

**BRIDGING THE GAP: AN INTEGRATIVE LITERATURE REVIEW ON
GUIDELINES FOR THE USE OF DENTAL GENERAL ANAESTHESIA IN
CHILDREN**

Submitted in partial fulfilment
of the requirements for the Degree of
Master of Health Science

At the
Eastern Institute of Technology
Hawke's Bay, New Zealand

Anne Hu

2021

Copyright is owned by the author of the dissertation. Permission is given for a copy to be downloaded by an individual for the purposes of research and private study only. The dissertation may not be reproduced anywhere without the permission of the author.

I declare that the work presented in this dissertation, is, to the best of my knowledge and belief, original and my own work, except as acknowledged in the text and reference pages.

Date25/01/2021.....

Abstract

Bridging the gap: an integrative literature review on guidelines for the use of dental general anaesthesia in children

by

Anne Hu

Dental general anaesthesia (DGA) in children has become widely accepted in many countries, including New Zealand. This is a risk to patients' health and well-being; as the DGA referral volume increases, so does the length of the theatre waitlist, and subsequently, critical treatments for these patients are delayed. This is alarming as dental caries themselves are a preventable disease. The aim of this research is to review and analyse the literature on DGA referral criteria and care pathways, and with the findings, to recommend guidelines for the use of DGA in children in New Zealand.

DGA referral guidelines for New Zealand children were called for in 2008 by a working group commissioned by the New Society of Hospital and Community Dentistry. However, this integrative literature review could find no evidence in the adoption of consistent national guidelines or on subsequent recommendations. International evidence suggests that the DGA referral rates for children could be reduced by up to 50% through a combination of; improving practitioners' skills on behaviour management strategies in clinics, rigorous assessment of the need for DGA referrals in the face of alternative treatment modalities, improved informed decision-making of the parents, and ultimately a clear set of guidelines for DGA referrals in children.

This integrative literature review identified 15 articles from four databases and synthesised nine themes. The themes were translated into recommendations which could form the basis of a pilot study for the guidelines of DGA in children. The evidence level of this review is sufficient to support a pilot study, according to the John Hopkins Nursing Evidence-Based Practice model.

Enabling practitioners to reduce their DGA referral rates is only a form of disease management, an interim solution to this public health crisis. The real disease solution is, and has always been, to focus on addressing the root cause of dental caries via public health prevention measures.

Keywords: dentistry, oral health, general anaesthesia, children, holistic, referral, criteria, care pathway, guideline.

Acknowledgements

I would like to acknowledge all who have inspired me to strive for excellence in academia and in my career thus far. Thank you for staying true to our pride and passion in delivering healthcare to patients in our community, and thank you for encouraging me to challenge our own practices so that we never settle with complacency.

I would like to extend my gratitude to my family, who have been very supportive when I have moments of doubt. To my newlywed husband, thank you for being so patient with me when I am on my study streaks. Lastly, I am extremely thankful for my academic supervisor Dr Patrick Lander, who tirelessly walked alongside me through my dissertation journey, guiding me with his expertise and providing insights from his wisdom – without him, I would not be where I am today.

Table of Contents

Abstract	iii
Acknowledgements	iv
Table of Contents	v
List of Tables	vi
List of Figures	vii
Chapter 1 Introduction	1
1.1 Research purpose	2
Chapter 2 Method	3
2.1 PRISMA guidelines	4
2.2 PICO framework.....	4
2.3 John Hopkins Nursing Evidence-Based Practice	5
2.3.1 Practice question	6
2.4 Research project approval.....	6
Chapter 3 Results	7
3.1 PRISMA flow diagram.....	7
3.1.1 Exclusion reasons.....	8
3.2 Evidence level	8
Chapter 4 Findings	10
Chapter 5 Discussion	18
5.1 A need for guidelines	18
5.2 Improved care through interdisciplinary prevention.....	19
5.3 Consistency in clinical decision making.....	20
5.4 Translation of evidence	21
5.4.1 Evidence quality.....	22
5.5 Limitations	23
5.5.1 Evidence level and quality.....	23
5.5.2 Researcher bias	23
5.5.3 Exclusion criteria.....	23
5.5.4 Other at-risk patients.....	24
Chapter 6 Recommendations	25
References	29
Appendix A John Hopkins Nursing Evidence-Based Practice Evidence Appraisal Guidelines	33
Appendix B EIT Research Project Approval	36

List of Tables

Table 1	PICO search keywords	4
Table 2	Integrative literature review search terms.....	5
Table 3	Article type and level of evidence	9
Table 4	Dental general anaesthesia referral indicators by authors (years).....	16
Table 5	Table summary of research themes and translation	21

List of Figures

Figure 1	Conventional dental general anaesthesia process.....	1
Figure 2	John Hopkins Nursing Evidence-Based Practice: three-step process.....	5
Figure 3	PRISMA flow diagram of the research process.....	7
Figure 4	Recommended guidelines for the use of dental general anaesthesia in children.....	26

Chapter 1

Introduction

Dental caries, also known as tooth decay, is a fully preventable disease; however, it is difficult to address due to the complex interplay of multiple contributing risks such as social, behavioural, cultural, and economic factors (Ministry of Health, 2006). It is a major public health concern globally and is the most widespread non-communicable disease (World Health Organisation, 2017). Quality of life is greatly impaired when one suffers from sensitivity and pain caused by cavities and infection. The teeth affected are filled or extracted, especially in the case of deciduous (baby) teeth, and the treatment procedures are not of pleasant nature (Lingard et al., 2008).

General anaesthesia is a tertiary health service provided, usually in a hospital theatre setting. It is an essential service which enables operations to be performed on patients who might not otherwise tolerate the procedure in other settings. Like many countries in the world, general anaesthesia is used in New Zealand for dental practice; this is referred to as dental general anaesthesia (DGA).

The use of DGA in children is often due to their inability to cooperate in the community dental clinic setting, which is where their routine care is provided. Common reasons for their inability to cope are: patient's age, type and extent of treatment required, and being medically compromised (Savanheimo et al., 2012). Hence the use of DGA in such children is commonly recommended, as it is the fastest approach to eliminate pain and infection with the minimal amount of traumatic experience to the children (Haworth et al., 2017). The figure below depicts the current or conventional DGA process adapted from Tyrer (1999).

Figure 1 Conventional dental general anaesthesia process



New Zealand Ministry of Health data shows that young children's oral health status in New Zealand has worsened since the late 1990s, and this appears to be consistent with the international trend (Lingard et al., 2008). In New Zealand, there are approximately 5000-7000 cases of children undergoing DGA every year (Thomson, 2016). The wide acceptance of the use

of DGA and the on-going increase in DGA referral volume in children have subsequently created a greater DGA waitlist and longer wait-time. This growth puts stress on the tertiary health system, as hospitals do not have the capacity to meet the demand in delivering service within the critical timeframe. This is problematic, as children on the waitlist for an extended period are without many options for care. During the wait-time, the children's oral health status deteriorates further and suffer more discomfort (Goodwin et al., 2015). In children, this can greatly affect his/her and the whanau's quality of life in the form of disruption to their daily routine such as eating, playing, learning, and resting, as well as the development of further negative attitudes and behaviours towards dentistry (Jiang et al., 2019). As a result, this overloaded DGA process becomes a wider public health issue. Over the past ten years, concerns have been raised around the use of DGA in children in New Zealand and worldwide (Lingard et al., 2008). As a response, many institutions have identified reducing DGA referrals and waitlist as a health priority, but how this is to be achieved is unclear in the face of limited consensus around DGA practice (Rogers et al., 2018).

The existing research around DGA is mostly quantitative and clinically focused. There is a lack of research leading up to the DGA event, and post-operative DGA follow-up activities on patients to measure the long-term oral health-related quality of life outcomes (Haworth et al., 2017). There are some generalised research findings advocating for a change to the current DGA referral process, but these have disjointed information and no specific solutions – indeed other authors have concluded that there are no standard policies or guidelines for the use of DGA in children to-date (Rogers et al., 2018).

The gap between the current process of DGA clinical practice and managing the increasing DGA referrals and waitlist is a clearly identified public health issue, hence the need for research investigation in this area.

1.1 Research purpose

The aim of this research is to review and analyse the literature on DGA referral criteria and care pathways, and with the findings, to recommend guidelines for the use of DGA in children in New Zealand.

Chapter 2

Method

The review of literature can take many formats (integrative, systematic, meta-analysis, qualitative, etc.), and it is an especially important practice used for both information gathering and developing evidence-based practice by seeking solutions from the literature on health-related problems (Coughlan & Cronin., 2017).

This research project took the format of an integrative literature review. An integrative literature review is one which summarises existing research and draws conclusions on a given topic (De Souza & Carvalho, 2010). It is a review that permits research in its broadest sense; allowing a review to encompass a diversity of literature not limited to empirical studies, as theoretical or conceptual literature is considered just as powerful (Torraco, 2005). An integrative literature review can provide a more comprehensive understanding of a concept, or it can be used to create a new perspective of a concept. This is particularly useful during the early stages of exploration or development of a solution when there is uncertainty or a lack of clarity in a health-related problem (Whittemore & Knafl, 2005).

Furthermore, because the researcher on this project is a practising oral health therapist, an integrative literature approach enabled this project greater insight than other review formats may have provided. Costley, Elliott & Gibbs (2010) noted the benefit of an 'insider' research being well-positioned to make powerful challenges to the status quo by investigating in-depth an area of interest or concern. There is no current literature on standard policies or guidelines for the use of DGA in children (Rogers et al., 2018). The combination of an insider interpretation and integrative literature review is justified for this research project.

This review adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as the preferred reporting method for research, using search terms formulated from the PICO framework. The combination of search keywords used were: 'dental', 'general anaesthesia', 'referral' AND/OR 'criteria', 'children' AND/OR 'paediatric'. The search was performed on four electronic scholarly databases: Cumulative Index to Nursing & Allied Health Literature (CINAHL), National Library of Medicine (PubMed), Science Direct, and Scopus. The search was limited to the English language. All search results were exported to Endnote X9 for screening. Eligible search results had their full-text articles attached.

2.1 PRISMA guidelines

PRISMA is the preferred reporting method for research. It is an evidence-based practice suitable for healthcare-related questions, using a minimum set of items for reporting. The PRISMA flow diagram in the next chapter depicts the different phases of article selection for the integrative literature review by mapping out at each stage the number of articles identified, included and excluded, followed by the reasons of exclusion.

2.2 PICO framework

The PICO (Population, Intervention, Comparator, and Outcome) framework was used to develop search terms for this integrative literature review (see tables 1 & 2). It is important to formulate accurate search keywords, as this affects the relevancy of articles generated from the databases, and subsequently, the information to draw conclusions from for evidence-based practice to support the healthcare-related concern (Centre for Reviews and Dissemination, 2009).

Table 1 PICO search keywords

Population	Intervention	Comparator	Outcome
Paediatric	Dental	Pain management	Awareness
Children	Oral health	Alternative treatment	Education
	General anaesthetic		Health guidelines
			Health system review

The targeted population of this review is children who are generally healthy but cannot cope in the community dental clinic setting for their routine care. The children's specific age, gender, ethnicity, dental health risk, and social-economic status were not deemed a priority for the purpose of this review. This group of generally healthy children makes up the biggest portion of DGA referrals; it is also the group that has the most potential to contain 'false' DGA referees, i.e., children referred for DGA who could have been treated in the community clinic according to Rogers et al. (2008). Children who are medically compromised, with complex medical conditions or special needs were not included in this review, as they do not fall under the care of routine dentistry. Sedation is not currently funded as a routine care option in New Zealand public health (Lingard et al., 2008); it was also not a feature of this review.

Table 2 Integrative literature review search terms

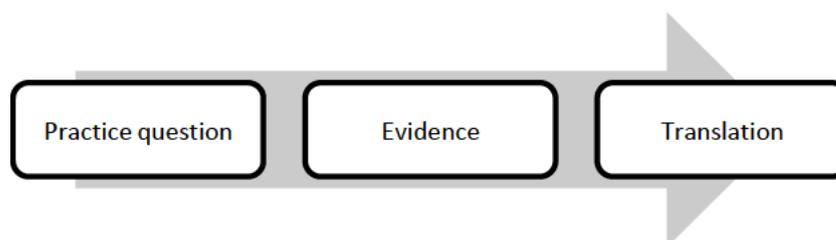
Inclusion criteria	Exclusion criteria
Dental	Non-dental
General anaesthesia	Sedation
Children	Special needs
Paediatric	Medical conditions
Referral	Adults
Criteria	Non-referral related

This research aim is to review and analyse the literature collected on DGA referral criteria and care pathways, and with the findings, to recommend guidelines for the use of DGA in children in New Zealand. Based on reducing DGA referrals and waitlist as a health priority for the targeted population, the anticipated research outcome topics may include: pain management, social visits and dental clinical confidence-building activities, parental/whanau health education, motivational interviewing, and behavioural management techniques (Coates et al., 2009).

2.3 John Hopkins Nursing Evidence-Based Practice

In conjunction with the PRISMA guidelines and PICO selection, this integrative literature review also adopted the John Hopkins Nursing Evidence-Based Practice (JHNEBP) model as a powerful problem-solving approach and as a clinical decision-making tool (Dang & Dearholt, 2017). The JHNEBP model, depicted in figure 2, is designed specifically to meet the needs of practitioners and seeking solutions to their research questions in the health industry with the use of a three-step process called PET: practice question, evidence, and translation. These steps are outlined in this review, specifically in sections 2.3.1 (practice question), 3.2 (evidence), and 5.4 (translation). The goal of the PET model is to ensure that the latest research findings and best practices are quickly and appropriately incorporated into patient care.

Figure 2 John Hopkins Nursing Evidence-Based Practice: a three-step process



The JHNEBP model is used to maintain the practical focus of this review, in addition, the rating of evidence will also serve to bring a form of rigour to the analyses of the articles.

2.3.1 Practice question

Part of the aim of this review aligns with the JHNEBP practice question; to recommend guidelines for the use of DGA in children in New Zealand.

2.4 Research project approval

Research approval was obtained from the Eastern Institute of Technology Research Ethics and Approval Committee (see Appendix B). Ethical approval was not applicable to this research project as this integrative literature review consists of data translation of existing literature and does not involve any individuals requiring consent to participate.

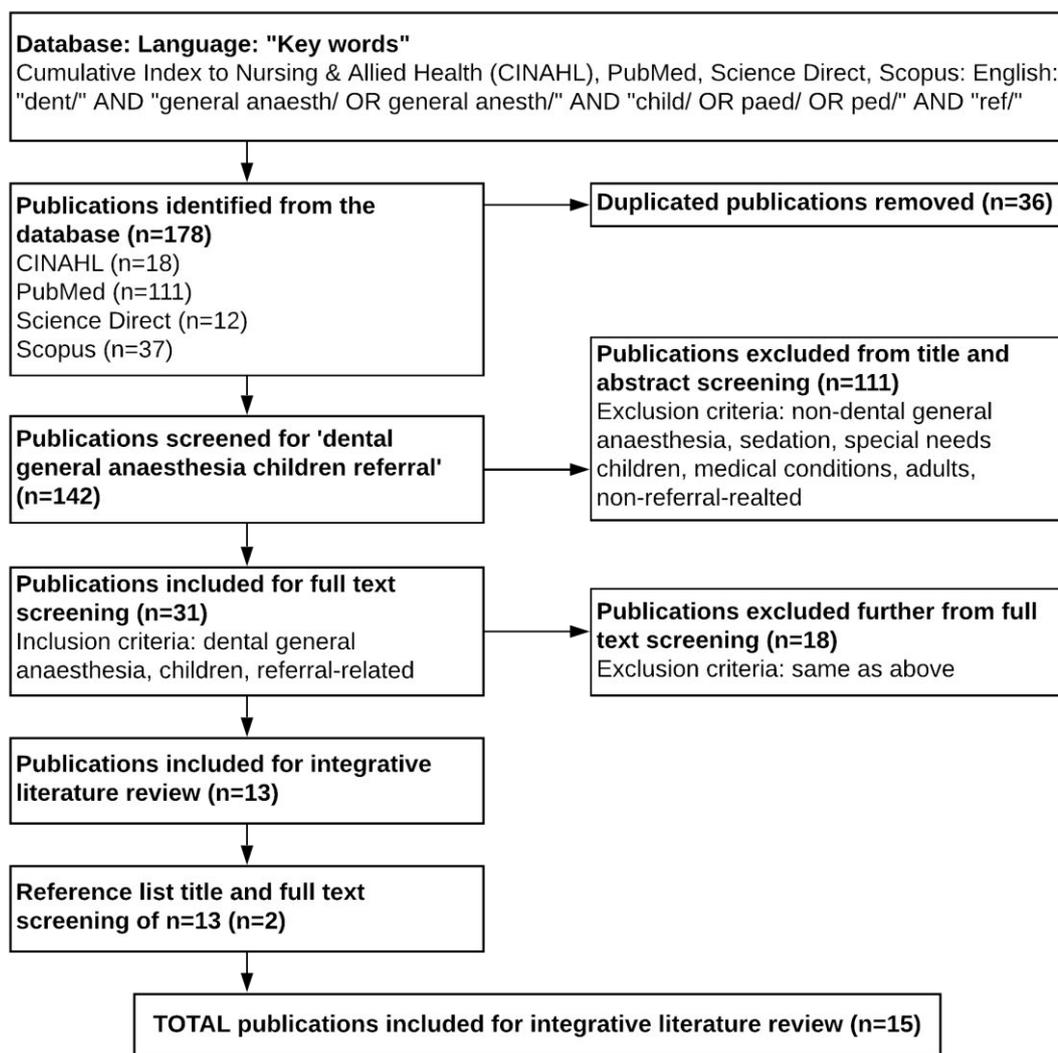
Chapter 3

Results

3.1 PRISMA flow diagram

The search of four databases yielded a total of 178 articles; the PRISMA flow diagram in figure 3 describes how these results were subsequently treated.

Figure 3 PRISMA flow diagram of the research process



The search terms described in the PRISMA flow diagram in figure 3 identified a total of 178 articles. The search results were exported to EndNote X9, and subsequently, 36 duplicates were removed. The remainder 142 articles were title and abstract screened for relevance using

the inclusion and exclusion criteria. This left 31 articles for full-text screening using the same criteria. Finally, 13 eligible articles went forward for full-text analysis. During this process, two more articles were identified from the reference list of the 13 articles, making a total of 15 articles included in this integrative literature review.

3.1.1 Exclusion reasons

An initial search to pilot the inclusion criteria yielded extraneous literature relevant to DGA on topics including: rate of repeated theatre admission, demographic profiles of patients (sex, age, ethnicity, and socioeconomic background), special needs and complex medical conditions, treatments received under DGA (radiographic utilisation, compare and contrast between different clinicians, choice of restorative materials and techniques), compare and contrast between general anaesthesia and sedation methods, general anaesthesia induction techniques, quality audit of incorrect or lack of information provided in referrals (names, contact details, and treatment plan), facilities and equipment in theatre, surgery attendance rate, correlation between caries experience and high-risk patient groups, and variables associated with dental caries.

These articles form the evidence-based practice associated with the current health system (Raja et al., 2016) and DGA process (Brown et al., 2019). However, these articles were heavily focussed on the clinical aspects of DGA. They did not meet the inclusion criteria of this research project and as such, were excluded from this review.

Haworth et al. (2017) identified that there is extremely limited quantitative and qualitative research leading up to the DGA event and post-operative DGA follow-up activities to measure long-term oral health-related quality of life outcomes, nor on addressing how to reduce the DGA referral volume and the waiting period. When such exclusion criteria are utilised, evidence from these search results would support that position.

3.2 Evidence level

To demonstrate the rigour in this review, and in line with JHNEBP model, each article in this integrative literature review was appraised and given a quality evidence level rating using the JHNEBP evidence level and quality guide (Appendix A).

All 15 articles have an evidence level of Level III to IV; the majority of articles identified are qualitative studies with a few studies being opinion-based by specialists or clinical practice guidelines. According to the JHNEBP model, information synthesised and translated from Level III and IV evidence are to be used under the advice 'proceed with caution', any outcomes recommended are for small scale only, such as pilot studies, before any full-scale change implementation.

Table 3 Article type and level of evidence

Article (Author[s], Year)	Evidence Type	Evidence Level
Adewale et al., 2011	Opinion; clinical practice guidelines	Level IV A
Albadri et al., 2006	Qualitative	Level III
Aminabadi et al., 2016	Qualitative	Level III
Brown et al., 2019	Qualitative	Level III A/B
Clayton & Mackie, 2003	Qualitative	Level III A/B
Dziedzic, 2017	Opinion; clinical practice guidelines	Level IV
Flynn & Strunin, 2005	Opinion; clinical practice guidelines	Level IV B
Lingard et al., 2008	Opinion; clinical practice guidelines	Level IV A
Raja et al., 2016	Qualitative	Level III
Roberts, 1990	Qualitative	Level III A/B
Shepherd & Ali, 2015	Qualitative	Level III A/B
Tochel et al., 2004	Qualitative	Level III A/B
Tyrer, 1999	Qualitative	Level III A/B
Weddell et al., 2015	Opinion; clinical practice guidelines	Level IV A
Winder, 1990	Qualitative	Level III C

Chapter 4

Findings

This chapter presents the findings from the 15 articles included in this integrative literature review. The information-gathering process included an initial reading of the 15 articles in full-text, followed by repeated in-depth reading and note-taking of each publication. Each article was interpreted and the information synthesised into themes. On reading and re-reading the articles, existing themes were strengthened, or new themes were generated. Through the 'narrative summary approach', the data were extracted in an interpretive expression. The data were then compiled into themes and presented in a comprehensive and coherent manner, as per methods described by Coughlan & Cronin (2017). The 15 articles had mostly similar outcomes, which enabled the synthesis of common themes for translation into the final recommendations. A lot of reflection and revisiting of articles occurred during processing. However, since data extraction and analysis were conducted by a single researcher, it was challenging to control or minimise researcher bias.

The nine themes which were synthesised from the 15 articles are described below. These themes were used to inform parts of the recommended guidelines for the use of DGA in children which conclude this dissertation.

Theme 1. New Zealand evidence of a need for guidelines

A working group commissioned by the New Zealand Society of Hospital and Community Dentistry in 2008 reviewed the situation at the time regarding access to dental treatment provided under general anaesthesia among New Zealand District Health Boards. The working group sought to identify if there were any guidelines for the referral of children to go under DGA, existing guidelines for post-operative DGA follow-up, or practises on continual risk management of patients. The working group's findings described inappropriate and inconsistent care across the District Health Boards and suggested the DGA process should be reviewed (Lingard et al., 2008). This integrative literature review has been unable to locate any update to the 2008 article suggesting that there had been no change in New Zealand DGA practice or oral health policies and guidelines at a national level since.

Theme 2. International similarities

Allied to the New Zealand trends, there were concerns to the current DGA process, especially around reducing the waitlist and wait-time in countries such as Scotland, England and Australia. They also had limited respective national information on the solution this practice question (Tochel et al., 2004). The literature research signalled the value of having a holistic care pathway route, with experienced staff who could provide alternative treatment modalities (where indicated), and the importance of providing continuous post-operative DGA care and education (Shepherd & Ali, 2015). Tyrer (1999) challenged national structures by calling for an auditing system to be developed to monitor clinicians who place the referrals and those approving the referrals. Under an auditing system, clinicians would be required to demonstrate that all means of appropriate alternative treatments had been exhausted before arriving at the final decision of utilising DGA.

Theme 3. Timely care

The progression of dental caries is frequently rapid in deciduous teeth. Once established, it could spread to the neighbouring teeth and cause episodes of pain and infection. Early extraction of deciduous teeth could lead to space loss and subsequent orthodontic issues that are not funded publicly in some countries (Lingard et al., 2008). Timely care could avoid extensive interventions such as teeth extractions as dental caries identified at an early stage could be addressed with treatments less invasive and traumatic. Also, Winder (1990) recognised that scheduling regular social visits as part of the timely care regime could allow the building of clinical familiarity and confidence in apprehensive children.

Apprehensiveness was a key contributing factor in the majority of the DGA referrals. However, the literature search also acknowledged that DGA was essential for some children when it was justified and appropriately utilised (Savanheimo et al., 2012). Lingard et al. (2008) identified that keeping children in primary care for "active review or monitoring [building clinical confidence]" whilst being on the DGA waitlist for extractions (due to pain and infection) did little beyond only managing symptoms in the form of antibiotics. Hence, timely access to care, be it diagnosis, treatment in the community clinic, or DGA is important. This theme of timely care presented itself through the literature search; as such, it would be remiss not to identify it. But because of the way in which terms around timing can be applied, this theme does not feature in the recommendations that emanate from this review.

Theme 4. Informed decision-making

An article by Tyrer (1999) acknowledged the need for informed decision-making around DGA, identifying that it was everyone's responsibility to know that any general anaesthesia in the absence of a clinical need was not sufficient to proceed. Lingard et al. (2008) further this notion by identifying that dental treatment under GA should not be regarded as a convenient alternative to routine dental care just because of the number of visits and time required for treatment, nor should the clinician's workload, parental pressure, a lack of operator experience, a lack of primary care facilities should influence the clinical justification of a DGA referral. Professionally, it was the referrer's responsibility to thoroughly explain the treatment plan and risks involved with DGA to the patient, and where possible attempt alternative treatment modalities. Clayton and Mackie (2003) clarified that a good quality DGA referral should include clear justification indicating the need for DGA, any interim method used to relieve pain while the patient was on the waitlist for DGA, and any alternative treatment options attempted.

In some practices, parents do have the opportunity to self-refer for a DGA. Here again, informed decision-making is important and would perhaps make a difference if parents knew the full scope of risks and benefits of treatment under DGA. Self-referral to DGA should be screened with the same criteria so that consistency in care could be achieved. But without the comprehensive and accurate advice given to families through public education advocated by Adewale et al. (2011) and the standard endorsed by the primary healthcare staff themselves, the attitude of 'DGA is convenient' would not change (Lingard et al., 2008).

A notable absence from the majority of these articles was the role of patient education in decision-making in whether to stay in primary care or refer to DGA (tertiary care). Adewale et al. (2011) suggested that at every point of patient contact was an opportunity for patient education which should occur in conjunction with the DGA referral process. Roberts (1990) noted that education and social visits to build dental confidence should still take-place post-DGA for better engagement and lifelong dental experience as a dental patient. However, none of the 15 articles included in this review considered a health promotion intervention in order to prevent DGA in the first instance; which could thereby be reducing the waitlist and associated cycle.

Theme 5. Avoiding repeated dental general anaesthesia

Children who have undergone DGA were shown to still be in the high-risk group of developing further dental caries if lifestyle choices and health behaviours were not changed (Lingard et al., 2008; Shepherd & Ali, 2015). Unfortunately, there were no clear policies and guidelines in place related to discharging patients and post-operative DGA follow-up care with the original referrer. Lingard et al. (2008) recommended a recall timeframe of within three-months after DGA, suggesting that the shorter recall time than a normal (6 to 12-month) check-up could maintain engagement and review health education and perform preventive measures. This approach was supported by Shepherd & Ali (2015), who asserted that the cumulative effect of regular visits should keep the treatment intervention at minimum or less invasive, and possibly avoid further repeats of DGA sessions.

Three of the 15 articles (Brown et al., 2019; Raja et al., 2016; and Tochel et al., 2004) identified in this review acknowledged that avoiding repeated DGA was a problem and key to reducing a waitlist. Tochel et al. (2004) reported that up to 31% of children requiring DGA were referred for further treatment under DGA. DGA readmission not only has a financial cost to the service providers, it also creates a burden to the DGA waitlist, and delays care for all patients and their whanau (Brown et al., 2019). Only one article advocated targeting the root cause of dental caries as part of routine care. A prevention-focussed approach could reduce the number of DGA referrals in the first place and thereby avoid repeated DGA (Flynn & Strunin, 2005).

Theme 6. Alternative treatment provision

It was clear from the literature some DGA is unavoidable (Lingard et al., 2008) however by utilising alternative methods of treatment including education (Aminabadi et al., 2016), and improving the children's confidence and cooperation in the clinical environment (Brown et al., 2019) some children can avoid DGA altogether (Flynn & Strunin, 2005).

In order to expand care provision, Winder (1990) also advocated for greater use of the workforce allied to dentists to be incorporated into the DGA process. In countries such as the UK, Australia, and New Zealand, a cohort of clinicians named dental or oral health therapists are employed in a community service by the Ministry of Health, who provide care to preschool, primary and intermediate school children including preventive and restorative treatments. The intervention of this workforce for early-age patients can provide education, preventive fissure sealants or coatings, temporary dressings, stainless steel crowns, fluoride

varnish application, and conduct radiographic examination which could accumulate to prevent DGA referrals. Shepherd & Ali (2015) noted that this workforce is better at engaging children due to the advantage of working with them from a young age. Children do cope better in clinics where they have their routine care and have an increased chance to successfully complete treatments under local anaesthetic in familiar clinics, especially once they reach school-age. Dental and oral health therapists thus have an advantage when it comes to avoiding DGA referrals in children.

Theme 7. Second assessment by an experienced clinician for alternative modalities

Articles from the Scottish health department (Tochel et al., 2004) and the New Zealand Society of Hospital and Community Dentistry (Lingard et al., 2008) emphasised that DGA should only be performed where there was a clinical need, and that the referred patients should be cross-assessed by a clinician experienced in children's dental treatment and behaviour management at a pre-DGA screen. In the 15 articles included in this integrative literature review; seven articles indicated a separate pre-DGA appointment should be used as a screening tool (Adewale et al., 2011; Dziedzic, 2017; Flynn & Strunin, 2005; Lingard et al., 2008; Raja et al., 2016; Tochel et al., 2004; Tyrer, 1999). The collective suggestion was that the 'extra' second appointment should be incorporated into the DGA process unless there was a greater overriding justification, such as an emergency treatment or urgent care required. The function of this second appointment would be to involve the parents and caregivers, to further discuss the treatment options in-depth and to attempt alternative treatment modalities. This would provide knowledge for the parents and caregivers to reconsider the risks and benefits of DGA.

By having a second assessment, 15% of DGA referrals by Scottish general dental practitioners were prevented in the community and hospital dental services (Tochel et al., 2004). In a UK based audit of a large town community dental service, adopting a second assessment as part of the DGA process showed that 50% of the DGA referrals could be avoided (Shepherd & Ali, 2015). Furthermore, a 2016 study from Iran by Aminabadi et al. showed that 47.5% of the referred children could undergo alternative treatment modalities to avoid a DGA. These figures clearly implicate opportunities to reduce DGA referrals and waitlist by implementing this practice.

Theme 8. Behaviour management strategies

Five articles identified in this review discussed the importance of behaviour management in patient care, especially for young and anxious children as an integral component to treatment planning and execution (Aminabadi et al., 2016; Dziedzic, 2017; Roberts, 1990; Shepherd & Ali, 2015; Weddell et al., 2015). The literature supported the notion that careful management of anxious patients required skills gained through experience in communication, showing empathy, coaching, tolerance, flexibility, and reflective/open listening. However, as Tochel et al. (2004) noted, these experiences were unlikely to be consistent across clinicians on a national or international scale. Aminabadi et al. (2016) discussed various strategies used for controlling children's behaviour in different categories with a hierarchical order:

1. Basic behaviour guidance: communicative guidance, tell-show-do, distraction, voice control, and positive reinforcement (tokens and toys) in the first and second appointments.
2. Advanced behaviour guidance: protective stabilisation by a practitioner, staff, and parent; protective stabilisation by a practitioner and staff; protective stabilisation by a practitioner and/or staff and/or parent; protective stabilisation by restrictive devices.
3. Independence by parental separation.
4. Deferred treatment.
5. DGA.

This flow-style guidance was not evidenced elsewhere in the literature search, but it represents a rudimentary series of guidelines institutions could agree upon in order to implement behaviour management strategies in training, or indeed bring consistency to a DGA referral process.

Theme 9. Clinical factors indicative for a dental general anaesthesia referral

The decision to refer children for DGA is ultimately a clinical one. In table 2 below, ten out of the 15 articles identified in this review advocated for different factors upon which this judgment should be made. Among the more stringent was the position of Clayton & Mackie (2003), who recommended declining DGA referrals for asymptomatic caries or trauma, as these cases were not deemed as an emergency treatment or urgent care, and treatment could

be attempted or monitored by the primary provider in the community clinic at shorter recall intervals.

Table 4 Dental general anaesthesia referral indicators by authors (years)

	Adewale et al., (2011)	Albadri et al., (2006)	Clayton & Mackie, (2003)	Dziedzic, (2017)	Flynn & Strunin, (2005)	Lingard et al., (2008)	Roberts, (1990)	Shepherd & Ali, (2015)	Tyrer, (1999)	Weddell et al., (2015)
Frequency and severity of signs and symptoms of swelling/sepsis		X	X	X	X	X	X	X	X	X
Extent of caries, i.e., multi-quadrant caries		X	X	X	X	X		X	X	X
Age and level of cooperation of the child, i.e., pre-cooperative	X	X	X		X	X		X	X	X
Medical history	X	X	X	X			X	X	X	
Attendance history of high-risk patients						X		X	X	X
Previous dental history					X			X	X	X
Trauma						X	X			X
Caries risk	X							X		
Require oral surgery						X				
Compliance with homecare practice/advice								X		
Alternative methods of pain control have been fully explored				X						

The diversity in the referral indicators in table 4, combined with the issues outlined in the previous eight themes, only seem to further the justification for an agreed set of guidelines for DGA referral.

Chapter 5

Discussion

The aim of this review is to analyse the literature on DGA referral criteria and care pathways, and with the findings, to recommend guidelines for the use of DGA in children in New Zealand.

The 15 articles identified for review showed evidence of a need for guidelines on DGA referral both in New Zealand and internationally (themes 1 and 2). The review then presented four themes associated with care through interdisciplinary prevention in health promotion and education (themes 3, 4, 5 and 6). Although advocated for in some articles (Tochel et al., 2004 & Flynn & Strunin, 2005), there was no evidence of existing DGA care pathways incorporating prevention. As for clinical DGA referral guidelines, the review identified evidence supporting the consistency in clinical decision-making (themes 7, 8 and 9).

5.1 A need for guidelines

According to Hunt et al. (2018), New Zealand Society of Hospital and Community Dentistry proposed a set of national guidelines for District Health Boards providing DGA for children in 2008. However, the Ministry of Health did not adopt the guidelines at the time, nor had any reviews been conducted since that publication. The Hunt et al. (2018) article was beyond the inclusion criteria of this integrative literature review; however, its findings supported those of this review.

Clinical Directors from the District Health Boards in New Zealand had pleaded the Ministry of Health to make reducing DGA demand a health target as anecdotal evidence suggested the number of children requiring and are waiting on the DGA waitlist is alarming, and theatre departments are struggling to cope under the workload generated by the current DGA process (Quinn, 2020). National statistics like these need to be captured and feedback given for discussion at the governmental level for better DGA planning. However, at present, the Government does not recognise dental caries as a fully preventable disease that is causing negative health impacts on the New Zealand population. In order to implement changes to the current DGA process, it must be driven from the governmental level.

In Australia, there were also no standard policies guidelines for referral to publicly funded DGA for children (Rogers et al., 2018). Rogers et al. (2018) attempted to explain the conundrums of 'to refer or not to refer' children for treatment under DGA, and suggested more research is required on long-term cost-benefit analysis of DGA, alternative treatment modalities, workforce modification, health promotion and education, as well as the development of standard policies and practise guidelines at the national level. These themes were consistent with the findings from this review, suggesting that change is required at an Australasian level, if not globally.

5.2 Improved care through interdisciplinary prevention

The DGA referral volumes and their concomitant effects on waitlists are an international phenomenon, observed at recent times in the UK, Ireland, Canada, America, Scotland, Australia, and New Zealand (Thomson, 2016; Adewale et al., 2011). The research to-date around DGA is mostly quantitative and heavily focused on clinical procedures as evidenced by the limited number of articles identified in this review advocating a prevention approach (Flynn & Strunin, 2005).

Evidence suggests there is room for improved care through interdisciplinary cooperation between community and hospital services when it comes to the crucial decision-making of a DGA referral and its treatment. Dziejczak (2017) advocated for a multidisciplinary team approach to evaluate the risks and benefits for every patient through the lens of holistic care before proceeding with DGA. This aligned with the recommendations from multiple articles in this review; that every opportunity to perform health promotion and education and reduce the number of DGA cases should be seized (Adewale et al., 2011; Shepherd & Ali, 2015; Tyrer, 1999).

Evidence from international articles suggested that DGA referrals have been reduced by advocating for second assessments where alternative treatment modalities could be offered (Aminabadi et al., 2016; Shepherd & Ali, 2015; Tochel et al., 2004). Winder (1990) also added it could be accommodated by dental and oral health therapists, thus expanding the interdisciplinary workforce.

5.3 Consistency in clinical decision making

Many clinicians with overlapping scopes of practice are involved in the routine care of the targeted population in primary health (i.e., community dental clinic setting), they are, therefore, the main DGA referrers. The use of DGA referral criteria and understanding of DGA care pathways are closely related to these health practitioners: paediatrician, community/general dentists, dental therapist, and oral health therapists. To enact interdisciplinary care these, all these health providers would need to be aware of DGA referral recommendations as they would be at the forefront of driving the change and developing consistency in practice.

DGA referral is complex and involves many aspects of professional judgement throughout the process; hence the importance of a robust set of guidelines at every stage with the support of an interdisciplinary team identified above. The most recurring indicators for DGA referral are listed below (Adewale et al., 2011; Albadri et al., 2006; Clayton & Mackie, 2003; Dziedzic, 2017; Flynn & Strunin, 2005; Lingard et al., 2008; Roberts, 1990; Shepherd & Ali, 2015; Tyrer, 1999; Weddell et al., 2015):

- The child has acute pain and/or orofacial infection which cannot be managed palliatively.
- The child requires multiple quadrant treatments, i.e., restorations or extractions, but cannot cope under local anaesthesia with sedation.
- The child is too young or anxious to cooperate under local anaesthesia even with sedation.
- The child has a complex medical history (special needs, medical complication, or certain physical disabilities) which preclude treatment under local anaesthesia with or without sedation.

The literature clearly showed that DGA should never be undertaken as the first choice of anxiety control because the child is young or because it is the parent's preference. DGA should only be considered as the last resort following behavioural management and sedation where available (Clayton & Mackie, 2003 & Dziedzic, 2017). Furthermore, clinicians should consistently challenge themselves to actively exhaust all means of alternative treatment modalities before arriving at the final decision to utilise DGA referral as a last resort (Tyrer, 1999). In the absence of consistent guidelines or requirements for secondary peer-assessment (i.e., a second appointment), this responsibility remains that of the DGA referrer.

5.4 Translation of evidence

The JHNEBP model recommends a clear translation of evidence, so table 5 serves to summarise this discussion in advised format.

Table 5 Table summary of research themes and translation

Theme	Discussion	Translation	
New Zealand evidence of a need for guidelines	National and international trends identifying the lack of policies and guidelines to address rising concerns in the referrals to DGA, waitlist and wait-time.	A need for DGA guidelines.	
International similarities			
Timely care	Reoccurring theme from the literature search on the importance of timely care to manage DGA.	Improved care through interdisciplinary prevention in health promotion and education.	
Informed decision-making	Improved informed decision-making of the parents.		
Avoiding repeated DGA	Emphasising the importance of health promotion and education in the post-DGA journey to avoid repeated GA.		
Alternative treatment provision	Advocating for an allied workforce to provide better care through a multidisciplinary approach.		
Second assessment for alternative modalities	Rigorous assessment of the need for DGA referrals in the face of alternative treatment modalities.		Consistency in clinical decision-making via DGA referral guidelines.
Behaviour management	Improving practitioners' skills in children behaviour management strategies in clinics		
Clinical factors indicative of a DGA referral	A clear set of guidelines for DGA referrals in children.		

It is apparent from international evidence that DGA referral of children can be reduced by up to 50% by establishing a good rapport with the patient and parent, relying on sound behaviour management skillsets, and employing a robust set of guidelines which allow children to be treated in the primary health, community dental clinic setting.

Multiple articles over an extended time period have called for a nationally consistent credentialing framework for clinicians on the DGA referral process for children. The DGA referrals need to be clinically justified with evidence of alternative treatment options attempted where appropriate, compulsory informed decision-making for both the parents and the clinician, as well as oral health education. Each referral for DGA should be individually developed and tailored to the patient's needs including the on-going care involved in the post-operative DGA follow up recalls, prevention treatment, and risk management (Lingard et al., 2008).

5.4.1 Evidence quality

It has been a consistent aim of this review to synthesis recommendations for the use of DGA in children. The JHNEBP model recommends that when there is consistency across findings of evidence from multiple articles of Level I and Level II status, that full-scale practice change could be confidently recommended. Since the majority of evidence in this review was of Level III and IV status, the JHNEBP model suggests that recommendations should 'proceed with caution', with small scale pilot studies to be implemented before any full-scale change implementation.

The implementation of guidelines for DGA referral in children has been recommended in New Zealand since 2008. And whilst national guidelines would be an ideal goal, the evidence from this review suggested it would be prudent to first consider a pilot study. This could easily be achieved in one of New Zealand's twenty District Health Boards(DHBs) for a trial period. The challenge to those DHBs is to translate recommendations that could bridge the gap between the current DGA process, to the ideal DGA care pathway, and start prioritising prevention of dental caries over treatment for this preventable disease.

5.5 Limitations

It is good practice for integrative literature reviews to identify its own limitations (Sparbel & Anderson, 2000; Whitemore & Knaf, 2005). In this section, four limitations are identified and discussed.

5.5.1 Evidence level and quality

The articles in this review were retrospective reviews of patient records and non-experimental of evidence Level III. There were no comparison group studies or controlled randomised trials included in this review; the topic did not lend itself to evidence of this level. Hence, the level of evidence was a limitation of the review.

5.5.2 Researcher bias

According to Costley, Elliott & Gibbs (2010), an insider has the best view to make powerful challenges to the status quo by investigating in-depth an area of interest or concern. The learnings from such exercise have great potential to generate recommendations to fit the situation rather than generic feedback. However, research conducted by a single researcher increases the chance of researcher bias, especially in this case of an interpretative, narrative approach for an integrative literature review heavily based on concepts rather than empirical data (Brown et al., 2019). The themes identified as a result could be guided by professional knowledge of the researcher or current role in a specific geographical area. Hence, the value of a third-party opinion is not to be undermined for future reference.

5.5.3 Exclusion criteria

Sedation was one of the exclusion criteria, as it is not readily available in the current New Zealand public health system. However, four of the fifteen articles suggested this as an intermediate intervention that should be part of the DGA care pathway. Whilst sedation is a highly effective alternative treatment modality in reducing the DGA waitlist (Flynn & Strunin, 2005), it was considered beyond the scope of this review. However, since one article identified that sedation may reduce DGA referrals (of all ages) by up to 25% (Shepherd & Ali, 2015), this exclusion may limit the final recommendation emanating from this review.

5.5.4 Other at-risk patients

It should be noted that there are many special needs children, adolescents, and adults as well as patients with complex medical conditions and underlying problems (e.g., anxiety) who also require dental care under general anaesthesia that were not discussed in this study. The literature was clear these patients must be treated on a case-by-case basis, as such; it was considered inappropriate to include this patient group in wider recommendations.

Chapter 6

Recommendations

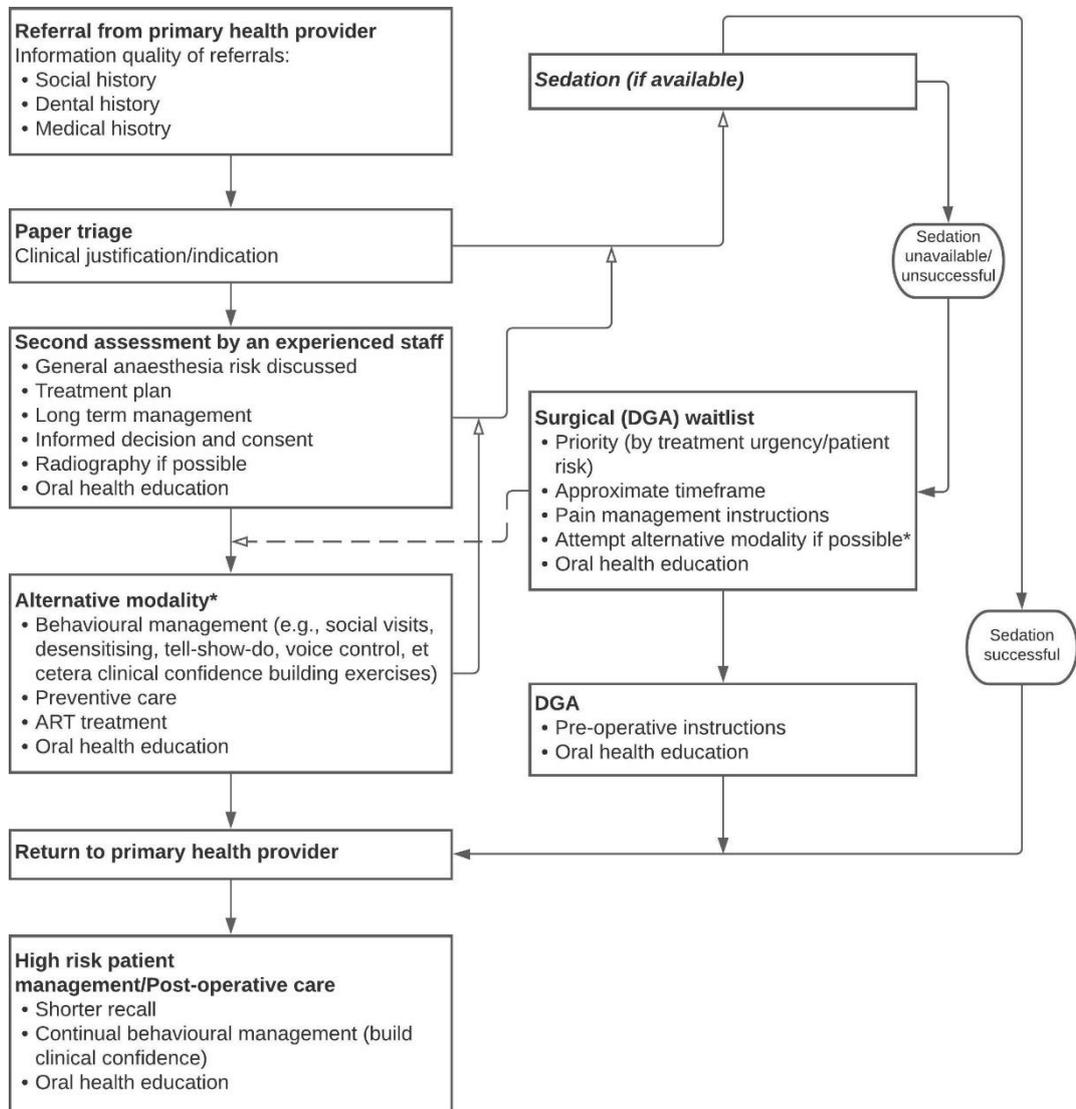
The key message throughout this review was that DGA should only be considered as the last resort following alternative treatment modalities, such as behavioural management, cognitive behavioural therapy, and sedation for dental care where possible. The conscious decision to proceed with DGA must be taken after thorough justification of all aspects of the patient's needs based on clinical need, valid consent, and level of cooperation. To-date, the system focuses on clinical treatment rather than public health prevention. It was forecasted that in the future with the advancement of medical technology, the demand for DGA referrals will only increase for patients with complex medical conditions and disabilities, creating an escalating hospital theatre workload and a significant increase in cost to the already burdened public health system.

As early as the 1990's, Roberts (1990) recommended a benchmark to be adopted by clinicians for good professional DGA practice by focusing on clinical justification rather than parental demand or the need purely due to the patient's uncooperativeness. However, the need for consistent guidelines for DGA care pathways across New Zealand is still present. The recommendations that were translated from this review are endorsed by the clinical expertise of the researcher as a practising oral health therapist. The JHNEBP model suggested this review recommendation could be adopted as part of a pilot study in, for example; a District Health Board, or a community clinic. The goal should be to eventually implement consistent practice across New Zealand through a set of nationally recognised guidelines.

Figure 4 below represents the latest evidence-based recommendations on DGA referral of children in New Zealand translated from the 15 articles from this review. This review has collated components from the themes together to create a DGA care pathway flowchart. No such flowchart has officially been published before in the setting of New Zealand. These recommendations challenge the current singular DGA process and clinical triaging aspects shown in figure 1, and as a result, a more complex and holistic DGA care pathway is synthesised. Through these recommendations, the definition of the DGA process is no longer start-to-end that of a need for surgery. The process is redefined by a prevention-focused DGA care pathway instead. The starting point is now the moment a DGA referral is made, and with an interdisciplinary team walking alongside the patient and whanau through to post-operative

DGA care; this continues further with health promotion and education, and short recall monitoring until the patient is no longer of the high-risk group.

Figure 4 Recommended guidelines for the use of dental general anaesthesia in children



The flow chart should be published with the following guidance:

- Patients referred to DGA should be triaged; some may require urgent treatment, and the rest will be given a second appointment.
- This second appointment is with an experienced clinician to carry out a pre-general anaesthetic screen which will determine if the patient goes on the waitlist or to attempt alternative treatment modalities.

- A full explanation of the procedure benefits and risks should be provided to the parent, and this should include the length of the waiting list, the child's priority rating, the nature of the procedures in the operation, and the proposed treatment plan.
- A written information sheet should be provided in order to reinforce the decision-making process, along with signed informed consent.
- The need for the temporary management of pain should be assessed, and appropriate actions are taken to treat this. Throughout the journey, every contact point is an opportunity to commence oral health education and the implementation of preventive measures.
- High-risk patients should be placed on a shorter recall to continue engagement and education, and to build the whanau and patients' clinical confidence in dentistry and at-home oral health practice.

With holistic dental and oral health long-term quality of life achievements in mind, the clinician is responsible for adopting the change to this approach, and ideally, this should be part of the clinician's training. Persuading the patients to attempt alternative treatment modalities may be more time consuming for clinicians, but it may be much more rewarding. Ultimately for change to occur, clinicians need to actively discourage the culture of routine DGA and use it only as a last resort. Due to geographical and local resource variations in New Zealand, standardisation on the minimal agreement for DGA referral criteria and guidelines to meet the need for its intended serving populations may pose a great challenge. However, changing the behaviour of practitioners and increasing parents' ability to make well informed and conscious decisions towards DGA have far fewer limitations.

As this review concludes, it is a public health crisis when the DGA referral volume and waitlist are ill-managed. The sustained lack of guidelines for the use of DGA and post-operative DGA care in children is woeful and only adds to the crisis. This review attempts to bridge the gap between the current DGA practice, which heavily relies on a single clinician with the risk of inconsistency in referral benchmark, to express the need for behavioural change through health promotion and practice. As an outcome of this change, an interdisciplinary team approach and a much more complex DGA care pathway was synthesised. The care pathway recommended in this review should improve the consistency and efficiency of dental and oral health healthcare delivery, and in turn, improve the patients' oral health-related quality of life

through an interdisciplinary approach to the preventable non-communicable disease of dental caries.

Last but not least, regulating the DGA referrals and waitlist is only a form of disease management, an interim solution to this public health crisis. The real disease solution is, and has always been, to focus on addressing the root cause of dental caries via public health prevention measures to improve oral health in the general population.

References

- Adewale, L., Morton, N., & Blayney, M. (2011). *Guidelines for the management of children referred for dental extractions under general anaesthesia*. London: Association of Paediatric Anaesthetists of Great Britain and Ireland.
- Albadri, S. S., Lee, S., Lee, G. T., Llewelyn, R., Blinkhorn, A. S., & Mackie, I. C. (2006). The use of general anaesthesia for the extraction of children's teeth. Results from two UK dental hospitals. *European Archives of Paediatric Dentistry*, 1(2), 112-117.
<https://doi.org/10.1007/BF03320825>
- Aminabadi, N. A., Najafpour, E., Aghaee, S., Deljavan, A. S., Jamali, Z., & Shirazi, S. (2016). Use of general anaesthesia in paediatric dentistry: barriers to discriminate between true and false cases. *European Archives of Paediatric Dentistry*, 17(2), 89-95.
<https://doi.org/10.1007/s40368-015-0211-y>
- Brown, L., Kenny, K., & O'Sullivan, E. (2019). Dental general anaesthetic pre-assessments completed by a specialist—does it change patient outcomes? A UK-based study. *International Journal of Paediatric Dentistry*, 29(2), 162-168.
<https://doi.org/10.1111/ipd.12442>
- Centre for Reviews and Dissemination. (2009). *CRD's guidance for undertaking reviews in healthcare*. York Publishing Services.
- Clayton, M., & Mackie, I. C. (2003). The development of referral guidelines for dentists referring children for extractions under general anaesthesia. *British Dental Journal*, 194(10), 561-565. <https://doi.org/10.1038/sj.bdj.4810208>
- Coates, D. E., Kardos, T. B., Moffat, S. M., & Kardos, R. L. (2009). Dental therapists and dental hygienists educated for the New Zealand environment. *Journal of dental education*, 73(8), 1001-1008. <https://doi.org/10.1002/j.0022-0337.2009.73.8.tb04789.x>
- Costley, C., Elliott, G., & Gibbs, P. (2010). *Doing work based research: approaches to enquiry for insider researchers*. London: Sage.
- Coughlan, M., & Cronin, P. (2017). *Doing a literature review in nursing, health and social care*. London: Sage.

- Dang, D., & Dearholt, S. (2017). *Johns Hopkins nursing evidence-based practice: model and guidelines*. Indiana, USA: Sigma Theta Tau International.
https://www.hopkinsmedicine.org/evidence-based-practice/ijhn_2017_ebp.html
- Dziedzic, A. (2017). The role of general anaesthesia in special care & paediatric dentistry; inclusion criteria and clinical indications. *Society for the Advancement of Anaesthesia in Dentistry Digest*, 33, 48-54.
- Flynn, P. J., & Strunin, L. (2005). General anaesthesia for dentistry. *Anaesthesia & intensive care medicine*, 6(8), 263-265. <https://doi.org/10.1383/anes.2005.6.8.263>
- Goodwin, M., Sanders, C., Davies, G., Walsh, T., & Pretty, I. A. (2015). Issues arising following a referral and subsequent wait for extraction under general anaesthetic: impact on children. *BMC Oral Health*, 15(1), 3. <https://doi.org/10.1186/1472-6831-15-3>
- Haworth, S., Dudding, T., Waylen, A., Thomas, S. J., & Timpson, N. J. (2017). Ten years on: Is dental general anaesthesia in childhood a risk factor for caries and anxiety?. *British dental journal*, 222(4), 299. <https://doi.org/10.1038/sj.bdj.2017.175>
- Hunt, G. R., Foster Page, L. A., & Thomson, W. M. (2018). Dental treatment of children under general anaesthesia in District Health Boards in New Zealand. *New Zealand Dental Journal*, 114(4).
- Jiang, H., Shen, L., Qin, D., He, S., & Wang, J. (2019). Effects of dental general anaesthesia treatment on early childhood caries: a prospective cohort study in China. *BMJ Open*, 9(9), e028931. <https://doi.org/10.1136/bmjopen-2019-028931>
- Lingard, G. L., Drummond, B. K., Esson, I. A., Marshall, D. W., Durward, C. S., & Wright, F. A. (2008). The provision of dental treatment for children under general anaesthesia. *The New Zealand Dental Journal*, 104(1), 10-18.
- Ministry of Health. (2006). *Good Oral Health for All, for Life: The Strategic Vision for Oral Health in New Zealand*. <https://www.health.govt.nz/publication/good-oral-health-all-life>
- Raja, A., Daly, A., Harper, R., Senghore, N., White, D., & Ravaghi, V. (2016). Characteristics of children undergoing dental extractions under general anaesthesia in Wolverhampton:

2007-2012. *British Dental Journal*, 220(8), 407-411.

<https://doi.org/10.1038/sj.bdj.2016.297>

Roberts, G. J. (1990). Caries and the preschool child: treatment of the preschool child in the hospital service. *Journal of Dentistry*, 18(6), 321-324. [https://doi.org/10.1016/0300-5712\(90\)90132-X](https://doi.org/10.1016/0300-5712(90)90132-X)

Rogers, J., Delany, C., Wright, C., Roberts-Thomson, K., & Morgan, M. (2018). What factors are associated with dental general anaesthetics for Australian children and what are the policy implications? A qualitative study. *BMC Oral Health*, 18(1), 1-12.

<https://doi.org/10.1186/s12903-018-0638-8>

Savanheimo, N., Sundberg, S. A., Virtanen, J. I., & Vehkalahti, M. M. (2012). Dental care and treatments provided under general anaesthesia in the Helsinki Public Dental Service. *BMC Oral Health*, 12(1), 45. <https://doi.org/10.1186/1472-6831-12-45>

Savanheimo, N., & Vehkalahti, M. M. (2014). Five-year follow-up of children receiving comprehensive dental care under general anaesthesia. *BMC Oral Health*, 14(1), 154.

<https://doi.org/10.1186/1472-6831-14-154>

Shepherd, A. R., & Ali, H. (2015). A care pathway for children unable to accept dental care within the general dental services involving the use of inhalation sedation and general anaesthesia. *Primary Dental Journal*, 4(2), 29-34.

<https://doi.org/10.1308/205016815814954894>

Thomson, W. M. (2016). Public health aspects of paediatric dental treatment under general anaesthetic. *Dentistry Journal*, 4(2), 20. <https://doi.org/10.3390/dj4020020>

Tochel, C., Hosey, M. T., Macpherson, L., & Pine, C. (2004). Assessment of children prior to dental extractions under general anaesthesia in Scotland. *British Dental Journal*, 196(10), 629-633. <https://doi.org/10.1038/sj.bdj.4811281>

<https://doi.org/10.1038/sj.bdj.4811281>

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4(3), 356-367.

<https://doi.org/10.1177/1534484305278283>

Tyrer, G. L. (1999). Referrals for dental general anaesthetics—how many really need

GA?. *British Dental Journal*, 187(8), 440-444. <https://doi.org/10.1038/sj.bdj.4800299>

Weddell, J. A., Jones, J. E., & Emhardt, J. D. (2016). Hospital dental services for children and the use of general anaesthesia. In J. A. Dean (Ed.), *McDonald and Avery's Dentistry for the Child and Adolescent* (pp. 328-348). Melbourne; Elsevier.

Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52(5), 546-553. <https://doi.org/10.1111/j.1365-2648.2005.03621.x>

World Health Organisation. (2017). *Sugar and dental caries*.
<https://www.who.int/publications/i/item/WHO-NMH-NHD-17.12>

Winder, M. (1990). Caries and the preschool child: implications within the community dental service. *Journal of Dentistry*, 18(6), 318-320. [https://doi.org/10.1016/0300-5712\(90\)90131-W](https://doi.org/10.1016/0300-5712(90)90131-W)

Appendix A

John Hopkins Nursing Evidence-Based Practice Evidence Appraisal Guidelines

Evidence Level and Quality Guide

Evidence Levels	Quality Ratings
<p>Level I</p> <ul style="list-style-type: none"> • Experimental study, randomised controlled trial (RCT) • Explanatory mixed method design that includes only a level I quantitative study • Systematic review of RCTs, with or without meta-analysis 	<p>Quantitative Studies</p> <p>A High quality: Consistent, generalisable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence.</p> <p>B Good quality: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence.</p> <p>C Low quality or major flaws: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn.</p> <p>Qualitative Studies</p> <p>No commonly agreed-on principles exist for judging the quality of qualitative studies. It is a subjective process based on the extent to which study data contributes to synthesis and how much information is known about the researchers' efforts to meet the appraisal criteria.</p> <p><i>For meta-synthesis, there is preliminary agreement that quality assessments of individual studies should be made before synthesis to screen out poor-quality studies.</i></p> <p>A/B High/Good quality is used for single studies and meta-syntheses.</p> <p>The report discusses efforts to enhance or evaluate the quality of the data and the overall inquiry in sufficient detail; and it describes the specific techniques used to enhance the quality of the inquiry. Evidence of some or all of the following is found in the report:</p> <ul style="list-style-type: none"> • Transparency: Describes how information was documented to justify decisions, how data were reviewed by others, and how themes and categories were formulated. • Diligence: Reads and re-reads data to check interpretations; seeks opportunity to find multiple sources to corroborate evidence.
<p>Level II</p> <ul style="list-style-type: none"> • Quasi-experimental study • Explanatory mixed method design that includes only a level II quantitative study • Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis 	
<p>Level III</p> <ul style="list-style-type: none"> • Non-experimental study • Systematic review of a combination of RCTs, quasi-experimental and non-experimental studies, or non-experimental studies only, with or without meta-analysis • Exploratory, convergent, or multiphasic mixed methods studies Explanatory mixed method design that includes only a level III quantitative study 	

<ul style="list-style-type: none"> Qualitative study Meta-synthesis 	<ul style="list-style-type: none"> Verification: The process of checking, confirming, and ensuring methodologic coherence. Self-reflection and scrutiny: Being continuously aware of how a researcher's experiences, background, or prejudices might shape and bias analysis and interpretations. Participant-driven inquiry: Participants shape the scope and breadth of questions; analysis and interpretation give voice to those who participated. Insightful interpretation: Data and knowledge are linked in meaningful ways to relevant literature. <p>C <u>Low quality</u> studies contribute little to the overall review of findings and have few, if any, of the features listed for high/good quality.</p>
<p>Level IV Opinion of respected authorities and/or nationally recognised expert committees or consensus panels based on scientific evidence Includes:</p> <ul style="list-style-type: none"> Clinical practice guidelines Consensus panels/position statements 	<p>A <u>High quality</u>: Material officially sponsored by a professional, public, or private organisation or a government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise clearly evident; developed or revised within the past five years.</p> <p>B <u>Good quality</u>: Material officially sponsored by a professional, public, or private organisation or a government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise clearly evident; developed or revised within the past five years.</p> <p>C <u>Low quality or major flaws</u>: Material not sponsored by an official organisation or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the past five years.</p>
<p>Level V Based on experiential and non-research evidence Includes:</p> <ul style="list-style-type: none"> Integrative reviews Literature reviews Quality improvement, program, or financial evaluation Case reports Opinion of nationally recognised expert(s) based on experiential evidence 	<p>Organisational Experience (quality improvement, program or financial evaluation)</p> <p>A <u>High quality</u>: Clear aims and objectives; consistent results across multiple settings; formal quality improvement, financial, or program evaluation methods used; definitive conclusions; consistent recommendations with thorough reference to scientific evidence.</p> <p>B <u>Good quality</u>: Clear aims and objectives; consistent results in a single setting; formal quality improvement, financial, or program evaluation methods used; reasonably consistent recommendations with some reference to scientific evidence.</p> <p>C <u>Low quality or major flaws</u>: Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement, financial, or program evaluation methods; recommendations cannot be made.</p> <p>Integrative Review, Literature Review, Expert Opinion, Case Report, Community Standard, Clinician Experience, Consumer Preference</p> <p>A <u>High quality</u>: Expertise is clearly evident; draws definitive conclusions; provides scientific rationale; thought leader(s) in the field.</p>

	<p>B <u>Good quality</u>: Expertise appears to be credible; draws fairly definitive conclusions; provides logical argument for opinions.</p> <p>C <u>Low quality or major flaws</u>: Expertise is not discernible or is dubious; conclusions cannot be drawn.</p>
--	---

Appendix B

EIT Research Project Approval



Faculty of Education, Humanities and Health Science
School of Education & Social Sciences
School of Health & Sport Science
Centre for Veterinary Nursing
ideaschool
School of Nursing
Te Ōranga Waka
Toihoukura

Our Ref: SONHSS20/01

22 April 2020

Dear Anne

Thank you for submitting your application for your research project "*Bridging the gap: a literature review of clinicians and public health perspectives on guidelines for general anaesthetic use with children*".

I am pleased to inform you that your research project was approved on 22 April 2020 by the appointed delegates of the Health Research Committee (comprising of School of Nursing and School of Health and Sport Sciences).

You are reminded that should the proposal change in any significant way, you must inform the Committee. Please quote the above reference number on all correspondence to the Committee. Please send all correspondence to: swong@eit.ac.nz who is the Committee Secretary.

The Committee wishes you well for the project.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Anita Jagroop-Dearing', is written over a light blue horizontal line.

Dr Anita Jagroop-Dearing BSC Hons MPhil FRSPH PhD
Chair
Health Research Committee

CC: Dr Patrick Lander; Dr Karen Munday; Assoc Prof Rachel Forrest
CC: Catherine Hines - REAC Secretary

Eastern Institute of Technology

Hawke's Bay Campus 501 Gloucester Street, Taradale, Napier, 4112, New Zealand. P 06 974 8000, F 06 974 8910, E info@eit.ac.nz
Postal Private Bag 1201, Hawke's Bay Mail Centre, Napier, 4142, New Zealand

Tairāwhiti Campus 290 Palmerston Road, Gisborne, 4010, New Zealand. P 06 869 0810, F 06 869 0825, E tairawhiti@eit.ac.nz
Postal PO Box 640, Gisborne, 4040, New Zealand

Auckland Campus Level 6, 238 Queen Street, Auckland, 1010, New Zealand. P 09 300 7410, E auckland@eit.ac.nz

Regional Learning Centres: Central Hawke's Bay, Hastings, Maraenui, Ruatoria, Wairoa

www.eit.ac.nz