



## Original Article

# A 10-year trend of dental treatments under general anesthesia of children in Taipei Veterans General Hospital

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## Abstract

**Background:** General anesthesia (GA) as a pediatric dental procedure is a well-established method of behavior management. However, studies of pediatric dentistry under GA have mostly focused on handicapped patients, and various retrospective studies in Taiwan have mainly reviewed only a limited number of years. The purpose of the present study was to report trends in pediatric dental treatment performed under GA over the past 10 years.

**Methods:** A retrospective review of the hospital records of patients receiving dental treatment under GA from 2006 until 2015 was performed. The patients were divided into three age groups: < 3 years, 3–6 years, and > 6 years. A range of information including basic patient characteristics and types of dental treatment was identified and then analyzed.

**Results:** A total of 791 cases (< 3 years old: 65 cases, 3–6 years old: 492, > 6 years old: 235; 549 male, 242 female) were treated under GA. The case number was found to have increased from 94 during 2006–2007 to 238 during 2014–2015, with the increase being especially pronounced among those aged 3–6 years (2006–2007: 49, 2014–2015: 165). The most common treatments (extraction, restoration, and pulp therapy) were associated with multiple dental caries (684, 86.4%). The < 3-years-old group was characterized by the highest decayed, extracted, and filled surface and decayed, missing, and filled surface indices; the highest mean number of treated teeth; and the highest mean number of treated teeth by composite resin fillings. The 3–6-years-old group had the highest number of primary teeth extractions. The > 6-years-old group had the lowest mean number of treated teeth by stainless-steel crowns (SSCs) and fewest cases treated with pulp therapy. From 2011 onwards, the number of primary tooth extractions significantly increased, while in 2013, there was a crossover whereby the SSC count surpassed the composite resin filling count.

**Conclusion:** Over the past 10 years, there has been an increased use of GA for pediatric dental treatments, in particular, in cases with multiple dental caries. In addition, there has also been an increasing trend towards extraction of primary teeth and the use of SSCs.

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**Keywords:** dental general anesthesia; rationale for anesthesia; dental treatment type

## 1. Introduction

When pediatric dentistry is considered, most dentists seem to have a preconception that involves uncooperative and

emotional children who strongly resist having dental treatment. This mindset results in dentists being unwilling to spend time treating uncooperative children. The American Academy of Pediatric Dentistry recognizes that dental care is medically necessary for the purpose of preventing and eliminating orofacial disease, eradicating infection, abolishing pain, restoring the form and function of dentition, and correcting facial disfigurement or dysfunction.<sup>1</sup> Behavior guidance techniques, both nonpharmacological and pharmacological, can be used to alleviate anxiety, nurture a positive dental attitude, and

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perform quality oral health care on infants, children, adolescents, and persons with special health care needs; all in a safe and efficient manner.

In order to reduce the anxiety that children may experience, some nonpharmacological approaches to behavior management are available; these include “tell–show–do”, positive reinforcement, physical restraint, voice control, and hand-over-mouth.<sup>2</sup> However, these techniques were not completely effective when used with some dental phobia patients due to either age or psychological factors; this is also the case when patients lack the ability to cooperate with the dentist due to physiological factors.<sup>2</sup> Furthermore, in recent years, as the birth rate has become lower and the importance of human rights has increased, many parents show antipathy towards negative approaches to behavior management, and the use of such approaches may even give rise to medical disputes. Investigations targeting the parents of pediatric dental patients have demonstrated that parents were more accepting of voice control, physical restraint, and hand-over-mouth in 1984 than medical sedation or general anesthesia (GA)<sup>3</sup>; but by 1991, parents found medical sedation more acceptable, as well as negative behavior management; however GA still remained unacceptable<sup>4</sup>; by 2005, both medical sedation and GA had become more acceptable than negative behavior management.<sup>5</sup>

In most cases, GA allows the dentist to complete the treatment rather than delay care because a patient's anxieties and fears about treatment make him or her uncooperative. By reducing the anxiety of patients and their movement through the use of GA, it is possible for dentists to offer significantly improved dental care. GA results in total relaxation, and recall of the procedure is minimized; this allows the successful treatment of even the most dental-phobic patient.<sup>6</sup> In the long run, the use of GA to treat healthy and fearful children results in the best outcome for the patient.<sup>7</sup> Despite the fact that the use of GA and sedation in pediatric dental treatment is common in European countries and North America, Taiwanese parents regard such approaches as not customary, and they find it hard to accept them. Therefore, most cases in which GA and sedation are used for children involve patients with special health care needs, and healthy children in Taiwan are still mostly treated using nonpharmacological approaches to behavior management. Nevertheless, quality of care may be significantly compromised due to uncontrolled movement by children with behavior problems.<sup>8</sup>

Dental treatment under GA at Taipei Veterans General Hospital (VGHTPE) started in the 1980s, and from this point onwards, it was available when treating patients in many districts of Northern Taiwan. While it provides treatment of the highest quality, information on this treatment method and studies on its use remain scarce. Furthermore, such studies of pediatric dentistry under GA in Taiwan that are available have mostly focused on children with special health care needs, and any retrospective studies were limited to only a few years.<sup>9–11</sup> Therefore, the objective of this study was to provide baseline information regarding trends in pediatric dental treatment performed under GA at VGHTPE over the past 10 years. The

information collected by this study should be very useful when planning the future use of GA in pediatric dentistry.

## 2. Methods

This was a retrospective review of hospital records of dental patients who were treated under GA from January 2006 until November 2015. All participants who attended our hospital were first examined to evaluate their behavioral capabilities and their psychological and physical disabilities. Qualified pediatric dentists performed charting and an oral examination. The behavior of patients was then classified according to Wright's Clinical Classification (1975).<sup>12</sup> Indications for the use of GA are based on specific criteria that take into account the risks, benefits, effectiveness, anticipated outcomes, and the use of other behavior management techniques as an alternative. These criteria are listed in Table 1.<sup>13,14</sup> If the guardian of the uncooperative child is hesitant to allow the use of GA, the patient then still undergoes dental treatment; this being arranged on an outpatient department basis initially. Several appointments take place involving behavior guidance, including regulation, tell–show–do, and desensitization, which are combined with oral hygiene instruction and intensive fluoride application for caries control. If the patient still fails to respond, GA may be recommended. Prior to the dental treatment procedures under GA, appropriate pediatric physicians and anesthesiologists are consulted on the systemic condition of each participant in order to ensure there are no absolute contraindications for the GA that is to be performed.

The following dataset was collected for each participant: age (< 3 years, 3–6 years, and > 6 years), sex, medical diagnosis, caries status, types and numbers of treatments, and any complications. Caries status was recorded based on the World Health Organization<sup>15</sup> oral health survey criteria and methods, which use the decayed, extracted, and filled surface (DEFS) index for primary dentition and the decayed, missing,

Table 1

Criteria used to select patients who will undergo dental treatment under GA.

1. Individuals who cannot cooperate due to a lack of psychological or emotional maturity and/or mental physical or medical disability
2. Individuals for whom local anesthesia is ineffective because of acute infection, anatomic variation, or allergy
3. Individuals who are moderately to extremely uncooperative
4. Individuals who are verbally uncommunicative because of psychosocial, medical, or cultural situations
5. Individuals who require complicated restorative and/or surgical procedures
6. Individuals for whom the use of GA may protect the developing psyche and/or reduce medical risk
7. Individuals who require immediate and comprehensive oral/dental care (e.g., dental abscess threat to the patency of the airway or other anatomical structures)
8. Individuals who have demonstrated a failure in behavior management when available behavior guidance techniques were used
9. Individuals who have full-mouth advanced caries and need to be treated invasively over several appointments at the out-patient department
10. Individuals who live in a remote area far from a hospital/dental clinic

GA = general anesthesia.

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