

# Patterns of Dental Therapists' Scope of Practice and Employment in Victoria, Australia

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*Abstract:* In Australia, dental therapists have practiced only within the state-operated School Dental Services (SDS) for around forty years providing preventive, diagnostic, restorative, and health promotion services to children and adolescents in a collaborative and referral relationship with dentists. Changes to legislation in 2000 have seen limits to dental therapists' employment removed, allowing private sector employment. This study examines the changes to dental therapists' employment since 2000 using a self-completed questionnaire with a response rate of 82 percent. Approximately one-third of responding dental therapists reported that they spent some time employed outside the SDS in community health services and private orthodontic and general practices, which indicates an acceptance of this type of dental care provider in these areas. The clinical services that dental therapists are currently providing are a complex mix with significant variations according to type and geographical location of practice, but include high levels of patient assessment, diagnosis, treatment planning, and the restoration of teeth. The findings from this study indicate that when legislative restrictions on employment settings are removed, there is a demand and demonstrable role for dental therapist-delivered services in nongovernment dental practices.

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In Australia, dental therapists have practiced for around forty years providing diagnostic, preventive, restorative, and health promotion services to children and adolescents in a collaborative and referral relationship with dentists. Until recently, almost all have been employed by state-operated school dental programs. Like their New Zealand counterparts, dental therapists have been responsible for examining, diagnosing, and developing plans for the oral health treatment they provide and have referred patients with treatment needs beyond their scope of practice to dentists, also mostly employed by School Dental Services, who have worked off-site.<sup>1</sup>

In Australia, dental services are delivered in the majority through private dental practices under self-funded (or self-insured) fee for service arrangements. The exceptions are the provision of dental services for children and adolescents and very limited and means-tested adult public dental services, which are funded by state and federal governments.<sup>2</sup> Australian School Dental Services (SDS) offer dental care to all primary school children and eligible adolescents in

high school, through fixed and mobile dental clinics. Common services provided by dental therapists within the SDS have included examination, diagnosis (including radiology), local anesthesia, preparation and restoration of carious lesions in teeth including pulp therapies, extraction of deciduous teeth, and preventive therapies such as fluorides and fissure sealants. They also provide oral health education and promotion for individuals and groups in the community and have more recently been prepared for orthodontic auxiliary practice. Like in New Zealand, the majority of dental care for children in Australia is provided by dental therapists.<sup>3</sup>

There is currently debate in the United States and elsewhere about the need for a practitioner of this type to address the high levels of unmet needs and extend access to oral health care services for lower-income groups.<sup>4</sup> This debate has also considered the extension of dental hygiene practice to include these skills.<sup>5-7</sup> This study therefore contributes to that debate and informs policy development for the provision of oral health services for the public.

The reviews of states' dental legislation driven by the National Competition Policy have produced changes in the regulation of dental therapists and dental hygienists' practice in most states and territories in Australia since 1998.<sup>8</sup> The Dentists Act of 1972 was reviewed in the Australian state of Victoria in 1998, culminating in the enactment of the Dental Practice Act of 1999 and, following this, the subordinate legislation (the Dental Practice Regulations of 1999 and the Codes of Practice for Dental Therapists and Hygienists in 2002).<sup>9</sup> Victoria was the first Australian state to finalize the review of its dental practice legislation and implement new codes of practice. In Victoria, the most significant changes to the regulation of practice in this area were the lifting of employment limits and extension of client age limits for dental therapists. There were no significant changes to the range of services provided by dental therapists other than the inclusion of orthodontic services.

Dental therapists have practiced in Victoria since 1975. Until 2000, dental therapists' employment was restricted to the SDS. The lifting of employment limits has resulted in the movement of dental therapists into new work settings such as private, community, and hospital practices. Further, prior to 2000, the client groups that could receive treatment from dental therapists were limited to children attending school (Parliament of Victoria, Dentists Act 1972).<sup>8</sup> The new regulatory frameworks have allowed dental therapists to provide dental care (subject to the boundaries described by the Codes of Practice) to clients aged up to eighteen years and, upon the prescription of a dentist, from nineteen to twenty-five years. In orthodontic practices, care prescribed by an orthodontist or dentist may now be provided by dental therapists to clients of all ages.<sup>9</sup> At the time of the survey, there were around 260 registered dental therapists in Victoria.<sup>10,11</sup>

Dental hygienists have practiced in Victoria since 1989 and, like their U.S. counterparts, provide health educational, preventive, periodontal, and orthodontic services to people of all ages largely in the private sector, without the employment restrictions that have applied to dental therapists. Both dental therapists and, more recently, dental hygienists have graduated from two-year (mostly diploma) programs. There has been a further change in the education environment in Victoria for these practitioners that has provided opportunities for existing dental therapists to add dental hygienist qualifications and vice versa. In addition, the majority of Australian and New Zealand educational institutions now offer combined

dental therapy and hygiene (also known as oral health therapy) baccalaureate degree programs.

As part of a broader study aiming at identifying the changes to dental therapy practice after employment limits for dental therapists were removed, this article aims to describe the characteristics of Victorian dental therapists who have moved to practicing in settings outside the SDS, including their educational qualifications, current scope of practice, and practice type and location. The study also examined whether the changes in employment settings of dental therapists has had an influence on the services they provide (scope of practice), in the interest of developing an understanding of the private sector market for their services.

Australian dental workforce projections and planning to date have been based on service provision in the SDS.<sup>10</sup> Changes to education and regulation may have had an impact on the workforce that has not yet been assessed and has implications for future workforce planning at both state and national level. An improved knowledge of these characteristics will provide a base to better contextualize dental therapists' work in Australia and offer insights into models of practice for other countries exploring ways to enhance the effectiveness of the dental team.

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## Materials and Methods

As part of a larger study designed to explore changes to dental therapists' practice since the implementation of new legislation in 2000, a self-completion survey was mailed to all registered dental therapists working for employers other than the SDS in Victoria. Workforce data collection carried out by the Dental Practice Board of Victoria (DPBV) for the Australian Institute of Health and Welfare Dental Statistics and Research Unit (AIHW DSRU) was used to identify dental therapists who had worked outside the SDS between 2000 and 2006. This process identified a total of ninety-six dental therapists who fulfilled these criteria. A package containing the data collection instrument and a plain language statement describing the study were sent to each participant. A reply-paid envelope was also included to facilitate responses. Participation was anonymous and voluntary. These packages were addressed and mailed out by the DPBV to protect participants' confidentiality. Participants were asked to complete the instrument in their own time. Second and third follow-up letters and surveys were posted to nonresponders six and

ten weeks after the first contact. Data were collected from November 2006 to February 2007. The Human Research Ethics Committee of the University of Melbourne approved the study protocol.

The survey instrument developed by the research team consisted of two parts. The first part of the instrument included eleven questions that requested sociodemographic information and asked respondents to provide information about their education, qualifications, and work experience. Five questions asked respondents about their current practice type and location, and thirty items addressed scope of current main practice. The results of this first part are reported in this article. The second part of the survey, comprised of thirty questions, sought information to allow comparisons of the perceived differences in the scope of practice within compared with outside the SDS in Victoria; the findings from this component of the research will be reported separately.

The survey included a consent form and was pilot-tested prior to formal use with dental therapists working outside Victoria. Pilot-testing resulted in some minor wording and format changes only.

Participants were asked to indicate the type of qualification (i.e., academic degree) in dental therapy they held and their year and place of qualification. Type of qualification was recorded using the following categories: certificate, diploma, bachelor's degree, and other qualifications. Year of qualification was reclassified for analysis into three categories: prior to 1990, 1990 to 1999, and after 1999. Additionally, to identify differences between university and non-university graduates, participants were asked to identify the institution awarding the qualification. Participants were also asked whether they had been working continuously in dental therapy since qualification. Those answering in the negative were then asked to indicate the length of time away from dental therapy and the reason. With this information, the proportion of time away from dental therapy was computed.

Participants were also asked whether they were also qualified as dental hygienists. For those with positive answers, the same suite of questions was asked regarding their dental hygienist qualifications (i.e., type, year, and place of qualification). Those with a dental hygiene qualification were also asked about the length of time they had practiced as dental hygienists only, and as both a dental hygienist and a dental therapist. Those with a dental therapy qualification only were asked their opinion about the

need for a dental hygiene qualification. Those who indicated a perceived need for an additional dental hygiene qualification were further asked about future plans for obtaining this qualification. Employment history information included practice location and the postal code of their main place of employment and of any additional working location. Using the Australia Post local delivery service guidelines,<sup>12</sup> work locations were classified as being urban or rural.

For each work location entry, participants were asked the number of days worked per week, the number of dentists, and the number of dental therapists and/or dental hygienists also working in that location. The two main clusters of practice types were public and private. Public practices were School Dental Services (SDS), Community Health Centers (CHCs), dental hospital, or general hospital and teaching institution. Private locations were private general practice, specialist orthodontic practice or specialist periodontal practice, and other. These categories were not mutually exclusive, and participants reported practicing in more than one practice.

Finally, participants were asked about the scope of their practice, using a list of thirty procedures (services) that included diagnostic, preventive, restorative, periodontal, and orthodontic procedures, as well as educational and administrative procedures. Participants were asked to note the frequency of undertaking these thirty activities utilizing a three-point scale with categories of regularly, occasionally, or never.

The first level of analysis was conducted to determine basic descriptive information on the distribution of selected sociodemographic, qualifications, and work variables. Subsequently, categorical and ordinal data were analyzed utilizing chi-square analysis to compare results between different qualifications and distribution of work variables. ANOVAs were conducted to evaluate the relationship of location and practice type with interval data.

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## Results

The response rate was 82 percent, with seventy-nine of the ninety-six dental therapists returning surveys. However, twenty of the returned surveys were subsequently excluded because the respondents did not meet the study criteria for the following reasons: they had either ceased working as a dental therapist for over three years or had not worked outside the SDS as a dental therapist; they were working exclu-

sively in management or other nonclinical roles; or they returned the questionnaire without completing it. Of the remaining fifty-nine questionnaires available for analysis, fifty-seven respondents were females.

## Qualifications

The majority (79.7 percent) reported holding a diploma in dental therapy (DT), while 20.3 percent had a certificate (some earlier programs conferred certificates on completion of DT training, which remains a qualification suitable for registration). When asked to name the institution issuing their DT qualification, more than two-thirds of the participants (67.8 percent) named the Victorian Dental Therapy School in Melbourne (the training program conducted under the auspices of the Victorian Department of Health and the predominant model for educating dental therapists in Australia until the mid-1990s), with another 15.3 percent naming the University of Melbourne. The remaining 16.9 percent indicated overseas ( $n=5$ ) or that their qualifications were acquired in another Australian state ( $n=5$ ). When asked about year of qualification, more than half of the sample (59.3 percent) said they obtained their qualifications before 1990, with 28.8 percent during the 1990s and 11.9 percent in the year 2000 or later.

The majority of the participants (67.2 percent) reported that they had not worked continuously in dental therapy since qualification. Among those having periods of discontinuity from dental therapy practice, about one-third (36.5 percent) indicated periods between three and eight years, with 24.4 percent indicating periods of eight years or longer. For those who had periods of discontinuity of dental therapy work, several reasons were reported, including maternity and raising a family (53.8 percent), other types of work (15.4 percent), travel and/or study (7.7 percent), and having a break, family, and retirement (23.1 percent).

Eight respondents (13.6 percent) indicated that they also held a dental hygienist qualification. Each of these individuals had received this qualification after 1998, the majority of them as a diploma (62.5 percent). Those with dual qualifications indicated that they have been practicing dental hygiene for periods ranging from eleven months to seven years. For those having a DT qualification only, 54.9 percent indicated that they felt the need to have DH qualifications also. However, only a minority of them indicated that they had plans to acquire a DH qualification (25.9 percent).

## Practice Type and Location

Data analysis for location of practices found that the majority (57.6 percent) worked in two or more locations, including six who indicated working in three different locations. When the primary location was reclassified according to geographical location, two-thirds of the respondents (66.7 percent) worked in urban areas. With two exceptions, all those who indicated working in an urban primary location also indicated a secondary work location in an urban area.

The overall mean number of days worked per week was 3.5 days (s.d. 1.3) with a range from 0.75 to six days. More than half of the participants (56.4 percent) worked four or more days a week, including fifteen participants (27.3 percent) who indicated that they worked full-time, of which one worked six days per week. Another 34.5 percent of the respondents worked between two and three days a week. The remaining 9.1 percent indicated working less than two days per week. A significant difference ( $p<0.02$ ) was present when comparing number of days of work by geographical location of the primary practice, in that those working in rural areas tended to work fewer days compared to those whose primary practice was in urban areas (2.9 vs. 3.8 days).

Most participants worked with one or two (51.0 percent) or with three or four (24.5 percent) dentists in the primary location. In contrast, 9.4 percent ( $n=5$ ) reported working in a setting that did not have a dentist present on the days they worked, and 15.1 percent ( $n=8$ ) reported working with more than four dentists. (Victorian legislation does not require a dentist to be present on site when a dental therapist or hygienist works, but does require a defined relationship for collaboration and referral between a dental therapist and an identified dentist [DPBV 2002].) Of those who reported working with no dentist present, four worked in the SDS and one in a public hospital. Those who worked with more than four dentists worked either in a Community Health Centre (CHC) ( $n=3$ ), a private general practice ( $n=1$ ), or an orthodontic practice ( $n=4$ ).

The participants were asked about the number of other dental therapists or dental hygienists who were also employed at their primary work location. Almost one-third (30.8 percent) reported not working with other DTs or DHs, while 25.0 percent worked with one other DT and 21.1 percent indicated working with two DTs. The remainder (23.1 percent) reported working with more than two, including two

dental therapists who indicated working with another nine DTs (one of these two DTs worked in a CHC and the other in the SDS). There were no significant differences in number of dentists or DTs/DHs by location.

Most dental therapists indicated that their primary workplace was in the private sector (n=33; 58.9 percent) as opposed to public settings other than the SDS (Table 1 presents the distribution of respondents according to primary practice and location). For those who named the public sector (n=23) as their primary practice, the most common work setting was in the SDS (43.5 percent) or community health centers (30.4 percent). Other public practices named included public hospitals (8.7 percent) and educational institutions (8.7 percent). For those in the private sector, the most frequently named type of practice was a private general practice (48.5 percent) and a private orthodontic practice (42.4 percent). Other practices named by respondents included pediatric practices and a cosmetic practice (9.1 percent). Regarding the secondary workplace, again the private sector was more frequently named. When considering all practice settings, a private general practice was the most frequently named type of practice (33.3 percent) followed by private orthodontic practice (24.2

percent), community dental clinic (15.2 percent), and the SDS (15.2 percent). Urban practices, like rural practices, were mostly private general practices (57.9 and 62.1 percent, respectively). An analysis of aggregated data from all reported work locations in this sample shows that 43 percent of available dental therapist days are spent in private general practice, 4 percent in orthodontic practice, 30 percent in public practice, and around 23 percent devoted to non-work-related activity. The data for dental therapists working in metropolitan areas are shown in Figure 1 and for rural areas in Figure 2.

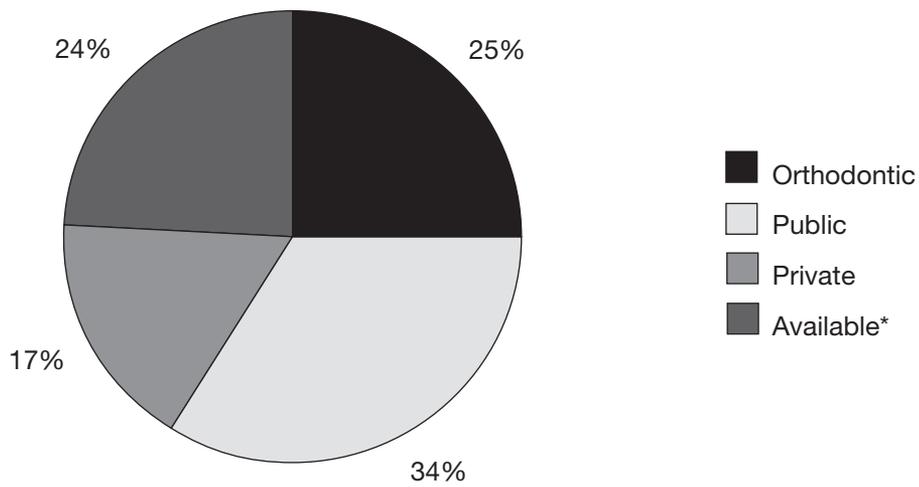
## Clinical Services Provided

Dental therapists reported a variety of procedures that they undertook as part of their work in their main practice outside the SDS (Table 2). Regardless of reported work location or practice type, most dental therapists regularly practiced dental health education (76.3 percent), dietary counseling (74.6 percent), prophylaxis (69.5 percent), and scaling (67.8 percent). A majority of the respondents (with the exception of those in orthodontic practices) also indicated they regularly performed oral examinations (55.7 percent) and treatment planning. Over half of the participants indicated they were regularly taking

**Table 1. Distribution of primary, secondary, and tertiary dental therapists' practices**

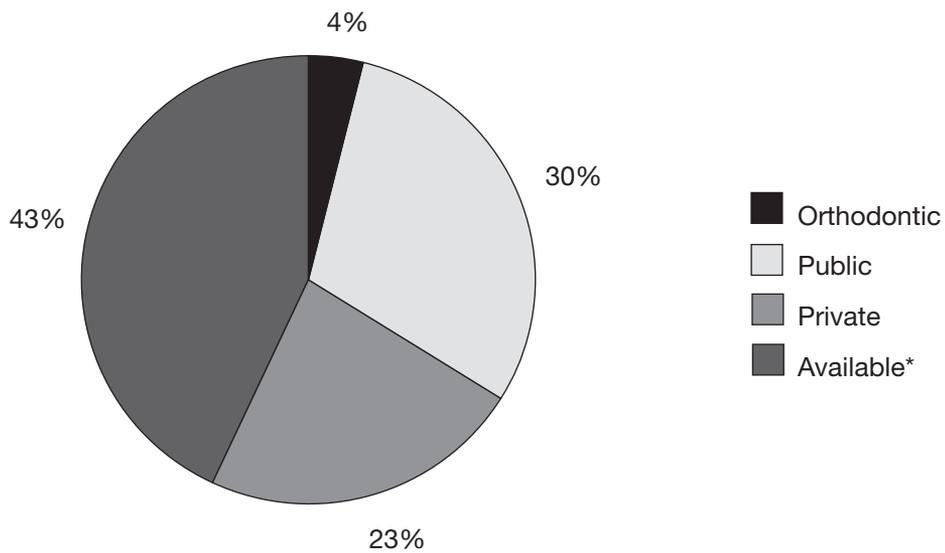
Primary	N	%	Secondary	N	Tertiary	N
School Dental Services	10	43.5%	Community dental clinic	1		
			Private general practice	4	Community dental clinic	1
			Orthodontic practice	5	Private general practice	1
Community dental clinic	7	30.4%	Community dental clinic	2		
			Teaching institution	1	Community dental clinic	1
			Private general practice	1		—
Hospital	2	8.7%	Dental hospital	1	Teaching institution	1
			Private general practice	1	Teaching institution	1
Teaching institution	2	8.7%	Orthodontic practice	1		—
Other public practice	2	8.7%	Community dental clinic	1		—
Total public practice	23	100%		18		5
Private general practice	16	48.5%	School Dental Services	1		—
			Teaching institution	1		—
			Private general practice	2		—
			Other private practice	1		—
Orthodontic practice	14	42.4%	School Dental Services	4		—
			Private general practice	3	Private general practice	1
			Orthodontic practice	2		—
Other private practice	3	9.1%	Community dental clinic	1		—
Total private practice	33	100%		15		1

Note: Total differs due to missing values.



**Figure 1. Distribution of dental therapists' working days by primary practice: urban locations**

\*"Available" reflects proportion of working week not spent working as a dental therapist.



**Figure 2. Distribution of dental therapists' working days by primary practice: rural locations**

\*"Available" reflects proportion of working week not spent working as a dental therapist.

**Table 2. Frequency of procedures regularly undertaken by dental therapists in their primary practice**

	Orthodontic Practice	Urban General Practice	Rural General Practice	Total
Dental health education	85.7	92.3**	52.9	76.3
Dietary counseling	78.6	92.3**	52.9	74.6
Prophylaxis	71.4	76.9	64.7	69.5
Scaling	64.3	73.1	70.6	67.8
Oral exam	7.1	69.2	82.4	55.7
Interpreting radiographs	14.3	57.7*	88.2	54.2
Treatment planning	0.0	61.5	88.2	52.4
Intraoral radiographs	14.3	61.5	76.5	52.4
Fissure sealant	0.0	65.4	82.4	52.4
Administer local anesthetic	7.1	50.0*	82.4	49.2
Placement of restorations	0.0	57.7	82.4	49.2
Taking impressions	78.6	50.0	29.4	47.5
Orthodontic procedures under supervision of a dentist	92.9	58.5	23.5	45.8
Extraction of primary teeth	7.1	42.3	70.6	40.7
Fluoride application	0.0	57.7*	23.5	32.2
Other emergency treatment	21.4	26.9	52.9	32.2
Polishing of restorations	0.0	34.6	52.9	30.5
Pulpotomy	0.0	26.9*	58.8	28.8
Temporary dressing	0.0	23.1	41.2	22.0
Indirect pulp capping	0.0	19.2	29.4	16.9
Direct pulp capping	0.0	19.2	23.5	15.3
Extraoral radiographs	14.3	19.2	11.8	15.3
Team management/coordination	14.3	11.5	17.6	13.6
Clinical supervision	7.1	15.4	11.8	11.9
Root debridement	7.1	60.0	40.0	10.2
Peer appraisal/peer review	7.1	11.5	11.8	10.2
Pouring up study models	7.1	15.4	0.0	8.5
Clinical teaching	7.1	7.7	5.9	6.8
Stainless steel crown	0.0	0.0	0.0	0.0
Extraction of permanent teeth	0.0	0.0	0.0	0.0

\*0.05; \*\*0.01

and interpreting intraoral radiographs, conducting treatment planning, and applying pit and fissure sealants. DTs in orthodontic practices reported that they devoted considerable time to dental education, diet counseling, and impression taking.

The clinical procedures that were carried out least regularly were taking extraoral radiographs and root debridement (15.3 percent and 10.2 percent, respectively). None of the respondents reported carrying out extraction of permanent teeth or placing stainless steel crowns (most DTs are trained to provide stainless steel crowns, but many practices are not equipped for this service, which may artificially decrease the number of these services provided). Approximately 10 percent of the respondents indicated that they regularly poured study models and carried out clinical supervision and peer appraisals. Eight dental therapists reported team management or co-

ordination as a regular role (13.6 percent); however, the majority of these individuals (n=5) indicated that public dental practice was their primary practice setting. Table 2 presents the frequency distribution of procedures regularly undertaken by DTs in their primary practice.

Those dental therapists who also had a DH qualification were significantly more likely to report taking intraoral radiographs ( $p<0.01$ ) and carrying out root debridement/planing ( $p<0.001$ ). On the other hand, they were significantly less likely to perform pulpotomies ( $p<0.05$ ). When practice location was considered (excluding orthodontic practices), the pattern of practice of dental therapists working in rural locations was significantly different when compared to those working in urban practices. For example, those in rural locations were significantly more likely ( $p<0.05$ ) to report administering local

anesthetics, performing pulpotomies, and interpreting radiographs. On the other hand, rural practitioners were significantly less likely to report providing dental health education, dietary counseling ( $p < 0.01$ ), and fluoride applications ( $p < 0.05$ ). There was also a trend ( $p < 0.10$ ) for those practicing in rural localities to report more regularly performing extractions of primary teeth, treatment planning, temporary restorations, and other types of emergency treatments (Table 2 shows a more detailed distribution of the most frequently reported procedure by type of practice). There were no significant differences in reported procedures performed according to year of qualification. However, there was also a trend ( $p < 0.10$ ) for those more recently qualified to perform more impression taking and tooth scaling.

Respondents were asked to indicate, from their perspective, any additional procedure that would be valuable to the practice where they worked, if scope of practice regulations permitted the performance of these tasks. Twenty-five participants (42.4 percent) responded to this question. Most frequently mentioned additional and beneficial procedures included undertaking clinical photography (not a procedure restricted by regulation, though only recent graduates or those trained in orthodontic procedures would have training in this skill), additional types of radiographs (e.g., OPGs and lateral cephalometric films) (28.0 percent), treating people older than twenty-five years (16 percent), and extracting permanent teeth (16 percent). There were significant differences by practice location ( $p < 0.05$ ). Those who indicated treating older patients ( $n=4$ ) were all dental therapists working in rural locations, and those who indicated performing other procedures ( $n=8$ ) (including bleaching and tooth whitening and the use of nitrous oxide), with one exception, were from urban practices.

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## Discussion

This article presents unique information regarding changes in the utilization and employment of dental therapists following reductions in regulatory control of this professional group in Victoria. The way in which dental therapists are embraced by the private dental system outside the School Dental Services has significant implications for dental care delivery in both private and public settings. In particular, the influence of market forces in determining the demand for and mix of dental therapists' services requires careful monitoring. Findings from this study

and future planned research should provide additional insights for the dental workforce, policy, and education sectors in Australia and internationally.

The results were presented in a simple and descriptive fashion; therefore, some limitations should be acknowledged when interpreting these results. First, as with any voluntary survey, there is the possibility of a bias in self-reporting of information. Secondly, with respect to sampling, not all dental therapists who register with the Dental Practice Board of Victoria complete the annual AIHW DSRU survey, with the result that some dental therapists who work outside the SDS may have been missed. The present survey data lacks, in some instances, the necessary depth for a detailed analysis of dental therapists' educational and clinical experience profile and their work context arising out of the forced-response questions. Although the sample was small in terms of numbers of respondents, it does represent the majority of those dental therapists currently working in settings other than the SDS in the state of Victoria, Australia, and the response rate was high. The results can be considered generalizable to the Victorian dental therapist population as the sample compares favorably to the 2006 workforce study in terms of the gender (1.4 percent male compared to 2.1 percent in our sample) and age of participants (when using year of qualification as a predictor of age).<sup>10</sup>

The most recently published data on the dental therapist labor force in Australia is drawn from the 2003 AIHW DSRU data collection, which indicates that 78 percent of dental therapists were working within the SDS and only 10 percent in private practices in Victoria and 13 percent Australia-wide.<sup>10</sup> In the 2003 sample, only thirty dental therapists indicated they were employed outside the SDS, with eight in specialist practices in Victoria.<sup>10</sup> Our sampling methods used the data collected for the AIHW DSRU in 2006 to identify participants for this study. These data indicated that ninety-six dental therapists were working outside the SDS, which equates with around 34 percent of the total DT workforce.

Survey responses indicate that the number of dental therapists working in practices outside the SDS in 2006 has doubled since 2003. It is to be expected that the employment settings of dental therapists would change gradually in response to regulatory change as both dental therapists and dental practices seek change and the market for their services develops; however, the rate of change over these three years has been quite rapid. Present data, although reflective of practice in 2006, are expected to alter as dental

therapists' roles in the private sector become more accepted by both dentists and the general public. It is also evident that most dental therapists are maintaining a mix of work locations, with most of our sample working in both the public and private sectors. There is also evidence of considerable differences in these distributions between urban and rural practices as shown in Figure 1.

It is not surprising that the majority of the participants worked part-time and in multiple practices. Part-time work is reflective of majority female workforce and equates with other similar health disciplines including dental hygiene and nursing.<sup>13</sup> In addition, many private practices did not employ dental therapists until recently and would still be developing strategies to incorporate DTs into the practice. Dentists and consumers are also still acquiring a complete understanding of the traditional and potential roles of the dental therapist.<sup>14</sup> Under these conditions, it is logical that employment may be limited to one or two days to assess the viability of this new type of employee, with the likelihood that over time as patient acceptance and demand increase, the days of work may increase.

Half of the respondents indicated that a dental hygiene qualification would be desirable, but only one-third had plans to complete it. This requires further exploration to differentiate the influences of personal development, dominant cultures, and market demands (consumer needs) on these views. Intuitively, a dental hygiene qualification would be desirable as it extends the potential range of patients and clinical treatments that can be provided. These dual-qualified practitioners have a wider range of skills and would therefore be likely to be utilized differently in a practice and with potentially greater emphasis on adult periodontal and preventive care than those with DT qualifications only. For example, with regard to the increase in radiography, it is possible that those with both DT and DH qualifications may become responsible for all or the majority of the radiography in a practice. These conclusions are speculative and cautious out of respect for the sample size and will be explored in more detail in a subsequent study using a qualitative approach. However, it would appear from this study that having a qualification solely as a dental therapist is not an impediment to employment in private practices, including orthodontic practices.

The data also show that dental therapists working in rural practices reported more of their time being spent on examinations, diagnosis, and treat-

ment planning than their metropolitan counterparts and also performing pulpotomies, restorations, and emergency treatments more regularly. This is likely to be reflective of higher dental disease levels in rural areas and consistent with the oral health workforce maldistributions reported elsewhere.<sup>2</sup> It is possible that where there are shortages of dentists and higher demands for restorative services, dental therapists are assuming more substitute-type roles and are required to be more self-reliant in treatment planning and in response to emergency needs. It is also possible that there is greater demand for treatment and less time allocated to preventive services in rural areas.

Interestingly, dental therapists in rural locations were more likely to suggest that being able to treat people older than twenty-five years and to extract permanent teeth would be useful skills. This too may be reflective of the higher needs for treatment and lower availability of dentists in rural areas. Until changes in regulations in Victoria in 1989, dental therapists routinely extracted permanent teeth, and it is possible that some of the dental therapists who suggested this were trained and experienced in this procedure. With respect to the expressed demand for extraoral radiography, the University of Melbourne bachelor of oral health graduates acquire this competence in their undergraduate program, and a continuing professional development program has been scheduled to address this shortage for older graduates.

The data presented in this article show that the procedures commonly practiced by dental therapists are a complex mix with significant variations according to type and location of practice (rural vs. urban and general vs. orthodontic practice). This study is of particular value to those involved in workforce planning and undergraduate and continuing education of dental therapists and hygienists because it is the first of its kind to differentiate the range of roles and services provided by dental therapists in both the private and public sectors and in urban and rural practices. Previous workforce planning has relied on the more normative, regulation-based approach to describing skills and services provided, whereas this study has collected self-reported "in practice" data. It therefore extends our understanding of the acceptability of dental therapists as dental care providers outside of their traditional SDS roles, the market for their services, and their undergraduate and continuing practice educational requirements in Australia. It will be important for education and workforce planning to monitor these trends over time. Fuller exploration using qualitative methods will add to this understanding.

The findings from this study of dental therapists' practice patterns also add valuable information to the discussion about the value and feasibility of this type of practitioner as a member of the dental team, particularly where unmet needs for dental services among children and young people are high and the costs of care are prohibitive. It is clear that dental therapists can make valuable contributions to the delivery of dental care in the private dental setting, which is the dominant model of dental service delivery in many developed countries.

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