CLINICAL REPORT

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Undergraduate student experience in dental service delivery in rural South Australia: An analysis of costs and benefits

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Abstract

Background: Rural experience for dental students can provide valuable clinical education, change attitudes to rural practice, and make a valuable contribution to clinical service provision. The aim of this paper is to assess the costs and benefits of service delivery by students through rural training programmes.

Methods: Groups of two students worked in the public dental clinics in adjacent rural centres where there had been long-term difficulties in recruiting staff. The costs and benefits of the programme were assessed by the impact on waiting lists, the total cost per patient of a course of care and by the marginal cost of adding service provision by students to existing arrangements.

Results: The total costs of emergency and complete treatment provided by students were greater than the costs of treatment provided by public-sector dentists but less than the costs of private providers treating public patients. However, the value of services were greater when care was provided by students or private providers and the marginal cost of students providing services was 50-70 per cent of the cost of care provided by public dentists.

Conclusion: This assessment suggests that the service benefits achieved compliment the primary objective of influencing the attitude of students to rural practice.

Key words: Rural health, dentistry, students.

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INTRODUCTION

The problems of recruiting and retaining health-care providers for rural and remote communities in Australia are well known. One strategy for improving the situation involves providing undergraduate students a positive vocational experience of rural practice as part of their clinical education. The goal then is that these positive experiences will encourage young graduates to consider a position in the country after graduation. With this in mind the University of Adelaide's Dental School, and the South Australian Dental Service (SADS) in partnership with the South Australian Centre for Rural and Remote Health (SACRRH) introduced a scheme to provide final year dental students with the opportunity to work in rural public dental service clinics during 1998.

The specific aims of the project were to provide undergraduate dental students with experience in rural vocational practice and to evaluate the cost effectiveness and efficiency of clinical service delivery by senior students.

An evaluation of the effect of this experience on the attitude of senior students to rural and remote practice as a career option is being undertaken and will be reported separately.

MATERIALS AND METHODS

To evaluate the effectiveness of clinical service delivery by senior students in rural communities required a location with appropriate clinical facilities, suitable accommodation and the potential for the required supervision. The sites were Port Augusta and Whyalla, adjacent cities north of metropolitan Adelaide, with populations of approximately 16 000 and 25 000 respectively. Port Augusta is about 300 km north west of Adelaide and Whyalla 75 km south west of Port Augusta. Both areas are easily accessible by road and by air.

Port Augusta has a six-chair public dental clinic providing services for both adults and children while Whyalla has a three-chair facility at the regional hospital for the provision of adult services and two

school-based clinics for the treatment of children. Both communities have experienced difficulties recruiting and retaining dentists to provide services through the public system and to supervise school dental therapists. At the time when this project was commenced there was one full-time public dentist resident in Whyalla and no resident public dentist in Port Augusta and no local access to public specialist services. The estimated waiting times for public treatment at the commencement of the project were approximately 29 months in Whyalla (1874 patients waiting) and about 14 months in Port Augusta (594 patients). By comparison the private sector was relatively well served by full time-resident dentists in both locations and an appropriate mix of visiting private dental specialists.

During the three-month period evaluated in this study (September-November 1998) public adult dental services were provided for the communities in both Port Augusta and Whyalla under the following arrangements: groups of two final year undergraduate students visited the region for periods of two weeks each; students were resident in Port Augusta but commuted to Whyalla for one or two days each week; and supervision was provided by staff who travelled to the region for periods of one or two days. One specially recruited SADS staff member who acted as 'mentor' for the students and conducted an orientation programme at the start of each visit, travelled to Whyalla for one day each week and a second SADS staff member spent one day in Port Augusta and one day in Whyalla each week. A third university staff member, who acted as programme co-ordinator, travelled to Port Augusta for one day in alternate weeks. Each of these staff also treated their own public patients in addition to supervising the students. On days when no clinical supervisors were available in either location, students joined clinics conducted by private visiting specialists, observed Royal Flying Doctor Service clinics at remote locations, or took part in an orientation programme arranged by Aboriginal liaison officers at one of the regional hospitals. Costs associated with these supporting projects have not been included in the programme costs.

These arrangements resulted in students providing an average of four half-day sessions per week of clinical service in Whyalla and three half-day sessions per week in Port Augusta.

The costs and benefits associated with the programme were assessed in a number of ways. Firstly, the impact of the programme on waiting lists which was used as an indicator of the benefit to the community. This information was derived from the monthly patient waiting list information for the clinics involved. Secondly, an evaluation of the total cost per patient of a course of care delivered by students as part of this project. The total cost of the provision of clinical services by the students involved in this project were calculated to include the staff and student travel and accommodation costs, the salary costs of the supervising dentists and the total costs of dental assistants employed to support the students. In addition, a part of reception and dental supply costs (based on the proportion of the total number of patient attendances that were for treatment by students), clinic cleaning, power and lighting (allocated according to the proportion of the total number of operator-sessions per week which were contributed by students) and a contribution to the central management costs (based on a complex cost allocation model (details available upon request) which generally attributes total statewide management costs according to the number of staff operating at each physical location). A number of these costs arose from the need for supervising staff to travel from Adelaide. The inclusion of 'total' costs of student-provided services facilitated a comparison with other service provision strategies if students were to be considered as an alternative provider. The costs were expected to be relatively high as the shortage of public-sector dentists in the region necessitated special arrangements to provide supervision. These costs were compared with the costs of services delivered by SADS staff in other rural locations or by local private providers where treatment is out sourced. This information is collected by SADS for audit and planning purposes. Lastly, an estimate of the marginal cost of adding service provision by students when supervision can be provided within existing arrangements. The marginal costs were calculated from the direct student-related costs including travel, accommodation and dental assistant support, but excluding fixed costs, infrastructure costs and central management costs. This provides an estimate of costs when student services supplement existing services in a region and where additional facilities and funds are available and the supervision and management involves no additional staff or resources.

RESULTS

Impact of the programme on waiting lists

The effect of this programme on waiting lists in both Whyalla and Port Augusta was reflected in the figures for the study period. Not surprisingly, the involvement of additional clinical personnel assisted in managing the local waiting lists in the absence of planned salaried dentists. In Port Augusta where students spent the greater part of their time, the number of patients waiting for treatment was reduced (by 143) during the period of the project and was maintained in Whyalla (Table 1). This contrasted with a consistent tendency for the waiting lists to increase in both locations over both the preceding three-month period and for the corresponding period in the preceding year as a result of difficulties in recruiting and retraining salaried staff. Compared with the preceding period, the rate of removal of names during the study period was 21 per cent greater in Port Augusta and 67 per cent greater in Whyalla.

Table 1.

	Port Augusta			Whyalla		
Effect on waiting list	Project period	Preceding 3 month period	12-months prior	Project period	Preceding 3 month period	12-months prior
Additions	151	202	160	159	166	219
Removals	294	242	60	160	96	114
Waiting	-143	-40	+100	-1	+70	+105

Change in waiting list figures presented as patients added to the list (Additions), patients treated (Removals) and the resultant change in the total number of patients waiting (Waiting) for Port Augusta and Whyalla for the project period (Sept-Nov 1998) for the preceding three-month period and for the corresponding period 12-months prior to the project.

Evaluation of the total cost per patient of a course of care

The total cost per patient of emergency care and complete courses of general care in both Port Augusta and Whyalla were calculated from the total value of services using the Veterans' Affairs, Local Dental Officer (LDO) Fee Schedule and the total number of courses of care provided during the period covered by the project. These costs were compared with average costs in rural SADS clinics across the state at the corresponding time and with the costs of care to the government (SADS) provided as part of a 'fee for service' scheme through private dental practice in Whyalla and Port Augusta in which participating providers received 85 per cent of an agreed fee from the government and recover the remainder from the patient (Table 2).

These data (Fig 1) indicate that the various provider options offered emergency care at costs ranging from $57.44 to $74.16 per patient. Compared with public-sector providers across the state, both students and private providers appeared to be more costly than public providers by margins that ranged between 70 per cent for student-provided general services in Whyalla and 177 per cent for privately provided general services in Whyalla.

Relative efficiency

The comparison of costs per patient included the impact of the actual costs of providing service, the variation in the service mix provided by the different providers, as well as productivity of the operator. Students and private dentists provided more expensive courses of care per patient compared to the services provided by public salaried providers, particularly for general care. The impact of this difference may result in fewer patients treated for any fixed expenditure.

However, a comparison of total costs with the value of services provided gave a measure of relative efficiency or 'productivity'. Based on the direct costs and value of services (using the 1996 LDO Fee Schedule) in both Whyalla and Port Augusta, the relative efficiency of students, was calculated at 82 per cent of the LDO fee for each item of care provided compared to 91 per cent for private providers and 67 per cent for salaried dentists in rural areas over the same period. Whilst private dentists provided care at the full LDO fee (100 per cent LDO fee plus an administration cost), patients receiving care through private dental practitioners were required to pay a patient co-payment equating to 15 per cent of the LDO fee thereby reducing the cost to government.

Marginal cost of service provision by students

The marginal costs of emergency treatment and complete general courses of care in both Port Augusta are summarized in Table 3 and Fig 2.

The marginal cost of service provision by students was between 47.3 per cent (Whyalla emergency) and 70.5 per cent (Whyalla general care) of the state-wide average total cost of courses of care provided by public-sector staff.

DISCUSSION

When access to dental services is limited by shortages of dentists, the availability of dental students should offer benefits to the community. The results of this study demonstrate that senior students can make a very positive contribution to a community. This can occur either by reducing the number of patients waiting for treatment – or by providing required emergency care.

While the acceptance of students by the community was not assessed in this study, the response of the local media was very positive with reports emphasizing the fact that these rural communities now had access to dental services provided by private practitioners, government dentists and dental students in the same

Table 2.

	Students		Private providers*†		Salaried staff
Procedure type	Port Augusta	Whyalla	Port Augusta	Whyalla	State-wide (rural)
Emergency	$69.16	$65.46	$74.16	$63.64	$57.44
General	$141.19	$150.72	$205.28	$245.80	$88.73

Average cost per patient of emergency and complete general coursesof care for services provided by students, private practitioners (not including co-payments) and salaried staff.
*Limited private practice Schemes operated in these regions during the period of the student programme.
†Range and extent of services limited through a schedule of items and funding 'caps'.

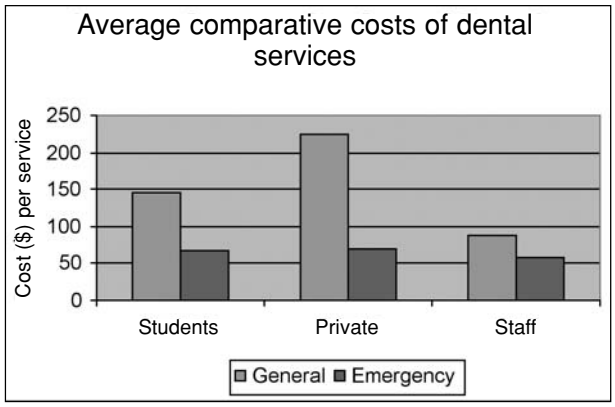

Fig 1. Total costs for emergency and complete courses of care provided by students, SADS staff (based on state-wide data) and participating private practitioners (excluding patient contributions) in Port Augusta.

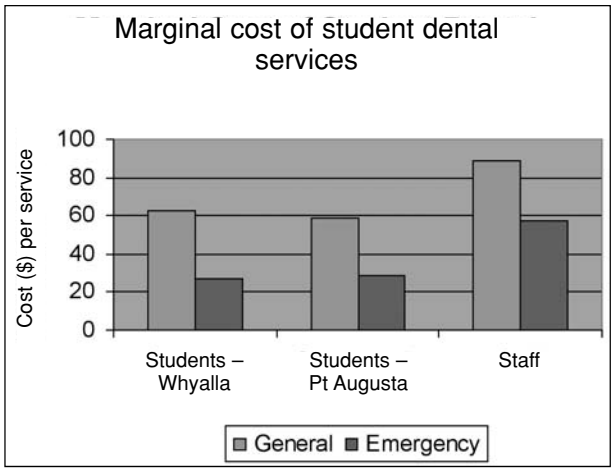

Fig 2. Marginal costs for emergency and complete courses of care provided by students, SADS staff (based on state-wide data) and in Port Augusta and Whyalla.

way as was available for metropolitan residents. In addition, there was a subjective feeling that students were at least as well received in rural clinics as they were in the more traditional dental school environment. This assessment is to be formally examined through a routine client satisfaction survey involving publicly funded patients attending private dental practices for their care as well as those receiving their care from salaried dentists in rural areas.

The costs associated with providing students with rural practice experience are relatively modest and can be interpreted in several ways. An analysis of total cost and output is most appropriate when the efficiency and effectiveness of students is being compared with alternatives and where there is limited clinical infrastructure, support, supervision or funding. There were no large differences between provider groups in the costs of emergency care that would impact significantly on the number of patients receiving care, but compared with the average cost of general care provided by public-sector dentists, both private providers and students appeared to provide care at a higher cost. In the case of the students these higher costs are explained in part by the differences in treatment emphasis with more conservative treatment plans being offered by dentists working in the public system where there may be a clearer appreciation of and the responsibility for equitably distributing limited resources between large numbers of patients. By comparison, students and private providers may approach the provision of publicly funded care from a differing perspective resulting in them providing more comprehensive and extensive treatment for some patients. There is some evidence that this is the case. The available data (not presented here) indicate that in Whyalla the average value of services provided per patient for a course of general care (based on the agreed schedule of fees used by private providers) were $184.08 for student-provided care and $282.12 for privately provided care. This compared with an average value of services per patient of $133.05 for a course of care provided by public-sector dentists in rural clinics. This indicates that students and private practitioners provided 38.3 and 112 per cent more services per patient respectively, contributing to a higher total cost per patient treated.

Not unexpectedly the marginal costs which would be involved in 'adding' student-provided care to existing services are significantly lower than the total costs. If facilities and funding existed in addition to 'core' salaried and support requirements, a model involving students would have been able to provide courses of care in Port Augusta and Whyalla at a lower cost than staff dentists, with marginal costs for student-provided care ranging from 50 to 70 per cent of the average costs of care from public sector providers. The differences would be even greater if the student service mix, particularly for general courses of care, was similar to public sector providers in rural areas. Because students were providing care with a total value of up to 38 per cent higher than that provided by staff, exactly comparable courses of care provided by students would

Table 3.

	Salaried staff	Students			
	State-wide (rural)	Port Augusta		Whyalla	
	Total cost	Marginal cost	Per cent of staff total cost	Marginal cost	Per cent of staff total cost
Emergency	$57.44	$28.68	49.9	$27.15	47.3
General	$88.73	$58.59	66	$62.51	70.5

Estimated marginal cost per patient of emergency and complete general courses of care for services provided by students and salaried staff in Port Augusta and Whyalla compared with salaried staff total costs.

cost between 35 per cent (in the case of emergency care in Whyalla) and 53 per cent (general care in Whyalla) of the total average cost of staff provided care.

In addition to the quantifiable benefits arising from undergraduate students working in rural dental clinics, a number of other benefits were identified. Firstly, making available some specialist services in rural centres. Arrangements were made for visiting supervisors to provide specialist consultations and services when appropriate staff were available. Secondly, enhanced relations with private providers. The response from regional private practitioners was very encouraging with many local dentists making efforts to ensure that the students' experience of rural practice was positive. Lastly, the opportunity for students to experience closer contact with other health care professionals and to gain an appreciation of the factors that influence health care provision in rural and remote locations.

Based on the encouraging results of this project, the scheme has been extended for a further 12 months to allow more comprehensive data acquisition. In addition, other aspects of the impact of the students' experience are being investigated. These include changes in the students' attitude to rural practice, the educational value of community practice experience compared with hospital-based experience, and the community response to student practitioners.

CONCLUSIONS

The results of this study provide evidence that senior undergraduate dental students can make a significant contribution to the provision of public dental services in rural communities. Furthermore, in situations where adequate publicly-funded services are not available, the total cost of student-provided services, i.e., all travel, accommodation, supervision, management, etc., compares favourably with the cost of similar treatment provided by private practitioners. Where student-provided services can be 'added' to existing services in locations where appropriate supervision, programme management and required funding is available, the expectation is that these services could be provided at a marginal cost that would compare very favourably with the cost of similar treatment provided by either public-sector staff or private practitioners.

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