 50 years age group (λ = 0.48) is moderately effective and < 35 years age group (λ = 0.26) a less effective discriminant function compared with the oldest age group. This finding is also shown in the Wilks Lambda value being low for the older age groups (= 0.59 for 50 + yrs; = 0.68 for 35–50 yrs; = 0.79 for below 35 yrs). The effectiveness of the discriminant function of the full sample to classify the dependent variable into two groups was better in comparison to the below 35 yrs group, based on distance between the group centroid, Eigen Values and Wilks Lambda scores. However, the discriminant function for the full sample was not as effective in comparison with the 35 to 50 yrs and 50 + years age group.

The sign of the centroid values for the Australian-trained dentists was negative and for overseas-trained positive in each of the discriminant functions. Country of birth is a key predictor in the full sample and across all age groups; appearing prominent both in magnitude and direction of the coefficients and significance. While obvious, overseas-trained dentists are more likely to have been born overseas as well.

Gender, type of practice and SEIFA disadvantaged categories were the other key predictors in the full sample that showed significance. Overseas-trained dentists were more likely to be female (0.12), more likely to practice in the public sector (0.25), and more likely to work in disadvantaged areas (-0.10), compared with Australian-trained dentists. The variables that did not reach significance were equally important, and the magnitude of the coefficients needs to be considered in interpretation. Compared with Australian-trained dentists, overseas-trained dentists are likely to be older in age (0.17), use less chairside allied dental hours (-0.17), but use more administrative staff hours (0.14). Further, patients have to wait longer (-0.22), but overseas-trained dentists also see more patients per week (0.19) compared to Australian-trained dentists.

Across the three age groups, gender, type of practice and SEIFA disadvantaged categories presented a similar direction of relationship as the full sample. This relationship appeared more prominent in the 35 to 50 year old group, with these three predictors (gender, type of practice and SEIFA disadvantaged categories) appearing significant. Overseas-trained dentists were likely to be younger in the below 35 yrs of age group; but older in the 50 + year group, when compared with Australian-trained dentists. The magnitude, direction and significance of the discriminant coefficients in the 35–50 yrs group were similar to the full sample coefficients and relationship with centroid values. Some differences were noted in the direction of the coefficients compared with the centroid values of the 50 + year old group, especially in the area of practice (0.21). This could mean that overseas trained dentists in the 50 + year group are likely to work more as specialists or academics or managers, compared with Australia-trained dentists.

Discussion

The results of the study showed gender, type of practice (public or private sector) and practice location in a SEIFA disadvantaged area were the main predictor variables that showed capacity to differentiate between Australian and overseas-trained dentists' practice of dentistry in Australia. The discriminant function was effective in the older age groups, and the differences between Australian and overseas-trained dentists, appeared more pronounced in the 35–50 year age group.

The study was based on nationally representative longitudinal study of dentist practice activity (LSDPA) collection that occurred on 2009-10. The period between the time of the final wave of the LSDPA, and the current paper requires thoughtful consideration. A few changes have occurred over the last 10 years - mainly on the assessment and examination processes of overseas-trained dentists in Australia [6,27,28], dropping dentists from the occupations on the demand list of the Australian immigrations registry[27], discontinuing the 457 temporary visas for all migrants[29], and plans to improve Australian dental student engagement in areas of need locations [30]. However, migration researchers have consistently argued that while these changes might influence short

term migrant decisions, over the long term migration is likely to continue as a global phenomenon [14,31,32]. Australia as being a migrant country and a popular destination based on historical trends, we argue is likely to remain a favourable destination of highly skilled personnel, including dentists. It is possible that the changes to the ADC examination and 457 visas could temporarily influence migration decisions of a certain type of migrants (especially from the low and middle income countries). However, further research will be required to see how new policy decisions have contributed to the changes in migration patterns in Australia.

The LSDPA collections are the oldest and largest known collection of dentist practice activity in Australia that has influenced policy and planning decisions for the last 4 decades[33,34]. Data from the study are weighted to reflect the age and sex distribution of private general practitioners in Australia, who comprise of more than three-quarter of the dental workforce in Australia[17,35]. The response rates were very high (around the 70% vicinity). Overall, it is likely that the results can be generalised to represent the Australian context.

It should also be noted that the changes that occurred in national registration and the temporary inability to link the LSDPA collections have led to no new collections following the 2009-10 survey[36]. Future research will need to take find innovative means to continue or commence new dentist practice collections. The use of routinely available data through electronic health record data and data linkage of certain private practice networks are possible solutions.

The Box M test was significant in each of the discriminant functions, suggesting the covariance matrices of the dependent variables are unequal. However, this test is highly sensitive (P value set at 0.001), and is based on the assumption that samples sizes are equal[22]. The test is arguably also not robust in the current study, therefore, Eigen Values and Wilks Lambda values are more useful[22]. Considering the scores of the Eigen Values and the Wilks Lambda values being significant in each of the discriminant functions we can argue that the separation of cases by the predictor variables was effective, and valid inferences can be made. As an alternative to discriminant anlaysis, logistic regression analysis can also be argued to produce similar results as the effect variable is mainly comprised of two factors. However, discriminant function anlaysis was considered suitable as the study question was to examine the predictive capacity of the explanatory variables. Though discriminant anlaysis is found more applicable for continuous predictor variables, careful interpretation can reduce bias in the examination of numerically coded discrete variables in the discriminant outputs[24,25].

The effects of the predictor variables appeared more pronounced with the 35–50 year age group. Differences in gender, type of practice and SEIFA advantaged areas were significant, with overseas-trained dentists likely to be more female, working in public practices, and disadvantaged areas compared with Australian-trained dentists. Our previous study on migrant dentists in Australia provided suggestive evidence that over half of all overseas trained dentists fell within the 35–54 yrs age group[4]. Qualitative evidence suggests that dentists are likely to migrate after gaining some level of experience or training in their home country, and not immediately after graduation[5,6,37]. The process of assessment and registration as dentist in Australia also takes considerable time[6,28], increasing the representation of overseas trained dentists in this age group. Overseas-trained dentists who migrated through the examination and assessment pathway were recent migrants and were contributing more in the public sector and disadvantaged areas of Australia. This provides some basis to argue that the policies to encourage overseas-trained dentists to contribute towards areas of need location in Australia (such as public sector schemes or rural and remote areas) have been successful. While the contribution and value overseas-trained dentists bring to dental service provision to Australia is immense, it is also necessary to identify support structures, career pathways, professional development, social and cultural inclusiveness of migrant dentists working in areas of need locations.

It was also not surprising to notice gender effects across the full sample, as feminization of migration has been reported in several health professions including dentists[1,4,38]. The effect of feminization of migration is to be understood not just as a difference in practice provision between Australian and overseas trained dentists, but as complementary to the dental profession as a whole, which has seen improvement in female participation in the workforce. In general, females work more part time, take more career breaks and more likely to be based in the public sector, compared with male dentists[8,23,39]. Policy decisions to influence the short term movement or support structures for overseas trained dentists in Australia should consider this gender variation in migration of dentists.

The discriminant analysis did not find any significant differences in practice inputs, direct demand and productivity measures between Australian trained and overseas trained dentists. While, the magnitude of the discriminant coefficients could offer some suggestions on the direction of the relationship, careful interpretation is required. One could argue that in these key measures overseas trained dentists are more likely to mimic the practice patterns of Australian trained dentists. This is also a good indication of success in the selection of overseas trained dentists mainly in the ADC assessment and examination process that have led to the adoption of an Australian practice culture among overseas trained dentists. The older age group (50 + yrs) showed no significant differences in key predictors, suggesting that age (and most likely experience) can further reduce differences in practice activity patterns between Australian and overseas-trained dentists. Our prior study has suggested that it takes at least 10 years (since migration to Australia) to better understand the Australian way of life and practice culture in Australia [9]. The age variations in predictor variables in this study provides necessary evidence on key differences in practice activity, areas where future focus needs to be strengthened in terms of both support to overseas trained dentists, and meeting oral health service demands in Australia.

Conclusion

The results of the study indicate that overseas-trained dentists contribute towards providing dental care to underserved populations, public sector and rural and remote locations. The study also provides a basis to argue that policies that encourage overseas-trained dentists to contribute towards areas of need locations in Australia (such as public sector schemes or rural and remote areas) have been successful. Key productivity measures of overseas trained

dentists also mimic Australian-trained dentists, suggesting that overseas-trained dentists have been able to integrate well into the practice culture in Australia. Gender, type of practice and location of practice are necessary elements to be included in the policy and planning of the future oral health workforce, and in providing support to both current and future migrant dentists in Australia.

Declarations

Ethics approval and Consent to Participate

Ethics approval for the study was obtained from the Australian Institute of Health and Welfare, and the study was conducted in accordance with the Declaration of Helsinki. The study was conducted as a mailed self-complete survey; hence, consent was implied through the return of completed surveys.

Consent for publication

All authors have provided consent for publication.

Availability of supporting data

The data used and/or analysed during the study are available from the corresponding author on reasonable request. Adherence to institutional guidelines on access to data is mandatory.

Competing interests

None declared

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Author contributions:

MB, DB & AJS were equally involved in the conceptualisation, design and development of the study. MB also collected the data for the study, conducted data analysis and wrote the paper. WS provided expert advice on data interpretation and anlaysis. All authors have read the draft paper, provided feedback, and have contributed to the final submission.

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