Dentists’ Views and Practice of Sedation and General Anaesthesia in Ontario

By

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A thesis submitted in conformity with the requirements for the degree of Master of Science in Dental Anaesthesia

 Discipline of Dental Anaesthesia
  University of Toronto

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Abstract
This study investigated Ontario dentists’ views and use of sedation and general anaesthesia (GA) (n=1076; 37.9% response rate). A mixed mode format offered mailed and web survey options. Study participants were 69.7% male, 83.0% general practitioners, practicing 0.5-42 years (mean 20.6 years), with 40.6% from cities >500,000. 60.2% of respondents provided sedation. Dentists’ underestimated patient interest in sedation/GA (66.8% vs. 43.9% not interested; 19.8% vs. 42.8% possibly interested; 13.4% vs. 12.4% definitely interested). Patients’ preference for sedation/GA by service was also underestimated (p<0.001) except for extractions. Barriers to care were cost (72.2%) for providers; lack of training (38.2%) and patient demand (25.3%) for non-providers. Dentists reported use of sedation highest for extractions (1.5% deep sedation/GA-5.7% nitrous). Dentists’ also overestimated patients’ level of fear (somewhat afraid 19.95 vs. 9.8%; very afraid 10.6% vs. 2.0%; terrified 6.0% vs. 3.5%).
This study confirms differences between dentists’ use and estimation of patient demand for sedation/GA.
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I dedicate this thesis to my parents who have given me the opportunity of an education at the best institutions and support throughout my life.
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1.0 Introduction

Remarkably, the first use of general anaesthesia was for dentistry. Two American dentists pioneered the use of general anaesthesia with Dr. Horace Wells’ first attempt in 1844. This was followed by his student American dentist, Dr. William Morton on October 16, 1846 who introduced ether as a general anaesthetic, in clinical treatment for the first time (Cohen, Fiske & Newton, 2000). However, 166 years since that revolutionary day, little is known about the views and use of sedation and general anaesthesia (GA) within dental practices.

The literature reports patients have a preference for sedation during dental treatment. In the United States, Dionne, Gordon, McCullagh & Phero (1998) indicated that of the 400 surveyed respondents, 2.8 percent received sedation/GA for dentistry, but 8.6 percent would have preferred the addition of sedation/GA although were not given that option. In 1987, over 30 percent of respondents in the United Kingdom stated they would prefer sedation/GA to their current dental care (Lindsay, Humphris, & Barnby, 1987) while in Canada, Chanpong, Haas & Locker (2005) revealed 54.7 percent of patients, preferred sedation/GA for dental treatment.

If patients have a preference for sedation services with dental treatment, and techniques of delivering anaesthesia exist, it is reasonable to expect the common application of sedation/GA techniques to all dental practices (Ryding & Murphy, 2007). However, the literature is limited with respect to the availability and provision of sedation and GA in dental practices not only within Canada but also throughout the world. Of
dentists surveyed in the United States, 93.7 percent of respondents believed there was a demand for sedation/GA among their patients, while only 6.3 percent of respondents felt their patients did not need any type of sedation to make their dental treatment viable (Boynes, Lemark & Close, 2006; Hill, Hainsworth, Burke & Fairbrother, 2008). However, little data substantiate or quantify the provision of sedation/GA within the profession (Boynes et al., 2006; Boynes, Moore, Tan & Zovko, 2010; Smith & Heaton, 2003). Similarly, in Japan the need for sedation is recognized but information on the prevalence of sedation services in Japan are lacking (Ryding & Murphy, 2007).

Although the data are limited on the use of sedation/GA within dentistry, dentists in the United Kingdom are cognizant of a need for sedation services but do not provide it (Fisher, Stassen & Nunn, 2011; Foley, 2002). In Britain, almost three-quarters of dentists felt a need for sedation in their own practice, while less than half were able to provide it (Fisher, Stassen & Nunn, 2011; Foley, 2002). Similarly, in the Republic of Ireland, 76 percent of surveyed dentists agreed that the provision of conscious sedation in general dental practice is important, even though it is being underutilized as a whole (Fisher et al., 2011). Of surveyed British prosthodontists, a third provided sedation services to their patients although respondents were aware of a greater need for it (Morgan & Skelly, 2005).

The question then has to be asked: Are dentists meeting their patients’ needs for sedation or GA? An investigation of the attitudes of provincial dentists may provide explanations for discrepancies that exist between preference and prevalence of sedation/GA services available to dental patients in Ontario. Once armed with greater
understanding of patient need and preference, dental practitioners will be better positioned to provide improved services and broaden provincial access to dental care.
Chapter 2

2.0 Literature Review

A review of the available literature was carried out by searching several online databases in a systematic way using the University of Toronto e-library. The following databases were searched: MEDLINE; OVID; Pub Med; CINAHL; PSYCHINFO; Cochrane Reviews Abstracts; and the Toronto Academic Health Sciences Network database of dissertation abstracts. The keywords searched included (either individually or in combination): sedation, general anaesthesia, dentistry, dentist, perceptions, Ontario, attitudes, survey, patient, anxiety, fear and barriers.

This literature review included an evaluation of the current literature on the demand for sedation and GA in dentistry, the barriers in achieving a balance between patients’ self-reported needs and dentists’ perceived views of patient’s needs with respect to the provision of sedation/GA, and the impact of patient fear and anxiety to the delivery of anaesthesia in dentistry.

2.1 Need for Sedation and General Anaesthesia

It is apparent that dentists and patients alike recognize the need for anaesthesia within dentistry. In a recent series of studies in Britain, researchers reported the overall need for sedation to be five percent of dental patients, with females 3.8 times more likely to be placed within the high need group when compared to men (Pretty et al., 2011). However, Goodwin & Pretty (2011) noted the study did not account for the needs of people who avoided dental treatment due to fear. To accurately reflect the needs of both dental attendees and non-attendees, they estimated that the need for sedation services is
closer to 6.9 percent throughout the entire adult population of Britain. As evidenced by the Goodwin and Pretty (2011) study, patient anxiety and fear largely impact the need for dental sedation. Traditionally, it is has been supported that anxiety or fear mainly drives patient preference for sedation/GA (Allen & Girdler, 2005; Armfield, Spencer & Stewart, 2006; Coulthard et al., 2011; Dionne et al., 1998; Foley, 2002; Goodwin & Pretty, 2011; Smith & Heaton, 2003). However, a growing body of literature is identifying factors in addition to anxiety that may drive patient preference for adjunctive sedation services with dental care such as: treatment complexity and medical/behavioural indicators (Coulthard et al., 2011; Chanpong et al., 2003; Fisher et al., 2011; Pretty & Goodwin, 2011; Wilson, Boyle & Smith, 2006). More specifically, sedation was considered useful, for patients with medical conditions exacerbated by stress, for complex or unpleasant procedures, and for patients with involuntary movement disorders, physical or learning challenges or for patients with strong gag reflexes (Wilson et al.; 2006). Before, reviewing the literature on the impact of dental anxiety and use of sedation within dentistry, let us examine the other factors affecting patients’ and dentists’ selection process of sedation/GA within dentistry.

2.1.1 Treatment Complexity

Treatment complexity may be construed as invasiveness of the procedure or noninvasive dental treatment of long duration (i.e. multi-quadrant dentistry). In Canada, the most significant recent study on the demand for sedation/GA reports patients’ perceived need for sedation service spans all types of dental services (Chanpong et al., 2005). The percentage of the Canadian population with a preference for sedation/GA was: 7.2 percent for cleaning services; 18.0 percent for fillings or crowns; 54.7 percent
for endodontics; 68.2 percent for periodontal surgery; and 46.5 percent for extractions (Chanpong et al., 2005). Interestingly, the study reported that the demand for sedation services exceeded the actual provision of sedation services in all categories of dental care, including complex surgeries (Chanpong et al., 2005). The researchers speculated that respondents might demand sedation/GA for various reasons. General comfort, length of dental procedure and/or severity of gag reflex may contribute to a patients’ desire for sedation/GA. Morgan & Skelly (2005), noted a potential increased patient preference for sedation corresponding to the perception of increased complexity or invasiveness of the procedure such as implants. Complexity is also determined by the dentist and patient. As an example a patient for whom routine scaling is comfortable with no adjunctive anaesthesia may prefer an oral sedative or form of anaesthesia modality with the prospect of more invasive procedures (Coulthard et al., 2011).

Additionally, treatment complexity embodies treatments of long duration. In Britain, 15% of surveyed dentists had referred a paediatric patient for GA, when the completion of care in one appointment was desirable (Ashley, Parry, Parekh, Al-Chihabi & Ryan, 2010).

2.1.2 Medical/Behavioural Indicators

Overlying patient factors such as medical conditions or behavioural challenges can render otherwise simple dental treatment difficult or impossible without the use of sedation/GA (Ashley et al., 2010; Boyle et al., 2009; Chanpong et al., 2005; Coulthard et al., 2011; Pretty et al., 2011; Smith & Heaton, 2003). In assessing medical factors, the clinician must balance the nature and severity of a patient’s medical condition with the
stress imposed upon the patient by the dental procedure itself. It is commonly accepted that dentistry can increase patients’ physiological levels of catecholamines possibly predisposing susceptible patients to life-threatening situations (Ryder & Murphy, 2007; Coulthard et al., 2011; Dionne et al., 1998; Morgan & Skelly, 2005). As an example, patients presenting with stress-induced or uncontrolled asthma, seizure disorders or compromised cardiovascular systems can be at heightened risk. Sedation or GA can mitigate a rise in catecholamine levels thus preventing an untoward outcome. However, anaesthesia is not without its own risks and must be assessed on an individual basis in the medically compromised (Coulthard et al., 2011).

Behaviourally, patients of any age with learning or mental difficulties (ex. Alzheimers), patients with physical disabilities or involuntary movement disorders (ex. Parkinson or Multiple Sclerosis) or individuals with a strong gag reflex (Coulthard et al., 2011; Chanpong et al., 2005; Wilson et al., 2006), may all benefit from adjunctive anaesthesia with dental care irrespective of the treatment complexity.

The largest subset of dental patients presenting with behavioural challenges are children (Ashley et al., 2010). A British study indicated respondents referred children for GA for the following top three reasons: if the patient was unable to cooperate due to age (80%), other behavior management techniques were unsuccessful (79%) or the patient had special needs (56%). The study cited the same reasons in a different order for intravenous (IV) sedation use (Ashley et al., 2010).

It is evident from the reviewed literature that a multitude of factors from treatment complexity to medical/behavioural indicators affect the implementation of sedation/GA within dentistry. Consequently, Coulthard et al. (2011), believe there is an indicated need
for dentistry, as a profession, to consider the development of standardized measures to determine whether or not sedation/GA should be used. However, a literature review of indications for sedation/GA administration in dentistry would be incomplete without an examination of the largest indicator of all, dental fear.

2.1.3 Dental Fear and Anxiety

Of the cited reasons for sedation/GA use within dentistry, anxiety and fear are number one (Armfield et al., 2006; Chanpong et al., 2005; Goodwin & Pretty, 2011; Ryding & Murphy, 2007; Smith & Heaton, 2003). Globally, dental fear in patients has been well documented in the literature (Allen & Girdler, 2005; Boyle, Newton & Milgrom, 2009; Chanpong et al., 2005; Doerr, Lang, Nyquist & Ronis, 1998; Gordon, Dionne & Snyder, 1998; Hunt, McCurley, Dempster & Marley, 2011; Smith & Heaton, 2003; Tanni, 2001; Weiner & Weinstein, 1995). The fear of dentistry can prevent patients from obtaining needed dental treatment. For example, in the United Kingdom, dental fear delays one in four adults from seeking help for a painful dental condition (Boyle et al., 2009), while in the United States, 68,000,000 people avoid dental care out of fear (Dionne et al., 1998).

For some patients, because anxiety and fear causes them to avoid oral health care services (Allen & Girdler, 2005; Boyle et al., 2009; Chadwick, Thompson & Treasure, 2005; Dionne et al., 1998; Milgrom, Newton, Boyle, Heaton & Donaldson, 2010; Ryding & Murphy, 2007), studies indicate that there are a greater number of decayed and fewer filled tooth surfaces in anxious versus non-anxious patients (Weiner & Weinstein, 1995). Similar statistics and avoidance of dental care have been presented through research in
other geographic areas, illustrating that fear and anxiety largely impact patient dental care (Foley, 2003). In the United Kingdom, Foley (2003) indicates, fifty percent of dentate adults are self-reported irregular attenders at their dentist with the main barrier to care, reported by more than half of those irregular attenders being fear of dental care. The resulting aversion to dental care can lead to a decline in patient oral health (Smith & Heaton, 2003). Consequently, dental professionals must address the barriers of fear and anxiety to improve the health of their patients.

2.1.4 Assessment of Patient Anxiety

If dentists are to ameliorate patient anxiety and fear, they must be able to identify the factors contributing to it (Hunt et al., 2011; Pretty & Goodwin, 2011). However, fear and anxiety are often difficult to define as a dentists’ perception of what constitutes patient anxiety may be different than what the patient themselves perceive. Demographic variables such as patient gender, education, socioeconomic status and age may develop the picture of the anxious patient. Prepared with a picture of the typically anxious patient, dentists may be able to readily diagnose those individuals with dental anxiety needs. With respect to demographic variables it appears fear tends to be the most common among younger patients, either in childhood or adolescence (Ashley et al., 2010), but can also be prevalent among adults, particularly individuals not exposed to regular dental treatment in youth (Chanpong et al., 2005; Ryding & Murphy, 2007). Increased fear of dentistry has been reported by female patients in certain populations, (Armfield et al., 2006; Milgrom et al., 2010), while in others, it has been shown that gender differences in dental fear are not age-related (Holtzman, Berg, Mann, et al., 1997). Younger women, i.e. under
the age of 30, tend to experience more fear than older women and older men, i.e. over the age of 70 (Holtzman et al., 1997). Conversely, there is also evidence that young adults have the least fear of any adult age group with higher fear levels demonstrated in adults between 40 and 64 years old (Armfield et al., 2006). With respect to socioeconomic status, research indicates that it may correlate with dental fear (Armfield et al., 2006). People living at a low socioeconomic status have inadequate dental care (Armfield et al., 2006; Chanpong et al., 2005), but no available evidence suggests it increases fear in a statistically significant manner. Armfield et al. (2006), noted demographic variables such as low income and low education may correlate to low to moderate dental anxiety, but extreme and debilitating anxiety seem to be connected to a patient’s individual personality. The relevance of demographic variables are variable as are the importance of these variables on mitigating fear and anxiety; as such the dentists’ responses to fear and anxiety will be more effective when each patient’s needs are evaluated on an individual basis.

Further complicating the clinical assessment of patient anxiety is the recognition that anxiety is not a static state. It can be magnified or potentiated in the mildly to moderately anxious depending upon clinical context. In health psychology research, Davey (2002) demonstrated over time dental fears likely increase and decrease depending on a number of physiological and behavioural factors, along with personal experiences at the dentist. Individual responses to pain and anxiety or abilities to manage the experience of pain and anxiety while it is occurring and after it ends may vary (Armfield et al., 2006; Chanpong et al., 2005; Davey, 2002). Accordingly, clinicians should continually monitor their patients to assess their level of anxiety.
2.1.5 Management of Patient Anxiety

Despite awareness of patient fear, current dental strategies are not demonstrably thorough enough to present adequate solutions to manage patient fear or anxiety (Chanpong et al., 2005; Doerr et al., 1998; Hunt et al., 2010; Ryding & Murphy, 2007; Smith & Heaton, 2003). Alleviating patients’ fear is not a simple task. Dental professionals have employed numerous non-pharmacologic and pharmacological methods to manage patient anxiety and fear, including empathy, audio or video distraction, guided relaxation and hypnosis (Dionne et al., 1998; Smith & Heaton, 2003; Weiner & Weinstein, 1995). Successfully, dentists armed with proper usage and knowledge of local anaesthetics have alleviated the pain associated with dentistry (Chanpong et al., 2005; Dionne et al., 1998; Smith & Heaton, 2003). Although, dentists have both researched pain prevention and relief options, and presented methods of pain and anxiety control to their patients, almost 40 percent of the Canadian population does not obtain professional services for their oral health (Ryding & Murphy, 2007).

Numerous studies have indicated patients would visit their dental professionals more frequently should a drug be administered to reduce anxiety (Abdulwahab et al., 2010; Allen & Girdler, 2005; Chanpong et al., 2005; Dionne et al., 1998; Milgrom et al., 2010; Smith & Heaton, 2003). In the United States 23,000,000 Americans would visit a dentist if sedation or GA were offered (Dionne et al., 1998). In the United Kingdom and Canada, 56.0 percent (Allen & Girdler, 2005) and 54.7 per cent of dental patients surveyed respectively reported a preference for sedation were it available (Chanpong et al., 2005).
The patient preference for sedation/GA is not consistent and may be guided by clinical circumstances. Baker et al., (2006) surveyed 513 patients in a dental emergency clinic, with 56.3 percent reporting a preference for sedation with treatment although 41.9 percent of respondents were considered dentally anxious using the modified dental anxiety scale. The study potentially indicates that 14.1 percent of respondents were motivated to have sedation for reasons outside of anxiety. Similarly, Chanpong et al. (2005) noted, although a greater percentage of patients with high fear were definitely interested in sedation, patients with low or no fear also had a preference with 42.3 percent interested depending upon cost and 11.4 percent definitely interested. Such data reflect that dental patients irrespective of their anxiety level have an interest in looking at the options available to them with respect to sedation/GA.

Currently no guidelines are available to assist dental professionals in evaluating their patients’ need for sedation on the basis of their anxiety level (Hunt et al., 2011). Additionally, standardized management options specific to a patient’s anxiety level are not outlined. Studies indicate the interest in sedation/GA increase significantly with the level of fear (Allen & Girdler, 2005; Baker et al., 2006; Chanpong et al., 2005). The research to date does not indicate whether patient decisions or preferences for anaesthesia are informed decisions based on available treatment options (Chanpong et al., 2005, Dionne et al., 1998, Lindsay, Humphris & Barnaby, 1987). Additionally, it is not known what percentages of patients are given the option or are aware an option even exists for sedation/GA with their dental care. Allen & Girder (2005) reported 38 percent of surveyed patient respondents did not know sedation could be used in conjunction with dental treatment. It is evident patients require information to make decisions for
themselves with respect to their pain and anxiety needs. In this way, patients will likely be empowered with the ability to alleviate their fear of dental work, thereby advancing public oral and medical health in Ontario.

As cited in the literature, if patients suffer from fear and anxiety, and techniques of successfully dealing with these conditions exist as demonstrated, it is practical to expect the common application of sedation/GA techniques to all dental practices (Ryding & Murphy, 2007). Creating the optimum environment for a patient to participate in dental care is in the best interests of public health. Within the literature it is evident a need for change in pain and anxiety management strategy exists (Chadwick et al., 2005; Coulthard et al., 2011; Doerr et al., 1998; Foley, 2003; Goodwin & Pretty, 2010; Hill et al., 2007; Hunt et al., 2010; Milgrom et al., 2010; Pretty et al., 2011; Ryding & Murphy, 2007). Furthermore, it is clear numerous indicators outside of patient anxiety exist for sedation/GA use in dentistry. The literature supports a discrepancy with respect to patients’ self-reported needs and dentists’ perceived views with the provision of sedation/GA. The next section will discuss possible current evidence based barriers to sedation/GA administration within dentistry.

2.2 Barriers to Sedation and General Anaesthesia

Within the literature, the most significant barrier to sedation/GA are dentists that prevent it from taking place, as opposed to the disinterest of patients (Baron et al., 1990; Boyle et al., 2009; Boynes et al., 2010; Chanpong et al., 2005; Dionne et al., 1998; Gordon et al., 1998; Wilson et al., 2010). The literature supports that dentists do not utilize sedation/GA in their practices for numerous reasons including: (1) lack of training;
(2) dentist risk and patient safety; and (3) lack of time or remuneration (Baron et al., 1990; Boyle et al., 2009; Boynes et al., 2010; Coulthard et al., 2011; Dionne et al., 1998; Gordon et al., 1998; Hunt et al., 2010, Morgan & Skelly, 2005; Wilson et al., 2010). Reported barriers to provision of sedation/GA within dental offices are discussed below.

2.2.1 Lack of Training

The literature reports, the most significant factor affecting dentists’ use of sedation/GA is their level of training (Ashley et al., 2010; Boynes et al., 2006; Foley, 2003; Morgan & Skelly, 2005; Wilson et al., 2006). Dentists in the United States reported their undergraduate training in the use of nitrous oxide to be sufficient, although 67.9 percent and 69.2 percent stated their training in intravenous and oral sedation, respectively, as poor or less than average (Boynes et al., 2006). Furthermore, the majority of recent dental school graduates perceived that the practical clinical application of these skills was not taught (Boynes et al., 2006). In Britain, 47-59 percent of surveyed dentists considered training in oral sedation, IV sedation and inhalational methods to be insufficient depending upon sedation technique (Hill et al., 2008). Furthermore, 61-85 percent of these surveyed dentists supported enhanced training in sedation techniques. Literature has indicated inadequate training extends beyond general practitioners to specialists in the field of dentistry as well (Wilson et al., 2006). Potential deficiencies include a lack of conscious sedation training and resuscitation training in the event of a sedation/GA emergency (Wilson et al., 2006). It is possible dentists enter clinical practice without the skills and confidence to implement sedation.
2.2.2 Patient Safety

Another possible barrier for the use of sedation/GA in clinical dental settings by practitioners is the perception of the risk to their patients. Although the literature has indicated an average mortality rate of 1.4 per 1,000,000 dental patients receiving anaesthesia per year in Ontario (Nkansah, Haas, & Saso, 1997), dentists may not wish to adopt an objectively small risk. Boynes et al., (2006) discovered many surveyed dentists refused to take on the risk of sedating children or other higher-risk patients over concerns of possible litigation (Boynes et al., 2006). In another survey, dentists reported being inadequately trained in the provision of sedation/GA, and that coupled with concern over risks of the use of sedation/GA prevented the availability of such services in their practices (Milson, Tickle, Humphris, & Blinkhorn, 2003).

2.2.3 Lack of Facility/Equipment

Another recognized barrier to provision of sedation/GA includes the logistics of implementing the procedure itself. The literature cites factors such as “the patient; type of treatment and its difficulty; consultant’s experience; facilities available for sedation both locally and within the hospital and waiting lists” (Morgan & Skelly, 2005) contributing to a clinician’s decision in providing patients sedation options. Additionally, factors such as the availability of secondary care, including post-operative and post-anaesthesia support can impact the decision-making process (Chadwick et al., 2006; Wilson et al., 2006). The reason being post-anesthesia care is vital to assess patient recovery and evaluate the patient’s total health after the administration of sedation/GA (Boynes et al., 2010). To
this end, without the proper team or access to facilities with such a team in place, these services cannot be rendered adequately or safely.

Dentistry’s provincial regulatory body in Ontario, the Royal College of Dental Surgeons of Ontario (RCDSO), determines the regulation of sedation and GA within dental practices. The 2009 guidelines provide a general descriptive outline for the administration of sedation and GA in dental practices. Principally, practitioners require successful training in the modality of sedation or general anesthesia being used. Additionally, the dental facility in which the procedures are to be executed require specific equipment and auxiliary trained staff. The dentist and staff are required to assess and respond to any adverse reactions with the correct emergency equipment and drugs if needed. Within the guidelines emergency medications are specified along with the sedation equipment required for the given modalities of sedation/GA. Within Ontario, dental practitioners using any of the modalities of sedation/GA are required to obtain a facility permit from the RCDSO. (The Royal College of Dental Surgeons of Ontario, 2009)

Facility permits require: (1) authentication and review of the training and qualifications of those administering sedation and/or anaesthesia services (2) and satisfactory on-site facility review to verify necessary equipment, monitors, emergency drugs and staffed recovery rooms/areas are available, current and properly maintained. Facility permits require renewal for new in-office anaesthesia providers or for new clinics providing the service. The new guidelines and facility permit requirements were newly enacted in 2009 replacing the 2005 guidelines (The Royal College of Dental Surgeons of Ontario, 2009).
2.2.4 Lack of Time/Remuneration

Lack of time and inadequate remuneration has been cited as possible limitations to sedation care administration (Baron et al., 1990; Hakeberg, Klingberg, Noren & Berggren, 1992; Moore & Brodsgaard, 2001; Hill et al., 2008). The factors may operate independently or together as the old adage goes, “Time is money.” Practitioners under the assumption that sedation/GA is predominantly for anxious patients, may not implement such services within their offices believing anxious patients require too much time with little monetary compensation. Baron et al., (1990) found anxious patients require time consuming management and behave unpredictably. According to Moore et al., (2001) Danish dentists were not willing to spend the time for anxious patients but noted they may be more inclined with some form of remuneration. British dentists share the sentiment citing inappropriate remuneration under National Health Service (NHS) guidelines that prevent practitioners from providing adequate anxiety measures due to time and money constraints (Hill et al., 2008). In the British study, 91 percent of dentists agreed that practitioners do not have time to manage anxious patients.

In surveys, Swedish, American, South African and Danish dentists felt more stress was created by running behind schedule or incurring patient pain as opposed to treating anxious patients (Moore et al., 2001). Similarly, 91 percent of studied British dentists reported feeling stress in managing uncooperative patients (Hill et al., 2008). Dentists commonly identified work stressors as: running behind schedule, patient demands, uncooperative patients and unpredictable patient behaviour (Baron et al, 1990; Hakeberg et al, 1992; Moore et al, 2001). Interestingly, anxious patients were not directly reported in either of the studies, yet dentists felt greatest stress in managing demanding,
uncooperative or unpredictable patient behavior. Furthermore, managing anxious patients who are time consuming and can unpredictably cancel or prolong dental appointments can lead the dentist to run behind schedule which was the number one reported dentist work stressor (Hill et al., 2008). The literature indicates a potential difficulty or unwillingness on dentists’ part to care for the dentally anxious due to time or remuneration constraints. Consequently, the motivation to implement an effective anxiety management technique such as sedation/GA may be minimized by the difficulties associated in treating such patients.

It is evident from the literature that patients have expressed a need for sedation and GA adjuncts to dental care. The needs of patients encompass numerous factors including treatment complexity, medical or behavioural indicators and varying levels of dental anxiety. It is equally apparent that dentists are not meeting that need. Barriers are: a) systemic, with respect to dentists’ sedation/GA education; and b) personal, to dentists preventing their use of this service. In this environment, it is important for researchers to understand patterns of sedation and general anaesthesia use among dental practices. In the absence of cross-comparative, practice-oriented research, dentists in specific geographic locations are not able to benchmark their sedation and general anaesthesia procedures against those of local peers, thereby losing the opportunity to learn from colleagues’ approaches and to better manage the risks and rewards related to sedation and general anaesthesia in clinical practice. For scholars and policy-makers, the absence of data makes it challenging to discern patterns of sedation and general anaesthesia use, resulting in a lack of precise understanding of the state of dental practice in Ontario.
Given the current state of academic knowledge on this topic, it is premature to make inferences about why differences exist between patient need and demand and dentists’ perception of patients’ need and demand. Therefore, it is important to gather data with the aim of acquiring insight into patterns and trends of sedation and general anaesthesia usage.

2.3 Comparison of Study Findings with Previous Study from 2003

To further enhance understanding of dentists’ views with respect to patient interest in sedation/GA and patient self-reported fear, the present study deliberately asked dentists’ similar questions which were posed to Canadian dentate patients in a 2003 study (Chanpong, 2003). The aim is to compare dentist and patient responses to investigate whether dentists’ are aware of patient preference for sedation/GA in general and with respect to procedure and if dentists are able to identify patient fear. Through a comparison, similarities and discrepancies can be noted.

2.4 Purpose

Given the findings from the literature, this study’s purpose are twofold: (1) to investigate the perceptions Ontario dentists have towards the use of sedation and general anaesthesia (GA) for dental patients; (2) and to determine the possible existence of specific patterns in the use of sedation and general anaesthesia within Ontario dental practices.
2.5 Research Questions

This project will attempt to answer the following questions:

1. What do Ontario dentists perceive to be their patients’ preference for the use of sedation or GA during dental treatment?
2. Who are the current self-reported anaesthesia providers within Ontario?
3. What are the potential self-reported barriers to patients accessing sedation/GA services in Ontario?
4. What is the current self-reported prevalence of sedation or GA that exists within dentistry in Ontario?
5. What do Ontario dentists perceive to be their patients level of fear and anxiety towards dental treatment?

2.6 Definitions

The following sedation/GA definitions are obtained from the American Dental Association (American Dental Association, October 2007).

Minimal/Conscious Sedation

‘is a minimally depressed level of consciousness, produced by a pharmacologic method, that retains the patient’s ability to independently and continuously maintain an airway and respond normally to tactile stimulation and verbal command. Although cognitive function and coordination may be modestly impaired, ventilator and cardiovascular functions are unaffected.” (American Dental Association, 2007)
**Moderate Sedation**

‘is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.’ (American Dental Association, 2007)

**Deep Sedation**

‘a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilator function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.’ (American Dental Association, 2007)

**General Anaesthesia**

‘a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilator function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.’ (American Dental Association, 2007)

**Need**

Need within a specific population reflects medically mutable illness. It is a summation of all forms of disease and illness (Fries, Koop, Sokolov, Beadle & Wright,
In the current study, need represents a measure or comparison between patients who obtained sedation or GA for dentistry versus patients who did not receive but expressed a need or demand for sedation or GA for dentistry.

**Demand**

Demand is independent of need reflecting a patient's request for medical services. Patients' needs may be the same but the variability of responses to it are represented by demand (Fries et al., 1998). Similarly, the impact of demand can affect patient healthcare outcomes. As an example, a patient seeking anti-infective agents from his/her physician may have little need for the medication but demands a prescription of antibiotics to remedy his/her cold symptoms (Miller, MacKeigan, Rosser & Marshman, 1999).

Demand within the context of the current study, encompasses patient preference for a service, in this case sedation/GA in conjunction with dental treatment.
Chapter 3

3.0  Methodology

3.1  Research Design

This study surveyed a random sample of Ontario dentists to assess the self-reported perceptions of dentists towards sedation and GA in dentistry. The research employed a descriptive and quantitative research survey design as the most appropriate methodological approach to investigate the problem of the perceptions Ontario dentists are likely to have towards the use of sedation and GA for dental patients.

3.2  Survey Selection

Surveys are a vital tool in health services and policy research supplying pertinent information on a health practitioner, “attitudes, knowledge, and practices related to care delivery.” (VanGeest, Johnson & Welch, 2007, p. 303). Surveys can be implemented in a number of different manners with advantages and disadvantages associated with each format. Person to person, telephone, Internet and letter surveys are all viable methodologies (Chanpong et al., 2003). Given the high costs associated with person to person and telephone surveys, these formats were discounted from the outset. Self-report questionnaires can be executed by Internet or mail (Dillman, 2010) with reduced cost.

Web-based surveys have several potential disadvantages including technological difficulties such as incompatible software interfaces, server delay, Internet security, invalid or incorrectly spelt email addresses can prevent potential respondents from participating (Braithwaite, Emery, de Lusignan & Sutton, 2003; Kaplowitz, Hadlock &
Levine, 2004). Additionally, slow Internet connections can frustrate responders or respondents may inadvertently reset surveys prior to submission leading to non-response or incomplete surveys. Sheehan (2001) speculated respondents receiving up to an average of 39 unsolicited emails/day may delete unknown emails, use spam/filtering software or not open an email for fear of contracting a computer virus. Some authors have noted the generalizability may be questioned as Internet survey responders were commonly male, had ready Internet access, educational aspirations and were of similar age, a mean of 37.6 years old (Brogger, Nystad, Cappelen & Bakke, 2007). Similarly, Braithwaite et al., (2003) found females tended to be underrepresented in web surveys.

Conversely, a web-based survey can reduce administrative costs from elimination of postage and printing. Electronic delivery is instantaneous. Consequently, incorrect addresses are reported immediately versus delayed via postal service return mail. Additionally, faster response times can circumvent potential loss of response past the data collection closing date. Lastly, data electronically obtained can be stored and analyzed in the same format preventing possible transcription errors from paper to electronic data (Lazar & Preece, 1999).

3.2.1 A Mixed Mode Approach

The scholarly literature showed that the use of email is a more viable process for obtaining survey responses than mail, but that they can also be used in cooperation as methods of engaging professionals (Kaplowitz et al., 2004; McMahon, Iwamoto, Massoudi, et al., 2003). In comparing three survey delivery modes in a physician survey: postal, fax and e-mail, it was found that fewer incomplete questions were obtained from
those completing by email vs. postal or fax, and where each member of the population has web access, a web survey application was likely to achieve a comparable response rate to a postal questionnaire if the web version was preceded by surface mail notification (McMahon et al., 2003). Similarly, Wilson et al. (2010), found mixed modes of survey delivery increased respondent participation.

Conversely, another study did not indicate an advantage with multiple avenues of data collection (Brogger, et al., 2007). When 1,926 general and specialty physicians were given the option to participate in a survey via post, web, phone or fax, the overwhelming majority (85.2%) selected mail (Field et al., 2002). In the current study, a hybrid approach was selected to curtail potential issues with external validity and low response rate, while containing costs of the project.

Based on the literature review and in accordance with the study objectives, a mixed mode format is a defensible research instrument. Dentists were sent letter mail recruitment documents containing a survey in letter format, the option to complete the survey online with the printed URL address given and an enclosed return postage paid envelope. Subsequent notifications to dentist non-responders were sent via email.

3.3 Study Design

In designing a study it is important to eliminate or minimize possible sources of error affecting survey accuracy. The goal is to optimize data quality within financial constraints (Biemer, 2010). According to Dillman (2010), potential errors affecting survey accuracy include: sampling errors, non-coverage errors, measurement error and nonresponse errors.
3.3.1 Sampling Errors

Sampling error is a function of surveying a part of a study population, not all of it. In the current study, dentists in Ontario were the population of interest. All Ontario dentists did not have the potential to be sampled. To minimize the effects of sampling error in this study, a large sample size of general dentists and specialists was utilized complemented by strategies to optimize response rate.

3.3.2 Coverage Errors

Incomplete sampling frames that do not sufficiently include all components of the study population can lead to coverage errors (Dillman, 2010). The result may be that the population being sampled does not reflect the target population. In the current study, to mitigate the effects of coverage errors, dentists within the RCDSO database with an email address had an equal chance of being selected to participate. In conformity with the study objectives, dentists across Canada were not part of this study. Ontario has the largest percentage of practicing dentists, the only dental anaesthesia program in the country and has unique laws and regulations pertaining to the provision of sedation and GA, making it an interesting initial population to study. Future studies can be directed at assessing possible variations in dentists’ views of sedation and GA across the country.

3.3.3 Measurement Errors

Measurement error occurs if the survey question concept deviates from the concept being measured (Beimer, 2010). It can arise if a respondent’s answer is inaccurate, imprecise or cannot be compared in a useful way to other respondents (Biemer, 2010; Dillman, 2010). It could result from poor wording of survey questions or
questionnaire construction. To reduce measurement errors, the questionnaire in the current study was piloted in a small sample of general practitioner and specialist dentists (n=20) and modifications were made based on their responses to the survey. Survey questions were kept short and succinct. To facilitate respondent understanding to differentiate the population of all dental patients in Canada versus dental patients specific to the respondent’s practice the word, all or your, was underlined in the stem of the question. To promote completeness for the current study, respondents were instructed that certain answers must total to 100 per cent in letter surveys and on the web respondents could not continue unless the total sum of percentages equaled 100 per cent. Additionally, web respondents were alerted if questions were unanswered or incomplete. Lastly, questions were deliberately ordered in an effort to prevent possible bias. As an example, questions specific to patient fear were deliberately left to the end of the questionnaire to prevent respondents’ from answering earlier questions in that context.

3.3.4 Non-response Errors

Another source of error affecting survey accuracy is introduced by non-responders. It can significantly reduce the effective sample size leading to possible bias (Beimer, 2010; Edwards et al., 2002). It is possible to introduce response bias by neglecting to collect data from some subgroup populations comprising the sample (Locker, 2000). The difference between sampled individuals that respond versus those that do not, create the possible bias (Dillman, 2010; Locker 2000). Between dental responders and non-responders, Locker (2000) found no dissimilar characteristics. Similarly, Murray, Locker & Kay (1996) found no difference in gender, region of
practice location or place or year of graduation between dentist participants and nonparticipants. Furthermore, Hovland, Romberg, & Moreland (1980) indicated the absence of non-response bias in a dental population where there was a 43 per cent response rate to a survey. The dental population is fairly homogenous with respect to training, attitudes, behaviour and knowledge. Consequently, the use of a survey to address the questions in this study is a defensible strategy.

Nonetheless, it is best to minimize the risk of non-response bias (Locker, 2000) and all possible sources of error. Survey methodologists have evaluated hundreds of surveys through meta-analyses to identify the best design methods to reduce survey error and maximize response rate. Dillman’s tailored design method is believed to prescribe the optimal protocol for mail and Internet surveys (Beimer, 2010).

3.4 Enhancing Response Rate

To reduce refusals and noncontacts, response-enhancing techniques can be introduced. In implementing Internet and mail surveys, the Tailored Design Method by Dillman (Dillman, 2010) is the present standard. In the population at large, these strategies were reproducible in a Cochrane Methodology Review (Edwards et al., 2009; Leece et al., 2004). The five major elements of the approach created by Dillman are: (1) the gift of a financial incentive or token; (2) a first class stamped return envelope; (3) first class mail delivery of four contacts with an additional unique contact (i.e. telephone call); (4) a survey that is respondent-friendly; and (5) other components to personalize the survey (Field et al., 2002).
Limited literature relates to maximizing response rate within the dental population. Of the studies available, consistently, pre-notification, reminders to non-responders and the personalization of questionnaires increased response rate (Kay & Lowe, 2005; Loeppky & Sigal, 2007). A greater breadth of research exists for a similarly educated population, that of physicians. Commonly, brief, personalized surveys, endorsed by legitimate institutions increased survey response rates. A similar effect was achieved with the use of first class stamps on return envelopes, close ended questions, reminders and assurance of confidentiality to participants (Braithwaite et al., 2003; Field et al., 2002; VanGeest et al., 2007). While some researchers found a better response rate with a current or potential incentive, either financial or material (Kay & Lowe, 2008; Wilson, Petticrew, Calnan & Nazareth, 2010), this was not determined to be viable for the current study due to cost. Similarly, the Dillman TDM (2010) methodology was deviated from slightly in the current study. The final contact did not include a different modality of approach from letter mail or email (for example, by telephone). Dentists are usually busy with patients when in their offices; as such no final contact was made by telephone for this reason. Such an interruption to patient care may be deemed intrusive and disruptive thus decreasing the potential response rate.

In the case of this study, to maximize response rate as validated by the literature, all dentists were invited to participate with letters and envelopes personalized with the doctor’s name. First class postage was utilized on outgoing and return postage paid envelopes. To indicate sponsorship from a legitimate authority, all materials seen by participants had the University of Toronto logo. The survey length was kept short and questions were predominantly partially or completely closed to ensure surveys were
respondent friendly. Additionally, the anonymity of participants was guaranteed along with the reassurance all answers provided were confidential. Dental participants were invited to partake in the survey via a letter with subsequent email reminders to non-responders.

Additional features attributed to web formatting were employed to maximize response rate of Internet users. Web respondents were alerted to the percent of the survey completed, all pages included the University of Toronto logo and each email was personalized with the doctor’s name and email address. The login ID personalized to the respondent was bolded to facilitate ease of use. The subject header was clear and succinct indicating university sponsorship and purpose, “U of T – Dental Sedation Study”. To prevent errors in keying in the URL link, a short and easy typing sequence was utilized.

Additionally, in email letters, participants had four easy highlighted links. One, click on a highlighted URL directly linked the participant to the survey site thus bypassing possible respondent error in typing in the wrong URL. Similarly, to address frequently asked questions or to email myself, the principal investigator, respondents need only click to readily access the required information requested thus facilitating ease of use. Finally, to curtail and expeditiously manage web server issues, a direct link to alert the web-master was also included.

3.5 Instrument Design

In the current study, the objectives of the questionnaire were to understand: the attitudes of dentists towards the provision of sedation and GA in dentistry; their current behaviours and practice use of sedation and GA; their perception of patient demand for such services; their perception of patient fear to dentistry: and finally, the demographics
of the population being studied. Survey questions were selected in accordance with the study objectives. Question design can be of two types, close-ended or open-ended (Dillman, 2010). Close-ended questions can be further stratified into four types: a rating scale, a forced choice, a dichotomous choice or demographic measure (Government of Canada, 2012). Conversely, open-ended questions enable respondents to express their views without restriction with a free response. Sometimes questions can be partially closed enabling participants freedom in response to fixed choices.

The questionnaire of the current study used a combination of closed and partially closed questions. Given the limited research in the field of the present study, a deliberate decision was made to allow respondents the freedom to express their ideas without the restriction of picking the answer that matches best in the partially closed questions under the category of ‘Other comments’. The exploratory and confirmatory nature of this research best meets the present studies’ objectives, with quantitative and qualitative data. Additionally, VanGeest et al. (2007), indicated physicians were less likely to respond to questions that did not provide a full range of choices. An example of a partially close-ended sentence in the present study is:

Estimate the percentage of all dental patients that would prefer to have conscious/moderate sedation for the following dental procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>________%</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>________%</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>________%</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>________%</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>________%</td>
</tr>
<tr>
<td>Implants</td>
<td>________%</td>
</tr>
</tbody>
</table>
Although, the above question provided no rating scale (such as a Likert), the data obtained were quantitative and did not potentially fragment respondent answers into set categories.

An example of a closed-ended question in the present study is:

Are you ___ male ___ female?

The question presented above is quick to answer and easily provides demographic information of the participant.

Lastly, Dillman (2010), states word choice is an elemental feature of question structure. In the current survey, the population sampled is of a homogeneous education level. Piloting the survey within a sample of 20 general and specialist dentists maximized attention to word choice to ensure ease of understanding.

3.6 Pre-Test

The questionnaire was piloted in a small sample of general practitioner and specialist dentists (n=20) and modifications to content, sentence structure and word choice were made based on their responses to the questionnaire and its use. Survey questions were: partially closed or multiple-choice questions listing several response categories with the option for participants to provide clarifications or explanations. The pre-test confirmed the survey took respondents less than 10 minutes to complete. Validity refers to the accuracy of the inferences and interpretations made on the basis of questionnaire results (Johnson & Christenson, 2008). The determination of the validity of the data has an effect on the interpretation and subsequent conclusion drawn from the results (Creswell, 2009). Validity of quantitative data has a basis in the content of the
questionnaires, the response processes, the internal structures, and the relations to other variables. In this case, the validity of the questionnaire was able to be determined during the pre-test process, and through the internal consistency tests run during the data analysis process. Reliability relates to the extent to which an experiment, test, or any measuring procedure gives consistent results on repeated trials (Johnson & Christenson, 2008). The external consistency of the data was determined through the use of the pre-test.

3.7 Questionnaire

The study questionnaire can be found in APPENDIX A. Besides question structure, Dillman (2010) stated whether a respondent participates is dependent upon whether the content and purpose of the study is perceived to be valid and worth the time and effort of the respondent. Additionally, surveys perceived to challenge a dentist’s knowledge base versus attitude could be deemed threatening. Appealing to a potential respondent’s expertise (Leece et al., 2006) can potentially increase response rate. Consequently, the introductory paragraph clearly indicated, “The intent of the study is to understand your views and practice, not your knowledge of sedation and general anaesthesia. There are no right and wrong answers. Your answers are important to better understand the use of sedation and general anaesthesia in Ontario dental practices today.” Additionally, respondents were informed their participation is voluntary and confidential (Leece et al., 2006).

In this survey, the first three questions were modified from a 2002 survey of dental students across Canada, which asked patients about their preference for anaesthesia services (Chanpong, 2003). This was done because the present study aimed to
investigate dentists’ awareness of dental patient’s level of interest for sedation or GA for dental treatment in order to compare dentist and patient responses to this question. The second and third questions attempt to make a similar comparison but with respect to the level of interest patients have for sedation or general anaesthesia related to specific dental procedures.

The study of Chanpong (2003) interviewed Canadian dentate patients, 18 years or older. Question 1 in the current study was posed to dentists from the dentists’ frame of reference although the same question was directed to patients from the patient frame of reference in the 2002 Chanpong (2003) study. The patient question was as follows: “If a trained individual could provide you with sedation or general anaesthesia in a safe, controlled environment which would allow you to undergo your dental treatment while partially or completely asleep at the dental office, which of the following best describes your interest in this service?” (Chanpong, 2003; p. 107). Not interested, possibly interested depending upon cost or definitely interested were the list of possible responses.

In the current study, questions 2 and 3 (see APPENDIX A) were broken into two questions not only to ascertain dentists’ estimation of patient preference for sedation/GA for specific dental procedures but also to determine if dentists’ perceived a possible difference in need depending upon the modality of anaesthesia administered. In the Chanpong, (2003) study patients were posed one question given patients would not likely have the knowledge background to discern between the effects of different sedation techniques.

The question concerning the demand for sedation or GA for specific dental procedures clearly indicated the service was to be provided within a dental office not a
hospital. The sedation choice was exclusively parental as opposed to oral or inhalational. Patients were asked if they, “Would you prefer to have sedation or general anaesthesia in order to be partially or completely asleep for the following dental procedures?” (Chanpong, 2003; p.108). The procedures listed were: routine cleaning, fillings or caps, root canal, gum surgery and tooth extraction. In the present study, additional dental procedures were included, namely, bridges and implants as it is believed patients may request sedation/GA for such invasive procedures.

Lastly, to prevent bias through association with fear or any specific kind of patient potentially associated with sedation/GA needs, the first question addressed all dental patients. To denote all patients, the word all was used and underlined for two reasons: (1) to facilitate respondent understanding that no specific type of patient is being referred to (2) and to generalize the question to all dental patients in Canada as opposed to dental patients specific to the respondent’s practice. Questions specific to patient fear were deliberately left to the end to prevent respondents from influencing their answer if based on the context of patient fear.

1. What percentage of all dental patients do you believe are interested in sedation or general anaesthesia for dental treatment?
   - Not interested
   - Possibly interested depending on cost
   - Definitely interested

   Total = 100%

2. Estimate the percentage of all dental patients that would prefer to have conscious/moderate sedation for the following dental procedures.
   - Routine Scaling
   - Fillings, Crowns/Bridges
   - Root Canal Therapy
   - Periodontal Surgery
   - Dental Extractions

   Total = 100%
3. Estimate the percentage of all dental patients that would prefer to have deep sedation/general anaesthesia for the following dental procedures.

Routine Scaling _______%
Fillings, Crowns/Bridges _______%
Root Canal Therapy _______%
Periodontal Surgery _______%
Dental Extractions _______%
Implants _______%

Questions 4 through 6 relate to the provider of sedation/GA services within the dental practice and possible limitations for provision of such services. For each question numerous choices were provided to respondents along with the freedom to provide their own comments. The intent is to explore the attitudes of dentists towards the provision of sedation and GA in dentistry. To gain a better understanding of dentist attitudes, dentists were asked who provides anaesthesia within their primary practice and whether the dentist encountered any barriers in providing their patients with sedation or GA.

4. Identify who provides sedation/anaesthesia services for your patients and the percentage of the time services are provided (Please check all that apply).

No sedation/GA provided Yes No _______%
Provide own sedation Yes No _______%
Dental Anaesthesiologist Yes No _______%
Medical Anaesthesiologist Yes No _______%
Other ________________ Yes No _______%

5. Have you experienced any of the following barriers to care when referring a patient to an anaesthesia provider? (Please check all that apply.)

___ Patient disinterest
___ Long wait time for appointment
___ High cost
___ Distance too far
___ Patient fear of sedation/GA
6. If sedation or anaesthesia services are not provided within your office, please indicate the reason(s). (Please check all that apply.)

- No patient need
- No patient demand
- Lack of training
- Lack of referral source
- Cost too high
- Inadequate fee/remuneration for service
- Believe sedation/GA is unsafe
- Other _______________________________

Questions 7 through 10 aims to assess the current behaviours and practice use of sedation and GA within Ontario dental practices. Specifically, the goal is to discern the modalities of anaesthesia provided for specific dental procedures with noted quantitative frequency. The responses to all four questions could subsequently be summated to obtain a total value of sedation provided, irrespective of anaesthesia modality, for the specified dental procedure. The summated responses would not only provide descriptive data but could also be compared to patient responses from the 2003 nationwide telephone survey (Chanpong, 2003) indicating prevalence of sedation provided for the specific dental procedures. It will be valuable to note congruency between the patient stated prevalence of sedation for specific procedures versus dentist stated prevalence of anaesthesia for the same dental procedures. In the 2003 survey of Canadian patients were asked, “Have you ever had sedation or general anaesthesia in order to be partially or completely asleep for a dental procedure?” The five specific dental procedures were: routine cleaning, fillings or caps, root canal, gum surgery and tooth extraction (Chanpong, 2003; p.108). The
question posed to patients does not differentiate between the methods of anaesthesia employed.

7. For what percentage of your patient practice do you provide nitrous oxide sedation for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>_____ %</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>_____ %</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>_____ %</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>_____ %</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>_____ %</td>
</tr>
<tr>
<td>Implants</td>
<td>_____ %</td>
</tr>
</tbody>
</table>

8. For what percentage of your patient practice do you provide oral sedation for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>_____ %</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>_____ %</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>_____ %</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>_____ %</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>_____ %</td>
</tr>
<tr>
<td>Implants</td>
<td>_____ %</td>
</tr>
</tbody>
</table>

9. For what percentage of your patient practice do you provide intravenous sedation for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>_____ %</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>_____ %</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>_____ %</td>
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<tr>
<td>Periodontal Surgery</td>
<td>_____ %</td>
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<tr>
<td>Dental Extractions</td>
<td>_____ %</td>
</tr>
<tr>
<td>Implants</td>
<td>_____ %</td>
</tr>
</tbody>
</table>

10. For what percentage of your patient practice do you provide deep sedation/general anaesthesia for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>_____ %</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
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<td>Root Canal Therapy</td>
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<td>Periodontal Surgery</td>
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<td>Dental Extractions</td>
<td>_____ %</td>
</tr>
<tr>
<td>Implants</td>
<td>_____ %</td>
</tr>
</tbody>
</table>
Questions 11 through 12 are altered from a survey posed to dental patients assessing dental patient fear (Chanpong, 2003). In the current study, sampled dentists were asked similar questions to discover their self-reported perception of dental patients deemed to be fearful or avoidant of dentistry. Question 11 of the current study corresponded to the 2003 survey question where patients were asked, “How would you rate your feelings towards having dental treatment done?” (Chanpong, 2003; p. 106). The possible responses listed were: not at all afraid, a little afraid, somewhat afraid, very afraid and terrified. Question 12 of the current study corresponded to the 2003 survey question where patients were asked, “Have you ever missed, cancelled or avoided a dental appointment because of fear or anxiety?” (Chanpong, 2003; p. 106). The possible responses listed were: yes or no.

11. What percentage of all dental patients describe their feelings towards dental treatment this way?
   - Not at all afraid ______%  
   - A little afraid ______%  
   - Somewhat afraid ______%  
   - Very afraid ______%  
   - Terrified ______%  
   Total = 100%

12. What percentage of all dental patients do you believe have ever missed, cancelled or avoided a dental appointment because of fear or anxiety? ______%  

The final set of four questions aids to illustrate the sample characteristics:

13. Are you ___ male ___ female

14. How many years have you been in clinical practice? ________
15. Which best describes you or your practice? (Please check all that apply)

___ General Practitioner
___ Dental Anaesthesiologist
___ Dental Public Health Specialist
___ Endodontist
___ Oral Medicine/ Oral Pathologist
___ Oral and Maxillofacial Radiologist
___ Oral and Maxillofacial Surgeon
___ Orthodontist
___ Paediatric Dentist
___ Periodontist
___ Prosthodontist

16. Is your primary office in a town/city with a population of....

___ Under 5,000
___ 5,000 - 50,000
___ 50,000 - 100,000
___ 100,001 - 500,000
___ Over 500,000

Question order can also impact a respondent’s decision to start or complete a survey (Dillman, 2010). Questions at the start concerning the respondent’s demographics may be construed as invasive if the decision to fill out the survey is still a question. Furthermore, at the end of a survey demographic questions are easy to fill out and can reduce perception of the survey’s length. Questions relating to the subject matter were inserted at the start to capture the participant’s interest.

3.8 Final Complete Survey

The final survey instrument was a 16-item self-administered questionnaire. A letter version was formatted and produced. Additionally, an electronic version was created. Ten dentists and insiders examined both finalized formats for simplicity and utility prior to being distributed to the sample population. Respondents had the option to
complete the survey by letter and return it in the return postage paid envelope included or to access and fill out the questionnaire online.

3.9 Study Population and Sample

In this study, the survey was exclusive to dentists practicing in Ontario. The source of the sampling frame was obtained from the Royal College of Dental Surgeons of Ontario (RCDSO), the regulatory and licensing body for all dentists practicing in Ontario. From their computerized database, the RCDSO provided the names, mail and in most cases email addresses of dentists licensed to practice in Ontario.

Of the 8,670 registrants, 8,513 had Ontario mailing addresses and of the 8,513, 77.7 percent or 6,613 had email addresses available in the RCDSO database. From the population of 6613 dentists, 3001 were sampled. Although the names and mail addresses of dentists in Ontario is public domain, the email addresses are not. Consequently, institutional approval from the RCDSO was obtained granting access to this information via their databases.

Unlicensed, retired or dentists with no email address within the RCDSO database were not included in this study. Upon receipt of the RCDSO database, members with an email address were separated from members without. Each person in the sample with email addresses was assigned a random number. Based on the random numbers assigned by SPSS version 20, the lowest 3001 values were assigned to the study sample.
3.10 Sample Size Formula

The sample size for this survey was based upon an expectation to obtain a 4 per cent sampling error with a modest presumption of a 50 per cent split for a ‘yes’ or ‘no’ response. To meet the above criteria, the objective was to attain 600 questionnaires. Based upon the previous response pattern of dentists in Ontario (Loeppky & Sigal, 2007; McCarthy & MacDonald, 1997; Murray et al., 1996; Nkansah et al., 2007) it was difficult to postulate a possible response rate. To optimize accuracy of study results, a very low response rate of 20 per cent was estimated. At a forecasted return rate of 20 per cent, the intent was to send out the survey to 3001 dentists.

The current study utilized a sample size calculation formula by Dillman (2010).

\[ n = \frac{(N_p) \cdot (pr) \cdot (1-pr)}{(\sqrt{C/Z})^2} \]

The population size is represented by \( N_p \), the population proportion believed to select one of two answers by \( pr \), sampling error is defined by \( C \) while the confidence interval associated with the Z score is represented by \( Z \).

Since the population size selected is greater than 5% of the true population, no correction factor in the denominator is required. Additionally, the effects of \( N_p \) in the numerator and \( (N_p - 1) \) in the denominator eliminate each other in the context of a large population as in the current study.

Consequently, the remaining formula becomes:

\[ n = (pr) \cdot (1-pr) \cdot (\sqrt{C/Z})^2 \]

In the above equation,
\( C = +/- Z (\sigma), \) where \( \sigma = \sqrt{pr (1-pr)/n} \)

\( \sigma \) represents the standard error. If the two equations are combined, the following equation results:

\( C = +/- Z [\sqrt{pr(1-pr)/n}] \)

Making \( n \),

\[ n = Z [\sqrt{pr(1-pr)}]^2 \]

\[ C^2 \]

Given a 50% split is given for a yes or no response,

\[ \sqrt{pr(1-pr)} = \sqrt{0.5*0.5} = 0.5 \]

Thus the equation becomes,

\[ n = [Z(0.5)/C]^2, \]

if \( C \) represents a confidence interval of 95% with +/- 4%,

\[ n = [1.96(0.5)/0.04]^2 \]

\[ n = 600 \]

It is important to note that \( pr \) impacts the population size. \( Pr \) denotes the percentage of the population that chooses a yes or no response. To obtain the maximum possible variation in a population, the \( pr \) was set at 50%, meaning respondents had a 50% chance of selecting yes or no.

### 3.11 Dentist Recruitment

Based upon Dillman’s Tailored Design Method (Dillman, 2010), participants received four main contacts: (1) an invitation/pre-notice to participate package mailed to
all sample participants, (2) an email invitation to participate to all non-responders, (3) a thank you and reminder email, and (4) a final contact 48 hrs. prior to study closing.

The initial invitation/pre-notice package consisted of a cover letter (APPENDIX B), paper survey (APPENDIX A), information sheet (APPENDIX C) and pre-stamped addressed envelope. The cover letter described the aims of the survey, emphasizing dentist views and practices not knowledge of sedation or GA were sought while the information sheet discussed voluntary participation, confidentiality and consent.

Additionally, the invitation included a URL link www.surveydental.ca that could be entered into any Internet browser, if the respondents wished to complete the survey online with the provided unique login ID. To opt out of the survey, respondents could make the appropriate request through the email contact of the principal investigator provided within the invitation package. Dentists participating in online surveys or returned letter surveys were tracked for questionnaire completion while the anonymity of their responses was maintained. Consequently, respondents received no further email reminders or follow up contacts. However, non-respondents received an email invitation to participate in the study (APPENDIX D), a thank you and reminder email (APPENDIX E) and finally, a notice 48 hours prior to data collection closing (APPENDIX F). At each contact, dentists were reminded that their anonymous participation would be voluntary and should they wish to not partake in the study their email address could be removed from the electronic mailing list.

The study protocol was designed to protect participant confidentiality. The respondent's name and any other personal identification information were not stored with answers provided nor will it be used in any reports or publications resulting from the
survey. To maintain anonymity, respondents were asked to refrain from including any identifying information in their written responses to survey questions. Personal identification information was only used for survey distribution, response tracking (for email reminders) and compiling the data file for analysis. Upon completion of the final data file all respondent keys are stripped from respondent survey responses.

3.12 Data Collection

The total duration of data collection took place during the 6 weeks between November 15, 2011 to December 23, 2011. All contacts were spaced 10 days to 2 weeks apart (See Figure 3.1). Surveys were returned in sequentially numbers envelopes, corresponding to the mailing list. The data was entered into a computer database for evaluation and statistical analyses. After the closing date of the data collection period, data collection was discontinued. The data from returned surveys were entered and imported into SPSS.

3.13 Data Analysis

This study is quantitative, cross-sectional, and survey-based in nature. In the current study, data analysis has included descriptive statistics, means, standard deviation, and frequency where applicable. The relationship between dentist responses and demographic variables was assessed with mixed analysis of variance followed by independent samples t-tests or one-way ANOVAs if a main and procedure by variable effect was found. For this analysis, alpha has been set at \( p = .05 \) to indicate statistical significance. Descriptive presentation of these data, including tables and graphical
displays were performed as well. Statistical analyses were carried out using the SPSS statistical software package version 20.0. Qualitative comments were also provided. No personal identification information was made available or used in the analysis.

3.14 Ethics Approval

Ethics approval was received from the Health Sciences 1 Ethics Review Board at the University of Toronto.
Chapter 4

4.0 Results

4.1 Response Rate

Of the 3,001 dentists identified to participate in the study, 713 responded by mail and 363 completed the online survey. Of the mailed surveys, 43 letter invitation packages were undeliverable marked “Unclaimed Moved or Unknown – Return to Sender” by Canada Post. Seven paper surveys were returned either blank (3) or citing the respondent had moved with no forwarding address provided (1) or in keeping with the inclusion criteria, the potential participant had written that they are semi-retired/retired (3).

In addition to those 363 respondents who completed the survey online, 49 emailed the principal investigator to decline participation and requested removal from the mailing list and to decline participation. They included 10 specialists, stating it was not relevant to their practice (Orthodontist – 2; Paediatric Dentist – 1; Dental Anaesthesiologist -1; Endodontist -1 and Oral Maxillofacial Surgeon -1); 5 general dentists who were nearly if not completely retired; 16 general dentists with no specified reason; and 18 general and specialist dentists, who cited variable reasons from exclusive use of local anaesthetic within their practice to personal issues of maternity leave or illness. On the web, 95 potential respondents started but did not complete the survey; 82 did not submit the first page; 17 stopped at the second page; and 4 reached the final page but did not activate the submit button. Furthermore, the questionnaire was emailed three times, with 111, 4 and 5 emails bouncing back respectively. Thus the final data set included 1,076 surveys of
Of the 1,076 returned questionnaires, 899 had all questions completed. Within the questionnaire, particular answers were discounted from the data set on an individual question basis if the following exclusion criteria were met: if questions requiring summation to 100 percent were less than 100 percent, or if data in question 4 did not correspond accurately to responses provided in questions 7 through 10. Consequently, the frequency results provided for each question are based upon the number of responses received for the particular question while the percentages represent valid percentages to exclude missing or invalid data. Thus N may not be 1076 for all statistical analysis, although all valid percentages will total 100 percent. Also all graphs displaying percentages are depicting mean percentages and standard error. Patient data obtained from Chanpong et al., (2005) did not include standard error or deviation, consequently, it could not be included here.

4.2 Sampling Error

The response rate exceeded the 600 returned questionnaires estimated from the sample size calculations of this project. The sample size calculation, as previously provided in the methods chapter of this thesis, indicates a sample size of 1066 or more represents a confidence interval of 95% with +/- 3% sampling error.
4.3 Demographics

The survey’s demographic data described respondent’s gender, years of clinical experience, primary type of work activity and the size of the community in which they practice (see Table 4.1). The sample (n=1036) consisted of 69.7% male (n = 722) and 30.3% female (n = 314) dentists. The majority of respondents were general practitioners (n = 860/1036), representing 83.0 percent of the sample, with the remaining representing specialists from all 10 dental disciplines.

Participants were in clinical practice for a mean of 20.6 years with the range being from 0.5 to 42 years. 42.2 percent (n = 437) of the dentists had their primary practice in a city with a population over 500,000; 29.4 percent (n = 304) were in cities between 100,001 and 500,000 inhabitants; 9.8 percent (n = 101) were in towns with 50,001 to 100,000 inhabitants; 14.6 percent (n = 151) were in towns with 5,000 to 50,000 inhabitants; and 4.1 percent (n = 42) were in towns under 5,000 in population. The data obtained for the practitioners’ clinical years of experience and the city size in which the dentists’ practice was collapsed into three categories of clinical experience and population size respectively. This was done to assess possible trends of sedation/GA practice specific to dentists’ clinical experience and/or size of community in which they practice.

4.4 Dentists’ Estimation of Patient Interest for Sedation/General Anaesthesia

When asked “What percentage of all dental patients do you think are interested in sedation or general anaesthesia for dental treatment?”, 66.8% of respondents (n = 969)
indicated that patients are not interested in sedation (see Figure 4.1). The remaining 33.2% indicated that patients had some degree of interest.

When asked to “Estimate the percentage of all dental patients that would prefer to have conscious/ moderate sedation for the following dental procedures: routine scaling; fillings, crowns, and bridges; root canal therapy; periodontal surgery; dental extractions; and implants” dentists (n = 749) believed patients had variable levels of interest in sedation depending upon the procedure (see Figure 4.2).

When asked to, “Estimate the percentage of all dental patients who would prefer to have deep sedation / GA for the following dental procedures: routine scaling; fillings, crowns, and bridges; root canal therapy; periodontal surgery; dental extractions; and implants”, dentists (n = 749) believed patient interest in deep sedation /GA was variable depending upon the procedure (see Figure 4.2).

Further analysis was done to determine if dentists’ estimation of patient preference for the listed dental procedure varied by type of sedation modality (see Figure 4.2). It was found for all procedures, dentists’ estimated patient preference to be greater for conscious/moderate sedation versus deep sedation/GA techniques. Paired samples t-tests were conducted. The p values are statistically significant for all procedures: routine scaling (t (748) = 19.43, p < 0.001), fillings, crowns and bridges (t (748) = 20.42, p < 0.001), root canal therapy (t (748) = 21.04, p < 0.001), periodontal surgery (t (748) = 20.46, p < 0.001), dental extractions (t (748) = 17.50, p < 0.001) and implants (t (748) = 18.46, p < 0.001).
4.4.1 Comparison Between Dentists’ and Patient Responses

To determine if dentists’ estimation of patient interest for sedation/GA varied from patient stated preferences for sedation/GA noted in a 2003 study (Chanpong et al., 2003) one sample t-tests were conducted with patient responses serving as the reference values 43.9, 42.3 and 13.4 respectively (see Figure 4.1).

Statistically significant differences were found for the categories of, ‘Not Interested’ and ‘Interested Depending on Cost’. Dentists estimated patients’ disinterest in sedation/GA adjuncts to be higher than stated patient preference, \( t (968) = 27.47, p < 0.001 \). Additionally, dentists’ predicted patients were less affected by cost than patients’ indicated, \( t (968) = -41.11, p < 0.001 \).

Dentists’ estimation of patient interest for sedation/GA specific to a type of dental procedure, were again compared with patient answers in a 2003 study (Chanpong et al., 2003) (see Figure 4.3). One sample t-tests were utilized to assess the difference between dentist estimation and patient preference for sedation/GA relative to each of the listed procedures with patient responses serving as the reference values 7.2, 18.0, 54.7, 68.2, and 46.5 respectively. Prior to t-test analysis responses from question 2 and 3 were summated. If upon addition, individual procedure totals exceeded 100 percent, responses were discounted. In other words, if a dentist estimated a patient would prefer routine scaling with conscious/moderate sedation and deep sedation/GA greater than 100 percent of the time, the summated response was excluded from the data set for this analysis. Statistically significant differences were found for all services with the exception of extractions. For routine scaling, \( t (748) = -5.65, p < 0.001 \), fillings, crowns and bridges, \( t (748) = -11.58, p < 0.001 \), root canal therapy, \( t (748) = -38.83, p < 0.001 \), and periodontal
surgery, $t(748) = -39.97, p < 0.001$, dentists underestimated the patients’ preference for provision of sedation services. No statistically significant difference was found for dental extractions with $t(748) = -1.15, p = 0.253$.

### 4.5 Proportion of Anaesthesia Services

When asked to, “Identify who provides sedation/anaesthesia services for your patients and the percentage of the time services are provided” 60.2% reported the provision of sedation/GA within their practice while 39.8% do not. The dentists providing sedation/GA, reported using it 12.5 percent of the time in their practices (see Figure 4.4). 36.6% of dentists administered the sedation/GA while dental anaesthesiologists followed by medical anaesthesiologists, and another type of sedation provider respectively were also reported providers (see Figure 4.5). In the free comments section, some dentists ($n = 99$) noted that they refer to other anaesthesia providers: oral and maxillofacial surgeons ($n = 56$); an associate within their practice ($n = 14$); an unidentified specialist ($n = 6$); an unidentified referral provider ($n = 6$); periodontists ($n = 6$); endodontists ($n = 4$); paediatric dentists ($n = 4$); dental anaesthesiologists ($n = 2$); medical anaesthesiologists ($n = 1$); University of Toronto Surgicenter ($n = 1$); and the hospital ($n = 1$).

### 4.6 Barriers to Patient Referral for Provision of Anaesthesia Services

When asked, “Have you experienced any of the following barriers to care when referring a patient to an anaesthesia provider?” dentists ($n = 1076$) identified the barriers in the following order: (1) high cost, (2) patient fear of sedation or general anaesthesia,
(3) long wait time for appointment, (4) distance too far, (5) patient disinterest, and (6) other barriers (see Figure 4.6). Also, dentists (n = 25) expressed their ideas in the free comments section. The repetition of several themes was noted: difficulty finding an anaesthesia provider (n = 5); no third party, Ontario Disability Support Program (ODSP) or Ontario Works (OW) coverage (n = 4); patient requests treatment be provided by their own dentist only (n = 3); dentists perceive quality of treatment decreased with adjunctive anaesthesia (n = 3); patient fear of needles (n = 2); parental fear (n = 2); responsible adult not always available to accompany patient home (n = 2); patient has a complex medical history (n = 2); difficulty referring very young children (n = 1); and uncertainty about risks/benefits of anaesthesia (n = 1).

4.7 Limitations to Provision of Sedation/General Anaesthesia in Dental Practices

When asked, “If sedation or anaesthesia services are not provided within your office, please indicate the reason(s).” dentists (n = 1076) indicated the following reasons in order of importance: (1) lack of training, (2) no patient demand, (3) cost too high, (4) no patient need, (5) other reasons, (6) inadequate remuneration for service, (7) lack of referral sources, and (8) the belief that sedation or general anaesthesia is unsafe (see Figure 4.7). Also dentists (n = 44) expressed their ideas in the free comments section. The repetition of several limitations preventing provision of anaesthesia within respondents’ practices were: lack of equipment (n = 13); college facility permit requirements are onerous (n = 10); no facility to accommodate (n = 6); do not want the added responsibility/liability (n = 5); patients are referred out (n = 6); patients are referred to hospital (n = 3); and not interested in attracting nervous patients (n = 1).
4.8 Practice Pattern: Use of Nitrous Oxide

Survey questions 7 through 10 evaluated the customary use of various sedation/GA modalities for six specific dental procedures. For each dental procedure, all 4 anaesthesia modalities were summated to graphically represent the total proportion of anaesthesia techniques used in Ontario dental practices (see Figure 4.8).

When asked, “For what percentage of your patient practice do you provide nitrous oxide sedation for the following dental procedures?” dentists (n = 773) reported frequency of use of nitrous oxide for specific dental procedures in the following order: extractions followed by fillings, crowns, and bridges, root canal therapy, implants, periodontal surgery and routine scaling (see Figure 4.8).

4.9 Practice Pattern: Use of Oral/Conscious Sedation

When asked, “For what percentage of your patient practice do you provide oral/conscious sedation for the following dental procedures?” dentists (n = 773) reported use of oral/conscious sedation for specific dental procedures in the following order: extractions followed by implants, root canal therapy, periodontal surgery, fillings, crowns, and bridges and routine scaling (see Figure 4.8).

4.10 Practice Pattern: Use of IV Sedation

When asked, “For what percentage of your patient practice do you provide IV sedation for the following dental procedures?” dentists (n = 773) reported use of IV sedation for specific dental procedures in the following order: extractions followed by
implants, periodontal surgery, root canal therapy, fillings, crowns, and bridges and routine scaling (see Figure 4.8).

4.11 Practice Pattern: Use of Deep Sedation/General Anaesthesia

When asked, “For what percentage of your patient practice do you provide deep sedation/GA for the following dental procedures?” dentists (n = 773) reported use of deep sedation/GA for specific dental procedures in the following order: extractions followed by implants, fillings, crowns, and bridges, root canal therapy, periodontal surgery, and routine scaling (see Figure 4.8).

4.11.1 Comparison Between Dentists’ and Patient Responses

Dentists’ self-reported provision of sedation for specific procedures was compared to the frequency with which patients received sedation for the stated dental procedure using one sample t-tests (see Figure 4.9). Patient responses from a 2003 survey of Canadian dental patients (Chanpong et al., 2003) were the reference values: 1.9, 6.5, 5.7, 4.3 and 21.5 respectively for each listed procedure. Prior to t-test analysis, responses from questions 7 through 10 were summated. If upon addition, individual procedure totals exceeded 100 percent, responses were excluded.

Dentist estimated provision matches patient stated provision of anaesthesia services for each procedure except extractions. Statistically significant differences were not found for any service except extractions. For routine scaling, t (772) = 0.783, p = 0.43, fillings, crowns and bridges, t (772) = -0.538, p =0.59, root canal therapy, t (772) =
4.12 Dentists’ Estimation of Patient Fear

When asked, “What percentage of all dental patients describe their feelings towards dental treatment this way?” dentists (n = 934) surmised almost 38.6% of dental patients were ‘not at all afraid’ with the remaining 61.4% of patients experiencing varying levels of fear (see Figure 4.10).

Dentists’ responses were compared with patient stated levels of fear provided in a 2003 nationwide survey (Chanpong et al., 2003) (see Figure 4.10). One sample t-tests were conducted to compare patient and dentist responses with patient responses being the reference values: 63.9, 20.7, 9.8, 2.0 and 3.5 respectively for each level of fear category. Statistically significant differences were found for all levels of self-identified patient fear. For the “Not Afraid” category, dentists underestimated the patients’ stated level of fear, t (933) = -28.58, p < 0.001. For the remaining 4 categories, the dentists overestimated the self-reported patient levels: “A Little Afraid”, t (933) = 7.66, p < 0.001; “Somewhat Afraid”, t (933) = 19.55, p < 0.001; “Very Afraid”, t (933) = 24.52, p < 0.001; “Terrified”, t (933) = 10.67, p < 0.001.

4.13 Dentists’ Estimation of Patient Avoidance of Dental Services

Finally when asked,” What percentage of all dental patients do you believe have ever missed, cancelled or avoided a dental appointment because of fear or anxiety?”, the mean response of dentists’ was 13.9 (see Figure 4.11).
Using a one-sample t-test, dentists’ estimation was compared with the patient reported mean of 7.6 in the 2003 survey (Chanpong, 2003). A statistically significant difference was found. Dentists believed more patients had avoided dental appointments than stated by patients, $t(1035) = 12.94, p < 0.001$.

To examine the relationship between the demographic information and dentist beliefs, inferential statistics were employed. Inferential statistical methods ranging from repeated measure tests, t-tests, cross-tabulation to regression analysis were performed.

4.14 The Role of Gender

A 2 way mixed-design analysis of variance (ANOVA) indicated no statistically significant main effect of gender, $F = 0.0, p = 1.0$ on dentists’ estimation of patients’ interest levels in sedation and general anaesthesia. However, the main effect of dentists’ estimation of patient interest for sedation/GA and the interaction between gender and dentists’ estimation of patient interest for sedation/GA were statistically significant with $F = 1065.72, p < 0.001$ and $F = 5.24, p =0.01$ respectively (see Figure 4.12).

Since a main effect was found, independent samples t-tests were conducted. For the categories of ‘not interested’ ($t(935) = 1.54, p = 0.13$) and ‘definitely interested’ ($t(935) = 1.58, p = 0.11$) no statistical differences were found. However, an independent samples t test indicated male dentists ($M = 18.67, SD = 16.51$) estimated significantly fewer patients as interested in sedation/GA depending upon cost than their female counterparts ($M = 23.25, SD = 18.39$), $t(935) = -3.75, p < .01$. 
The next analysis assessed possible effects of gender on whether the dentist provided sedation/GA within their practice. To test whether proportions were different in each group, a \( \chi^2 \) test of independence with a \( \alpha = 0.05 \) as criterion for significance was used. When assessing the provision of sedation/GA within a dental practice, it was noted that a statistically significant higher proportion of male dentists (61.2 percent) provided sedation within their practices than female dental practitioners (58.6 percent), \( \chi^2 (1) = 3.94, p < 0.001 \).

Next the effect of gender on dentists’ estimates of all patients preferring sedation/GA for specific procedures was appraised (see Figure 4.13). The results of the mixed-design ANOVA indicated no significant main effect of gender (\( F = 0.15, p = 0.70 \)). However, the dentists’ estimation of patient procedure specific preference for sedation/GA and the interaction between gender and dentists’ estimation of patient procedure specific preference for sedation/GA were statistically significant with \( F = 580.94, p < 0.001 \) and \( F = 2.89, p = 0.01 \) respectively. Subsequently, independent samples t-tests were conducted and no statistically significant p values were discovered. The t-test results were: routine scaling (\( t (719) = 0.63, p = 0.53 \)), fillings, crowns and bridges (\( t (719) = 0.47, p = 0.65 \)), root canal therapy (\( t (719) = -0.51, p = 0.61 \)), periodontal surgery (\( t (719) = 0.97, p = 0.33 \)) and implants (\( t (719) = -0.39, p = 0.70 \)). For extractions the result was also not significant, although it was trending towards significance, \( t (719) = -1.80, p = 0.07 \).

Next, the effect of gender on dentists’ provision of all sedation modalities according to specific dental procedure was assessed (see Figure 4.14). The results of the mixed-design ANOVA indicated no significant main effect of gender (\( F = 1.21, p = \))
0.27). However, the dentists’ provision of sedation/GA and the interaction between
gender and dentists’ provision of sedation/GA were statistically significant with F =
58.53, p < 0.001 and F = 3.45, p < 0.001 respectively. Subsequently, independent
samples t-tests were conducted and no statistically significant differences were
discovered except for fillings, crowns and bridges. The t-test results were: routine scaling
(t (744) = -0.76, p = 0.45), root canal therapy (t (744) = -0.86, p = 0.39), periodontal
surgery (t (744) = -0.75, p = 0.45) and implants (t (744) = 0.29, p = 0.78). For fillings,
crowns and bridges a statistically significant difference was found with t (744) = -3.4, p <
0.001 where female dentists (M = 8.96, SD = 12.17) provided more sedation/GA than
male practitioners (M = 5.0, SD = 12.17).

Finally, the effects of gender on dentists’ estimation of patient fear levels and
avoidance of dental treatment were examined (see Figure 4.15). In the first test, the
results of the mixed-design ANOVA revealed no main effect of gender on dentists’
prediction of patient level of fears (F = 0.041, p = 0.84). However, effects of procedure
and gender with procedure were statistically significant with F = 353.4, p < 0.001 and F =
4.48, p < 0.001 respectively.

Consequently, a one-way ANOVA revealed gender impacted dentists’ estimation
of patient fear for the category of ‘Somewhat Afraid’, with a statistically significant value
of F = 11.53, p < 0.001. Female dentists had a greater tendency (M = 22.26, SD = 17.24)
to estimate patients were ‘Somewhat Afraid” than their male counterparts (M = 18.48,
SD = 14.35).

Lastly, to determine a possible significant difference between gender and dentist
assessment of patient avoidance of dental treatment, an independent samples t-test was
computed. Female dentists (M = 16.02, SD = 18.40) estimated a statistically significant higher percentage of patients avoided the dentist than did male dental practitioners (M = 12.91, SD = 13.99), t (996) = -2.926, p < 0.001.

4.15 The Role of City Size

The next form of inferential analysis was to determine the relationship between city size with dentists’ estimation of patient preference of sedation/GA, the provision of different anaesthesia modalities and dentists’ estimation of patient levels of fear and avoidance of dental treatment. City size was collapsed from the five categories asked in the survey to three categories: under 50,000, between 50,001 – 500,000 and over 500,000.

The results of a 2 way mixed design ANOVA indicated no statistically significant main effect of city size, F = 0.0, p = 1.0. However, the main effect of dentists’ estimation of patient interest for sedation/GA and the interaction between city size and dentists’ estimation of patient interest for sedation/GA were statistically significant with F = 1149.64, p < 0.001 and F = 2.35, p =0.05 respectively (see Figure 4.16).

Since a main effect was found, the 2 way ANOVA was followed by a one-way ANOVA. The categories of ‘possibly interested depending on cost’ (F = 2.05, p = 0.13) and ‘definitely interested’ (F = 1.84, p = 0.16) were not statistically significant. The category of ‘not interested’ was not statistically significant either at F = 2.66, p = 0.07 but there was a trend towards dentists practicing in cities 50,001-500,000 estimating less patients interested in sedation/GA than practitioners in communities over 500,001 (p = 0.06).
Next the effect of city size and dentists’ estimation of patient preference for sedation/GA according to dental procedure was evaluated (see Figure 4.17). A 2 way mixed ANOVA indicated no statistically significant main effect of city size, \( F = 0.20, p = 0.82 \) or interaction effect between city size and dentists’ estimation of patient preference for sedation/GA according to dental procedure, \( F = 0.03, p = 0.97 \). However the main effect of dentists’ estimation of patient preference for sedation/GA according to dental procedure was statistically significant with \( F = 1073.31, p < 0.001 \). Consequently, no further analysis was conducted.

A cross tabulation to examine the association of city size and provision of sedation within dental practices indicated a statistical difference (\( \chi^2 (2) = 19.40, p < 0.001 \)). Practitioners in communities under 50,000 were more likely to provide sedation (22.9 percent) than practices in cities with 50,001-500,000 (41.8 percent) and over 500,001 (46.2%) (see Figure 4.18).

Next the effect of city size and dentists’ provision of sedation/GA for specific procedures was appraised. A 2 way mixed ANOVA indicated no statistically significant main effect of city size, \( F = 0.36, p = 0.69 \) or interaction effect between city size and dentists’ provision of sedation/GA, \( F = 0.92, p = 0.51 \). However the main effect of dentists’ provision of sedation/GA was statistically significant with \( F = 60.89, p < 0.001 \). Consequently, no further analysis was conducted (see Figure 4.19).

To analyze the effect of city size on dentists’ estimation of patient fear, a 2 way mixed ANOVA indicated no statistically significant main effect of clinical experience, \( F = 0.0, p = 1.0 \). However the main effect of dentists’ estimation of patient fear and the
interaction between city size and dentists’ estimation of patient fear were statistically significant with $F = 366.36$, $p < 0.001$ and $F = 2.87$, $p < 0.001$ respectively.

Since a main effect was found, the 2 way ANOVA was followed by a one-way ANOVA. City size did not have a statistically significant impact on the categories of ‘not at all afraid’ ($F = 2.58$, $p = 0.08$), ‘somewhat afraid’ ($F = 0.45$, $p = 0.64$), ‘very afraid’ ($F = 0.29$, $p = 0.75$) and ‘terrified’ ($F = 0.68$, $p = 0.51$). In contrast, a statistically significantly effect was found for the ‘a little afraid’ ($F = 7.31$, $p < 0.001$), with dentists practicing in communities under 50,000 estimating patients to be more afraid than dentists operating clinics in larger city centers of 50,001-500,000 ($p < 0.001$) and over 500,001 ($p < 0.001$) (see Figure 4.20).

Finally, to determine a possible significant difference between population size and dentist assessment of patient avoidance of dental treatment, a one-way ANOVA with a Tukey post hoc test was completed. City size had no statistically significant effect ($F = 0.48$, $p = 0.62$) on dentist estimation of patients’ missing, cancelling or avoiding dental appointments out of fear or anxiety.

### 4.16 The Role of Clinical Experience

Years of clinical experience were collapsed into thirds resulting in the three categories: $\leq 13.0$, $13.1 – 27.0$ and $\geq 27.1$ years of clinical experience. The results of a 2 way mixed ANOVA indicated no statistically significant main effect of clinical experience, $F = 1.3$, $p = 0.27$ (see Figure 4.21). However the main effect of dentists’ estimation of patient interest for sedation/GA and the interaction between clinical years
of experience and dentists’ estimation of patient interest for sedation/GA were statistically significant with $F = 1371.27, p < 0.001$ and $F = 20.46, p < 0.001$ respectively.

Since a main effect was found, the 2 way mixed ANOVA was followed by a one-way ANOVA. Clinical experience had an impact on dentists' estimation of patient interest in sedation/GA. ‘Not Interested’ ($F = 23.85, p < 0.001$) with respondents’ with less than or equal to 13 years experience stating less patients were disinterested in sedation/GA than dentists with $13.1 - 27.0 (p < 0.001)$ or $27.1 + (p < 0.001)$ years of experience. Practitioners with $13.1$ years of clinical experience or less ($F = 21.11, p < 0.001$), estimated patients’ interest in sedation/GA was more cost dependent than their more experienced peers ($13.1 - 27.1, p < 0.001$ and $27.1 +, p < 0.001$). Additionally, less experienced clinicians predicted more patients were ‘Definitely Interested’ in sedation/GA ($F = 10.07, p < 0.001$) than their counterparts with $13.1$-$27.0 (p < 0.001)$ and $\geq 27.1 (P< 0.001)$ years of clinical experience.

Next the effect of clinical experience on dentists’ estimates of all patients preferring sedation/GA for a number of dental procedures was appraised (see Figure 4.22). The results of a 2 way mixed ANOVA indicated a statistically significant main effect of clinical experience, $F = 4.61, p = 0.01$. Also, the main effect of dentists’ estimation of patient interest for sedation/GA for specific procedures and the interaction between clinical years of experience and dentists’ estimation of patient interest for sedation/GA for specific procedures were statistically significant with $F = 1202.16, p < 0.001$ and $F = 4.06, p = 0.02$ respectively.

Since a main effect was found, the 2 way ANOVA was followed by a one-way ANOVA (see Figure 4.22). A statistically significant interaction was found for all
procedures except routine scaling (F = 0.91, p = 0.40) and root canal therapy (F = 2.59, p = 0.08). For fillings, crowns and bridges (F = 3.72, p = 0.03), respondents’ with less than or equal to 13 years experience stating more patients were interested in sedation than practitioners with 13.1 – 27.0 years of experience (p = 0.03). For periodontal surgery and implants, less experienced respondents estimated greater interest in sedation/GA adjuncts than practitioners with 13.1-27.0 years in practice p = 0.01 and p < 0.001 respectively. Clinicians with less than 13 years of experience estimated greater sedation/GA need in concert with dental extractions than seasoned practitioners ( ≥27.1+ years), p = 0.05.

The next analysis assessed possible effects of clinical experience on dentist provision of sedation/GA within their practice (see Figure 4.23). To test whether proportions were different in each group, a χ² test of independence with a α = 0.05 as criterion for significance was used. When assessing the provision of sedation/GA within a dental practice, there was no statistically significant association, χ² (2) =0.33, p = 0.85, between the provision of sedation and the clinical years of experience the dentist had.

Next the effect of clinical experience on dentists’ provision of all sedation modalities according to specific dental procedure was assessed (see Figure 4.24). The results of a 2 way mixed ANOVA indicated a statistically significant main effect of clinical experience, F = 9.43, p < 0.001. Also, the main effect of dentists’ provision of sedation/GA for specific procedures and the interaction between clinical years of experience and dentists’ provision of sedation/GA for specific procedures were statistically significant with F = 63.69, p < 0.001 and F = 3.8, p < 0.001 respectively.

Since a main effect was found, the 2 way mixed ANOVA was followed by a one-way ANOVA. A statistically significant interaction was found for all procedures except
routine scaling (F = 1.6, p = 0.20). For fillings, crowns and bridges (F = 8.8, p < 0.001) least experienced respondents’ (13 years or less of experience) provided more sedation than practitioners with 13.1 – 27.0 (p = 0.01) and ≥ 27.1 years of experience (p < 0.001). For root canal therapy (F = 4.4, p = 0.01), lesser-experienced dentists administered more sedation than dentists with 13.1 - 27.0 (p = 0.04) and ≥ 27.1 (p = 0.02) years in practice. For periodontal surgery (F = 4.7, p < 0.001) novice dentists utilized more sedation for patients than seasoned professionals, ≥ 27.1 years (p = 0.04). For dental extractions (F = 9.3, p < 0.001), respondents with 13 years or less in clinical practice utilized more sedation/GA than surveyed dentists with 13.1 – 27.0 (p = 0.01) and ≥ 27.1 (p < 0.001) years. Finally, for implants (F = 7.8, p < 0.001) dentists with 13 years or less (p < 0.001) or 13.1 – 27.0 years (p =0.05) in practice utilized more sedation/GA than clinicians 27.1 years in practice.

To analyze the effect of clinical years of experience and dentists’ estimation of patient fear, a 2 way mixed ANOVA indicated no statistically significant main effect of clinical experience, F = 0.0, p = 1.0 (see Figure 4.25). However the main effect of dentists’ estimation of patient fear and the interaction between clinical years of experience and dentists’ estimation of patient fear were statistically significant with F = 424.50, p < 0.001 and F = 4.06, p < 0.001 respectively.

Since a main effect was found, the 2 way mixed ANOVA was followed by a one-way ANOVA. No statistically significant interactions were found for the categories of ‘a little afraid’ (F = 0.57, p = 0.56) and ‘somewhat afraid’ (F = 1.37, p = 0.25). In contrast, statistically significantly values were discovered for the remaining categories. For ‘not at all afraid’ (F =4.81, p = 0.01), dentists with 13 years or less in the field estimated less
patients to be fearless than practitioners with 13.1 – 27.0 (p = 0.02) and ≥ 27.1 years (p = 0.02). For ‘very afraid’ (F = 11.93, p < 0.001), inexperienced dentists estimated more patients to be fearful than dentists with 13.1 – 27.0 (p < 0.001) or ≥ 27.1 (p < 0.001) years experience. Additionally, less experienced clinicians predicted more patients were ‘terrified’ (F = 8.36, p < 0.001) than their counterparts with 13.1–27.0 (p = 0.01) and ≥ 27.1 (p < 0.001) years of clinical experience.

Lastly, to determine a possible significant difference between years of clinical experience and dentist assessment of patient avoidance of dental treatment, a one-way ANOVA with a Tukey post hoc test was completed. Years in practice had a statistically significant effect (F = 3.64, p = 0.03). Dentists 13 years or less in practice estimated more patients to miss, cancel or avoid dental appointments than dentists with ≥ 27.1 (p = 0.04) years experience.

4.17 Letter versus Web

Although not a hypothesis of the current study, some analysis was completed on the data to determine possible statistically significant differences between letter versus web respondents with respect to gender, years of clinical experience and city size (see Figure 4.26).

To test whether proportions were different in each group, a $\chi^2$ test of independence with a $\alpha = 0.05$ as criterion for significance was used. When assessing effects of gender on letter and web participants, no statistically significant association, $\chi^2$ (1) =1.07, p = 0.30, was noted.
When analyzing the effects of city size on format of survey response, no statistically significant association, $\chi^2 (2) = 2.84, p = 0.24$, was indicated (see Figure 4.27).

Finally, $\chi^2$ analysis pointed to a statistically significant association of clinical experience and respondents choice of survey completion; $\chi^2 (2) = 24.77, p < 0.001$ (see Figure 4.28).
Chapter 5

5.0 Discussion

5.1 Research Question 1

Assessment of Dentists’ Estimation of Patient Preference for Sedation or GA during dental treatment

The current study indicates Ontario dentists’ perceive 66.8 percent of patients are not interested in sedation services with dental treatment. It is difficult to interpret the estimation of Ontario dentists relative to dentists in other Canadian provinces or countries as little literature poses the question to dentists. However, Ryding & Murphy (2007) contend the availability of sedation services in the Atlantic Provinces is lacking with dental student enthusiasm waning after graduation and merely 15 percent of practitioners utilizing it for anxious adults. Reasons for the sparse application of conscious sedation in Atlantic Canada are unknown and uncertainty exists with respect to patient need (Ryding & Murphy, 2007). Canadian dentists potentially do not reflect their international colleagues as the literature supports that United Kingdom and American dentists believe in the implementation of anaesthesia within clinical practice, although many do not provide it (Boynes et al., 2006; Foley, 2003; Fisher et al., 2011; Morgan & Skelly, 2005). The studied dentists in the literature are basing their views upon perceived patient need. Conversely, British researchers estimate the need to approximate 6.9 percent in their population (Coulthard et al., 2011; Pretty & Goodwin, 2011). Comparisons with Canadian patient responses from a 2003 study (Chanpong, 2003) indicate Ontario dental clinicians closely identify those patients (13.4 percent) that absolutely are not interested in anaesthesia adjuncts. However, provincial dentists’ estimated patients’ disinterest in
sedation/GA adjuncts to be higher than stated patient preference and predicted patients were less affected by cost than patients stated.

Ontario dentists, patients or both are underestimating patient sensitivity to cost by almost 25 percent. This begets the question are dentists and patients speaking of the same preference or need? Are dentists including sedation options in their treatment plans irrespective of cost or are patients less immune to cost than they perceive, with most declining anaesthesia options upon learning the fees of the service? The use of sedation and general anaesthesia is commonplace within the medical community for elective preventive procedures such as endoscopy to necessary general medical procedures, however it is possible patients are not aware of their anaesthesia options with respect to dental treatment. (Ryding and Murphy, 2007). Also within medicine, patients are not responsible for the added costs of anaesthesia while in dentistry they are. The percentage of patients aware of their dental anaesthesia options and or the associated costs is not known in Canada. In Sweden, the use of sedation has increased from 1996 (Kleinberg et al., 2006) while in the United Kingdom patient demand for anaesthesia services has paralleled Sweden with noted increases from 1978 to 1998 (Morgan & Skelly, 2005). The authors of both studies postulate elevated use may be attributed to greater patient awareness of sedation services. Yet in a recent study from 2005, 38 percent of surveyed patients were unaware of the availability of sedation/GA options within dentistry (Allen & Girdler, 2005).

Interestingly, dentists’ estimation and patient preference for sedation/GA matched with respect to the specific procedure of dental extractions. Is it possible dentists and patients were communicating the same need? Did costs figure less prominently in the
equation (as the majority of third party payers cover anaesthesia adjuncts) for dental extractions or is the availability of anaesthesia for such procedures more commonly recognized in dentistry? Equally noteworthy, dentists’ underestimated the patients’ preference for provision of sedation services with respect to routine scaling, fillings, crowns and bridges, root canal therapy and periodontal surgery. If patients can identify their preference for sedation/GA for specific procedures how is it that patient preference and dentist estimation only matches for dental extractions and not all procedures? Is it possible patients are only given anaesthesia options for certain dental procedures? (Ryding & Murphy, 2007). Clearly, patients cannot request services for which they are unaware of; however, no literature confirms or disputes such a possibility.

Potentially little discrepancy exists with respect to extractions as a specific specialty exists to aid this preference. Arguably, dentists refer patients to oral and maxillofacial surgeons for not only the complexity of the dental procedure but in some cases, to facilitate less complex procedures with adjunctive anaesthesia modalities. Within the current study, some practitioners noted they do not provide sedation within their practices as they refer to specialists, with oral and maxillofacial surgeons most commonly reported. Referral patterns are entrenched within patients and dentists alike to accept other modes of anaesthesia besides local anaesthetics for a perceptibly invasive procedure such as dental extractions. Implants, root canal therapy and periodontal surgery may be deemed similarly invasive to dental extractions by patients. Within the current study and others (Chanpong et al., 2005; Morgan & Skelly, 2005) it is interesting to note patient preference for sedation/GA may approximate the patient perceived invasiveness of the dental procedure. However, it needs to be noted no comparison between patient
preference and dentists’ estimation of patient preference could be drawn for implants or bridges in the current study. In the 2003 nationwide telephone survey (Chanpong et al., 2003), patients were not asked the prevalence or preference of sedation/GA for these procedures.

Surveyed dentists in the United Kingdom indicated sedation was appropriate for multiple implants irrespective of patient fear, potentially indicating implant placement is considered traumatic (Morgan & Skelly, 2005). In the present study, implants as a procedure did not differentiate between implant placement versus restoration of implant abutments. The former may be construed as more invasive and data needs to be interpreted in the light of varying impressions of implant placement complexity.

Finally, provincial dentists’ estimated patient preference for conscious/moderate versus deep sedation/GA to be similar; the only difference was the quantitative assessment of need per procedure with dentists perceiving a larger need for conscious/moderate sedation. Provincial dentists’ estimations of patient preference specific to dental procedure and to type of anaesthesia modality preferred in relation to other dentists is again challenging with limited data available to contrast dentists’ perceptions.

However, British dental researchers, Coulthard et al., (2011) postulate using dentist estimation to evaluate patient preference for sedation/GA in dentistry can expose patients to practitioner bias. Consequently, the research team devised an assessment tool (the IOSN - an Indicator of Sedation Need questionnaire) to standardize and validate identification of patient need for adjunctive anaesthesia. The authors (Coulthard et al., 2011) emphasize the IOSN is not intended to replace clinical judgment, but can aid
clinicians in examining all aspects in their decision making process to implement sedation/GA. Potentially, dentists in Ontario are underestimating or obfuscating all indicators affecting a patients’ choice for sedation/GA.

5.2 Research Question 2

Assessment of the Provision of Sedation and General Anaesthesia in Ontario Dental Practices

In the current study, the majority of dental practices in Ontario, 60.2 percent offer some form of sedation adjuncts to their patients. The provincial administration of anaesthesia in dental offices represents a higher value than found in other sampled populations of Canadian dentists. In a survey of clinicians in Atlantic Canada, 17 percent provided conscious sedation in their own practices with 7.7 percent utilizing IV sedation (Ryding & Murphy, 2007). Any comparison must be tempered due to the low response rate in the Ryding & Murphy (2007) study. However, the sixty percent of Ontario dentists closely approximate their colleagues in the United States, where 65 percent of respondents also indicated they provided sedation in their practices. Additionally, the 40 percent of Ontario practitioners that do not provide it, closely parallel the 35 percent in the United States who do not, indicating local anaesthesia is adequate for patient management (Boynes et al., 2006). In the United Kingdom, the numbers are slightly lower with 49 percent of Irish dentists providing sedation in their practices and 43 percent not (Hunt et al., 2008). In North England 37-51 percent of dental practitioners provided sedation within their practices (Chadwick et al., 2006). However, the results in the current study are prone to potential bias as sampled dentists may have responded to this
study due to a pre-existing interest in sedation/GA than sampled dentists non-
respondents.

For the 648 practices of 1076 respondents rendering anaesthesia services, the
health care practitioner administering the sedation was commonly the respondent
practitioner followed by dental anaesthesiologists, medical anaesthesiologists and other
sedation providers. Under the free comments section about 10 percent of the sample
indicated referral to other sedation providers consisting mainly of oral and maxillofacial
surgeons followed by associates or other dental specialists. The provincial figure for
provider referrals compares much lower than for British dentists (Chadwick et al., 2006)
where 52.9 percent of the 797 clinicians responding, had referred patients for sedation
services. Surveyed Irish dentists indicated: 34 percent refer to specialists for sedation
provision, 23 percent to hospitals, 26 percent for general anaesthesia and other methods
were employed by 16 percent (Fisher et al., 2011). In Northern Ireland, 43 percent
surveyed refer patients for anaesthesia care (Hunt et al., 2010). Morgan & Skelly (2005)
noted 35 percent of specialists provide sedation to their patients, the majority in
undergraduate teaching hospitals.

However, the comparison between Ontario and United Kingdom dentists is
difficult, as the United Kingdom studies did not distinguish if referrals were outside of
the practice or not. Additionally, the current study did not ask participants what
percentage of patients they refer, again tempering any possible comparison of the current
sampled dentists with other studies. Lastly, regulations and laws regarding the
administration of sedation/GA in dental practices differs in both countries with United
Kingdom laws prohibiting the use of GA in dental clinics making absolute comparisons in referral patterns impractical.

Lastly, in the current study respondents provide sedation in their practices 12 percent of the time followed by dental anaesthesiologists at 6 percent, other sedation providers at 3.4 percent and medical anaesthesiologists at 3 percent. Although respondents indicated the mean frequency of time the service is provided, there is no indication whether the time is adequately serving patient needs. Similarly, with limited literature, it was not possible to draw comparisons between practices in Ontario and other parts of the country or world.

5.3  Research Question 3

Assessment of Potential Barriers to Patients Accessing Sedation and General Anaesthesia Services in Ontario

Ontario dentists were asked to identify potential barriers in the referral of patients for adjunctive anaesthesia care. Additionally, respondents who did not utilize sedation/GA within their practices were asked to cite reasons for the absence of anaesthesia in their clinic. In the current study, Ontario dentists cited barriers to referral in the following order: high cost, patient fear of sedation or GA, long wait time for appointment, distance too far, patient disinterest and other barriers.

5.3.1  High Cost

Within Ontario, costs associated with adjunctive anaesthesia services can be supplemented or covered in total by third party payers such as insurance companies or
government social assistance plans or the patient him/herself. Anaesthesia adjunctive fees are normally based on the Ontario Dental Fee Guide 2012.

Third party payer coverage for anaesthesia services is variable dependent upon treatment procedure or need. Flick & Clayhold (1998) surmise third party payers do not consider dental sedation or GA to be ‘medically necessary’ considering local anaesthetics to be less costly and adequate. The question becomes whether adjunctive anaesthesia modalities in dentistry are necessary for patient care or elective. Currently, there are no accepted definitions of what constitutes medical necessity. Third party payers may cover additional anaesthetic services for particular procedures or situations such as dental extractions but terms and conditions are variable among third party payers. Perhaps the need is readily identified in specific behaviourally challenged populations such as paediatric patients or the physically or mentally challenged while it is less obvious for those with dental fear (Flick & Clayhold, 1998). However, extensive literature corroborates, sedation and GA can manage patient anxiety and fear enabling dental procedures to be performed which otherwise would not have been without the adjunctive use of anaesthesia (Abdulwahab et al., 2010; Allen & Girdler, 2005; Chanpong et al., 2009; Dionne et al., 1998; Milgrom et al., 2010; Smith & Heaton, 2003).

In comparing provincial dentist responses to other sampled dentists the literature is limited. In Britain only 45 of 797 (5.6 percent) respondents cited finances as a potential barrier for patient access to anaesthesia care due to the NHS contract or lack of funds available to the local center (Chadwick et al., 2006). While in Ireland, 4 percent of participants reported cost as a barrier to provision of sedation in general dental practice (Fisher et al., 2011).
5.3.2 Patient Fear of Sedation/GA

Interestingly, a third of sampled Ontario dentists stated their patients were fearful of sedation/GA. The literature does not provide studies investigating or assessing the prevalence of patient fear of sedation/GA. Consequently the results of this study may not be interpreted relative to other patient populations but it points to a possible barrier that requires further research.

5.3.3 Long Wait Time for Appointment

In Britain 74 dentists out of 797 stated wait time for anaesthesia provision was too long (Chadwick et al., 2006). The current wait time to see an anaesthesia provider in Ontario is unknown. However, almost a third of Ontario dentists cited this as a barrier. A reasonable wait time for treatment is subjective although if delay in treatment increases patient comorbidities or mortality it may be construed as too long. Consequently determining patient wait time lengths and identifying if changes need to be made requires further research.

5.3.4 Distance Too Far

A quarter of the dentists sampled in Ontario felt anaesthesia care was too far for their patients to access. In Britain, 51% of respondents estimated patients referred for anaesthesia services traveled 30 minutes. Their Irish counterparts echoed the sentiment with 53 percent sampled in Northern Ireland stating inadequate referral services were
available in their geographic area (Hunt et al., 2010). Currently, the concentration of sedation providers throughout the province is unknown.

5.3.5 Patient Disinterest

Ontario dentists reported this to be the fifth highest barrier to patient referral for anaesthesia services. The literature does not substantiate this view globally, (Abdulwahab et al., 2010; Allen & Girdler, 2005; Dionne et al., 1998; Milgrom et al., 2010; Smith & Heaton, 2003) and nationally from the Canada wide survey of patients (Chanpong et al., 2005). Possibly the patients seen by the cohort of dentists sampled in the current study vary from patients cited in previous studies or dentists’ perception of patient disinterest may broadly encompass other factors such as: high cost, distance too far or patient fear.

5.3.6 Other

Under the section: Other, dentists’ noted difficulty in finding an anaesthesia provider and no third party benefits for coverage of sedation adjuncts. Both reasons could be associated with the other factors noted earlier; high cost, long wait time for appointment and distance too far.

5.3.7 Limitations to Provision of Sedation/GA within Ontario Dental Practices

Dentists who do not provide sedation in their practices were asked to cite reasons why. The most common response was lack of training followed by no patient demand, no patient need, other reasons, inadequate remuneration, lack of referral source and belief that sedation/GA is unsafe.
5.3.8 Lack of Training

In Ontario, 38.2 percent of respondents indicated a lack of training in the provision of sedation/GA as a barrier to its administration in their practices. It represents a sizable proportion of the sample but it is almost half of what Irish (73 percent) (Hunt et al., 2011) and Scottish (70 percent) (Foley, 2002; Hill et al., 2008) dentists indicated. Similarly, 58.8 percent of new American dental graduates did not feel adequately trained in various anaesthesia modalities particularly oral and intravenous techniques (Boynes et al., 2006). British respondents not using sedation techniques ascribed it to a lack of skill (Hill et al., 2008).

Irrespective of the percentage, it is clear dentists in Ontario, the United Kingdom and the United States, do not feel adequately trained to provide sedation/GA in practice. Lack of training may be attributed to few educational resources in the respective countries. Throughout the provinces of Canada, no nationwide standardized competencies in administration of anaesthesia exist within dental schools. Consequently, training and clinical competency upon graduation vary (Ryding & Murphy, 2007). New Ontario and Canadian dental graduates upon entering clinical practice vary in their application of sedation within their practices from the outset.

In Ontario, continuing education programs exist with courses offered in oral/conscious sedation. Lastly, another avenue for dental training in anaesthesia can be provided through residencies in all eleven dental disciplines particularly oral and maxillofacial surgery, dental anaesthesia and periodontics and general practice residencies in hospital based programs.
The current study survey did not ask participants who would appreciate more training. However, in the literature, dental colleagues expressed a large desire for additional sedation training. Of recent American dental graduates sampled, 78.1 percent would favour increased dental school tuition to augment their knowledge or ability to acquire an anaesthesia permit (Boynes et al., 2006). While in United Kingdom 68-73 percent of study participants favoured extra education in sedation (Fisher et al., 2011; Foley, 2002; Hill et al., 2008; Hunt et al., 2011).

5.3.9 No Patient Need/ No Patient Demand

Of the sampled provincial dentists, no patient demand (25.3 percent) and no patient need (15 percent) were the next most commonly cited reasons for absence of sedation/GA in respondents’ practices. Similarly, in the United States, 35 percent of study respondents felt local anaesthesia was adequate for patient care (Boynes et al., 2006). As previously stated in this thesis, the literature does substantiate an expressed need by patients and dentists alike for the provision of anaesthesia services within dentistry.

Is it possible a quarter of respondents in Ontario have a patient base not reflective of sampled patients in the literature or are dentists underestimating the requirement without considering the many variables constituting patient need and demand? No current literature in Ontario can elucidate either potential.
5.3.10 Other Reasons

In the free comments section, respondents most commonly noted a lack of equipment as a barrier to the provision of sedation/GA in their practices. Additional reasons included RCDSO facility permit requirements perceived to be onerous, no facility to accommodate equipment, did not wish to adopt added liability, and patients are referred out.

Although the literature cites, 13% of Irish dentists (Fisher et al., 2011) do not provide sedation due to litigation concerns, dentists in Ontario did not experience the sentiment to the same degree. However, respondents indicated recent RCDSO requirements for a facility permit and onsite inspection as obstacles to their provision of sedation to their patients. Although not overt, such views may encompass apprehension over possible litigation.

5.3.11 Inadequate Fee/Remuneration for Service

The current study only asked participants to indicate if inadequate compensation presented a barrier to provision of sedation/GA in their practice. Specific factors affecting the dentist’s perception of insufficient compensation were not elicited but pose an interesting question for future research. In the current study, 8.6 percent of the sample decided not to integrate sedation/GA in their practices due to inadequate remuneration. A similar statistic is found in the United Kingdom with 4 percent of Irish respondents (Fisher et al., 2011) indicating the same.

Interestingly sampled Ontario dentists in the current study although not asked did not cite lack of time nor dentally anxious patients as potential barriers to providing
sedation or GA. According to Foley, (2002), 88 percent indicated a lack of time and British dentists paralleled the sentiment in a 2008 study, with one stating, ‘The time it takes to treat these patients, I could have seen three times as many’ (Hill et al., 2008, p.3). Such a comment illustrates, it can be hard to separate remuneration from time.

Additionally, costs not only constitute the units of service time per patient but also the operational fees associated with instituting sedation/GA in a dental clinic. Under the other comments section, the second most commonly cited barrier to sedation/GA provision was lack of staff and lack of facility. All may be difficult to implement due to a myriad of reasons, one being cost.

5.3.12 Lack of Referral Source

The inability to find a referral source was cited by 5.6 percent of respondents as a barrier preventing the provision of anaesthesia services within their practices. Possibly, long wait for appointment times, and the distances being too far for providers (expressed by respondents in question 5) potentially contribute to the reason for no identifiable referral source. Within Ontario all facilities providing anaesthesia must be registered with the RCDSO. According to Greg Morris, (personal communication, February 22, 2012) at the RCDSO there have been 1,048 permits issued; 590 for deep sedation and GA, 214 for parental conscious sedation and 244 for oral moderate conscious sedation. However, permits do not reflect the number of anaesthesia providers only the facilities equipped to do so. Additionally, there are no data to establish the concentration of practices with sedation permits in Ontario.
5.3.13 Believe Sedation/GA is Unsafe

Of the sampled respondents, 4.5 percent felt patient safety may be at risk with sedation/GA. Again, the most current data in Ontario, have indicated an average mortality rate of 1.4 per 1,000,000 anaesthetics given by dentists or dental specialists per year in Ontario (Nkansah et al, 1997). In Ontario, it is hard to know what accounts for practitioner and patient perception alike that sedation/GA is unsafe. Perhaps media cases of anaesthesia mortality magnify the risks disproportionately to the statistics or one mortality is considered prohibitive for elective procedures. In the United Kingdom more respondents, 36 percent were concerned about patient safety (Fisher et al., 2011). However, similar statistics in the United Kingdom reveal no mortalities have been attributed to inhalational sedation with two deaths associated with IV sedation possibly resulting from midazolam overdose in a hypothyroid patient (Fisher et al., 2011). The latter statistics reflect deaths from 1979 to 1989 with well over 2,000,000 sedation cases being rendered (Fisher et al., 2011). Perhaps the perception of patient safety is heightened in Britain where an expert committee of medical and dental officers expressed concern with respect to the administration of GA within dental offices thus leading to the restriction of GA to British hospitals (Hunt et al., 2011).

5.4 Research Question 4

Assessment of the Current Use of Sedation and General Anaesthesia Within Ontario Dental Practices

Limited literature exists on the practice use of conscious sedation or general anaesthesia in dentistry in Ontario. Among the 60 percent of provincial practitioners
utilizing sedation in their clinics, nitrous oxide is used the majority of the time at 17.1 percent. It is used the most for all dental procedures except implants. Oral, IV and deep sedation were employed 9.7, 7.2 and 5.5 percent of the time respectively. Surveyed dentists in Ontario were similar to their Atlantic neighbours where 17 percent provided conscious sedation in their own practices and 7.7% utilized IV sedation (Ryding & Murphy, 2007). Similarly, among the 65.1 participants providing sedation care in the United States, 21.6 % used nitrous oxide, 17.1 % utilized oral sedation alone, 19.5 percent and 6.9 percent combined oral and IV sedation with nitrous oxide (Boynes et al., 2006). In the current study, Ontario dentists’ responses may be under or over-estimated as no distinction was made between anaesthesia modality. In other words, a respondent may have used oral and nitrous oxide in conjunction. However, it appears Ontario dentists are trending in a similar pattern to the Maritime Provinces and the United States where nitrous oxide use is followed by oral sedation and IV techniques respectively.

In contrast, in the United Kingdom statistics indicate providers employ sedation in their practices 30 – 50 percent of the time (Chadwick et al., 2006; Fisher et al., 2011; Foley, 2002; Hunt et al., 2011). Oral sedation or IV methods predominate depending upon the region but in all countries inhalation agents were least employed and reserved mainly for children. Literature indicates, United Kingdom dentists favour IV sedation 6-23 percent and oral sedation 21-51 percent of the time (Foley, 2002; Chadwick et al., 2006; Fisher et al., 2011; Hunt et al., 2011). Although not a focus of the present study, interestingly, adults were more commonly sedated in the UK than paediatric patients. Study authors speculate differences in sedation techniques across the United Kingdom may be a reflection of variable training at the undergraduate, post-graduate or continuing
education level and patient selection (Chadwick et al., 2006; Fisher et al., 2011; Foley, 2002; Hunt et al., 2011). However, Foley (2002) notes low use of nitrous oxide is not surprising given the high costs of installing and running inhalational equipment. Additionally, comparisons between general anaesthesia use among Ontario and United Kingdom dentists cannot be made as United Kingdom practice providers are not legally permitted to administer GA outside of the hospital (Hunt et al., 2011).

The current study relies upon dentist recall and estimation of percentage use of specific anaesthesia modalities. In some cases the percentages listed for certain procedures are less than one percent. Given the small percentage of mean values and large standard deviations, conclusive statements about the absolute use of such anaesthesia modalities in practice cannot be made. However, the data provide trends and indicate dentists across Ontario vary greatly in their practice use of sedation/GA. The results are important to the profession for future research to assess the reproducibility of this studies’ results and possibly in creation of policy to standardize provision of anaesthesia care for patients across Ontario.

5.5 Research Question 5

Assessment of Dentists’ Estimation of Patient Levels of Fear and Avoidance of Dentistry

The current survey indicates dentists were not able to accurately estimate patient anxiety for all levels of fear. Initially, Ontario dentists underestimated the proportion of patients self-reporting no fear. Subsequently at all remaining levels of fear from ‘little afraid’ through to patients’ self-identified as ‘terrified’, dentists overestimated the percentage of fearful patients. Furthermore, dentists in Ontario attributed a higher
incidence 13.3 percent of missed, cancelled or avoided appointments to patient anxiety than patients did at 7.6 percent (Chanpong et al., 2003). In contrast to the dental literature, the Canadian patient cohort in 2003 (Chanpong et al., 2003) self-reported a lower percentage of missed, cancelled or avoided appointments than British researchers (Milgrom et al., 2010; Moore et al., 2001) who found 14 -15 percent of surveyed patients, were irregular dental attenders due to anxiety. Similarly, 14.8 - 17.2 percent of American patients indicated they did not attend the dentist due to fear and 3.4 – 18.1 percent noted the lack of adjunctive anaesthesia (Boyle et al., 2009; Dionne et al., 1998).

Although Ontario dentists overestimated patient fear, the ability of the dental clinician to accurately assess patient anxiety is paramount to dental care (Hunt et al., 2011; Pretty & Goodwin, 2011; Doerr et al., 1998; Milgrom et al., 2010). Dental literature states patients with moderate levels of anxiety or fear periodically miss, cancel or avoid dental appointments caused by their apprehension (Dionne et al., 1998; Milgrom et al., 2010; Taani, 2001; Weinstein et al., 1993). Dental anxiety is one of the most prevalent fears and it poses a significant barrier to dental care provision resulting in dental avoidance or irregular attendance (Foley, 2002; Milgrom et al., 2010). It has been reported that irregular dental attenders have one less tooth than patients who attend the dentist regularly (Goodwin & Pretty, 2011). Consequently, a dentists’ ability to identify and evaluate patient fear is integral to ameliorating patient oral health care outcomes. Dental literature reports numerous factors that could affect a clinicians’ ability to adequately assess patient anxiety including the dentist’s own stress levels, and assessment skills of fear in patients.
From the present study it is not known how Ontario dentists assess anxiety however, it appears current methods are potentially inaccurate. Literature is limited on the methods dentists employ to evaluate patient fear. In Ireland, Hunt et al., (2011), discovered 14 percent of respondents assess anxiety formally and only 2 utilized a validated questionnaire. The authors extrapolate dentists may appraise patient anxiety via past experience or intuition which could lead the clinician to erroneously evaluate patient anxiety and subsequent treatment planning. Additionally, with no evidence-based guidelines to assess patient anxiety or an understanding of the various anaesthesia modalities available to manage it, clinicians are unable to make consistent informed decisions on the need and use of anaesthesia for their patients.

The ability to accurately assess patient anxiety may be attenuated by dentists own stress levels (Hakeberg et al., 1992). The researchers noted dentists found it difficult to discern patient anxiety especially during points of a procedure when their own stress levels were elevated. In Britain, 91 percent feel stressed upon provision of treatment to anxious patients (Hill et al., 2008).

The dynamic between patient anxiety creating dentist stress has been increasingly recognized as a factor affecting patient outcomes (Hill et al., 2008). A stressed dentist may be less empathetic with an anxious patient providing less time and needed attention (Moore & Brodsgaard, 2001). It has been noted that dentally anxious patients perceive dentists do not validate their concerns with some patients feeling guilty for their anxiety (Doerr et al., 1998).

For a clinician, accurate diagnosis of patient anxiety is half the equation with appropriate treatment the second half. In the current study the methods dentists employ to
manage patient fear are unknown. The literature is limited in its review of dental management of anxious patients. Talking with patients, encouraging moments of extra pause or taking extra time were primarily indicated by Danish and American dentists (Hakeberg et al., 1992; Baron et al., 1990). Conversely, although the majority of dentists sympathize with patient anxiety, they do not manage or treat it (Hakeberg et al., 1992) while Doerr et al., (1998) found one third of American dentists did not treat anxiety.

5.6 The Role of Gender

Although female practitioners in Ontario estimated more patients to be somewhat fearful and overall avoidant of the dentist, with general patient interest in sedation/GA dependent upon cost, fewer female dentists provided sedation/GA in their practices than their male colleagues. Conversely, gender did not affect the provision of sedation/GA for specific dental procedures except for crowns, fillings and bridges where female clinicians were more likely to provide sedation. The disparity between the sexes is hard to conclusively account for. Perhaps, women providers are stereotypically more perceptive of or display greater empathy to patients than male dentists. However, in the current study, dentists of both genders did not accurately assess patient anxiety level or avoidance of dental care. Despite differences in gender perception of patient distress, overall greater provision of sedation/GA among female respondents was not noted and in fact fewer female clinicians offered sedation in their practices. Potentially fewer female practitioners work full-time or own practices and consequently have less ability to influence anaesthesia provision or resources available to practice patients. The interpretations presented are speculative and require further research for verification.
5.7  The Role of City Size

The size of the community in which the dentist practices did not affect dentist estimation of patient interest, procedure specific provision of sedation/GA or clinicians’ perception of patients’ avoidant of the dentist. However, practitioners operating in communities under 50,000 detected more patients to be ‘a little afraid’ but were less likely to provide sedation services in their practices than their colleagues in larger communities. Possibly there is a paucity of dental resources and specializations in smaller cities affecting the availability of sedation/GA practices in these communities.

5.8  The Role of Clinical Experience

The effect of clinical experience clearly impacted the provision of sedation/GA in Ontario dental practices. Less experienced practitioners perceived patients to be fearful or avoidant of the dentist more than seasoned dentists. Clinicians with less than 13 years of experience estimated a greater overall preference and patient procedure specific interest for adjunctive sedation/GA services. Potentially, to meet the perceived need, dentists with less than 13 years were far more likely to employ sedation and GA than older doctors for all dental procedures (except routine scaling). Such data may be interpreted in a number of ways. First, dentists who are more recent graduates of dental school may have absorbed an ethos of more frequent administration of sedation and GA (Ashley et al., 2010). Secondly, less experienced dentists may have to work harder to build their practices, and are therefore more interested in catering to patient demand (Boynes et al., 2010; Foley, 2002; Smith & Heaton, 2003). Interpretations are speculative but from the
perspective of this study, the identification of significant sedation and GA differences between more and less experienced dentists is evident. The factors contributing to the differences deserve further exploration by future research.

5.9 Study Strengths and Limitations

5.9.1 Study Strengths

Response Rate

The main strength of this study is the high response rate that exceeded projected expectations. The completeness of data from a province-wide cohort and the avoidance of selection bias resulting from gender, years of clinical experience, practice type or community size contribute to the generalization of the obtained study data to the entire population of dentists currently practicing in Ontario. The RCDSO (Morris, G, personal communication, February 22, 2012) confirmed the percentage of male/female practitioners in Ontario is 68/32, a figure that mirrors the sampled respondents (69.7 percent male/30.3 female practitioners). Furthermore, approximately 84.6 and 15.4 percent of practitioners are generalists and specialists in Ontario. Similarly the studied cohort of dentists represented 83.0 and 17.4 percent of generalists and specialists respectively.
5.9.2 Study Limitations

The primary limitation of the study is inherent to the observational design. The effect of unmeasured confounders cannot be excluded. Several limitations to study design must be considered in the context of interpreting results. The accuracy of self-report evaluations in the delivery of various sedation and GA modalities for specific dental procedures relies exclusively upon dentist recall and interpretation. Self-report indices of clinical practice patterns in the delivery of sedation or general anaesthesia may be over or under-estimations (Lind et al, 2002).

Alternatively, to track practice billings for anaesthesia services obtained from insurance or dental practice financial databases could be impractical due to cost and time involved. Although the current study may be affected by the erroneous perceptions of dentists regarding their own practice patterns of sedation/ GA, health practitioner self-reporting is the current standard methodology employed within the reviewed literature in analyzing practice patterns and obtaining practitioner views.

Secondly, although practice patterns were stratified according to procedure, complexities and patient selection specific to the procedure were not. A small proportion of respondents noted their provision of anaesthesia for a specified dental procedure was attenuated by other variables including: complexity of the procedure (i.e. impacted teeth versus uncomplicated extractions or the placement of an implant versus the restoration of an implant) and patient selection (paediatric versus adult patients). Such variables could lead to an over or under-estimation of noted practice patterns. In the current study a deliberate attempt was made to simplify and reduce question length to maximize response rate albeit at the sacrifice of some data. Future studies are necessary to illustrate the
variation in sedation/GA administration for complex procedures and according to patient type.

Thirdly, to avoid the conundrum plaguing previous studies, the current study attempted to maintain estimations between patient and dentists’ estimation of preference for sedation/GA without making a distinction between patient need and demand. Numerous telephone surveys have indicated patients have a high demand for anaesthesia services with 12.4% of Canadians, 8.6% of Americans and 9.8% of Saudi’s preferring it (Abdulwahab et al., 2010; Chanpong et al., 2005; Dionne et al., 1998). Such studies although interesting do not necessarily reflect need. The argument made is that demand does not reflect actual need or provision of that service. In other words, a patient can hypothetically prefer to have sedation for root canal therapy but if they do not actually require a root canal, no need for sedation exists. Although such an argument is logical it is interesting to note that in the studies, dental extractions showed preference and prevalence were matched best. However, it is important to note that in the segment of patients interviewed which represents patient need or preference, some represent irregular or non-attenders to the dentist (Pretty et al., 2011). Consequently, no need can be adequately ascertained for patients not accessing dental services (Pretty et al., 2011). In some ways it is a circuitous problem as those with anxiety may not attend for dental services thus the assessment of need could be under-estimated. Yet with greater access or provision of such services, anxious patients would receive treatment thereby justifying a greater need for anaesthesia care in dental treatment. The current study attempted to mitigate the effect of need versus demand surveys to examine patient preference and dentists’ estimation of patient preference.
Fourthly, interpretations of questions may not have been consistent. Although questions detailed the differentiation between all versus dentists’ own practice patients’ estimates may have been skewed in either direction based upon interpretation of the question. Plus percentages may have been difficult to quantify but it was thought to be easier for dentists to report a percentage of practice time versus a specified number of cases. Given not all respondent answers totaled 100% when asked to do so, it is important to recognize possible error in question comprehension. All attempts were made to exclude any data that were potentially misinterpreted from the data set.

Fifthly, this study population was limited to dentists licensed to practice, with an email address on file in the RCDSO database. It is possible the results are not generalizable to the population of Canada. However, the province of Ontario represents about 50 percent of dentists practicing in Canada. Notwithstanding the large proportion of dentists in Ontario, various influences of regulatory laws governing the use of sedation/GA in dental practices, dental school curricula, the availability of continuing education and ratio of dentists to patients can alter the practice use and views of dentists across the provinces.

Lastly, comparisons between patients interviewed in 2002 and dentists in Ontario in 2011 are subject to possible limitations. It may be speculated that patients from across Canada vary ten years later from the population of patients Ontario dentists are referring to in their survey responses of 2011. The reviewed literature indicates no available data confirming patient responses today are similar or dissimilar from 2002. Additionally, the 2002 survey represented patients across Canada that may vary from patients in the province of Ontario. Again the literature does not support or contradict either possibility.
However, more recent dental literature supports global patient preference for sedation/GA to be considerably higher than Ontario dentists’ estimates of 33.2 percent (Abdulwahab, 2010; Hunt et al., 2011). In terms of sampled patients in Ontario differing from patients across the country it is difficult to report. However, the sample in the 2002 study was weighted according to province population meaning 397 or 36.1 percent of the 1,100 respondents were from Ontario.

5.10 Future Directions

The current study provides a preliminary overview of practice usage of various anaesthesia modalities in Ontario. To appreciate the breadth of anaesthesia services and practices, future studies could assess common routes of sedation/GA administration, medications and combinations used, monitoring equipment, patient selection for various types of anaesthesia, team members providing the anaesthesia and elements of post-anaesthesia care.

Future studies may examine practice patterns across the country to provide greater insight on variation in sedation/GA implementation.

The response rate in the current study although reflective of the Ontario proportion of general and specialist practitioners, does not adequately capture the potential variations in specialist practice patterns and uses of sedation/GA. Future studies could potentially survey specialist populations to identify the practice usage, needs and views of specialists with respect to anaesthesia delivery.

The current study was able to identify possible limitations and barriers to the provision of sedation and GA in Ontario dental practices. However, future studies could
assess the impact of other factors such as dentist assessment or treatment of patient anxiety and patient awareness of anaesthesia options relevant to dentistry.

5.11 Conclusions

The main significance of this study lies in the use of rich quantitative analysis carried out on data gathered from a statistically representative cross-section of dentists in Ontario. This analysis offers novel insights into patterns and themes of sedation and GA adoption among dentists in the province, serving as a general and current practise benchmark. Understanding patterns of sedation and GA use makes it possible for dentists throughout the province to compare and contrast their practises with those of their peers, thereby enabling dentists to optimize their provision of sedation/GA. For scholarly researchers and policy-makers the data elucidates the state of sedation and GA uses among dentists in Ontario.

Furthermore, the study provides insight into factors affecting the availability of sedation/GA in Ontario dental clinics namely lack of dentist training and dentists’ perception that there is no patient demand or need. Additionally, the main barriers to referring patients for anaesthesia services were mainly the high costs associated with the services, patient fear of sedation/GA and difficulty accessing providers due to long wait times for appointments and distances too far.

Lastly, this study points to the discrepancy in dentist estimation of patient fear, avoidance of dental care and patient interest in sedation/GA irrespective of patient fear. This finding perhaps is most interesting as potentially it reflects dentists are not identifying their patients’ needs. At present, no evidence-based guidelines exist
delineating the clinical indications for sedation or anaesthesia or for the specific anaesthesia techniques to address its clinical uses within dentistry (Hunt et al., 2008). Research into enabling consistent administration of sedation/GA, dentist assessment and management of patient anxiety and diagnostic tools to aid practitioners in examining clinical need are required. This is an exciting time for dentistry with wider accessibility and acceptance of the safety of sedation/GA in healthcare, dentists have the ability to provide services based on patients’ need and demand.
Figure 3.1: Recruitment Timeline

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>RECRUITMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>November 15, 2011</td>
<td>Invitation Letter/Pre-notice</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Email Invitation</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Thank You/Reminder Email</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>December 23, 2011</td>
<td>Final Notice Email – 48 hrs. prior to study closing</td>
</tr>
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Table 4.1: Demographic Characteristics of the Sample Population

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td><strong>Gender (N = 1036)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>722</td>
<td>69.7</td>
</tr>
<tr>
<td>Female</td>
<td>314</td>
<td>30.3</td>
</tr>
<tr>
<td><strong>Practice Type (N = 1036)</strong></td>
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<td></td>
</tr>
<tr>
<td>General Practitioner</td>
<td>860</td>
<td>83.0</td>
</tr>
<tr>
<td>Dental Anaesthesiologist</td>
<td>9</td>
<td>0.8</td>
</tr>
<tr>
<td>Dental Public Health Specialist</td>
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<td>0.7</td>
</tr>
<tr>
<td>Endodontist</td>
<td>22</td>
<td>2.1</td>
</tr>
<tr>
<td>Oral Medicine/ Oral Pathologist</td>
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<td>0.4</td>
</tr>
<tr>
<td>Oral and Maxillofacial Radiologist</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Oral and Maxillofacial Surgeon</td>
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<td>2.1</td>
</tr>
<tr>
<td>Orthodontist</td>
<td>23</td>
<td>2.2</td>
</tr>
<tr>
<td>Paediatric Dentist</td>
<td>25</td>
<td>2.4</td>
</tr>
<tr>
<td>Periodontist</td>
<td>23</td>
<td>2.2</td>
</tr>
<tr>
<td>Prosthodontist</td>
<td>18</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Clinical Years in Practice (N = 1034)</strong></td>
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<td>20.6 mean years</td>
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<tr>
<td>&lt; = 13.0</td>
<td>346</td>
<td>33.5</td>
</tr>
<tr>
<td>13.1 – 27.0</td>
<td>366</td>
<td>35.4</td>
</tr>
<tr>
<td>27.1+</td>
<td>322</td>
<td>31.3</td>
</tr>
<tr>
<td><strong>Community Size (N = 1035)</strong></td>
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<td></td>
</tr>
<tr>
<td>Under 50,000</td>
<td>193</td>
<td>18.6</td>
</tr>
<tr>
<td>50,001 – 500,000</td>
<td>405</td>
<td>39.1</td>
</tr>
<tr>
<td>Over 500,000</td>
<td>437</td>
<td>40.6</td>
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Figure 4.1: *Dentists’ Estimation vs. Patient Interest for Sedation/GA*

<table>
<thead>
<tr>
<th></th>
<th>Not Interested</th>
<th>Interested Depending on Cost</th>
<th>Definitely Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dentists</strong></td>
<td>66.8</td>
<td>19.8</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Patients</strong></td>
<td>43.9</td>
<td>42.3</td>
<td>13.4</td>
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</table>
Figure 4.2: Dentists’ Estimations of Patient Preference for Type of Anaesthesia

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Conscious/Moderate</th>
<th>Deep Sedation/GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>4.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Fillings/Crowns/Bridges</td>
<td>9.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>17.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>20.2</td>
<td>8</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>28.7</td>
<td>16.6</td>
</tr>
<tr>
<td>Implants</td>
<td>25.5</td>
<td>12.8</td>
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Figure 4.3: Dentists’ Estimation vs. Patient Preference for Sedation/GA Based on Dental Procedures (%)
Figure 4.4: Provision of Anaesthesia Services

Provision of Anaesthesia Services

<table>
<thead>
<tr>
<th>Percent</th>
<th>No Sedation Provided</th>
<th>Provide Sedation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists</td>
<td>39.8</td>
<td>60.2</td>
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</table>
Figure 4.5: Providers of Anaesthesia

<table>
<thead>
<tr>
<th>Providers of Anaesthesia</th>
<th>Percent</th>
<th>Mean Percent Time</th>
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<tbody>
<tr>
<td>Provide Own Sedation</td>
<td>36.6</td>
<td>12.5</td>
</tr>
<tr>
<td>Dental Anaesthesiologist</td>
<td>20.7</td>
<td>6</td>
</tr>
<tr>
<td>Medical Anaesthesiologist</td>
<td>12.3</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>3.4</td>
</tr>
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</table>
Figure 4.6: Barriers to Patient Referral for Provision of Anaesthesia Services

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Cost</td>
<td>72.2</td>
</tr>
<tr>
<td>Patient Fear of Sedation/GA</td>
<td>33.5</td>
</tr>
<tr>
<td>Long Wait Time</td>
<td>32.2</td>
</tr>
<tr>
<td>Distance Too Far</td>
<td>25.1</td>
</tr>
<tr>
<td>Patient Disinterest</td>
<td>23.3</td>
</tr>
<tr>
<td>Other Barrier</td>
<td>5.9</td>
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</tbody>
</table>

Dentists
Figure 4.7: Indicated Reasons for Sedation/GA Absence within Dental Practices

Barriers to Provision of Anaesthesia

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Lack of Training</td>
<td>38.2</td>
</tr>
<tr>
<td>No Patient Demand</td>
<td>25.3</td>
</tr>
<tr>
<td>Cost Too High</td>
<td>19.1</td>
</tr>
<tr>
<td>No Patient Need</td>
<td>15.1</td>
</tr>
<tr>
<td>Other Reason</td>
<td>10.2</td>
</tr>
<tr>
<td>Lack of Fee</td>
<td>8.6</td>
</tr>
<tr>
<td>Lack of Referral Source</td>
<td>5.6</td>
</tr>
<tr>
<td>Believe Sedation/GA Unsafe</td>
<td>4.6</td>
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</table>

Dentists
Figure 4.8: Total use of Sedation/GA for Specific Dental Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Nitrous Oxide</th>
<th>Oral/Conscious</th>
<th>IV Sedation</th>
<th>Deep/GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>1.1</td>
<td>0.4</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Fillings/Crowns/Bridges</td>
<td>3.7</td>
<td>1.4</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>3.2</td>
<td>1.5</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>1.6</td>
<td>1.4</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>5.7</td>
<td>2.9</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Implants</td>
<td>1.8</td>
<td>2.1</td>
<td>2.1</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Figure 4.9: Patient Stated vs. Dentist Stated Prevalence of Sedation/GA
Figure 4.10: Dentists’ Estimation of Patient Fear vs. Patient Stated Fear (Percent)

Dentists’ Estimation of Patient Fear

<table>
<thead>
<tr>
<th></th>
<th>Dentists</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>not afraid</td>
<td>38.6</td>
<td>63.9</td>
</tr>
<tr>
<td>little afraid</td>
<td>24.8</td>
<td>20.7</td>
</tr>
<tr>
<td>somewhat afraid</td>
<td>19.9</td>
<td>9.8</td>
</tr>
<tr>
<td>very afraid</td>
<td>10.6</td>
<td>2.0</td>
</tr>
<tr>
<td>terrified</td>
<td>6.0</td>
<td>3.5</td>
</tr>
</tbody>
</table>
Figure 4.11: Dentists’ Estimation of Patient Avoidance of Dental Care

<table>
<thead>
<tr>
<th>Missed/Cancelled/Avoided</th>
<th>Dentists</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.3</td>
<td></td>
<td>7.6</td>
</tr>
</tbody>
</table>
Figure 4.12: Gender: Dentists’ Estimation of Patient Interest for Sedation/GA

<table>
<thead>
<tr>
<th></th>
<th>Not Interested</th>
<th>Interested Depending on Cost</th>
<th>Definitely Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td>67.4</td>
<td>18.7</td>
<td>13.1</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>64.6</td>
<td>23.2</td>
<td>12.2</td>
</tr>
</tbody>
</table>
Figure 4.13: Gender: Procedure Specific Patient Interest for Sedation/GA

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>5.9</td>
<td>5.6</td>
</tr>
<tr>
<td>Fillings/Crowns/Bridges</td>
<td>13</td>
<td>12.5</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>24.2</td>
<td>25.1</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>29.1</td>
<td>27.1</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>44.1</td>
<td>48.5</td>
</tr>
<tr>
<td>Implants</td>
<td>38</td>
<td>39</td>
</tr>
</tbody>
</table>
Figure 4.14: Gender: Procedure Specific Provision of Sedation/GA

Gender: Procedure Specific Provision of Sedation/GA

Male
Female

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Fillings/Crowns/Bridges</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>5.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>3.9</td>
<td>4.8</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>11.2</td>
<td>11.7</td>
</tr>
<tr>
<td>Implants</td>
<td>5.8</td>
<td>5.4</td>
</tr>
</tbody>
</table>

* Indicates significant difference between genders.
Figure 4.15: Gender: Dentists’ Estimation of Patient Fear

<table>
<thead>
<tr>
<th></th>
<th>Not Afraid</th>
<th>Little Afraid</th>
<th>Somewhat Afraid</th>
<th>Very Afraid</th>
<th>Terrified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>39.6</td>
<td>25.7</td>
<td>18.7</td>
<td>10.1</td>
<td>5.8</td>
</tr>
<tr>
<td>Female</td>
<td>36.5</td>
<td>23.1</td>
<td>22.4</td>
<td>11.2</td>
<td>6.3</td>
</tr>
</tbody>
</table>

* denotes a statistically significant difference between genders.
Figure 4.16: *City Size: Patient Interest for Sedation/GA*

<table>
<thead>
<tr>
<th>City Size</th>
<th>Not Interested</th>
<th>Interested Depending on Cost</th>
<th>Definitely Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 50,000</td>
<td>67.4</td>
<td>20.3</td>
<td>12.3</td>
</tr>
<tr>
<td>50,001 - 500,000</td>
<td>64.2</td>
<td>21.2</td>
<td>14.6</td>
</tr>
<tr>
<td>Over 500,001</td>
<td>68.5</td>
<td>18.7</td>
<td>12.8</td>
</tr>
</tbody>
</table>
Figure 4.17: City Size: Procedure Specific Patient Interest for Sedation/GA
Figure 4.18: City Size: Provision of Sedation

<table>
<thead>
<tr>
<th>City Size</th>
<th>Provide Sedation</th>
<th>Do Not Provide Sedation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 50,000</td>
<td>22.9</td>
<td>12</td>
</tr>
<tr>
<td>50,001 - 500,000</td>
<td>37.4</td>
<td>41.8</td>
</tr>
<tr>
<td>Over 500,001</td>
<td>39.6</td>
<td>46.2</td>
</tr>
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</table>
Figure 4.19: *City Size: Procedure Specific Provision of Sedation/GA*

<table>
<thead>
<tr>
<th>City Size</th>
<th>Routine Scaling</th>
<th>Fillings/Crowns/Bridges</th>
<th>Root Canal Therapy</th>
<th>Periodontal Surgery</th>
<th>Dental Extractions</th>
<th>Implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 50,000</td>
<td>1.3</td>
<td>7.4</td>
<td>5.9</td>
<td>4.1</td>
<td>13.1</td>
<td>6</td>
</tr>
<tr>
<td>50,001 - 500,000</td>
<td>2.6</td>
<td>6.8</td>
<td>6.7</td>
<td>4.6</td>
<td>11.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Over 500,001</td>
<td>2.1</td>
<td>5.5</td>
<td>5.7</td>
<td>3.8</td>
<td>10.3</td>
<td>5.8</td>
</tr>
</tbody>
</table>
Figure 4.20: City Size: Dentists’ Estimation of Patient Fear

<table>
<thead>
<tr>
<th>City Size</th>
<th>Not Afraid</th>
<th>Little Afraid</th>
<th>Somewhat Afraid</th>
<th>Very Afraid</th>
<th>Terrified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 50,000</td>
<td>35.5</td>
<td>29.0</td>
<td>20.0</td>
<td>10.1</td>
<td>5.6</td>
</tr>
<tr>
<td>50,001 - 500,000</td>
<td>38.4</td>
<td>24.4</td>
<td>20.1</td>
<td>10.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Over 500,001</td>
<td>40.2</td>
<td>23.6</td>
<td>19.4</td>
<td>10.4</td>
<td>5.7</td>
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</tbody>
</table>
Figure 4.21: Clinical Years of Experience: Patient Interest for Sedation/GA

Clinical Years of Experience: Patient Interest

<table>
<thead>
<tr>
<th></th>
<th>≤ 13.0 years</th>
<th>13.1 - 27.0 years</th>
<th>&gt;27.1 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Interested</td>
<td>58.7</td>
<td>70</td>
<td>71.6</td>
</tr>
<tr>
<td>Interested</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depending on Cost</td>
<td>24.8</td>
<td>18.3</td>
<td>16.4</td>
</tr>
<tr>
<td>Definitely</td>
<td></td>
<td></td>
<td>11.7</td>
</tr>
<tr>
<td>Interested</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent
Figure. 4.22: Clinical Years of Experience: Procedure Specific Patient Interest

<table>
<thead>
<tr>
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<th>≤ 13.0 years</th>
<th>13.1 - 27.0 years</th>
<th>&gt;27.1 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>6.3</td>
<td>14.1</td>
<td>27</td>
</tr>
<tr>
<td>Fillings/ Crowns/ Bridges</td>
<td>5.4</td>
<td>11.1</td>
<td>23.1</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>27</td>
<td>31.5</td>
<td>49.4</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>31.5</td>
<td>43.7</td>
<td>42.8</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>49.4</td>
<td>34.8</td>
<td>37.2</td>
</tr>
<tr>
<td>Implants</td>
<td>429</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical Years of Experience: Provision of Sedation

<table>
<thead>
<tr>
<th></th>
<th>≤ 13.0 years</th>
<th>13.1 - 27.0 years</th>
<th>&gt; 27.1 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Sedation</td>
<td>35.1</td>
<td>35.5</td>
<td>29.4</td>
</tr>
<tr>
<td>Do Not Provide Sedation</td>
<td>30.9</td>
<td>35.3</td>
<td>33.8</td>
</tr>
</tbody>
</table>
Fig. 4.24: *Clinical Years of Experience: Procedure Specific Provision of Sedation/GA*

<table>
<thead>
<tr>
<th>Procedure</th>
<th>&lt;= 13.0 years</th>
<th>13.1 - 27.0 years</th>
<th>&gt;27.1 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>6.3</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>Fillings/Crowns/Bridges</td>
<td>27</td>
<td>23.1</td>
<td>23</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>31.5</td>
<td>25</td>
<td>29.3</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>49.4</td>
<td>43.7</td>
<td>42.8</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>42.9</td>
<td>34.8</td>
<td>37.2</td>
</tr>
<tr>
<td>Implants</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.25: Clinical Years of Experience: Dentists' Estimation of Patient Fear

Clinical Years of Experience: Dentists’ Estimation of Patient Fear

<table>
<thead>
<tr>
<th></th>
<th>≤ 13.0 years</th>
<th>13.1 - 27.0 years</th>
<th>&gt;27.1 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>not afraid</td>
<td>34.9</td>
<td>24.3</td>
<td>13.1</td>
</tr>
<tr>
<td>little afraid</td>
<td>24.3</td>
<td>25.1</td>
<td>21.0</td>
</tr>
<tr>
<td>somewhat afraid</td>
<td>21.0</td>
<td>18.6</td>
<td>9.2</td>
</tr>
<tr>
<td>very afraid</td>
<td>12.8</td>
<td>9.2</td>
<td>5</td>
</tr>
<tr>
<td>terrified</td>
<td>7.2</td>
<td>5.4</td>
<td>4</td>
</tr>
</tbody>
</table>

0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0

Clinical Years of Experience:

Dentists’ Estimation of Patient Fear

- ≤ 13.0 years
- 13.1 - 27.0 years
- >27.1 years
Figure 4.26: Gender: Letter vs. Web
Figure 4.27: Clinical Years of Experience: Letter vs. Web

Clinical Years of Experience: Letter vs. Web

- ≤ 13.0 years
- 13.1 - 27.0 years
- >27.1 years

<table>
<thead>
<tr>
<th></th>
<th>Paper Survey</th>
<th>Web Survey</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 13.0 years</td>
<td>30</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>13.1 - 27.0 years</td>
<td>35</td>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td>&gt;27.1 years</td>
<td>25</td>
<td>20</td>
<td>22.5</td>
</tr>
</tbody>
</table>
Figure 4.28: City Size: Letter vs. Web
References


Anesthesia Progress, 52(3), 3-11.


Edwards P., Roberts I., Clarke M., DiGuiseppi C., Pratap S., Wentz R., & Kwan I.
(2002). Increasing response rates to postal questionnaires: systematic review. 

*British Dental Journal*, 324, 589-593.


*Medical Care*, 40(7), 596-606.


doi:10.1016/j.janxdis.2010.09.007


APPENDIX A: FINAL QUESTIONNAIRE
Dentists’ Views and Practice of Sedation and General Anaesthesia

1. What percentage of all dental patients do you believe are interested in sedation or general anaesthesia for dental treatment?
   - Not interested %
   - Possibly interested depending on cost %
   - Definitely interested %
   Total = 100%

2. Estimate the percentage of all dental patients that would prefer to have conscious/moderate sedation for the following dental procedures.
   - Routine Scaling%
   - Fillings, Crowns/Bridges%
   - Root Canal Therapy%
   - Periodontal Surgery%
   - Dental Extractions%
   - Implants%

3. Estimate the percentage of all dental patients that would prefer to have general anaesthesia for the following dental procedures.
   - Routine Scaling%
   - Fillings, Crowns/Bridges%
   - Root Canal Therapy%
   - Periodontal Surgery%
   - Dental Extractions%
   - Implants%

4. Identify who provides sedation/anaesthesia services for your patients and the percentage of the time services are provided (Please check all that apply).
   - No sedation/GA provided Yes No
   - Provide own sedation Yes No
   - Dental Anaesthesiologist Yes No
   - Medical Anaesthesiologist Yes No
   - Other Yes No

135
5. Have you experienced any of the following barriers to care when referring a patient to an anaesthesia provider? (Please check all that apply.)
   ___ Patient disinterest
   ___ Long wait time for appointment
   ___ High cost
   ___ Distance too far
   ___ Patient fear of sedation/GA
   ___ Other ________________________________

6. If sedation or anaesthesia services are not provided within your office, please indicate the reason(s). (Please check all that apply.)
   ___ No patient need
   ___ No patient demand
   ___ Lack of training
   ___ Lack of referral source
   ___ Cost too high
   ___ Inadequate fee/remuneration for service
   ___ Believe sedation/GA is unsafe
   ___ Other ________________________________

7. For what percentage of your patient practice do you provide nitrous oxide sedation for the following dental procedures?
   Routine Scaling _______%
   Fillings, Crowns/Bridges _______%
   Root Canal Therapy _______%
   Periodontal Surgery _______%
   Dental Extractions _______%
   Implants _______%

8. For what percentage of your patient practice do you provide oral sedation for the following dental procedures?
   Routine Scaling _______%
   Fillings, Crowns/Bridges _______%
   Root Canal Therapy _______%
   Periodontal Surgery _______%
   Dental Extractions _______%
   Implants _______%
9. For what percentage of your patient practice do you provide intravenous sedation for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>__________%</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>__________%</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>__________%</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>__________%</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>__________%</td>
</tr>
<tr>
<td>Implants</td>
<td>__________%</td>
</tr>
</tbody>
</table>

10. For what percentage of your patient practice do you provide deep sedation/general anaesthesia for the following dental procedures?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine Scaling</td>
<td>__________%</td>
</tr>
<tr>
<td>Fillings, Crowns/Bridges</td>
<td>__________%</td>
</tr>
<tr>
<td>Root Canal Therapy</td>
<td>__________%</td>
</tr>
<tr>
<td>Periodontal Surgery</td>
<td>__________%</td>
</tr>
<tr>
<td>Dental Extractions</td>
<td>__________%</td>
</tr>
<tr>
<td>Implants</td>
<td>__________%</td>
</tr>
</tbody>
</table>

11. What percentage of all dental patients do you believe have ever missed, cancelled or avoided a dental appointment because of fear or anxiety?

__________%

12. What percentage of all dental patients describe their feelings towards dental treatment this way?

<table>
<thead>
<tr>
<th>Feeling</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all afraid</td>
<td>__________%</td>
</tr>
<tr>
<td>A little afraid</td>
<td>__________%</td>
</tr>
<tr>
<td>Somewhat afraid</td>
<td>__________%</td>
</tr>
<tr>
<td>Very afraid</td>
<td>__________%</td>
</tr>
<tr>
<td>Terrified</td>
<td>__________%</td>
</tr>
</tbody>
</table>

Total = 100%

Some questions about you.....

13. Are you ___ male ___ female
14. How many years have you been in clinical practice? _________

15. Which best describes you or your practice? (Please check all that apply)
   ___ General Practitioner
   ___ Dental Anaesthesiologist
   ___ Dental Public Health Specialist
   ___ Endodontist
   ___ Oral Medicine/Oral Pathologist
   ___ Oral and Maxillofacial Radiologist
   ___ Oral and Maxillofacial Surgeon
   ___ Orthodontist
   ___ Paediatric Dentist
   ___ Periodontist
   ___ Prosthodontist

16. Is your primary office in a town/city with a population of....
   ___ Under 5,000
   ___ 5,000 - 50,000
   ___ 50,000 - 100,000
   ___ 100,001 - 500,000
   ___ Over 500,000

Thank you for your time in completing this survey.

Please return the completed survey to: Dr. Sangeeta Patodia c/o Faculty of Dentistry, University of Toronto
Discipline of Anaesthesia, Toronto ON M5G 1G6
APPENDIX B: INVITATION: LETTER CORRESPONDENCE

[Date]
[Address]

Re: Dentists’ views and practice of sedation and general anaesthesia
Dear: [DOCTOR’S NAME],

Little is known about the views of Ontario dentists toward the use of sedation and general anaesthesia in dentistry. A study at the University of Toronto is being conducted to learn more about this subject. This letter is an invitation asking you to participate in a brief survey which is the basis for this research. Your perspective on this matter can provide insightful information. The intent of the study is to understand your views and practice, not your knowledge, of sedation and general anaesthesia. There are no right or wrong answers.

The survey will take less than 10 minutes to complete. You have one of 2 choices to complete the survey. You may do so by filling out the survey and returning it in the postage paid envelope enclosed. The second choice, if you prefer, is to complete the survey online by typing www.survey.com into any internet browser. At the site, type in the following password: sleep. Further instructions will be provided once on the site. Your answers are important to better understand the use of sedation and general anaesthesia in Ontario dental practices today.

Your privacy is important. The information you provide by letter or on the survey site cannot be linked to you or your email in any way. Your participation is completely anonymous and voluntary. A Letter of Information is enclosed to address any questions you may have regarding the practices and procedures of this survey.

I value your time and do not wish to inconvenience you. If you decide to opt out of the survey, please email me, thus ensuring you will receive no further correspondence. Additionally, if you have any questions, feel free to contact me at any time.

I look forward to your response and thank you in advance for your involvement.

Sincerely,

Sangeeta Patodia BSc., DDS
Resident, Masters of Dental Anaesthesia Program, Faculty of Dentistry
124 EDWARD STREET  TORONTO, ON  M5G 1G6  EMAIL s.patodia@utoronto.ca
How was I selected to be in the sample? Who will see my answers? Will my answers be kept confidential?
Your contact information was obtained from the public register of all licensed dentists in Ontario and will be used solely for the purposes of this important research. During the course of data collection, names and addresses of dentists selected to participate in this survey will be stored electronically on a secure and encrypted network and accessed via a password-protected computer. Identifying information is only used for survey distribution, tracking responses (for email reminders) and compiling the data file for analysis. Upon completion of all data collection, all contact information will be destroyed from the source.

Your survey responses are 100% anonymous and confidential. Your name and any personal identification information will not be stored with your answers nor will it be used in any reports or publications that result from the survey. To maintain anonymity, please do not include such information in your written responses to survey questions.

If I do not answer, what happens?
The choice to answer is completely yours. It is your right to refuse to: answer, participate or withdraw from the study at any time. There are no consequences to you if you decide not to participate.

Does my participation provide any benefits to myself?
There are no immediate benefits to you.

Does my participation incur any risks or harm to myself?
There are no risks or harm to you by your participation in this study.

How do you obtain my consent to participate?
Completion and receipt of this survey by mail or web implies your consent to participate in this study.

Can I stop in the middle of a survey and come back to finish it later?
You can complete the survey in multiple sittings. To return to a survey previously started, follow the original link to the survey and re-enter your respondent key. You will be taken to where you left off.

How is this survey important? Why does my view matter? Will I be able to obtain the findings from this study?
Dentists’ views and practices of sedation and general anaesthesia in Ontario have not been examined before. It is important to understand how dentists like yourself feel about the use of sedation or general anaesthesia for dental patients. Your opinion is critical to the accuracy and success of this project. The enclosed survey is part of a Master's thesis. All participants are invited to review the graduate thesis published in the Harry R Abbot Dentistry Library in 2013.

Who can I contact for more information?
Further questions about this study can be answered by myself, the Principal Investigator at any time. Kindly email me at s.patodia@utoronto.ca
Re: Dentists’ views and practice of sedation and general anaesthesia

Dear: [DOCTOR’S NAME],

Little is known about the views of Ontario dentists toward the use of sedation and general anaesthesia in dentistry. A study at the University of Toronto is being conducted to learn more about this subject. This email is an invitation asking you to participate in a brief survey which is the basis for this research. Your perspective on this matter can provide insightful information. The intent of the study is to understand your views and practice, not your knowledge, of sedation and general anaesthesia. There are no right or wrong answers.

The survey will take less than 10 minutes to complete. You have one of 2 choices to complete the survey. You may complete the survey online by typing www.survey.com into any internet browser. At the site, type in the following password: sleep. Further instructions will be provided once on the site. The second choice if you prefer, is to fill out the letter survey and return it in the postage paid envelope mailed to you last week. Your answers are important to better understand the use of sedation and general anaesthesia in Ontario dental practices today.

Your privacy is important. The information you provide by letter or on the survey site cannot be linked to you or your email in any way. Your participation is completely anonymous and voluntary.

I value your time and do not wish to inconvenience you. If you decide to opt out of the survey please email me thus ensuring you will receive no further correspondence. Additionally, if you have any questions, feel free to contact me at any time.

I look forward to your response and thank you in advance for your involvement.

Sincerely,

Sangeeta Patodia BSc., DDS

Resident, Masters of Dental Anaesthesia Program, Faculty of Dentistry
124 EDWARD STREET TORONTO, ON M5G 1G6 EMAIL s.patodia@utoronto.ca
APPENDIX E: THANK YOU/REMINDER: EMAIL CORRESPONDENCE

[Date]
[Address]

Re: Dentists’ views and practice of sedation and general anaesthesia
Dear: [DOCTOR’S NAME],

A few weeks ago you were sent a letter and email inviting you to participate in a survey which should take less than 10 minutes. If the online or mail questionnaire previously sent to you has been completed and returned, thank you for your time and contribution to this study!

If you have not had time to complete the questionnaire, please do so at your earliest convenience. Your answers are important to better understand the use of sedation and general anaesthesia in Ontario dental practices today.

To access the online survey please go to the URL: www.survey.com. At the site, type in the following password: sleep. Further instructions will be provided once on the site.

The survey is entirely voluntary and your answers remain completely anonymous. If you have completed the questionnaire or wish to opt out of the survey, you can be removed from the mailing list, by contacting me directly at s.patodia@utoronto.ca.

Sincerely,

Sangeeta Patodia BSc., DDS

Resident, Masters of Dental Anaesthesia Program, Faculty of Dentistry
124 EDWARD STREET TORONTO, «Address» M5G 1G6 EMAIL s.patodia@utoronto.ca
[Date]
[Address]

Re: Dentists’ views and practice of sedation and general anaesthesia

Dear: [DOCTOR’S NAME],

This is a final reminder inviting you to complete the survey concerning your views and practice of sedation and general anaesthesia. The study closes in 48 hrs. To complete the survey, please access the internet and enter the following URL: www.survey.com. At this site, type in the following password: sleep. Further instructions will be provided once on the site.

Your participation is entirely anonymous and voluntary.

Thanks to all for your time!

cheers,

Sangeeta Patodia BSc., DDS

Resident, Masters of Dental Anaesthesia Program, Faculty of Dentistry
124 EDWARD STREET TORONTO, «Address» M5G 1G6 EMAIL s.patodia@utoronto.ca
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