

Peer-reviewed paper; submitted May 2018; accepted July 2018

# Dental treatment of children under general anaesthesia in District Health Boards in New Zealand

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## Abstract

**Background and objectives:** To update information on the treatment of children under general anaesthetic (GA) in New Zealand in order to provide evidence for health service planning and dental care provision for children, and to determine whether District Health Boards (DHBs) have followed guidelines that were published in 2008.

**Methods:** A questionnaire was sent to all Clinical Directors of DHBs in New Zealand. This was complemented by structured interviews with a number of those Clinical Directors.

**Results:** The numbers of children receiving dental care under GA have risen substantially, from 4,646 in 2004/2005 to 7,755 in 2014 (a 65% increase). Hospital dental departments are reporting difficulties meeting demand. The 2008 guidelines have been widely used by hospital dental units in providing such care. Resources (both in the community oral health services and the hospital dental services) have had to increase; first to attempt to prevent, and second to treat those who develop decay. This has been at some considerable cost to the health system. However, many DHBs are still struggling to meet the increasing demand. All Clinical Directors believed that reducing demand for dental care under GA should be an explicit goal of the Government and DHBs.

**Conclusions:** Hospital dental units have adopted many of the 2008 guidelines, but variations persist in access to such treatment, with DHBs under more pressure than ever to cope with the growing demand for child dental care under GA.

## Introduction

Dental caries is one of the most common childhood diseases and is the cause of poor oral health in children. Many of these children are treated successfully in dental clinics with local anaesthesia; however, an increasing number of children are being referred to hospital for their dental caries to be treated under general anaesthesia (GA). Early childhood caries (ECC) and severe early childhood caries (S-ECC) disrupt the day-to-day lives of children, with chronic pain, disrupted sleep changes, in eating patterns and altered growth (Signal et al., 2012; Thomson, 2016). It has been shown that the effects on the wider family are considerable (Jankauskiene and Narbutaite, 2010). The improvement in oral-health-related quality of life following treatment of ECC provides further

evidence of the impact of this disease (Malden et al., 2008; Gaynor et al., 2012; Jankauskiene et al., 2014).

In 2003, a working group commissioned by the New Zealand Society of Hospital and Community Dentistry (NZSHCD) was set up to review and report on the services provided by District Health Boards (DHBs) for children under GA, and to use the information gained to develop a set of national guidelines. Those were promulgated in 2008 (Lingard et al., 2008) but, to date, there has been no formal review of them.

Accordingly, the aim of the current study was to provide a situational analysis of the dental treatment on children under GA in New Zealand (NZ), in order to determine whether DHBs have followed the working party's recommendations. A second aim was to describe the current state of those services and to provide evidence that can be used as a reference point for health service planning and implementation of dental care for children under GA.

## Methods

This study was approved by the University of Otago Ethics Committee. Endorsement was given by the Ngai Tahu Research Consultation Committee at the University of Otago. The study was of an embedded mixed-methods design and involved an initial collection and analysis of quantitative data, followed by a qualitative phase. All Clinical Directors from the 20 DHBs in NZ were asked to participate in the data collection. There were no exclusion criteria. The Clinical Directors were sent a questionnaire which sought information on: access to GA services, both within their own DHB, and any other DHB with which they have a relationship; the type of operating facilities available; the range of services provided; the anaesthetic staff involved; the dental staff involved; the range of clinical procedures available; acute and planned case waiting time information; assessment; and post-operative follow-up and audit information. In addition, the Clinical Directors were asked for the number of GA sessions and the number of children seen, both in a typical month and during the calendar year from 1 January 2014 to 31 December 2014.

Quantitative data from the questionnaires were entered into a database and analysed using a statistical software package (SPSS version 23). Cross-tabulations and Chi-square tests were used with categorical dependent variables, while means were compared using analysis of variance.

Qualitative data were obtained via telephone interviews. These semi-structured interviews were guided by a template that was formulated following collection of data from the initial questionnaires. However, this continued to be emergent, and provision was made for new paths of inquiry to be identified and followed. Data analysis began during (or immediately after) the initial data collection. Themes were identified and categorised. Once the interviews were transcribed, the researcher read each transcript with the aim of summarising each element. The researcher then collected all of the summaries from the different transcripts. From this, the report of findings was developed.

## Results

Data were obtained from all DHBs. The greater Auckland area comprises 3 DHBs (Auckland, Waitemata and Counties-Manukau), but these are reported together as "Auckland DHB". Otago and Southland, who form the Southern DHB, are kept as separate DHBs; historically, they have always been separate, and the University of Otago Dental School takes responsibility for treating children under GA in Otago, and it is a distinctly separate service. This means that all reports of data show NZ as having 19 DHBs (rather than the actual 20 DHBs).

Dental services for children under GA are available in each DHB region. Wairarapa is the only DHB not to

have a hospital dental service providing some dental care under GA for children, or a hospital dental Clinical Director. The data for Wairarapa DHB were obtained from Mobile Surgical Services (MSS), who provide every GA for dental care on children in the Wairarapa area, apart from those whose medical condition may require referral to Hutt or Wellington Hospitals. Wairarapa DHB is the sole DHB where MSS is the only provider.

MSS are based in Christchurch and their mobile operating theatre travels to rural centres throughout New Zealand. Dental treatment on children under GA is one of the services offered, and they provide some dental care under GA for 10 DHBs. Four DHBs use private hospitals in addition to their own facilities and MSS. This is not always a routine arrangement but is used to alleviate waiting lists when required.

The total number of children receiving dental care under GA by DHBs in 2014 was 7,470. In addition, private specialists were responsible for another 285 children (3.7%) being treated, meaning that a total of 7,755 children aged 0 to 13 years received dental care under GA in 2014. MSS provided care for 519 of these children, and so was responsible for 6.8 % of all child dental treatment operations for the DHBs.

An overview of DHB dental GA services is shown in Table 1, with data on the population, number of GAs completed, the rate per thousand of population, and

**Table 1** Overview of DHB Child Dental GA Services

DHB	Population <sup>1</sup>	Child Population <sup>2</sup>	Total GAs	Rate/1000 Total Population	Rate/1000 Child Population	Own GA Hospital	MSS used for some	Private Hospital	Adequate Access	GAs for other DHBs	Theatre Sites
Northland	166,000	36,200	500	3.0	13.8	Yes	Yes	Yes	No	No	5
Auckland	1,506,400	317,700	2000	1.3	6.3	Yes	No	Yes	No	Yes	5
Waikato	383,500	82,300	402	1.0	4.9	Yes	No	No	No	Yes	3
Bay of Plenty	217,400	45,500	354	1.6	7.8	Yes	No	No	Yes	No	2
Lakes	103,600	23,200	200	1.9	8.6	Yes	Yes	No	No	No	1
Taranaki	115,000	24,200	158	1.4	6.5	Yes	No	No	Yes	No	2
Whanganui	62,200	12,900	326	5.2	25.3	Yes	Yes	No	No	No	1
Tairāwhiti	47,100	11,600	151	3.2	13.0	Yes	Yes	No	Yes	No	2
Hawkes Bay	159,400	34,700	271	1.7	7.8	Yes	Yes	No	Yes	No	2
Mid-Central	170,300	34,200	380	2.2	11.1	Yes	Yes	Yes	Yes	No	3
Wairarapa	42,800	8,400	78	1.8	9.3	No	Yes	No	n/a	No	0
Hutt Valley	143,400	29,900	330	2.3	11.0	Yes	No	No	Yes	No	1
Capital and Coast	296,700	54,600	663	2.2	12.1	Yes	No	No	Yes	Yes	2
Nelson-Marlborough	143,100	26,800	283	2.0	10.6	Yes	No	No	Yes	Yes	2
Canterbury	514,500	95,600	682	1.3	7.1	Yes	Yes	Yes	No	No	1
West Coast	32,800	6,200	71	2.2	11.5	Yes	Yes	No	Yes	No	2
South Canterbury	58,100	10,600	88	1.5	8.3	Yes	No	No	No	No	1
Otago	214,140	36,100	230	1.1	6.4	Yes	No	No	No	No	2
Southland	95,760	20,300	303	3.2	14.9	Yes	Yes	No	Yes	No	6
Total	4,472,200	911,100	7,470	2.1 <sup>3</sup>	10.3 <sup>3</sup>	18	10	5	10	4	2.3 <sup>3</sup>

<sup>1</sup> 2014 population estimates NZ Statistics.

<sup>2</sup> Child is under 14 years of age 2014 population estimates NZ Statistics

<sup>3</sup> Mean for all DHBs

child population (under 14 years of age), those DHBs for whom MSS provide some of the care, whether they use a private hospital facility, the number of sites used to provide GAs, and whether their Clinical Director believed they had enough access to theatre. The number of GAs and rate per thousand population ranged from 4.9 operations per thousand of the child population in Waikato DHB to 25.3 in Whanganui. The overall mean was 10.3 children receiving dental care under GA per thousand of the child population, with considerable variation among DHBs.

There were 8 Clinical Directors who reported inadequate access to GA facilities for their children. Interviews with Clinical Directors revealed a growing concern that demand is increasing, but access to clinicians and theatres is not. The larger DHBs often provide care for neighbouring DHBs, showing that a degree of co-operation exists among DHB dental services. The larger hospitals have more specialist medical services available, especially for medically compromised children. The number of theatre sites available to DHBs also varies. The variation does not reflect population; rather, it reflects geographical spread. Two of the smaller DHBs (Southland and Northland) have two of the greatest number (6 and 5 respectively) of sites with theatre access, including MSS. Although the populations of these DHBs are small, their geographical size is large. Comments made in the questionnaire and

during the interviews revealed the greater difficulties these larger geographical DHBs face, with travel times for patients, assessment and follow-up all seen as being more difficult. The planning and organising of multiple sites also provides challenges which are not experienced by other DHBs. It was mentioned that the population-based funding model, used to fund DHBs for all healthcare, does disadvantage the smaller population DHBs, who are responsible for a larger geographical area.

Table 2 provides an overview of the service mix and waiting times for acute treatment, first specialist appointment (FSA) and planned treatment. The number of dental paediatric specialists working in New Zealand hospitals is low, with only 5 hospitals employing a specialist. The majority of DHB hospital dental departments do see children for assessment prior to their placement on a GA waiting list. Most are assessed by senior clinicians. However, 2 DHBs use junior house surgeons for assessment, and 4 DHBs do not assess the majority of the patients; they are placed on the waiting list straight from referral. MSS can assess the patients only from the referral letter because their clinicians are usually unable to assess their patients before the day of their treatment. Post-operative follow-up is less likely to occur in a hospital setting, with only 7 DHBs routinely seeing patients after treatment under GA. Most commonly, these post-operative appointments occur

**Table 2** Overview of DHB Child Dental GA Service-mix and waiting times

DHB	Access to Paediatric Dental Specialist	Assessment in Hospital (%)	Post-op in Hospital (%)	Other sedation services	Clinicians deciding Care	Mean WT Acute <sup>1</sup>	Mean WT Referral to FSA <sup>2</sup>	Mean WT FSA to GA <sup>2</sup>	Audit
Northland	No	100	100	Yes	Yes	3	5	14	Yes
Auckland	Yes	100	0	Yes	Yes	1	14	14	Yes
Waikato	No	100	0	Yes	Yes	5	4	10	No
Bay of Plenty	No	20	0	No	Yes	7	16	16	No
Lakes	No	100	0	No	Yes	10	5	5	Yes
Taranaki	No	100	0	Yes	No	4	8	12	Yes
Whanganui	No	30	0	No	Yes	N/A	N/A	16	Yes
Tairāwhiti	No	0	60	No	No	2	4	2	Yes
Hawkes Bay	No	100	0	No	Yes	1	6	17	Yes
Mid-Central	No	100	0	No	No	0	N/A	10	Yes
Wairarapa	No	n/a	0	No	Yes	N/A	N/A	N/A	N/A
Hutt Valley	Yes	100	100	Yes	Yes	2	12	14	Yes
Capital and Coast	No	100	100	Yes	Yes	2	4	6	Yes
Nelson-Marlborough	Yes	80	100	Yes	Yes	4	4	8	Yes
Canterbury	Yes	100	0	Yes	Yes	1	22	12	Yes
West Coast	No	0	0	No	Yes	N/A	N/A	10	No
South Canterbury	No	100	100	No	No	28	3	20	No
Otago	Yes	100	90	Yes	No	3	5	20	Yes
Southland	No	100	100	Yes	Yes	3.5	2	12	No

<sup>1</sup> Mean waiting time in days

<sup>2</sup> Mean waiting time in weeks

back in the community. There are two main reasons given for this; the first is the lack of resources available in the hospital departments, and the second is that the high appointment failure rate discourages DHBs from using their scarce resources for this activity. MSS do not see patients following treatment; those post-operative reviews are expected to be done by the referrer. Almost all DHBs offer restorative options to children (whether with or without special needs) without GA. Other sedation (either nitrous-oxide sedation or oral sedation) is offered by 50% of DHBs, in an attempt to reduce the number of GAs required. It is apparent again that the larger DHBs, or those who employ a paediatric specialist (or paediatric postgraduate diploma clinician) are more likely to offer these services. The exceptions are Taranaki and Southland, smaller DHBs without a dental paediatric specialist, where sedation is available. Auditing of services is carried out in the majority of DHBs; however, most do this in respect of outputs (such as the number of procedures) rather than outcomes (such as quality-of-life audits, or the success of treatments chosen). MSS have a detailed audit showing every clinician's individual statistics with regard to the number of extractions or restorations. A quality-of-life audit has been undertaken in Otago (at the dental school) and at Wellington and Auckland DHBs and by one private paediatric specialist. Canterbury DHB is currently doing one. Comments on audits show that, while greater auditing is desirable,

resources are limited and audits take up time which can be better utilised in seeing patients.

All DHBs reported suitable staffing of theatres with anaesthetists, anaesthetic technicians, and appropriate nursing levels, in both theatre and recovery. It is almost universal that nasal tubes are used in treating children for dental care, except where they cannot be used, and this seems to be always discussed by the dentists and anaesthetists. All DHBs reported that cancellation of theatres is rare and, if it does happen, it is usually because of anaesthetic staff shortages. This may involve an anaesthetist or an anaesthetic technician. Hospital dental departments tend to prioritise GA sessions and rearrange other clinics to make sure that these are completed rather than cancelled. It was commented in the semi-structured interviews by almost all Clinical Directors that this rearrangement of clinics places stress on their services. While most hospital dental departments are managing to see their children, this is increasingly at other patient groups' expense. Most Clinical Directors and clinicians reported their concern at the apparent rise in numbers of referrals for children having dental treatment under GA. Many do not believe that the present situation is sustainable.

Table 3 shows the mean treatment time for different DHBs, along with the mean session lengths and the hours per month available for GA sessions. The most common length of time for a treatment session for a child receiving

**Table 3** Overview of DHB Child GA Services: case lengths, session lengths and clinicians providing care

DHB	Mean length per case (mins)	Mean length of session (hours)	Hours per month GA	Percentage of treatment provided by					
				Paediatric Specialist <sup>1</sup>	Experienced Hosp Dentist <sup>1</sup>	Special Needs Specialist <sup>1</sup>	Private Practitioner <sup>1</sup>	Postgraduate Diploma (Paeds) <sup>1</sup>	House Surgeon <sup>1</sup>
Northland	60	3.5	56		80				20
Auckland	60	3.5	158	60	20	20			
Waikato	45	8.0	48		70				30
Bay of Plenty	75	4.0	64		100				
Lakes	40	5.0	20		20		70	10	
Taranaki	45	4.0	44		5	95			
Whanganui	50	4.0	32		50		50		
Tairāwhiti	60	8.0	16				100		
Hawkes Bay	50	3.5	32		95				5
Mid-Central	50	4.0	56		98		1		1
Wairarapa	60	7.6	6				100		
Hutt Valley	60	4.5	54	16	59			25	
Capital and Coast	45	3.5	77		100				
Nelson–Marlborough	60	4.0	24	90	10				
Canterbury	55	4.0	76	40	2	2		56	
West Coast	60	6.5	7		10			90	
South Canterbury	60	4.0	8				100		
Otago	105	3.5	32	100					
Southland	55	4.0	32		100				

<sup>1</sup> Percentage of treatment provided by groups of clinicians

dental care under GA is 60 minutes. It was pointed out that restorative work does take longer to complete, but most do not recommend adoption of an extraction-only policy in order to be able to complete more children. MSS report that, on average, individual treatments take sixty minutes. Experienced hospital-based dentists perform the majority of dental treatment under GA on children, with 9 of the DHBs reporting that their treatment is mainly completed by this group.

There were 4 DHBs reporting that the majority of treatment is performed by a paediatric specialist. House surgeons are rarely able to complete treatment alone, and DHBs that did report this happening commented on the requirements for this: being a second-year house surgeon; having been suitable trained and watched over time; and having easier cases selected. Private practitioners were employed, usually on a contract basis, in mainly smaller rural DHBs. MSS reported that, of the 22 contractors it used in 2015, 12 were private practitioners and the remaining 10 were hospital-based clinicians. Not surprisingly, the University of Otago Dental School was the only facility where postgraduate students completed some of the dental treatment; however, this was always supervised. Special needs dentists were reported as treating a high percentage of children in only one DHB, with another two DHBs reporting that they have special needs dentists providing care to a small number of children.

All DHBs have theatres fully equipped to offer comprehensive dental care. Only 2 theatre facilities had no machine to take radiographs and, for one of these,

the situation was to have been rectified very soon.

Most DHBs reported that clinicians decide what care is being offered, with only 4 DHBs reporting that a Clinical Director (or management) is involved in deciding the level of care, rather than the clinicians who are operating.

## Discussion

To date, there has been no formal review of the health system's response to the recommendations and guidelines which were recommended in the 2008 report prepared for the NZSHCD (Lingard et al., 2008). The aims of the current study were to provide a situational analysis of the dental treatment on children under GA in NZ. This is required to provide evidence that will be used as a reference point for health service planning and implementation of dental care for children under GA and to report on whether DHBs have followed the working party's recommendations. The current study found that the numbers of children, aged 0 to 13 years of age, receiving dental care under GA have increased substantially. Hospital dental departments are reporting difficulties meeting demand. Many of the Clinical Directors stated that the guidelines produced by the working group (Lingard et al., 2008) have been widely used by hospital dental units in treating children under GA.

The strength of quantitative data from a survey is partly dependent on a high response rate. In this study, there was a 100% response from Clinical Directors to their questionnaire. The study is dependent on the validity of the answers. The Clinical Directors were asked for the numbers of children receiving GA for dental care during 2014. It is impossible to know whether the figures given from each individual DHB are completely accurate or whether liberties have been taken and numbers estimated. Clinical Directors are assumed to have high ethical standards and the numbers are likely to be accurate. Lingard et al. (2008) were also reliant on information from DHB Clinical Directors in respect of the numbers of children treated by them under GA. The qualitative data collected in the semi-structured interviews cannot be generalised to respondents in the survey or to the source population of clinicians. However, generalisability was not the point; the interviews were intended to add depth to the quantitative data (Creswell and Plano-Clarke, 2011).

The current study has found that the total number of children receiving dental care under GA by DHBs in 2014 was 7,470. In addition, private specialists were responsible for another 285 children (3.7%) being treated, meaning that a total of 7,755 children received dental care under GA in 2014. MSS provided care for 519 of these children. This is an increase by 3,109 children receiving their dental care under GA in less than 10 years; that is, it is a 66.9% increase. Statistics NZ report that the total number of children under 14 years of age in 2014 was 911,300. This is a 2.6% increase over the 888,300 in that age group in 2006. While MSS treated 568 children (12.2%) of the 4,646 children who required GA in 2004/2005, they reported treating 519 (6.8%) of

**Table 4** Key comparisons of GA services in 2004/2005 and 2014

2004/2005	2014
4,646 children received dental treatment under GA in 12-month period	7,650 children received dental treatment under GA in 12 month-period
MSS undertook 12.2% of these GAs	MSS undertook 6.8% of these GAs
Wide variations in access among DHBs	Wide variations in access among DHBs
High demand	High demand
Little Government support in reducing demand (upstream approaches)	Little Government support in reducing demand (upstream approaches)
Waiting times very high in some DHBs	Some DHBs still have long waiting times but these are shorter overall
Wide variations in assessment	Assessment mostly by senior clinicians
Low numbers of paediatric specialists	Low numbers of paediatric specialists
House surgeons treat children under GA unsupervised in 7 DHBs	House surgeons rarely treat children under GA unsupervised
GIC the most used material Low use of SSC	SSC the most used material Lower use of GIC
Pulpotomies rarely undertaken	Pulpotomies routinely undertaken
Low use of dental dam	Low use of dental dam
Guidelines produced	Guidelines used

the 7,650 children in 2014. This shows that DHBs are now carrying a higher proportion of the load.

In NZ, the Primary Health Strategy was introduced (King, 2001) with the key vision involving a greater emphasis on population health and the role of the community, along with health promotion and preventive care. MoH figures for 2014 show that 58.6% of 5-year-old children are caries-free. However, the caries-free rate shows the prevalence of the disease but not the severity so, while it may be assumed that the higher caries-free rate would lead to decreasing demand for extensive dental treatment, certain population groups (of mainly disadvantaged children) experience very high levels of disease (Thomson et al., 2003; Gowda et al., 2009) and this study has found that many of this group require their dental treatment under GA. Social and ethnic inequalities are apparent in NZ in both adults and children (Schwendicke et al., 2015). The increasing prevalence of ECC or S-ECC over the last decade (Thomson, 2018) and the treatment of young children under GA places a considerable burden on NZ's health system (Thomson, 2016).

The 2004/2005 study found large variations among DHBs in the numbers of GAs (Lingard et al., 2008). This is still true, with considerable variation among DHBs observed in the current study. Waikato DHB has replaced Auckland DHB in treating the lowest number of children per thousand of population. Otago, Auckland and Canterbury closely followed. Whanganui reported the highest number (by some margin), followed by Southland and Tairāwhiti. Differences might be expected, since the need may vary due to the availability of water fluoridation, but the reported variations are greater than can be explained by water fluoridation alone. These inequalities are most likely because of an interaction of underlying disease levels, socio-economic deprivation, the relationship between the community oral health services and the hospital dental unit, and importantly, the size, and staffing levels, of the hospital dental unit. It is apparent that not only are there differences among DHBs in the number of children seen, there are also inequalities in the number and mix of clinicians employed by DHBs.

There were 8 Clinical Directors who reported inadequate access to GA facilities for children in their area. The questionnaires were completed by Clinical Directors in August 2015, some 8 months following the MoH lowering the waiting time from FSA to GA treatment from 5 months to 4 months. During the interviews, conducted in February 2016, it was evident that services were coming under more pressure than was the case earlier. While most clinicians support audits or monitoring, many state that there is simply no time. However, all hospital departments should be encouraging the collection of data and conducting quality-of-life audits in order to support arguments for change.

Well Child and Tamariki Ora providers such as Plunket have a critical role, working in communities with families and raising awareness of the importance of good oral health and the role they can play in ensuring that their child remains caries-free. Through programmes such as 'Lift the Lip', these providers can identify the young

children who are at the greatest risk of developing caries, raising awareness and promoting coordinated care for children in health and oral health at an early age. The community oral health service is responsible for enrolling preschool children and taking action to protect, promote and improve oral health of children, thereby reducing the prevalence and severity of ECC. However, a significant barrier is that a minority of children are having the major amount of oral health disease. The high risk children identified using family SES as the basis for caries risk assessment at 9-12 months of age should have 6-monthly topical fluoride applications (Coop et al, 2009). This may be achieved by stretched community services, by delaying the first visit for children who are at low risk of dental caries. There is debate whether a targeted approach is an appropriate response for the high risk children; universal coverage, such as community water fluoridation, making the greatest difference (Watt and Sheiham, 2012).

Inequalities have been shown in oral health in NZ (NZ Oral Health Survey, 2009); poorer oral health exists in Māori and Pacific children as well as those living in areas of higher socioeconomic deprivation.

**Table 5** Additional recommendations for GA services

Recommendation	
1	Dental dam, whenever possible, should be used when providing dental care to children under GA. Dental dam improves access and isolation and protect the soft tissues. It prevents water and debris from entering the pharynx.
2	Auditing of services, both clinical and quality-of-life audits should be completed routinely by hospital dental services. Hospital dental units must allow clinicians enough time to allow this important duty to be able to be completed.
3	Data on referrals, from the community oral health services should also be collected. This should include details on age, ethnicity, treatment required, and siblings. Hospital dental services and community oral health services should meet regularly to discuss their respective aims and roles and to work together.
4	Community oral health services should proactively engage with all siblings of children who have received dental treatment under GA. In order to reduce their risk of caries experience.
5	Targets for the number of referrals from the community oral health service should be agreed upon and set. This could be done at DHB level, or nationally by population level, adjusted for SES deprivation levels and fluoridation status. Community dental services need to identify any outlier referrers and provide assistance to these clinicians, if required.
6	A formal training program organised by the dental paediatric specialists be implemented. This should be available to be completed by all dentists, who intend to treat children under GA, including general private practitioners.
7	Written treatment guidelines should be formulated; these should be written by the dental paediatric specialists but in consultation and agreement with the NZ Society of Hospital and Community Dentistry, to improve the consistency of dental treatment under GA throughout NZ.



There are 3 main challenges to reducing inequalities that occur in caries experience in NZ: the poor oral health of low-SES families; a focus on individual behaviours; and the increasing amount of the marketing of high-sugar products. It will require action on all these areas if any meaningful reductions in dental caries are to be achieved. Lingard et al. (2008) suggested that other factors are also changing expectations of the provision of treatment under GAs. It may be seen as a convenient alternative to routine care by either primary dental services or parents. Also suggested were changes in children's behaviours, a lowering of parent's preventive strategies at home, or a failure of the community dental services to implement effective preventive regimes. Without monitoring, audits or research, this will be difficult to change.

This study also confirms the inequality of access in receiving dental care under GA among DHBs that was reported by Lingard et al. (2008). While most clinicians accept that this is undesirable, there is a general belief that it cannot be changed. Some DHBs do require more resources in order to be able to meet the MoH elective performance indicators, because the children cannot be sent back to the primary care provider, as they can in other medical disciplines. There are also differences on how collaboratively some hospital departments work with their community oral health service counterparts. If demand for dental treatment under GA is to be reduced, it cannot occur without these services working together for a common goal. It was observed that one of the targets for the community oral health services should be to reduce the number of referrals for GAs. Any changes that the hospital dental services may make alone will not significantly alter their capacity to meet the demand (without extra resources).

The guidelines recommended by the working group of the NZSHCD (Lingard et al., 2008) were intended by the society to be adopted by the MoH as a standard for all DHBs to implement. While this has not happened, it is apparent that all DHBs have taken steps to follow these guidelines. These guidelines are still relevant in this current environment; however, there are several additional points which could be added to those especially the collection of data on referrals, auditing of services, both clinical and quality of life. Access to theatres, equipment and materials have improved. Experienced hospital based clinicians are now providing the majority of assessments and treatment.

However, the substantial increase in the number of children requiring GA for their dental treatment (66.9%) is somewhat surprising and disappointing, considering that they are receiving treatment for what is essentially a preventable disease. The figure of 7,755 children receiving their dental care under GA in a single year must be a concern. All Clinical Directors believed that reducing demand for dental care under GA should be an explicit goal of the Government and DHBs (which at present it is not). National water fluoridation is a major opportunity to reduce caries in young children at high risk (Treasure and Dewar, 1994; Schluter and Lee, 2016). However, this requires action at the highest level, with intervention from

the Government. The recent announcement to place decisions on community water fluoridation in the hands of DHBs (instead of territorial local authorities) may see an improvement, but also may be seen as a missed opportunity for the Government to show leadership in an area of proven prevention. The most common 'upstream' approaches suggested are: the taxing of sugar; reducing the marketing and promotion of sugary foods; healthy food policies in schools; reducing child poverty; healthy warm homes; and community water fluoridation. All of these initiatives require Government support, which has been lacking over the past decade or so.

Only Government policies can help reduce these inequalities. Success cannot be achieved without political leadership. The community at large and other health professionals do not recognise ECC (or S-ECC) as an important problem. Dental health, unfortunately, has not been a priority for most governments.

## Conclusion

This study has successfully met its aims. It has shown that the numbers of children requiring dental care under GA in NZ have increased substantially. DHBs are now under more pressure than ever to cope. This information will be needed for health care planning in both the hospital and primary care sectors. The study has also shown that hospital units have adopted many of the 2008 guidelines even though these guidelines were never officially adopted by the Ministry of Health, as intended by the NZSHCD.

However, in addition to the 2008 guidelines, it is recommended that several additional guidelines be implemented. The collection of data and auditing of both patient referral and the treatment provided under GA should be undertaken by community and hospital services. This should be a regular and required component of providing this care.

Most clinicians and Clinical Directors felt that a formal training programme organised by the dental paediatric specialists be implemented. This should be available to be completed by all dentists (including general dentist private practitioners) who intend to treat children under GA. However, it was not intended that this be so stringent that it remove the ability of general practitioners to participate, because they have a valuable contribution to make. Associated with this, it is recommended that treatment guidelines be compiled to provide guidance to clinicians. Mentoring to all clinicians should be available.

The children who receive dental care under GA are high-risk children, and their siblings should routinely be considered to be so as well; the community services must make every effort to identify those. It was recommended that community services set and use targets in respect of referring children for GA, not to penalise children who require this treatment but to highlight the need to identify solutions to the constant increase in numbers of referrals. The most important aspect of this review was the fact that the Government does not, at present, acknowledge that caries is a problem and it must be part of our collective responsibility to keep pressing for this recognition.

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