

The presenting complaints of low income adults for emergency dental care: An analysis of 35,000 episodes in Victoria, Australia.

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Objective This study examined the mix of presenting problems faced by a large diverse dental service treating low-income Australian adults and provides a basis for communities to understand and manage demand for dental services. **Design** A retrospective analysis in a state-wide multi-centre dental health service. Data for all patients (in all public adult dental clinics in the state of Victoria during May–Aug 2005) who used the emergency services in a 12 week period were recorded and analysed. A triage question tree was developed and embedded into a neural network based computer triage tool. **Results** Approximately 52% of low income adults presenting for emergency treatment required treatment on the day of triage. The main problem was with natural teeth (89.6%). Of those with natural teeth problems, 41.3% had pain disturbing their sleep patterns and 14.7% had experienced a swelling. Metropolitan patients accessed the services 2.3 times more than rural patients. **Conclusion** These data clearly highlight that there is significant opportunity to reduce nearly 48% of on-day demand for emergency dental care through the application of appropriately clinical based triage.

Key words: Dental triage, emergency, presenting complaints

Introduction

Internationally it is acknowledged that dentistry is facing increasing demand for services coupled with workforce shortages. This has led to the development of a number of innovative demand management approaches. Demand management is about ensuring the development of the most cost efficient, appropriate and equitable dental health system possible. Primarily, demand management is concerned with making the most appropriate use of dental health services, so that care needs are met in order of priority.

In Australia most dental care (85%) is provided through the private sector on a fee for service basis while the various State and Territory governments provide subsidised dental care for low-income adults. The State of Victoria covers an area of approximately 227,000 square kilometres in the south east of Australia with a total adult population of approximately 3.5 million, about 20% of which are eligible for State subsidised dental care (ABS 2005a; Australian Government 2005). The vast majority (72%) of people live in Melbourne, the major capital city with the remaining 1.4 million adults distributed over a very large rural area predominated by farming activities (ABS 2005b). Government subsidised adult dental care is provided on a regional basis in Victoria. Each region is semi-autonomous and has one or more dental clinics providing mainly general dental care. Central Melbourne has a 135 chair dental teaching hospital that provides general and specialist care as well as supporting the

State's only dental school (ABS 2005b). All government subsidised dental care is managed through a purchaser-provider arrangement from the State government (Dental Health Services Victoria 2005). Dental care for children, under the age of 18, is provided through a separate arm of the health system and is not included in this study. However, children aged between 0–5 and 15–17 years are seen if their emergency is the result of an accident. All patients aged 6–14 years are referred to the school dental service.

Until early 2005 emergency dental care was provided to different people in different ways in different regions of Victoria. However, there was a significantly growing demand for emergency dental care which was impeding the delivery of general dental care (ABS 2005b). Studies have shown telephone triage for emergency dental care is being used successfully in the United Kingdom (Anderson *et al.*, 2005a; 2005b; Topping 2005). Against this backdrop Dental Health Services of Victoria introduced a state-wide computer guided triage model to facilitate a more streamlined approach to emergency dental care. Data from the triage system provides an insight into the presenting symptoms of patients demanding emergency dental care.

This study examines the mix of presenting problems faced by a large diverse dental service treating low-income Australian adults and provides a basis for communities to understand and manage demand for dental services.

Material and Methods

A triage question tree was developed by a small working group of Victorian government clinical experts. This included dentists, dental health administrators and receptionists. This tree was refined through trialling over a three month period before being embedded into a neural network based computer assisted triage tool (Smith *et al.*, 2005). A neural network is a device modelled after the human brain, in which several interconnected elements process information simultaneously, adapting and learning from past patterns. This system learning is not fully automated. The database however is modified from time to time using the outcome of its analysis. The details of the question set and triage process was not released to the users or patients to prevent patient coaching.

Training documentation was provided prior to implementation. The triage process is undertaken by either the dental receptionist (in most cases) or dental assistant. Prior to implementation users were provided with documentation explaining the utilisation of the system and for a period of approximately four weeks the system was used in parallel to their existing processes, as a training period. A State-wide policy to ensure all patients requesting emergency dental care were triaged through the tool was implemented and this was linked to the patient management system for recording the care provided after triage. All patient responses to the questions presented by the computer assisted triage tool were recorded on a central server, and these data form the basis of the study set. Patients were asked questions in a sequence determined by their response to the previous question. For example patients reporting a problem with their natural teeth were not asked any questions related to dentures. The final diagnostic result of the question sequence can therefore be used to determine a triage category. For simplicity these categories were coded as 1 to 10 with 1 being the most urgent (requiring care on the day). The triage category (as determined by the sequence of answers) was set during the original development phase by the clinical expert committee and remained fixed throughout the study period. The advice provided

to patients ranged from immediate care through to not eligible for care. Patients were also informed that they could call back and be re-assessed if they experienced the problem to get worse.

Data were collected for a 12 week period between May 23rd and August 16th 2005 inclusive. These data points made-up the study frameset, no data was removed from the set and all regions of Victoria were included. Patients were triaged either in person or over the telephone. Although not recorded, anecdotal reports found that the vast majority of episodes were telephone derived (estimated at greater than 80%). The triage category ranged from 1 to 10 with the urgency of treatment need determined by the category.

For confidentiality reasons data from individual regions is not identified. The data is reported separately by locality to the level of metropolitan Melbourne versus rural Victoria. Population data was acquired from a number of sources including the Australian Bureau of Statistics and Dental Health Services, Victoria for 2005 population information (ABS 2005a; 2005b; 2005c). Incidence was calculated using these statistics as no matched time point population data is available.

All analysis was completed using Excel 2003, Access 2003 and SPSS Version 12.

Results

A total of 34,646 episodes of triage occurred during the study period. Extrapolating this to a full year results in an annual episode load of approximately 150,000. This is an annualised rate of just under 14,000 episodes per 100,000 low income Victorian adults. Of the 34,646 episodes 6,222 (17.9%) were from rural Victoria giving an annual adjusted rate of 7,400 per 100,000 rural dwelling low income Victorian adults. This is significantly different ($p < 0.05$) from the annualised rate for city dwelling low income Victorian adults of 17,000 per 100,000.

A total of 18,105 episodes (53.0%) were categorised as needing a dental appointment on the day of triage with the remaining 16,029 episodes (47.0%) determined to need care at a future time (Figure 1). In annualised

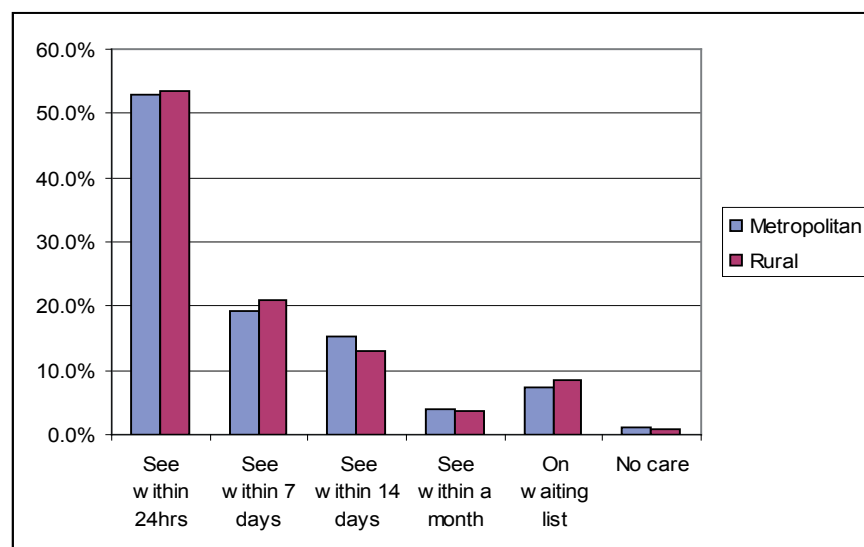


Figure 1. Type of care recommended through the triage system.

terms this equated to 7,300 episodes per 100,000 low income Victorian adults requiring dental care on the day of triage with 6,500 per 100,000 low income Victorian adults requiring non-immediate dental care.

The first question patients were asked was used to determine the type of problem they were suffering. More than 89% of respondents to this question reported a problem with their natural teeth, with only 7% reporting problems with dentures (Table 1).

Of the total 31,036 episodes reporting problems with their teeth nearly 15% reported some sort of swelling whilst less than 3% reported an accident. The remaining 82% were asked a sequence of questions to further refine their complaint. Of this 82%, under half (47.4%) reported that the problem was waking them at night, a further 39.8% suffered pain (that did not wake them at night) and the remaining 12.8% suffered no pain.

A total of 9,469 episodes (27.3% of the total episodes) had moved through the sequence of questions to the point of problem with “teeth and suffering pain that

did not interrupt sleep”. Of these, 62% reported pain on pressure or heat stimulus whilst the remaining 38% reported pain on sweet and cold stimulants.

Of the 3,457 episodes reporting no pain, 105 (2.9%) reported having an ulcer, 28.3% reported a tooth fracture affecting less than half of a tooth, 27% reported a fracture affecting more than half of a front tooth and 41.8% reported some other problem (Table 2).

Of the 674 episodes reporting an accident causing a problem with their natural teeth, nearly 65% reported a tooth fracture, 17.2% reporting a tooth had been avulsed and 18.3% reported some other problem.

Of the 1,799 episodes (5.2% of all episodes) reporting a problem with their false teeth, 819 (45.5%) reported they had a broken denture (2.4% of all episodes). Of the 819 broken denture episodes, 471 (57.2%) were unable to eat (1.4% of the total episodes). More than a third (36.9%) reported their existing dentures needed adjusting (1.9% of all episodes).

Table 1. The distribution of main problem areas as reported by patients

<i>Response</i>	<i>N (%)</i>	<i>Annual rate*</i>	<i>Metropolitan Rate*</i>	<i>Rural Rate*</i>
Teeth	31 036 (89.6%)	12 519.9	15 340.4	6940.5#
Gums	1317 (3.8%)	531.3	684.5	228.3#
False Teeth	1788 (5.2%)	721.3	974.1	221.1#
Other	237 (0.7%)	95.6	126.3	34.8#
Bleeding Socket	35 (0.1%)	23.4	29.2	12.0#
Mouth Opening	58 (0.2%)	14.1	18.8	4.8#

* Annualised rate per 100 000 low-income Victorians

Significantly different ($p>0.05$) to Metropolitan rate

Table 2. A distribution of triage episodes for patients initially reporting a problem with their natural teeth.

<i>Questions</i>		<i>n</i>	<i>% of total episodes</i>
All Episodes		34,646	100
Reporting a tooth problem	Yes ¹	31,036	89.6
¹ Have you had an accident or is your face swollen	Accident	656	1.9
	Swelling	4,440	12.8
	Neither ²	27,161	78.4
		31,036	89.6
² Are you in pain and did it stop you sleeping last night?	Tooth pain, not wakened ³	1,2820	37.0
	Tooth pain, wakened	10,753	31.0
	No ⁴	3,457	10.0
		27,161	78.4
³ What causes the pain?	Sweet or cold	4,003	11.6
	Pressure, biting or hot	6,764	19.5
		10,767	31.1
⁴ Have you broken a tooth or do you have an ulcer?	Broken front tooth, more than half	973	2.8
	Broken tooth less than half	1,021	2.9
	Ulcer	105	0.3
	Other	1,505	4.3
		3,064	8.8

Metropolitan/Rural

Of those rural patients with a problem with their teeth (92.8%), the majority had not experienced an accident or facial swelling (83.6%). This was comparable to the metropolitan patients (84.3%). When these figures were adjusted for population, metropolitan patients (17,262 per 100 000) had a significantly higher rate of triage than rural patients (7,475 per 100 000). Metropolitan people used the triage service approximately 2.3 times more than rural patients (Table 1).

Discussion

Previous research indicates that people mostly seek emergency dental care because of pain and problems related to natural teeth (Anderson and Thomas, 2003; Khaleeq-Ur-Rehman, 2003). This study confirms those findings with 89% of low-income adults in Victoria, Australia requesting emergency dental care because of a problem related to their natural teeth. Almost half of this group (47.4%) reported pain causing disturbed sleep patterns.

Applying the categorisation process developed by the clinical expert team, to the 34,646 episodes during the study period, resulted in finding that 52.3% were deemed by the triage system to require dental care on the day of triage. Earlier research found that in addition to symptom relief, the main desire for emergency dental patients may be informational and psychological, especially reassurance that the problem is not serious, and reduced uncertainty about the cause of pain (Anderson 2004). These data clearly highlight that there is a significant opportunity to reduce on day demand for emergency dental care through the application of appropriately clinical based triage. In this case a near 48% reduction in on-day demand would be expected.

In Australia a number of studies have highlighted an increased burden of dental disease in rural and remote areas (AIHW 2002; Steele *et al.*, 2000). In this study however, there was a 2.3 times higher rate of metropolitan health care card holders accessing the dental triage than rural patients. This is an even more intriguing result because proportionally more people eligible for subsidised dental care reside in rural areas (Metropolitan=20%; Rural=26%) (ABS 2005b). This confirms the results of an earlier study which indicated that rural and remote people are less likely to access dental health services (Adams *et al.*, 2004). It also confirms results of a study (Anderson and Thomas 2003) where many factors were identified to influence people seeking emergency care, and one of these included anticipated service availability. The care-seeking behaviour of people and the range of factors influencing it are complex and in this study clearly differed between urban and rural people.

The use of telephone triage has previously been investigated. It was acknowledged that this can make a significant contribution to reduction in demand for emergency care. One study (Horie *et al.*, 2005) indicated that only 68% of child patients came for care following dentist triage; and similarly another study using telephone triage for adult emergency dental care found that 40% of patients only received advice (Topping 2005). Topping

(2005) also noted that a significant proportion of adult patients told to seek dental treatment in the near future did not follow through and receive care.

Under the National Health Service in England there has been an increasing tendency to move towards out-of-hours telephone based triage (Anderson and Thomas 2000). In some areas using non-dentally qualified people to undertake guided triage processes for dental emergencies has been successfully used. Guided telephone triage by medical personnel has also been found to be an effective sifting process for emergency dental care (Horton *et al.*, 2001).

Australia, like many countries, is facing a significant shortage of dental professionals (AHMC 2004). This shortage is already affecting government dental care as the income gap between private and government dentists grow. In Australia it is estimated that a full time equivalent (FTE) dentist can provide approximately 3,200 visits of dental care per annum (Tennant 2005). With approximately 7,300 episodes per 100,000 low-income adult Victorians per annum of care required to address on-the-day emergency care it is estimated that it would require approximately 2.25 FTE dentist per 100,000. Extrapolating this estimate nationwide would mean that a total of 90 FTE government dentist time would be required to meet the demand for emergency on-the-day dental care. However, this estimate obviously disregards the issue of population distribution and distance of travel to clinical locations. These geographic issues are of particular relevance to the highly irregular population distribution that is found in Australia (AIHW 2002; Kruger and Tennant 2004). This issue is the focus of a future study.

Conclusion

It is clear from this analysis that when using the triage process, it can lead to a large proportion of patients (47.0%) presenting as an emergency, whether by phone or in person, being deemed not to require treatment on the day they presented. To screen all presenting emergency patients results in lost dentist-hours in a system that can ill afford it. Strategies to ensure cost and time effective delivery of public dental services, like a reliable triage system, can contribute to appropriate clinical care and outcomes for patients.

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