

# Service provision in private general practice: 1983-1984 to 1998-1999

Australian Research Centre for Population Oral Health, The University of Adelaide, South Australia\*

## Introduction

Shifts in service provision over time can reflect changes in demography, oral health and expectations, as well as new technology and provider preferences. Trends towards improved oral health have been observed in the Australian population over recent decades. Reductions in caries experience have occurred among children,<sup>1</sup> although recent data have shown an upward trend in caries,<sup>2</sup> and decreased levels of tooth loss have been reported among adults.<sup>3-5</sup> The pool of middle to older aged adults at risk of oral disease is increasing,<sup>6</sup> driving increases in services to restore tooth function. New materials and techniques have made many interventions both more efficacious and efficient, and the preference of many patients.

## Methods

### (a) Sample and response

A longitudinal design involving a sample of 10 per cent of male dentists and 40 per cent of female dentists was randomly drawn from the dental registers for each State or Territory in Australia in 1983. The higher sampling rate for female dentists was designed to provide sufficient numbers for comparisons by gender of dentist, as females comprise a lower percentage of registered dentists than males. Sample supplementation at each successive wave of the study based on 10 per cent of male and 40 per cent of female dentists who were newly registered since the previous wave ensured representative cross-sectional estimates. In 1983, 1988, 1993 and 1998 these samples were surveyed by mailed questionnaire, providing response rates of 73, 75, 74 and 71 per cent.

The data were weighted using the estimated number of practising private general practice dentists at December 1983 and 1988,<sup>7,8</sup> with the age and gender distribution of dentists from the 1981 and 1986 population censuses of Australia,<sup>9,10</sup> and dental board registration statistics from 1992,<sup>11</sup> and 1994.<sup>12</sup> Therefore the estimates of practice activity are representative of the age and gender distribution of Australian private practice dentists at each time.

### (b) Service provision data

Practitioners recorded the types of services provided over one to two self-selected typical days of practice. The number of patients sampled by each dentist varied according to their

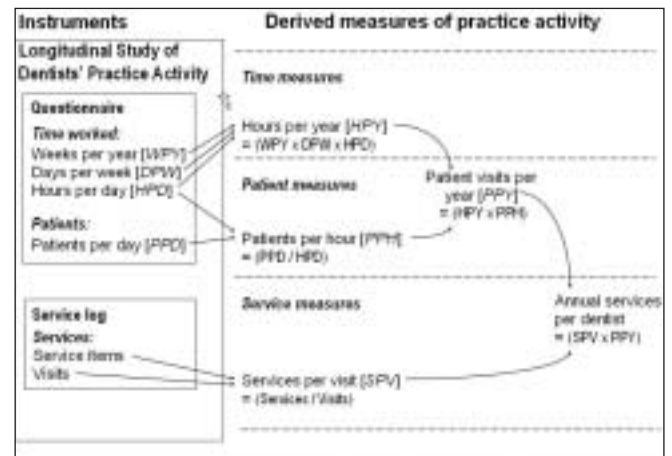


Fig 1. Schematic outline of data collection and derivation of practice activity measures.

typical level of activity. Dentists were free to choose which days to include in their service log. Only sampled dentists within any group practice provided data. Dentists were instructed to record for each patient treated on their selected typical days the services provided regardless of whether or how they were charged to the patient. A patient may receive a number of services per visit across the range of 10 main areas of service. For most analyses services were classified into main areas of service following the Australian Dental Association's Schedule of Dental Services.<sup>13</sup> Extraction services reported in this paper correspond to the area listed as oral surgery in the Schedule. Further analyses focus on groups of services within a main area of service.

Figure 1 provides a schematic outline of the data collection and derivation of the service provision measures. The rate of services per visit was produced by dividing counts of services provided by the number of visits. Annual services per dentist were calculated by multiplying the rate of services per visit by the practice activity measure of patient visits per year.

## Results

### (a) Practice activity measures by gender and age of dentist and time of study

Table 1 presents measures of service provision by gender and age of dentist and time of study. Male dentists had a lower rate of services per visit, but higher rates of patient visits supplied per year and annual services provided per dentist. Significant variation occurred by age of dentist, with

\*Prepared by David S Brennan and A John Spencer

**Table 1. Mean practice activity measures by gender and age of dentist and time of study**

	<sup>(a)</sup> Services per visit		<sup>(b)</sup> Patient visits per year		<sup>(b)</sup> Annual services per dentist	
	Mean	(S.E)	Mean	(S.E.)	Mean	(S.E)
Gender of dentist	**		**		**	
Male	1.97	(0.02)	3091	(42)	5862	(84)
Female	2.05	(0.03)	2181	(49)	4477	(114)
Age of dentist	**		**		**	
20-29 yrs	1.98	(0.03)	2695	(61)	5209	(134)
30-39 yrs	2.03	(0.02)	3048	(59)	5982	(118)
40-49 yrs	2.01	(0.03)	3160	(67)	6105	(142)
50-59 yrs	1.87	(0.04)	3163	(97)	5794	(188)
60+ yrs	1.92	(0.08)	2333	(121)	4240	(230)
Time of study	**		**		NS	
1983-84	1.78	(0.03)	3405	(82)	5832	(147)
1988-89	1.84	(0.02)	3097	(65)	5607	(123)
1993-94	2.10	(0.03)	2816	(61)	5766	(134)
1998-99	2.14	(0.03)	2589	(58)	5463	(145)

(a): Poisson regression

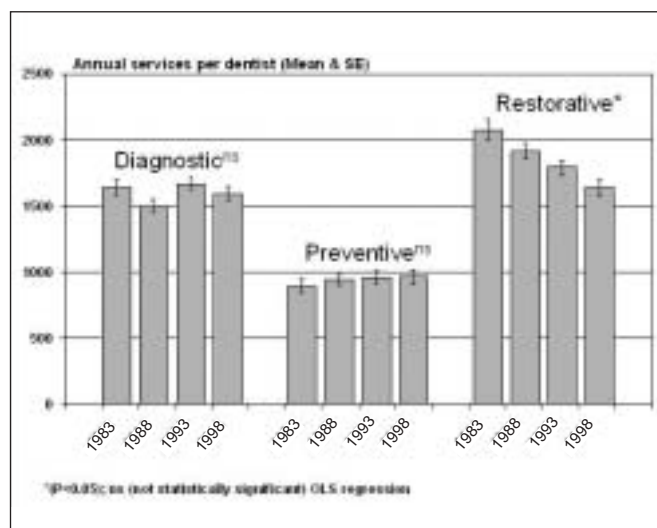
(b): OLS regression

\* $(P<0.05)$ , \*\* $(P<0.01)$ , NS (Not statistically significant)

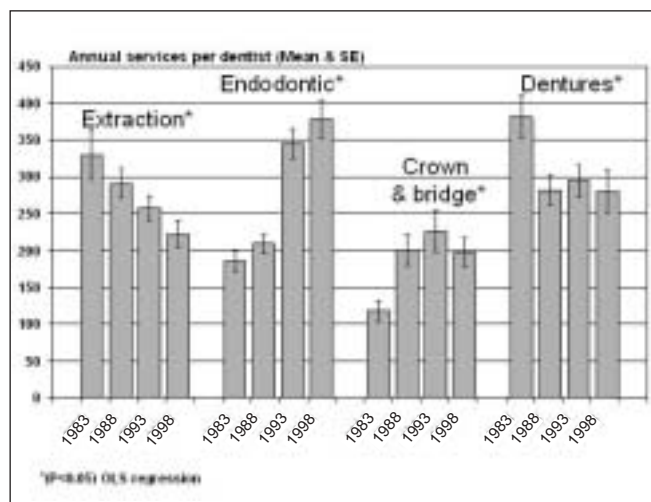
high rates of service provision per visit and annual services per dentist among dentists aged 40-49 years, and high rates of patient visits supplied per year for 40-49 and 50-59 year-old dentists. Services per visit increased from 1.78 to 2.14 over the study period, while the number of patient visits supplied per year decreased. However, the number of annual services supplied per dentist remained stable over the period.

**(b) Main areas of service by time of study**

Annual services provided per dentist (see Fig 2) decreased over the time of the study for restorative services, but remained stable for diagnostic and preventive services. Endodontic and crown and bridge services both increased over time (see Fig 3), while rates of extraction and denture



**Fig 2.** Annual diagnostic, preventive, and restorative services per dentist by time of study.



**Fig 3.** Annual extraction, endodontic, crown and bridge, and denture services per dentist by time of study.

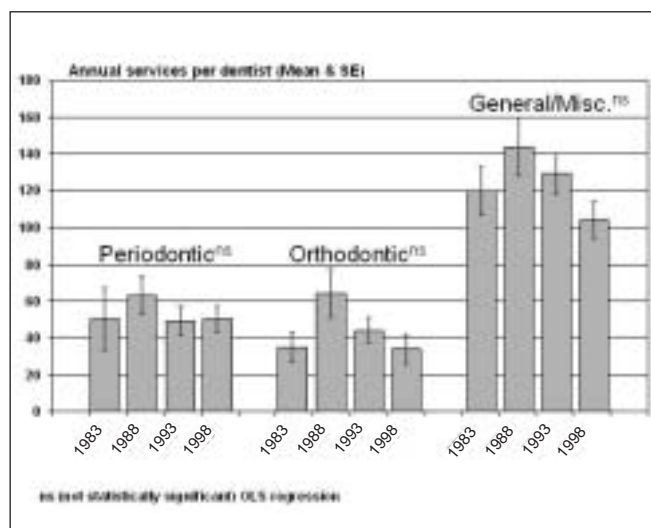
services decreased. No changes over time were observed for periodontic, orthodontic, or general/miscellaneous services (Fig 4).

**(c) Restorative services**

Annual numbers of restorative services provided per dentist is presented in Fig 5 broken down into amalgam, composite resin and glass ionomer services. The number of amalgams decreased consistently across all four points in time. Composite resin services, while provided at stable rates between 1983 and 1993, increased in 1998. Glass ionomer services increased initially in 1988 and 1993, before decreasing in 1998.

**(d) Denture services**

Annual numbers of denture services are presented in Fig 6 broken down into full and partial dentures. The provision of full upper and lower dentures decreased across all four points in time between 1983 and 1998, as did the provision of full upper dentures. There was no statistically significant change



**Fig 4.** Annual periodontic, orthodontic, and general/miscellaneous services per dentist by time of study.

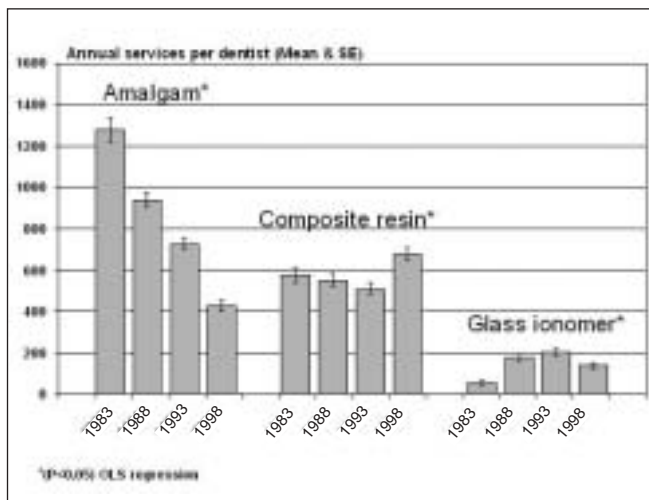


Fig 5. Annual amalgam, composite resin and glass ionomer services per dentist by time of study.

in the provision of full lower dentures, but there was a non-significant trend towards lower provision of these services. Partial upper dentures showed a significant decrease between 1983 and 1998, while the provision of partial lower dentures increased in 1998.

## Discussion

### (a) Aggregate trends

Different patterns over time were observed among the two measures of service provision. Services per visit increased over time, but annual services per dentist were not statistically different over time. The trend towards an increased number of services per visit over time may be related to the observed decrease in the number of patient visits supplied by dentists over this time period.<sup>14</sup> Factors related to the declining supply of visits by dentists per year such as the retention of teeth<sup>15</sup> and a shift towards adults with complex treatment needs<sup>16</sup> as well as the operation of infection control procedures may explain the observed trends in service provision measures.

The stability in annual services per dentist reflects a counterbalancing of increased rates of service per visit by declining numbers of visits being supplied by dentists per annum. While, on average, there appears to have been no change in the aggregate provision of services per year by dentists, this masks the shift in the way there are providing services. The trend is to supply fewer visits but to provide more services at each visit.

### (b) Component trends

While endodontic services increased as a component of the annual services provided per dentist, there were no changes over time in annual numbers of either diagnostic or preventive services per dentist. Annual numbers of restorative services per dentist decreased over time. These trends in component services reflect the operation of rates of component services per visit and the annual number of visits supplied by a dentist. When broken down into sub-categories of restorative services it was evident that much of the decline

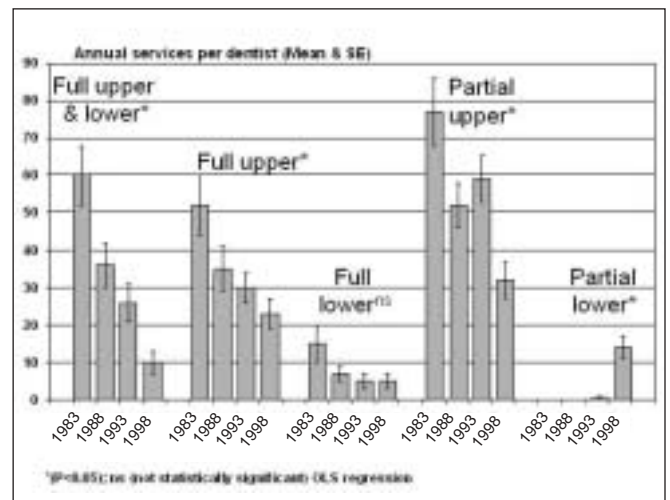


Fig 6. Annual full and partial denture services per dentist by time of study.

in restorative services reflected lower rates of provision of amalgam restorations while other types of restorations such as composite resins and glass ionomers increased. Denture services decreased over time, lead by the steep fall in full denture work. While upper partial dentures decreased, lower partial dentures increased, despite reports of low ongoing wearing of lower partial dentures.

Rates of service provision have followed the trends which were evident from previous reports,<sup>17</sup> such as interventions consistent with the maintenance of a functional dentition such as endodontic and crown and bridge services. However, this increase in the annual workload of dentists was balanced by decreases in restorative services, and reductions in services associated with tooth loss and replacement, such as denture and extraction services.

## Acknowledgements

The Longitudinal Study of Dentists' Practice Activity was supported by the Commonwealth Department of Health (1983-1984), the Australian Institute of Health and Welfare (1988-1989), the Commonwealth Department of Human Services and Health (1993-1994), and the National Health and Medical Research Council (1998-1999).

## References

- Spencer AJ, Davies MJ, Slade GD, Brennan D. Caries prevalence in Australasia. *Int Dent J* 1994;44:415-423.
- ARCPOH. Changes in South Australian children's caries experience: Is caries re-surfacing? *Aus Dent J* 2004;49:98-100.
- Australian Bureau of Statistics. Dental Health (persons aged 15 years or more) February-May 1979. Cat No. 4339.0. Canberra: ABS, 1979.
- Barnard PD. National Oral Health Survey, Australia 1987-88. Canberra: AGPS, 1993.
- Carter KD, Stewart J, Davies M, et al. 1994. National Dental Telephone Interview Survey 1994. Adelaide: AIHW DSRU, The University of Adelaide, 1994.
- NHMRC Expert Advisory Panel. The impact of change in oral health status on dental education, workforce, practices and services in Australia. Canberra: National Health and Medical Research Council, 1993.
- Barnard PD. Facts and figures Australian dentistry 1984-85. Sydney: Australian Dental Association, 1987.

8. Barnard PD. Facts and figures Australian dentistry 1988. Sydney: Australian Dental Association, 1989.
9. Australian Institute of Health. Dental workforce 1981. Health workforce information bulletin No 3 (Health workforce information series) Canberra: AGPS, 1988.
10. Australian Institute of Health. Dental workforce 1986. Health workforce information bulletin No 15 (Health workforce information series) Canberra: AGPS, 1988.
11. Australian Institute of Health and Welfare. Dental practitioner statistics, Australia, 1992. AIHW Dental Statistics and Research Series No. 6. Adelaide: The University of Adelaide, 1994.
12. Szuster FSP, Spencer AJ. Dental practitioner statistics, Australia, 1994. AIHW Dental Statistics and Research Series No. 11. Adelaide: The University of Adelaide, 1997.
13. Australian Dental Association. An Australian Schedule of Dental Services and Glossary. Sydney: Australian Dental Association, 1996.
14. Brennan DS, Spencer AJ. Practice activity trends among Australian private general dental practitioners: 1984-84 to 1998-99. *Int Dent J* 2002;52:61-66.
15. Douglass CW, Furino A. Balancing dental service requirements and supplies: epidemiologic and demographic evidence. *J Am Dent Assoc* 1990;121:587-592.
16. Shuman SK, Loupe MJ, Davidson GB, Martens LV. Productivity in Minnesota dental practices with increased visits by older patients. *J Public Health Dent* 1994;54:31-38.
17. Brennan DS, Spencer AJ, Szuster FSP. Service provision trends between 1983-84 and 1993-94 in Australian private general practice. *Aust Dent J* 1998;43:331-336.

*Address for correspondence:*

Australian Research Centre for Population Oral Health  
 AIHW Dental Statistics and Research Unit  
 Dental School, Faculty of Health Sciences  
 The University of Adelaide  
 South Australia 5005  
 Email: arcpoh@adelaide.edu.au