

Pediatric anesthesia in Australia and New Zealand and health inequity among First Nations and Māori children

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Abstract

Australia and New Zealand are two countries in the Southern Pacific region. They share many pediatric anesthesia similarities in terms of medical organizational systems, education, training, and research, however there are important differences between the two nations in relation to geography, the First Nations populations and the history of colonization. While the standards for pediatric anesthesia and the specialty training requirements are set by the Australian and New Zealand College of Anesthetists and the Society for Pediatric Anesthesia in New Zealand and Australia, colonization has created distinct challenges that each nation now faces in order to improve the anesthetic care of its pediatric population. Australia generally has a high standard of living and good access to health care; disparities exist for First Nations People and for those living in rural or remote areas. Two influences have shaped training within New Zealand over the past 40 years; establishment of a national children's hospital in 1990 and, more importantly, acknowledgement that the First Nations people of New Zealand (Māori) have suffered because of failure to recognize their rights consequent to establishing a partnership treaty between Māori and the British Crown in 1840. Health inequities among Māori in New Zealand and First Nations People in Australia have implications for the health system, culturally appropriate approaches to treatment, and the importance of having an appreciation of First Nations people's history and culture, language, family structure, and cultural safety. Trainees in both countries need to be adequately supported in these areas in order for the sub-specialty of pediatric anesthesia to develop further and improve the anesthetic and surgical outcomes of our children.

KEYWORDS

Aboriginal, anesthesia, cultural safety, inequity, Māori, pediatric, teaching, Torres Strait Islander, training

1 | INTRODUCTION

Australia and New Zealand are two countries in the Southern Pacific region that were colonized by the British. Australia is comprised of six states and two territories, and its population of 27 million

people are mainly concentrated in cities along the Eastern coast. The islands of New Zealand were separated from the Colony of New South Wales and made a colony in their own right in 1841, although the Constitution of Australia still gives New Zealand the option to join Australia. Political, social, and health institutions remain similar.

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Both countries are ethnically diverse. At least half the population of Australia have one parent born overseas.¹ New Zealand ethnically diverse population comprises just over 5.2 million people, with approximately one quarter living in the North Island city of Auckland. These countries both enjoy a high quality of life and overall have good access to services such as health care and education. The Gini Coefficient, a measure of how equal a country's distribution of income is, are similar (0.32) and suggests adequate equality.

The Australian government currently fund 66% of Australia's total health expenditure, with the remaining third from voluntary health care payments and household out-of-pocket payments. Australia spends \$US 6372 per capita on health, more than the OECD average of \$US 4986. This is equal to 9.6% of GDP, compared to 9.2% on average in the OECD countries. New Zealand's healthcare system comprises of public, private, and voluntary sectors. Around 85% of New Zealand's healthcare is government funded. New Zealand citizens receive free or subsidized healthcare. New Zealand spends \$US 6061 per capita on health, 11.2% of GDP.

Australia and NZ share many similarities in terms of medical education, specialty training and research. Most medical colleges, societies and organizations are mutual between countries. While the standards for pediatric anesthesia and the specialty training requirements are set by the Australian and New Zealand College of Anesthetists (ANZCA) and the Society for Pediatric Anesthesia in New Zealand and Australia (SPANZA), colonization has created distinct challenges that each nation now faces in order to improve the anesthetic care of its pediatric population.

2 | AUSTRALIA

Australia is the largest country in Oceania and the sixth largest country in the world. It is home to one of the oldest continuing civilizations on earth with First Nations people settling the land over 60000 years ago. Disparities exist for those living in rural and remote regions and for First Nations Australians.

The distribution of health care remains disproportionate. While there are approximately 4.2/1000 registered medical practitioners in the country with 4% of those anesthesia specialists, distribution is based mostly in major cities. Rural communities are often served by general practice anesthesia practitioners. Aboriginal and Torres Strait Island doctors comprise only 0.52% of total registered medical practitioners (c.f., 3.8% of population). There are approximately 362 anesthesia practitioners who have membership with SPANZA,² but these practitioners are mainly based in major hospitals, leaving rural communities, and that includes domiciles for Aboriginal and/or Torres Strait Island Peoples, less well served.

2.1 | First Nations children and disparity

First Nations people have lived on this continent for over 60000 years, constituting 3.8% of Australia's population, encompassing over 250 different and distinct Aboriginal and Torres Strait

Islander groups, each with their own culture, language and beliefs.³ In this manuscript, we respectfully use the term "First Nations people" for the diverse Aboriginal and/or Torres Strait Islander populations across Australia.

The lasting impact of colonization's violent history and ongoing repercussions, combined with unresolved disparities in social health determinants, have resulted in a 2.2 times increased burden of chronic disease and 15 years shorter health-adjusted life expectancy.⁴ Geographically, 62% of First Nations people reside outside of major cities, compared to 29% of the non-First Nations population.² The First Nations demographic is relatively young, 33% are children under 15, representing 6% of all Australian children.³ These children face increased surgical disease burdens due to higher preterm birth rates, critical rates of ear, dental and skin conditions, increasing youth-onset type 2 diabetes, significant burns and trauma incidents and one of the highest recorded rates of rheumatic fever and rheumatic heart disease in the world.⁵

Across all age groups, First Nations people are less likely to have procedures, which is more pronounced with increasing remoteness.⁵ First Nations people undergo more emergency surgery, and their elective surgery waiting times are longer than non-First Nations Australians.^{5,6} Factors such as disparities in health determinants, remoteness, language, and cultural barriers increase the risk of delayed diagnosis, reduced access to treatment and contribute to poorer surgical outcomes.⁷ To improve timely and equitable access to specialist pediatric perioperative care, collaboration with First Nations communities is essential to understand and respect their values and strengthen the perioperative experience.⁸

Working toward embedding culturally responsive practices that consider First Nations values on health and wellbeing and redressing health inequity in anesthesia, perioperative medicine and pain is strongly supported by ANZCA and SPANZA.^{9,10}

2.2 | Geographical challenges

Due to the vast size of the Australian continent, many children live a long way from specialist pediatric services. One third of the population live outside the metropolitan centers and often it may be an 8-h drive to the nearest town.¹¹ This poses significant challenges to ensure all children can access the appropriate level of care when required. In rural and remote areas anesthesia is often provided by a general practitioner anesthetist, and if necessary, the child is transported by air to a larger center. ANZCA has recently launched the Rural Generalist Anesthesia (RGA) training program. This qualification was developed in conjunction with the Royal Australian College of General Practitioners (RACGP) and the Australian College of Rural and Remote Medicine (ACRRM) and it provides general practitioners in rural and remote areas the training and qualifications to provide anesthesia services within a limited scope of practice. For pediatrics, this means the provision of anesthesia for children 5 years and over who are ASA 1 or 2, or for elective cases up to a stable ASA 3 level. An [advanced certificate in pediatric anesthesia](#) for the 3–5 year old age group is being

developed. The certificate can be completed subsequent to the RGA training program qualification and will be available in 2024.

The transport of children to larger centers, or occasionally the transport of specialist teams to remote areas, is performed by the Royal Flying Doctor Service (RFDS). Aeromedical retrievals are an essential part of medical services in a country with an area of 7.69 million square kilometers and it requires significant resources and coordination. In 2020/21 the RFDS flew 112 839 Australians with its aeromedical retrieval service.¹² An effective, 24-h aeromedical service is essential to help address disparity in health service access and provide people in rural and remote areas some peace of mind when they do not have easy access to specialist health care.

2.3 | History of pediatric anesthesia in Australia

After William Morton's demonstration of ether anesthesia in Boston in October 1846, it did not take long for practitioners in Australia to replicate the technique. William Russ Pugh performed the first ether anesthetic for surgery in Launceston, Tasmania in June 1847 and the use of ether and subsequently chloroform rapidly increased. In 1952 the first 40 anesthesia practitioners around Australia and New Zealand were invited to the fellowship of the newly formed Faculty of Anesthetists within the Royal Australasian College of Surgeons. Subsequently, in 1992 the stand alone ANZCA was formed and in 1998 the Faculty of Pain Medicine was established.

The Society for Pediatric Anesthesia in Australia and New Zealand (SPANZA) was incorporated officially in 2000. The Society's vision is to be a global leader and collaborator in education, research/science and quality improvement in pediatric anesthesia, perioperative care and pain management of all children in the region regardless of age, gender, race, complexity, or location.

Prior to the formation of SPANZA, there were a number of exceptional anesthetists who advanced the subspecialty of pediatric anesthesia in Australia and New Zealand and internationally. In the 1950s and 60s there was a small group of dedicated practitioners who lay the foundation for pediatric anesthesia to be recognized as a subspecialty. Names such as Kester Brown and Ian McDonald from Melbourne, Mary Burnell, Tom Allen, and Ian Steven from Adelaide, Verlie Lines, John Stocks, Charles Sera, and Graham Fisk from Sydney, Nerida Dilworth from Perth and Tess Crammond from Brisbane all made important contributions to pediatric anesthesia.

2.4 | Delivery of pediatric anesthesia today

Children aged 0–14 years made up 18.7% of the population according to census data from 2016. This figure has fallen considerably since 1968 when children made up 29% of the population. In the intervening time there have been decreasing fertility rates and increasing life expectancy.¹³

Pediatric anesthesia services are provided across the country in major tertiary teaching hospitals, outer metropolitan and regional

hospitals and in private facilities. SPANZA, in association with ANZCA, are responsible for setting the standards for anesthesia care for infants and children and ensuring that anesthesia providers are appropriately trained to meet the needs of our pediatric population. The length of pediatric training varies between states but usually consists of time in a general hospital with mixed adult/pediatric practice and then 3–6 months in a dedicated pediatric facility. Junior doctors in Australia can apply to the anesthesia program after a minimum of 2 years working as a hospital medical officer. Once on the program they need to complete at least 5 years of anesthesia training and pass a primary and final examination. Within this training time, trainees must complete their pediatric specialized study unit. This unit involves a variety of skill-based assessments plus a volume of practice of at least 150 pediatric cases (including at least 20 under the age of 2 years and at least 20 between the ages of 2 and 6 years). At the completion of training, it is expected that the trainees can independently provide anesthesia and sedation for surgery of moderate complexity for children over 2 years of age without significant co-morbidities. For those wishing to work in tertiary pediatric facilities, further study is required with the completion of at least an extra year of pediatric fellowship training.¹⁴

2.5 | The future of pediatric anesthesia in Australia

Pediatric anesthesia in Australia continues to grow and develop and our specialists are at the forefront of teaching, research, and clinical care. Engagement in health equity driven initiatives, such as the Deadly Ears Program,¹⁵ which incorporates outreach perioperative care to Aboriginal and Torres Strait Islander children (jarjums) to reduce middle ear disease and hearing loss, is being encouraged and financially supported through ANZCA's Health Equity Grants. In association with SPANZA, there are several specialized programs that have been developed by pediatric anesthetists to further develop sub-specialty areas within the profession. Effective Peri-procedural Communication (EPIC) is an initiative designed to improve the experience of children undergoing procedures by reducing anxiety and promoting psychological well-being. Each year the EPIC group run workshops around Australia and New Zealand to teach health professionals how they can have a positive impact on a child's health care journey.

The Managing Emergencies in Pediatric Anesthesia (MEPA) course is a 1-day course run in a high-fidelity simulation center that aims to prepare anesthetists to confidently handle a range of emergency situations. It is particularly useful for anesthetists who undertake occasional pediatric lists. Simulation is increasingly being used to develop and maintain skills to manage rare events or crisis situations. In addition to clinical skills, it promotes effective teamwork and communication which is essential for the safety and effective management of emergencies.

Pediatric anesthetic research in Australia has grown considerably in recent years and there is now a well-established network of researchers around Australian and New Zealand. Our centers are

regular contributors to international trials and all the major centers have a variety of investigator-led research projects. Some of the largest and most significant pediatric anesthetic trials in recent years have been led from Australia, including the GAS trial (General Anesthesia compared to Spinal Anesthesia Trial) and the TREX trial (Neurodevelopmental outcome after standard dose sevoflurane versus low-dose sevoflurane/dexmedetomidine/remifentanyl anesthesia in young children). The SPANZA Research Subcommittee is responsible for research priority setting, allocation of research grant funding, contributing content to the annual scientific meeting and facilitating an annual research day.

In addition to the Research Subcommittee, SPANZA has subcommittees for Education, the EPIC Program, and Guidelines and Statements. SPANZA's purpose is to improve the quality of anesthesia, perioperative care and pain management received by all children.¹⁶ The vision of the organization for pediatric anesthesia is to provide the highest level of care that is child-centered and based on the principles of collaboration, inclusivity, equity, and sustainability and to inspire and strive for continual improvement in care.¹⁶

In the future it is hoped there will be increased collaboration between sites, both in Australia and overseas, to combine perioperative data and leverage the opportunities of the digital age to further improve the safety and effectiveness of care for children. Work is ongoing on an international level to standardize perioperative measurements and to promote more collaborative projects between nations that will ultimately lead to better outcomes for children and their families.

3 | NEW ZEALAND

New Zealand remains ethnically diverse, mainly as a result of current government immigration policies. Europeans made up 70.2% of the population, Pacific people 7.4%, and Asian people 15.1%. Māori, the native inhabitants of the land or 'tangata whenua', comprise 14.9%. Children under the age of 16 years account for approximately 19% of the population.

Pediatric anesthesia training in New Zealand mirrors that of Australia. Two influences have shaped training within New Zealand over the past 40 years and constitute a major difference from training in Australia. These two influences were establishment of a national children's hospital in 1990 and, more importantly, acknowledgement that Māori have suffered because of failure to recognize their rights consequent to establishing a partnership between Māori and the British Crown in 1840 (The Treaty of Waitangi).¹⁷

3.1 | Medical manpower

There are approximately 3.6 registered medical practitioners for 1000 people. This is consistent with OECD average of 3.7/1000. There are 913 anesthesia practitioners (5% of practitioners). Unlike

Australia, there are no general practice anesthesia practitioners. The proportion of Māori doctors is 4.4%, well below the proportion of Māori in the New Zealand population. There are 85 SPANZA members across NZ, with the majority of fellowship-trained pediatric anesthesiologists residing in major cities.¹⁴

3.2 | A National Children's Hospital

Starship Children's Hospital is the only dedicated pediatric hospital in New Zealand and is situated in Auckland, in the north of the country. This is the city where the most children live. It is the largest Polynesian city in the world. These geographic and demographic qualities enable the national hospital to service not only the children of New Zealand, but also those of the South Pacific. However, the geographical nature of the country (including the variable climate, mountainous terrain, the length of the country being 1600 km, and limitations in public transport infrastructure) also impose restrictions of access to the hospital for those living outside major centers.

3.2.1 | Establishment of specialty and national services

The build of the national children's hospital enabled a small group of trained pediatric anesthesiologists to band together, improve skill sets, establish educational programs, define safe protocols, establish dedicated pediatric operating room lists rather than combined adult and pediatric surgical programs, and create better links with district hospitals. It also allowed exposure to a broad range of pediatric specialties for both trainees and fellows. The hospital accessibility issue made specialist services such as subspecialty medical and surgical services, pain medicine, outreach programs, and liaison with other district general hospitals all important factors in anesthesia training. Air transport medicine became an important aspect of any training program. Pediatric intensive care training became possible. Organ transplantation became available locally rather than relocation of families to Australia for months at a time. Opportunities for mission work within the Pacific Islands evolved and Starship Hospital is now a major referral hub for children from the Pacific Islands who require complex surgery.

Currently, Starship Children's Hospital has four pediatric anesthesia/intensive care fellowship positions available each year, although the majority of dedicated pediatric anesthesiologists also travel abroad to complete at least one further year of pediatric fellowship training, most commonly in Australia, Canada, and the United Kingdom.

3.2.2 | National links

SPANZA and the New Zealand Society of Anesthesia (NZSA) formed the Pediatric Anesthesiologist Network of New Zealand (PANNZ) in 2015 to

facilitate better communication and collaboration across the country to ensure high quality anesthetic services for all children, irrespective of geographical location. PANNZ have recently set up a working group to deliver in-situ pediatric anesthesia crisis management courses (IS-PACMaC) in operating rooms throughout New Zealand. New Zealand has also established the Māori Anesthetists Network Aotearoa (MANA) and Pasifika Anesthetists in Aotearoa (PAiA) to ensure Māori and Pacific trainees and fellows are adequately supported, and to facilitate future growth of the Māori and Pacific anesthetic workforce.

3.2.3 | Academic development

The Starship Children's Hospital is sited in close proximity to the Faculty of Health and Medical Sciences, University of Auckland. Although many of the senior medical and surgical staff within Starship Children's Hospital have university academic appointments, pediatric anesthesia appointments were lacking until an academic department of anesthesiology was established within the University of Auckland in 2002. Starship Children's Hospital anesthesiologists were encompassed into that academic department and liaison with the University of Auckland has proven useful for attainment of higher degrees among trainees, teaching of pharmacology and airway skills, publications within peer reviewed journals,¹⁸⁻²² and New Zealand pediatric anesthesia academic representation internationally. The University of Auckland Anaesthesiology Dept has established a committee that reviews all research proposals through a Māori perspective. This committee has proven extremely useful and will serve as a blueprint for research project review from other university departments.

3.3 | Cultural perspectives

Māori are the 'tangata whenua' (people of the land) of New Zealand (Aotearoa), arriving in several waves of seafaring voyages from East Polynesia around 1300CE. Similar to Australia and Canada, and many other countries who underwent British colonization, New Zealand displays patterns of Māori disenfranchisement and inter-generational trauma that persist today.

3.3.1 | Māori health inequities

Quantified and monetized inequality in the distribution of healthcare and psychosocial status have been described in NZ. There is marked inequality: Gini coefficients equaled 0.96 for criminal-convictions, 0.91 for public-hospital-nights, 0.86 for welfare-benefits, 0.74 for prescription-drug-fills, and 0.54 for injury-insurance-claims. A small population segment accounted for a disproportionate share of use-events and costs across multiple sectors.²³ That small population segment is disproportionately Māori.

Major inequities occur for Māori across indicators of socioeconomic deprivation, housing, education, justice, and health.²⁴ Many of

these social inequities are also present across large groups of Pacific Island peoples living in New Zealand. Māori continue to experience the worst health outcomes of any population group in New Zealand.

Health inequities are widespread and the disease spectrum similar to that in Australia and other First Nations populations. Mortality rates for Māori children and adolescents are higher compared to those for non-Māori, non-Pacific children at every age group except those aged 5-9 years.²⁴ The prevalence of obesity is higher in Pacific (35.3%) and Māori (17.8%).²⁵ There is also an increasing prevalence of mental health conditions including anxiety and mood disorders, depressive episodes, intentional self-harm, and substance use disorders, in children and adolescents in New Zealand. However, unlike Australia, the Treaty of Waitangi granted Māori the rights and privileges of British subjects. Misguided interpretation of this Treaty has resulted a standing commission of inquiry for claims brought by Māori relating to alleged breaches of this treaty.²⁶ Reports detailing breaches of within the health sector relating to primary care, legislation, and health policy are dictating improvement in health care for Māori.

There is a relative paucity of literature looking at ethnic differences in perioperative outcomes and inequities for Māori and Pacific children in New Zealand. This remains an important area for future epidemiological research. However, funding, time allocation and support for trainees to undertake such studies are difficult to achieve.

3.3.2 | Implications for pediatric anesthesia in New Zealand

These health inequities command that anesthesia trainees must be aware of health inequities among Māori, implications for the health system, culturally appropriate approaches to treatment, and most importantly have an appreciation of Māori history and culture, language, family structure, and cultural safety. Small system changes are happening for example, reduction in wait times for scheduled surgical intervention through preferential loading, improved access to services and medication, family rather than patient orientated care, and greater use of Māori language. Bigger system changes within our field of pediatric anesthesia are obligated.

3.4 | Future directions

The future of pediatric anesthesia in New Zealand should continue to focus on providing high quality services and improving equitable perioperative health outcomes for Māori and Pacific children. There is an urgent need for more quantitative and qualitative research to be undertaken to look more closely at the patient and whanau (family) experience through their perioperative journey, to elucidate factors that drive health inequities in Māori, Pacific, and other marginalized children, and to determine how we might improve delivery of pediatric anesthesia and pain management services across the country to make sure our children live the best lives possible.

4 | SUMMARY

Pediatric anesthesia specialist training and healthcare provision in Australia and New Zealand support a generally thriving pediatric population, with a high standard of living and good access to health care. In addition to a high standard of clinical care, the development of pediatric anesthesia as an academic specialty has flourished in recent times with increasing research projects from Australia and New Zealand and major clinical trials being designed and led from the region. However, despite the progress that has been made in clinical care, research and training, significant healthcare disparities still exist for those residing in rural or remote areas, and for First Nations and Māori children and adolescents. The degree of impact of health inequities among Māori in New Zealand and Aboriginal and/or Torres Strait Islander people(s) in Australia on perioperative outcomes of children has not been quantified. Nonetheless, these disparities have implications for the health care system and highlight the importance of clinicians having an appreciation of First Nations Peoples' and Māori history and culture, language, family-centered care, and cultural safety. Training in the subspecialty of pediatric anesthesia that incorporates culturally safe practices is essential to improve perioperative outcomes for all children and adolescents.

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Brian Anderson is Deputy Editor-in-Chief and Paul Lee-Archer is Associate Editor for the journal, *Pediatric Anesthesia*.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

TERMINOLOGY

First Nations peoples are the original inhabitants of the land. First Nations peoples of land known as Australia are the Aboriginal and Torres Strait Islander peoples. Māori are 'Tangata Whenua' (people of the land) of Aotearoa (New Zealand).

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