Dental Sedation and General Anaesthesia in Manitoba:
A survey of need, demand, and perceptions

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

Background: Dental anxiety is a major reason why patients seek sedation/general anaesthesia (SGA) for dental treatment.

Objective: To investigate patients’ reported and perceived dental anxiety and provision of SGA services in Manitoba dental practices.

Methods: A paper-based survey was distributed to Manitoba dentists registered to provide intravenous sedation and a sample of their patients.

Results: 21 dentists (53% response) and 505 patients participated. Dentists overestimated patients’ dental anxiety (Dental Fear/Avoidance Scale, p = 0.01; Index Dental Anxiety/Fear, p = 0.02), and underestimated patient interest for SGA. Patients also reported a preference for SGA services (ie., 2.5-fold demand for restorations) more often than they received SGA services (ie., 11.1-fold increase for implant surgery.)

Conclusion: Dentists overestimate their patients’ anxiety levels but underestimate their interest in SGA services. Use of validated dental anxiety scales would aid in more accurate assessment of patient anxiety, and better alignment with patients SGA needs and demands.
Acknowledgments

A special thanks is in order for my parents, Bruce and Jane Campbell, who assisted me in the best decisions of my life and career.

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Thank you to the Manitoba Dental Association and all the Manitoba dentists who participated in this study.

Finally, I need to thank my right hand man, Dr. Andrew Adams, who was the best co-resident turned life-long friend I could have ever asked for!

Sincerely,

Jonathan Campbell
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Chapter 1

1.0 Introduction

Significant fear and anxiety related to dental care has been well-documented and is commonly seen in dental practice (Chanpong, Haas, & Locker, 2005; Dionne et al., 2001; Smith, T.A., Heaton, 2003). Within North America, the prevalence of dental anxiety ranges from roughly four to twenty percent (Chanpong, Haas, & Locker, 2005; Dionne, Gordon, McCullagh, & Phero, 1998; Locker, Liddell, Dempster, & Shapiro, 1999; Locker, Shapiro, & Liddell, 1996a; Tellez, Kinner, Heimberg, Lim, & Ismail, 2015). In Canada, the most recent national study found a prevalence of high anxiety in 5.5% of subjects sampled (Chanpong et al., 2005). Dental anxiety can produce serious and negative effects in patients, such as failed or postponed dental visits, lack of preventive care, and overall poor oral health (Doerr, Lang, Nyquist, & Ronis, 1998; Gordon, Dionne, & Snyder, 1998; Milgrom, Newton, Boyle, Heaton, & Donaldson, 2010). It is important to accurately assess patients’ level of dental anxiety in order to facilitate the management and treatment of anxious patients during dental care. However, the multidimensional nature of dental anxiety is such that affected individuals may be difficult to identify (Armfield, 2010; Dempster, 2007; Pretty et al., 2011) because some present with one or more of the cognitive, behavioural or physiological dimensions in varying degrees. This can make a diagnosis of dental anxiety difficult, especially in individuals who are not overtly anxious. Diagnosis is further complicated by patients not open to discussing their dental anxiety with their dentist, and/or dentists who do not recognize the subtle signs and cues that are indicative of dental anxiety. As a result, the correct assessment of a patients’ dental anxiety cannot be assumed or presumed to always happen.

Previous literature reports that dentists may not accurately identify patients’ level of dental anxiety as compared to patient reports of their dental anxiety (Coulthard et al., 2011; Patodia, 2013). However, no study has directly compared dentists’ perception of their patients’ dental anxiety with patients’ self-reported anxiety. This study is unique in
that dentists and patients were surveyed concurrently in order to assess patients’ level of anxiety towards dental treatment. Interest lies in whether dentists are able to identify the level of anxiety in a sample of their respective patients.

Dentally anxious patients often seek out additional pharmacological interventions to supplement local anaesthesia in order to make dental treatment more comfortable and to reduce dental anxiety. A viable adjunct to local anaesthesia, that is highly effective at reducing anxiety levels, is intravenous (IV) sedation and/or general anaesthesia (SGA) (Corah, 1988; Delfion, 1997; Dionne et al., 2001; Kramer, Ganzberg, Prior, & Rashid, 2012; Pretty et al., 2011). This is supported in the literature with patients reporting a preference for more dental procedures to be done with SGA (Allen & Girdler, 2005; Baker, Farrer, Perkins, & Sanders, 2006; Goodwin et al., 2012). However, dentists tend to underestimate the perceived needs of their patients to reduce their anxiety when seeking dental care (Baron, Logan, & Kao, 1990; Hunt, McCurley, Dempster, & Marley, 2011). Similar to the lack of direct assessment of dentists and their patients regarding patient dental anxiety, no study to date has directly compared dentists’ perceptions of patients’ need and demand for anaesthesia services with patients’ actual perceptions, preferences, or requests for such services. These data would be of interest to the dental profession in order to ensure patients’ needs are being met.

Some dentists take additional training beyond their undergraduate dental education in order to be able to offer a variety of sedation services. However, information on the practice of sedation services, such as frequency and type of sedation provided, is not readily available. A better understanding of the practice of sedation services by those dentists who are trained to do so, as well as reasons why trained dentists do and do not offer sedation services, can provide insight into the provision of SGA services. This is relevant information in light of reported patient demand for sedation services (Chanpong et al., 2005; Dionne et al., 1998). Current considerations to providing SGA include high cost to dentist, patients’ lack of insurance coverage, and limited sedation services offered by dentists. The literature suggests that dentists recognize the benefit of these services but do not routinely provide them (Boyle, Newton, & Milgrom, 2009; Boynes, Lemak, & Close, 2006; Moore & Brødsgaard, 2001; Ryding & Murphy, 2007).
The province of Manitoba was chosen as the location for this study. Current literature supports the presence of oral health needs in Manitoba, along with limited data in addressing the needs of dentally anxious patients (CIHI, 2013; Schroth, Moore, & Brothwell, 2005). As a limited number of dentists in Manitoba are trained to administer SGA services, it is a unique environment to assess the needs and demands of patients in relation to the perspectives of clinicians who offer or refer for these services.

The purpose of the study is two-fold, in that it investigates (1) patients’ and dentists’ perceptions of their patients’ anxiety in relation to dental services in Manitoba, and (2) patients’ and dentists’ perception of need and demand for SGA in relation to dental services in Manitoba. This study does not intend to generalize to all dentists in Manitoba, but focuses on comparing dentist and patient perspectives, which is unique in that no studies to date have made direct comparisons matching dentist and patient perspectives in this area.

1.1 Definitions

Anxiety

Anxiety “is anticipation of future threat” (American Psychiatric Association, 2013). Anxiety is further defined as the reaction to an undefined or irrational anticipated stressor or perceived danger (Craske et al., 2009; Urman & Kaye, 2012).

Fear

Fear “is the emotional response to real or perceived imminent threat” (American Psychiatric Association, 2013). The differences between anxiety and fear are discussed in further detail in the literature review chapter.

Need and Demand

Medical need represents the integrated sum of all medically modifiable illnesses that burden a defined population (Fries, Koop, Sokolov, Beadle, & Wright, 1998). For the
purposes of this study, need represents the comparison between patients’ reports and dentists’ beliefs of need for SGA services by patients for a variety of dental procedures. For the purposes of this study, demand represents the request of the patient or dentist.

Need and demand are considered related yet independent (Fries et al., 1998). More simply stated, patients’ needs may be similar but their demand for treatment may vary. An example is a patient’s demand for antibiotics for a sore tooth, whereas in reality there is no need for an anti-infective agent as no signs of systemic infection or compromised immunity are present (Dar-Odeh, 2010). Specifically for this study, demand represents patient preference for SGA services in conjunction with dental treatment.

Anxiolysis

Anxiolysis is the administration of behavioural modification techniques (non-pharmacological) or pharmacological agents to reduce worry (Urman & Kaye, 2012).

Sedation

Sedation is the administration of a sedative drug to produce a state of calm or sleep. Sedation produces this state while simultaneously reducing agitation and irritation (Urman & Kaye, 2012).

Minimal / Conscious Sedation

Minimal/conscious sedation refers to a “minimally depressed level of consciousness, produced by a pharmacological 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

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**

Deep sedation is “a drug-induced depression of consciousness during which patients cannot easily be aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilatory 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**

General anaesthesia is “a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory 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).
Chapter 2

2.0 Literature Review

A review of the available literature was carried out by a systematic search of online databases using the University of Toronto e-library. The literature review focused on the following subjects with respect to SGA services: patients’ self-report anxiety and avoidance; dentists’ perceived views of patient anxiety and avoidance; patients’ self-reported needs and demands; and dentists’ perceived views of patients’ needs and demands. The impact of patient factors such as anxiety, cost, insurance, and personal characteristics on the delivery of SGA in dentistry was also considered. The following databases were searched: MEDLINE, OVID, Pub Med, CINAHL, Web of Science, TRIP, PSYCHINFO, Cochrane Reviews Abstracts, and the Toronto Academic Health Sciences Network database of dissertation abstracts. The keywords searched (either individually or in combination) were the following: sedation, general anaesthesia, dentistry, dentist, interest, effectiveness, perceptions, conscious, deep, attitudes, survey, patient, anxiety, avoidance, Manitoba, Canada, and fear.

2.1 Fear and Anxiety: An Overview

Fear and anxiety are common feelings when people are exposed to unfamiliar situations or experience a lack of control (American Psychiatric Association, 2013). Dental fear and anxiety can be caused by any situation or stimuli that is related to dental treatment (Boyle et al., 2009; Dionne et al., 1998). The American Psychiatric Association (2013) defines fear as “more often associated with surges of autonomic arousal necessary for fight or flight, thoughts of immediate danger, and escape behaviours,” and anxiety as “more often associated with muscle tension and vigilance in preparation for future danger and cautious or avoidant behaviours.” A dental-related example of anxiety describes the reaction to the anticipation of “the shot” (the needle), whereas fear refers to the reaction to “the shot” itself (Urman & Kaye, 2012). These two states overlap, which can cause confusion when patients are asked to separate these two feelings during assessments.
When excessive and unreasonable levels of anxiety exist that interfere with an individual’s day to day functioning, the person may be diagnosed as having a specific phobia (American Psychiatric Association, 2013). In the dental context, a specific phobia may relate to dental instruments, needles or clinical settings (Dempster, 2007). Individuals with a clinical diagnosis of specific phobia represent a very small subset of dentally anxious people (Dempster, 2007). This study focuses on patients’ self-reported dental anxiety rather than on a clinical diagnosis of specific phobias. Since the dental literature uses the terms fear and anxiety interchangeably, the phrase “dental anxiety” will be used to describe patients’ fear and/or anxiety related to dental treatment in this thesis.

Dental anxiety can be categorized into cognitive, physiological and behaviour dimensions (Armfield, 2010; Dempster, 2007; Urman & Kaye, 2012). The cognitive dimension includes anxious predictions, assumptions and beliefs; the physiological dimension involves biochemical and physical changes to the body (e.g., heart rate or blood pressure); and the behavioural dimension includes avoidance or endurance of the feared stimuli (e.g., needle or drill). People may present with single or multiple dimensions of anxiety, although further research is needed regarding the relationship between dimensions and the conditions that produce these anxieties (Barlow, 2002). Variability exists between dentally anxious individuals, which makes identification of affected individuals challenging.

Dental anxiety is a global phenomenon with the prevalence of people who experience high anxiety reported to be as high as 20.9% (Thomson, Stewart, Carter, & Spencer, 1996). Affected individuals tend to avoid or postpone treatment, thus exacerbating any current problems they may have, which could lead to poor oral health (Armfield, 2013; Milgrom et al., 2010). Effective treatment and management of dental anxiety mitigates missed patient visits, and thereby may improve regularity of dental visits. This may create greater patient comfort in attending the dentist, and aid in improving patients’ overall oral health (Foley, 2002; Locker & Quiñonez, 2011; Ng & Leung, 2008; Pretty et al., 2011; Vermaire et al., 2008).
2.1.1 Etiology of Dental Anxiety

Multiple reasons exist why people develop anxiety associated with dental treatment (Boyle et al., 2009; Davey, 1989; Locker et al., 1996b; Rachman, 1977). Operant conditioning, which is based on the theory that consequences modify behaviour, is common in dentistry (Dempster, 2007). Patients who have had a traumatic incidence are more likely to experience increased anxiety at their next visit (Doerr et al., 1998; Gordon et al., 1998; G. Humphris & King, 2011). Dental anxiety can also be transferred from parent to child (Milsom, Tickle, Humphris, & Blinkhorn, 2003; Rachman, 1977). Childhood dental anxiety onset can be difficult to resolve if it continues into adulthood (Davey, 1989; Doerr et al., 1998; Locker, Liddell, Dempster, & Shapiro, 1999). Furthermore, children with missing teeth and caries are reported to be more dentally anxious (Schuller, Willumsen, & Holst, 2003; Thomson, Locker, & Poulton, 2000). Children, like adults, can succumb to the vicious cycle of avoiding the dentist until serious oral health problems develop (Ashley, Parry, Parekh, Al-Chihabi, & Ryan, 2010).

Dental anxiety is also generated by a variety of stimuli, including dental smells, sounds, sensations, instruments, or clinical personnel. These can make patients feel vulnerable, and thus, anxious or fearful (Locker et al., 1996). Patients who maintain routine appointments tend to be less anxious as they are familiar with the environment and procedures (Hakeberg & Cunha, 2008; Milgrom et al., 2010; Sohn & Ismail, 2005). However, patients who only attend when they experience pain or discomfort are less familiar with the setting and/or the personality of the dental professional who is treating them (Armfield, 2013), and therefore may be more likely to have higher anxiety levels (Armfield, 2013; Cohen et al., 2000; Gatchel et al., 1983; Hunt et al., 2011; Milgrom et al., 2010). Additionally, patients unfamiliar with difficult procedures, such as complex extractions and root canals, may require follow-up appointments thus further facilitating their anxiety (Chanpong et al., 2005; Doerr et al., 1998; Goodwin et al., 2012; G. Humphris & King, 2011; Schuller et al., 2003).
2.1.2 Dental Fear and Anxiety in Canada

A national telephone survey of 1,101 Canadians found that 36.1% of the population has some level of dental fear with 3.5% being terrified (Figure 2.1) (Chanpong et al., 2005). This study also reported 7.6% of respondents as having missed, cancelled, or avoided an appointment. However, of those subjects with high levels of fear (5.5%; very afraid/terrified), 49.2% reported avoiding a dental appointment; in contrast subjects reporting no or low fear (84.6%) reported avoiding much less (5.2%). A summary of the prevalence of dental fear in Canada can be seen in Table 2.2.

Figure 2.1 Prevalence of Dental Fear in Canada

A sample of 1101 Canadians surveyed over the telephone regarding dental fear reported: no dental fear 63.9% and very afraid and terrified 5.5% (Chanpong et al., 2005).
Table 2.2  Prevalence of Dental Anxiety in Canada

<table>
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<tr>
<th>Study findings</th>
<th>Year</th>
<th>Authors</th>
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<tr>
<td>4.6% (DAS &gt;15) high anxiety</td>
<td>1991</td>
<td>(Locker, Liddell, &amp; Burman, 1991)</td>
</tr>
<tr>
<td>10.9% (DAS &gt;13) high anxiety</td>
<td>1996</td>
<td>(Locker, Shapiro, &amp; Liddell, 1996a)</td>
</tr>
<tr>
<td>10.7% (DAS&gt; 13) high anxiety</td>
<td>1997</td>
<td>(Liddell &amp; Locker, 1997)</td>
</tr>
<tr>
<td>16.4% (DAS&gt; 8, Gatchel Fear Scale &gt;8, Milgrom Single item scale, being very afraid or terrified) high anxiety</td>
<td>1999</td>
<td>(Locker et al., 1999)</td>
</tr>
<tr>
<td>5.5% very afraid/ terrified</td>
<td>2003</td>
<td>(Chanpong et al., 2005)</td>
</tr>
<tr>
<td>14.4% (DFAS high fear/low avoidance)</td>
<td>2007</td>
<td>(Dempster, 2007)</td>
</tr>
<tr>
<td>6.3% (DFAS low fear/high avoidance)</td>
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<td></td>
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<tr>
<td>16.6% (DFAS high fear/high avoidance)</td>
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Dental Anxiety Scale (DAS), Dental Fear and Avoidance Scale (DFAS)

2.2  Assessment of Dental Anxiety

Dental anxiety is typically measured by patient self-report. Current scales often categorize patients into no, low, moderate and high levels of dental anxiety. The use of scales allows for a quick tabulation of the prevalence of dental anxiety within a population (Armfield, 2011). Scales assessing dental anxiety were first developed in 1968 and are still used today (Corah, 1968). However, dental anxiety scale scores are often interpreted differently depending on the researcher, resulting in varying prevalence levels ranging from 2.6% to 20.9% (Dempster, 2007; Locker et al., 1996a; Newton & Buck, 2000; Schuurs & Hoogstraten, 1993; Thomson et al., 1996).

In order to accurately measure dental anxiety, a scale should have high test re-test reliability (correlation co-efficient of 0.7 or higher). This means the likelihood of choosing the same answer on two occasions is high if no change in anxiety has occurred between testing time points (Armfield, 2010; Dempster, 2007; Ronis, 1994). Questions measuring dental anxiety should also have high validity, meaning that they accurately assess anxiety. This ensures the phenomenon of anxiety is being measured, and provides confidence that a change in score represents a true change in anxiety (Armfield, 2010; Humphris, Morrison, & Lindsay, 1995; Milgrom, 1986; Ragnarsson, 1998). The ideal
scale examines multiple dimensions of anxiety, including the physical, cognitive, emotional and behavioural components (Armfield, 2010, 2011; Corah, 1988; Dempster, 2007), although this is not often the case. Anxiety scales should also report evidence of psychometric testing to ensure reliability and validity, with unambiguous questions whose intent is clearly stated. (Schuurs & Hoogstraten, 1993).

### 2.2.1 Dental Anxiety Scales

#### 2.2.1.1 Corah's Dental Anxiety Scale

Corah’s Dental Anxiety Scale (DAS), established in 1968, poses four scenario-based multiple-choice questions with each answer correlating feelings ranging from relaxed to very frightened or anxious (Corah, 1968). Answer scores are tabulated. The resulting sum determines the patient’s overall dental anxiety level, with a score of 13/20 indicating the person is highly dentally anxious (Corah, 1968). Over the years, the DAS has been modified to include consistent response choices, gender neutral wording to describe the dentist, identifying dental hygienists and dentists as providing scaling, and describing the reason for the visit as a routine check-up so the participant does not assume it is as a result of pain (Humphris et al., 1995; Ronis, 1994). The Modified DAS (MDAS) also includes an additional question regarding use of local anaesthesia (Humphris et al., 1995). The MDAS has a cut-point of 15/25 that indicates dental anxiety, and 19/25 to identify high dental anxiety (Humphris et al., 1995). The DAS is the most commonly cited scale used to assess dental anxiety (Dempster, 2007).

#### 2.2.1.2 Gatchel Dental Anxiety Scale

Gatchel’s Dental Anxiety Scale is a single question 10-point scale (Gatchel et al., 1983). Scale scores range from 1 (no dental anxiety) to 10 (extreme dental anxiety), with no pre-determined cut-point to classify participant’s level of anxiety. The reliability and validity of this method has not been tested as comprehensively as other dental anxiety scales (Dempster, 2007).

#### 2.2.1.3 The Dental Fear Survey

The Dental Fear Survey (DFS) is composed of 20 questions that examine the
physical, behavioural, and cognitive aspects of dental anxiety, with one question pertaining to dental fear (Kleinknecht, Thorndike, McGlynn, & Harkavy, 1984). Answers range from 1 (never or minimal fear) to 5 (every time or most afraid) and are tabulated to produce a score that correlates to a level of dental anxiety. There is no predetermined cut-point; however, dental phobics tend to score at 76/100 points (Kleinknecht et al., 1984).

### 2.2.1.3 Milgrom’s Single Item Scale

Milgrom’s is a single item scale with one question and five possible answers (Milgrom, Fiset, Melnick, & Weinstein, 1988). The question is “How do you rate your own feeling toward dental treatment?” The responses rank respondent’s level of anxiety as: not at all afraid, a little afraid, very afraid, and terrified.

### 2.2.1.4 Dental Fear and Avoidance Scale (DFAS)

The Dental Fear and Avoidance Scale (DFAS) consists of two questions that separately assess cognitive fear and behavioural avoidance related to dental anxiety (Dempster, Locker, Swinson, 2011). Questions ask individuals to rate their level of fear and avoidance on a scale from 1 to 10, with 1 being no fear or avoidance and 10 being extreme fear and avoidance. A score of four or below identifies no or a low level of anxiety (i.e., normal anxiety), with a score of five or higher representing a moderate to high level of anxiety (i.e., clinically significant anxiety). Respondents are grouped into one of four categories: 1 - low fear and low avoidance, 2 - high fear and low avoidance, 3 - low fear and high avoidance, and 4 - high fear and high avoidance. The DFAS was used to assess dental anxiety in this study as it is simple, easy to administer, and has high reliability (0.87 two-way intraclass correlation coefficient) and high validity ($p < 0.01$) when compared to other measures of dental anxiety (Dempster, 2007; Dempster et al., 2011).

### 2.2.1.5 Index of Dental Anxiety and Fear (IDAF)

The Index of Dental Anxiety and Fear-4C Scale (IDAF-4C) assesses patients’ cognitive, behavioural, physiological, and emotional components of dental anxiety (Armfield, 2010). The IDAF-4C scale contains eight questions answered using a 5-point Likert-scale, ranging from 1-disagree to 5-strongly agree. In addition to the four
components (4C), the scale has additional sections that inquire about phobia and specific stimulus. The IDAF-4C+ scale was also selected for use in this study because it is simple to use, and evidence shows good internal consistency and test-retest reliability (Cronbach’s alpha = 0.94 and $r = 0.82$, respectively).

2.2.2 Limitations of Scales

Many of the scales were developed 20-30 years ago, which means they may be dated and not current with society norms. Notwithstanding this, limitations exist with current measures of dental anxiety that are addressed below.

The lack of a clear and universally accepted definition of dental anxiety can lead to different understandings of what dental anxiety is amongst participants and between participants and the researcher (Dempster, 2007). This is further complicated by the overlapping characteristics between fear and anxiety, which can make it difficult for participants to distinguish between them when asked specifically about one or the other. The resulting confusion could result in an over or under reporting of prevalence.

Scale cut-points are thresholds for determining the different levels of dental anxiety. Cut-points are typically determined using some psychological analysis; however, these values can be arbitrary (Armfield, 2010). Locker et al. (1996a) compared the DAS, Gatchel’s 10-point fear scale, and a single-point question with a possible answer scale of 1-5. The reported variation in prevalence of high dental fear among the three difference scales ranged from 8.2% to 23.4%. Gatchel’s scale with a cut-point of 8/10 produced the lowest prevalence and the single point question with a 3/5 cut-point produced the highest. Similar values, 7.3% to 28.4%, were reported when the DAS, IDFA-4C, and single-item questionnaire were compared for their assessment of dental fear, anxiety, and avoidance (Armfield, 2011). The wide range of results can lead to confusion and poor management of fear and anxiety for patients (Coulthard et al., 2011). The large variation may be based on the scale score corresponding to high fear and anxiety if the participant lands at or above the cut-point (Armfield, 2011; Chanpong et al., 2005). The IDAF-4C scale (Armfield, 2011; Armfield, 2010) evaluates dental anxiety based on the mean score of all questions or a sum score. Respondents’ scores are referenced to their corresponding
percentile rank based on a sample of the general adult population and further stratified according to their age and gender, which are two known factors of dental fear and anxiety. However, recent email correspondence with Armfield confirmed use of a score of 3 as an arbitrary cut-point to distinguish low and high dental anxiety.

Dental anxiety scales may also produce different results based on the specific wording used in their questions. For example, the DAS scale asks participants to pretend they are in the scenario described and then to report their corresponding dental anxiety (Corah, 1968). However, these scenarios are specific in some instances, for example, when identifying the dentist as being a male. This may induce a biased response if respondents perceive males to be less gentle and caring than females (Coulthard et al., 2011; Humphris et al., 1995; Ronis, 1994).

Variations also exist among scales regarding inquiry into dimensions or components of dental anxiety. The DAS inquires primarily about the cognitive dimension of dental anxiety with some consideration of the physiological dimension in one of the response categories (Corah, 1968). Therefore, individuals whose dental anxiety is attributed to avoidance or the behavioural dimension of anxiety may not be captured using the DAS (Dempster, 2007).

Existing dental anxiety scales rely largely on patient self-report. This can produce variability in results seen as either over or under reporting of dental anxiety (Dionne et al., 1998; Locker et al., 1996b; Schuurs & Hoogstraten, 1993). Physiological measures such as blood pressure, heart rate, or blood samples could also be collected to supplement patients’ self report; however this may be time consuming and invasive. Given the limitations inherent in the existing scales, it appears prudent to use multiple scales to measure dental anxiety, to confirm the level of dental anxiety present (Schuurs & Hoogstraten, 1993).

2.3 Sedation and Anaesthesia

Sedation and anaesthesia have a strong history in dentistry due to the need for pain control during dental procedures. Today, three main groups of anaesthesia are used
in dentistry: local anaesthesia, conscious sedation, and deep sedation and general anaesthesia (American Dental Association, 2007). The development of local anaesthetics, which are fast acting, reversible, and allow the patient to be in a conscious state but feel no physical pain, has vastly improved dental care. Two discoveries were needed, however, to allow local anaesthesia to become a common practice. First, the invention of the syringe in the early twentieth century allowed for injection of liquid compounds into the oral cavity. Secondly, lidocaine, a safe and reliable anaesthetic, was discovered in 1949 (Ring, 2007). Moderate/conscious sedation was pioneered when dentists Jorgensen, Driscoll, and Trieger combined the effects of general and local anaesthetic drugs to allow the patient to be in an altered state of consciousness without being unconscious (Urman & Kaye, 2012). The discovery of general anaesthesia was attributed to an American dentist, Dr. Horace Wells, in 1844 (Bjorn et al., 1978; Hodge, 1989). Wells was inspired by the use of nitrous oxide as an anaesthetic during a show when a boy was treated with the gas and felt no pain. He realized the potential of nitrous oxide and tested his theory on himself as a colleague extracted his tooth, proving a successful method for general anaesthesia (Hodge, 1989). Two more dentists, C.K. Teter and J.C Heidbrink, were involved in the advancement of general anaesthesia by improving the delivery and control of oxygen (Bjorn et al., 1978). The use of nitrous oxide as a general anaesthetic rapidly became popular in both the medical and dental fields with each field developing the practice of anaesthesia differently.

Sedation in dentistry has several aims and indications: 1) to allay anxiety and fear, 2) to provide analgesia, 3) to provide amnesia, 4) to control secretions, 5) to counteract hyperactive gag reflex, 6) to allow for lengthy and difficult dental procedures, 7) to enable treatment of medically compromised patients (unable to tolerate the stress of the dental visit, and 8) to enable treatment of special populations: (a) developmentally disabled patients and (b) children (Urman & Kaye, 2012). Multiple factors need to be considered to determine which type of sedation or anaesthesia for pain control should be used. These include patient history of medications or health problems, behavioural patterns, level of fear and anxiety, and age. While most of these factors are easily determined, the level of fear and anxiety experienced by a patient is subject to interpretation and, therefore, may be overlooked (Dailey, Humphris, & Lennon, 2001;
Heaton, Carlson, Smith, Baer, & de Leeuw, 2007; Pretty et al., 2011). Thus, it is important for dentists to be aware of the prevalence of fear and anxiety in their patient population and the consequent need and demand for sedation and general anaesthesia services from their patients (Armfield & Heaton, 2013; Boyle et al., 2009; Dailey et al., 2001; Goodwin & Pretty, 2011; Goodwin et al., 2012; Pretty et al., 2011).

2.3.1 Types of Anaesthesia Used in Dentistry

2.3.1.1 Local anaesthesia

While local anaesthesia (LA) is effective for many patients to prevent sensations of pain, they are still conscious during the dental procedure, allowing patients to see, hear, and feel pressure or discomfort. As a result, patients with high levels of anxiety still may respond fearfully and/ or avoid their dental procedures altogether.

2.3.1.2 Conscious sedation

As previously defined, conscious sedation (CS) means that patients are breathing spontaneously, are protecting their own airway, are rousable when needed, and have little cardiovascular variation from their normal awake baseline. Collectively, these attributes are what lend this level of sedation its superb level of safety. There are many different routes to achieve this level of sedation: nitrous oxide, pills or tablets, suspensions, and injectable intramuscular or IV drugs (Kaufman & Jastak, 1995).

In 1946, Jorgensen and colleagues discovered that a combination of IV-administered pentobarbital, meperidine, and scopolamine produced a state of analgesia and sedation for an average of 3 hours. This new method of anaesthesia provided clinicians with a choice between local and general anaesthetics, which have shorter half-lives and higher complication rates, respectively (Dionne et al., 2001). Today, midazolam is the agent most often used for CS as it greatly reduces anxiety and provides amnesia while having minimal effects on the respiratory and cardiovascular systems, thus increasing its safety (Foley, 2002; Pereira-Santos et al., 2013). Midazolam is often combined with a short-acting opioid, such as fentanyl or alfentanil to provide a more balanced anaesthetic technique (Dionne et al., 2001). In addition, IV CS is currently
easily and quickly titrated to the desired effect while providing a route for emergency and reversal drugs, if required (Kaufman & Jastak, 1995).

Both the patient- and dentist-based survey used standardized definitions with clinical examples to best guide the respondent in answering the questions accurately. The definition used for CS for patients was as follows:

Refers to medication delivered though the IV that gives you the feeling of being lightly asleep but able to be aroused by light touch or someone’s voice and having some memory of the procedure.

**Example:** You are given a small amount of medication into your IV and a few moments later when the dentist asks you “do you feel relaxed?” you respond verbally. You might remember the dentist asking you this at the end of the visit.

2.3.1.3 **Deep sedation and general anaesthesia**

Deep sedation (DS) and general anaesthesia (GA) can also be achieved for patients through a variety of routes, including combinations of oral, inhalational and intravenous methods. DS and GA are two distinct levels of sedation/anaesthesia. However, from an educational and regulatory perspective, it is reasonable to consider them one level, as both require expert anaesthesia supervision because patients can readily and quickly transition from DS to GA. These anaesthetics provide the patient with the potential benefits of loss of consciousness, lack of response to repeated painful stimulus, muscle relaxation, and amnesia. The many indications for DS and GA in dentistry are as follows: where the dentistry is likely to be extensive and unsuitable for an awake or lesser-sedated patient; for small children who may not tolerate dental surgery under local anaesthesia; failures of previous attempts using local anaesthesia and nitrous oxide/oxygen mixture & allergy to local anaesthetics (rare); patients with physical or mental disabilities, that make it difficult for them to cooperate with surgery; severe gag reflex; dental anxiety and fear; and where there is acute inflammation so that the local anaesthetic may not be effective because of local change in pH and of the risk of spreading infection (Greenan, 1996). However, these levels of sedation come with some potential drawbacks, such as the loss of protective airway reflexes and cardiovascular and
respiratory suppression. Therefore, only highly trained professionals should provide DS and GA, as the negative outcomes can be drastic, such as brain damage and/or death.

The definition used for DS for patients was as follows:

Refers to medication delivered through the IV which gives you the feeling of being deeply asleep, but able to be aroused by repeated touch or painful touch and having no memory of the procedure.

**Example:** You are given a greater amount of medications into your IV and a few moments later the dentist asks you “do you feel relaxed?” you do not respond. Next, you have local anaesthesia “freezing” injections and you move your hand towards your face because something feels odd. You cannot remember the injections at the end of the visit.

Finally, the definition used for GA for patients was as follows:

Refers to medication delivered through the IV, mask, or breathing tube and being totally asleep, but not able to be aroused awake, and having no memory of the procedure.

**Example:** An anaesthetic gas is delivered through a breathing tube, you are asleep and when you have injections for local anaesthesia “freezing” you don’t feel anything or move. You cannot remember the injections at the end of the visit.

### 2.3.2 Patient Need and Demand for Anaesthesia

Dentists and patients have suggested that both the need and the demand for SGA services exist. A 1995 Gallup telephone survey of 1,008 adult Americans regarding their attitude towards oral surgery found the following: 60% of respondents preferred an anaesthetic method that would allow them to be pain-free but conscious, and 56% expressed a preference for anaesthesia-induced amnesia (Delfion, 1997). The first study to focus on need and demand for SGA services was conducted by Dionne et al. in 1988. They conducted a telephone survey of 400 US citizens and found that 15% of the
respondents were very anxious or terrified of dental treatment and 18.1% said they would visit a dentist more often if given a medication to decrease their nervousness. Further, 8.6% of the survey participants stated they would prefer to have their dental treatment done with SGA services if available. A Canadian telephone survey, conducted by Chanpong et al, found that 11.4% of respondents with no or low fear and 31.1% of those with high fear were definitely interested in sedation or GA. They also found that if these adult patients are combined with cost dependent patients, over half of the adult population in the no or low fear group are interested and greater than 85% are interested in the high fear group. A four-part study that evaluated the Indicator of Sedation Need (IOSN) sedation-screening tool was completed recently in England. This study found that the total need for sedation was 5%, with females being 3.5 times more likely to be placed in the high need group than males (Pretty et al., 2011). Unfortunately, this did not account for patients who did not visit their dentist due to feeling fearful. When these non-attendees are taken into account, the need for sedation is estimated to be 6.9% (Goodwin & Pretty, 2011).

Similar results were reported in a mail-based survey of 287 university students in Saudi Arabia, with 5.5% of respondents reporting high dental phobia, 13.9% stating they would prefer “being put to sleep,” and 9.8% preferring sedation for their dental treatment (Taani 2001). Similarly, when the needs for anaesthesia and sedation were surveyed in Kuwait by Abdulwahab et al. (2010), the respondents showed a preference for sedation and anaesthesia services as a way to reduce their anxiety with 51.2% in the high fear group and 19.2% in the low fear group. Further, the respondents were willing to visit the dentist more frequently if such services were available.

With respect to emergency dental care, the demand for sedation is high, as evidenced by a 2006 survey by Baker et al. (2006) that included 513 respondents. Of these respondents, 56.3% preferred their dental treatment to be done under sedation.

The literature also demonstrates the need and demand for SGA for dental treatment from the dentists’ perspective. A survey of the US graduating dentists’ class of 2003 concerning their sedation education found that 93.7% of respondents had
recognized a need from their patient population for sedation services (Boynes et al., 2006). A 2004 mail questionnaire of 179 consultant dentists reported 95% deemed it appropriate for restorative treatment procedures to be provided under sedation (Morgan and Skelly, 2005). Nevertheless, despite recognizing the need for sedation, only one-third of the responding dentists actually provided sedation for their patients.

The following sections will discuss factors that influence need and demand for SGA services.

2.3.2.1 Dental anxiety

The primary reason patients seek SGA services in conjunction with dental care is because of moderate to high levels of dental anxiety (Armfield, Spencer, & Stewart, 2006; Chanpong et al., 2005; de Carvalho et al., 2012; Goodwin & Pretty, 2011; Smith & Heaton, 2003). Accordingly, many patients avoid seeking dental care and present with poor overall oral health (Armfield, 2013; Boyle et al., 2009; Chadwick, Thompson, & Treasure, 2006; Gordon et al., 1998; Milgrom et al., 2010).

2.3.2.2 Impact on dental treatment plan

The definition of demanding and/or complex treatment is not clear-cut but may apply to more invasive treatments, typically surgical in nature, or perhaps to multiple quadrant restorative treatments. The same patients who are able to tolerate treatment with local anaesthetic for more straightforward dental care may not be able to tolerate treatment without the use of SGA services when the dental care becomes more demanding and/or complex (Coulthard et al., 2011). They recommended that, if doubt exists regarding treatment complexity, clinicians should consider patients’ level of dental anxiety to decide on SGA in order to avoid unnecessary discomfort for the patient. Further, even when a dental treatment is not demanding and/or complex, patients may demand SGA for reasons such as general comfort, length of treatment, previous experience, perceived invasiveness and complexity, and severe gag reflex (Chanpong et al., 2005; Fisher, Stassen, & Nunn, 2011; Morgan & Skelly, 2005; Pretty et al., 2011; Wilson, Boyle, & 2006).
2.3.2.3 Medical or behavioural indicators

Patients with medical and/or behavioural conditions are often faced with limited access to dental care because their issues can transform otherwise simple dental treatment into treatment that is difficult or impossible without the use of SGA services (Ashley et al., 2010; Boyle et al., 2009; Coulthard et al., 2011; Pretty et al., 2011; Smith & Heaton, 2003). However, not all patients are suitable for SGA services. Certain patients may be too medically compromised to have dental care in conjunction with SGA in an outpatient setting. Severely medically compromised patients must be assessed on an individual basis and those deemed unfit for outpatient SGA should seek care in a more appropriate setting that provides greater patient monitoring and resources dedicated towards patient care, for example, a hospital operating room (Coulthard et al., 2011). Dental anxiety can drastically elevate circulating levels of stress hormones, and predispose these patients to life threatening situations when they experience anxiety-provoking situations (Coulthard et al., 2011; Dionne et al., 1998; Morgan & Skelly, 2005). However, many patients with medical conditions can undergo SGA during dental treatment in an outpatient facility in a very safe fashion (Coulthard et al., 2011; Wilson et al., 2006). Use of SGA can significantly reduce patients’ anxiety levels, and therefore catecholamine levels, thus creating a safer and more pleasurable experience for patients during dental treatment (Corah, 1988; Dionne et al., 1998 and 2001).

Patients who exhibit physical disabilities or involuntary movement disorders, such as Parkinson’s, Multiple Sclerosis, or a severe gag reflex and behavioural conditions, including Alzheimer’s, dementia, autism, and attention deficit hyperactivity disorder may also benefit from SGA services during dental care (Chanpong et al., 2005; Coulthard et al., 2011; Morgan & Skelly, 2005; Wilson et al., 2006).

In summary, a review of the literature has demonstrated that need and demand for SGA is present for a multitude of reasons. Primary reasons for this need and demand include: anxiety and fear, medical and behavioural conditions, treatment complexity, and patient preference (Coulthard et al., 2011). As such, dentistry needs to develop more standardized tools to guide dentists whose patients are anxious to better assess which
patients could benefit from SGA services (Armfield, 2010, 2011; Coulthard et al., 2011; Dempster, 2007).

2.3.3 Dentists’ Provision of Anaesthesia

Presently there is minimal information with regards to provision of SGA services in Canada. A 2013 mail and internet-based survey of 1,076 Ontario dentists found that 60.2% of responding dentists reported SGA services being provided in their practices (Patodia, 2013). In these practices, 36.6% of the dentists provided SGA themselves, 20.7% used a dental anaesthesiologist, 12.3% a medical anaesthesiologist, and 8% had some “other” practitioner conducting the SGA. Of the dentists providing SGA services, they reporting doing so only 12.5% of the time (Patodia, 2013). Further, the majority of respondents (71.8%) reported using IV sedation for extractions, followed by implants, periodontal surgery, root canal therapy, fillings, crowns and bridges, and routine scaling.

In 2002, 951 dentists residing in Wales (69% response) were surveyed regarding SGA services. Of the responding dentists, 87 (12.1%) reported offering some form of sedation, primarily for adult patients (Chadwick et al., 2006). Provision of SGA services increased slightly to about one-third in another UK survey in which 179 consultants (dentists) reported that they provided conscious sedation to patients (Morgan & Skelly, 2005).

2.4 Potential Oral Health Improvements

The aversion to dental care can result in the deterioration of patients’ oral and general health, and negatively affect their quality of life (Armfield, 2013; Cohen et al., 2000; Locker & Quiñonez, 2011; Ng & Leung, 2008; Vermaire et al., 2008; Wilson et al., 2006). Consequently, it is the responsibility of the dental profession to help patients with dental anxiety manage, and where possible, resolve this condition. Earlier studies have determined that SGA services are beneficial for alleviating fear and anxiety, a major hindrance for many patients who seek dental care (see Figure 2.2) (Ashley et al., 2010;
Corah, 1988; Hunt et al., 2011; Urman & Kaye, 2012). Reasons that prevent patients from seeking SGA services are important to know and understand in order to be able to address the factors involved. The knowledge gained from this study may help guide policy in this area and contribute to improving the dental care that patients undergo.

Figure 2.2  Cycle of Fear of Dental Treatment and the Impact of Sedation to Improve Oral Health

Source: (Urman & Kaye, 2012)
3.0 Statement of the Problem

The majority of patients receive local anaesthetic when undergoing dental treatment to reduce the pain associated with dental procedures. Pain expectations and pain experience are influenced by many factors, one of which is a patients’ level of dental anxiety. Dental anxiety affects a significant segment of the population, and is one of the most common psychological conditions seen in clinical practice (Dempster, 2007; Goodwin & Pretty, 2011). Consequently, patients who are dentally anxious often seek out additional pharmacological support to supplement local anaesthesia in order to make their dental treatment more comfortable and to reduce their dental anxiety (Coulthard et al., 2011; Dionne et al., 1998). A viable adjunct to local anaesthesia that is highly effective at reducing anxiety levels is intravenous (IV) sedation or general anaesthesia (SGA) (Corah, 1988; Delfion, 1997; Dionne et al., 2001; Kramer et al., 2012; Pretty et al., 2011).

Interest lies in whether dentists correctly identify dental anxiety in their patients and whether patients are routinely offered additional levels of anaesthesia beyond local anaesthesia, especially those patients who would prefer sedation services for their dental treatments. A better understanding of patients’ and dentists’ views, with respect to dental anxiety and patient interest in SGA services, will help ensure patient needs and demands for SGA are being met.

3.1 Study Purpose

The goal of this study was to directly compare dentists’ and their patients’ beliefs and perceptions regarding dental anxiety, interest in sedation and general anaesthesia, and patterns of SGA practice.

The specific objectives were:
(1) To assess Manitoba dentists’ perception of their patients’ level of dental anxiety and their patients’ reported level of dental anxiety related to dental treatment.

(2) To assess Manitoba dentists’ perception of patient need and demand for sedation and general anaesthesia and their patients’ reported preference for SGA services.

This research dissertation includes two manuscripts, each individually addressing the study objectives described above.
4.0 Manuscript I: Assessing Patients’ Dental Anxiety in Manitoba, Canada

4.1 Abstract

**Background:** Dental anxiety prevents many patients from seeking dental care; however, data is lacking regarding patients’ self-reported levels of dental anxiety compared to dentists’ perceptions of their patients’ dental anxiety.

**Objective:** To assess Manitoba dentists’ perception of their patients’ level of dental anxiety and their patients’ reported level of dental anxiety related to dental treatment.

**Methods:** A paper-based survey was distributed to Manitoba dentists registered to provide intravenous (IV) conscious sedation (CS) as well as to a sample of their patients in order to assess patients’ level of dental anxiety. Descriptive and inferential analyses were performed.

**Results:** Twenty-one dentists (53% response) and 505 patients responded. Dentists’ significantly overestimated patient dental anxiety and avoidance assessed by the Dental Fear and Avoidance Scale (DFAS), \( p = 0.01 \), and Index of Dental Anxiety and Fear (IDAF-4C), \( p = 0.02 \). Frequency of patients’ reported dental anxiety (DFAS-41.8%; IDAF-4C-45%), was lower than dentists’ perception of their patients anxiety (DFAS-71.4%; IDAF-4C-66.7%). Patients that had SGA previously primarily did so for tooth extractions (56.8%), with the majority (78%) of these patients reporting high dental anxiety. 65.1% of patients had not received SGA in the past because it was not offered, with 93.8% of these patients having low anxiety.

**Conclusion:** Dentists did not accurately perceive their patients’ dental anxiety and avoidance. Use of validated dental anxiety scales may aid dentists in understanding their patients’ anxiety levels and subsequently offer SGA services to patients.
4.2 Introduction

Significant fear and anxiety regarding dental care exist in the population. General population studies in North America report the prevalence of dental anxiety ranges from 4% to 20% (Chanpong et al., 2005; Dempster, 2007; Dionne et al., 1998; Locker et al., 1999, 1996a; Sohn & Ismail, 2005; Tellez et al., 2015). In Canada, the most recent national study found a prevalence of high anxiety in 5.5% of subjects sampled (Chanpong et al., 2005). Dental anxiety can result in serious and negative effects for patients, primarily associated with failed or postponed dental visits, lack of preventive care, and overall poor oral health (Doerr et al., 1998; Gordon et al., 1998; Milgrom et al., 2010). Patients who are dentally anxious often seek out additional pharmacological support to supplement local anaesthesia in order to make their dental treatment more comfortable and reduce their dental anxiety. A viable adjunct to local anaesthesia that is highly effective at reducing anxiety levels is intravenous (IV) sedation and/or general anaesthesia (GA) (Corah, 1988; Delfion, 1997; Dionne et al., 2001; Kramer et al., 2012; Pretty et al., 2011).

In order to facilitate the management and treatment of anxious patients, it is important for dentists to be able to assess their patients’ level of dental anxiety (Armfield, 2011; Coulthard et al., 2011; Dempster, 2007; Schuurs & Hoogstraten, 1993). It may be expected that dentists learn to assess patient anxiety during their dental education; however, a recent study of dentists in Ontario, Canada, reported dentists overestimated patients’ level of fear (Patodia, 2013).

Multiple studies have investigated dentists’ perceptions of patient dental anxiety and patients’ self-reports of their anxiety; however, no research has directly compared dentists’ perception of dental anxiety with their patients’ self-reported anxiety.

This paper presents Part 1 of the results of a larger study that surveys dentists and their patients to assess patients’ level of anxiety towards dental treatment concurrently with their preference for sedation and/or general anaesthesia (SGA) services. The focus of this Part 1 paper is to determine if dentists are able to accurately estimate the level of
anxiety in a sample of their respective patients and compare this to patients’ reports of their level of dental anxiety. This ability cannot be assumed, and is important to study since not all patients readily discuss their dental anxiety with their dentist and therefore may not appropriately receive SGA services. The province of Manitoba, Canada, was chosen as the site for this study for multiple reasons. These include: limited data on dental anxiety prevalence in this province, no dentists practicing there have completed a dental anaesthesiology residency, and Manitoba has been shown to have a great SGA service demand (CIHI, 2013; Chanpong et al., 2005; Schroth, Moore, & Brothwell, 2005).

The purpose of this study is to assess Manitoba dentists’ perception of their patients’ level of dental anxiety and their patients’ reported level of dental anxiety related to dental treatment.

4.3 Methods

4.3.1 Study Participants

All dentists (n=41) who were registered with the Manitoba Dental Association (MDA) to provide IV mild or moderate sedation or conscious sedation (CS) were contacted to participate in this study. These dentists had successfully graduated from a recognized dental anaesthesiology program, an oral maxillofacial surgery program, or had completed a course of study with a minimum of 20 hours of didactic instruction specific to intravenous conscious sedation and performed 20 supervised cases related to this level of sedation. Inclusion criteria for dentist participants were their registration to provide IV CS services in Manitoba and being a practicing dentist.

The patients involved in the study were self-selected from the dental practices of the participating dentists. Dentists in Manitoba are not permitted to provide IV sedation or general anaesthesia to patients under the age of 12 (MDA, 2009); therefore, inclusion criteria required participants to be adults (18 years of age or older) and capable of reading the questionnaire which was written at a Grade 6 level. Ethics approval was granted from the University of Toronto, Toronto, Ontario, Canada (Protocol # 29591).
4.3.2 Survey Questionnaire

Separate questionnaires were developed for dentist and patient participants (see Appendices B and C) to assess dentists’ perceptions of dental anxiety in their patients, patients’ reported dental anxiety, patient receipt and preference for SGA and dentist provision of SGA services. Demographic information included dentist age, gender, years in practice, sedation training, and type of dentist (specialist type or general dentist), and patient age, gender, level of education and dental insurance coverage. No personal identifying information was collected. Most questions were check-box style to facilitate ease of response and a few open-ended questions were provided to allow respondents to elaborate on specific questions or topics. Both questionnaires were pilot-tested with their respective respondent types to verify overall clarity, language, and design.

The definition used for IV CS, “Refers to medication delivered though the IV that gives you the feeling of being lightly asleep but able to be aroused by light touch or someone’s voice and having some memory of the procedure.” While the definition used for IV DS, “Refers to medication delivered through the IV which gives you the feeling of being deeply asleep, but able to be aroused by repeated touch or painful touch and having no memory of the procedure.” Finally the definition used for GA, “Refers to medication delivered through the IV, mask, or breathing tube and being totally asleep, but not able to be aroused awake, and having no memory of the procedure.”

Dental anxiety was assessed using the Index of Dental Anxiety and Fear (IDAF-4C) scale (Armfield, 2011) and the Dental Fear and Avoidance Scale (DFAS) (Dempster et al., 2011). The IDAF-4C questionnaire consists of eight questions each scored out of five. A cut-point of 3.0 or higher for the IDAF-4C identifies moderate/high anxiety. The DFAS asks patients to rate their level of fear and avoidance, each on a 10-point scale. The DFAS interprets a score of less than or equal to four as low fear or low avoidance, and five or higher as moderate/high fear or moderate/high avoidance (Dempster et al., 2011).

4.3.3 Data Collection
Eligible dentists were contacted via letter to request their participation in this study (see Appendix A - introductory letter and Appendix B - dentist survey). Their participation was confirmed two weeks later in a follow-up phone call, followed by a questionnaire to complete. Participating dentists gave permission for their patients to be surveyed (see Appendix C – patient survey). Surveys were provided to the participating dentists to leave in their offices for their patients to complete. This protocol allowed data collection of patients and dentists who have a direct clinical relationship, rather than an arbitrary pool of patients and dentist. Information regarding the study was posted in each participating dental office and adult patients were asked to participate in the survey when they presented for their dental appointment. Patients enclosed the completed survey in a sealed envelope and deposited it in a secure drop box that was regularly emptied by a research assistant. Patient surveys were collected over a five-month period.

Survey completion time was less than ten minutes, and it was clearly stated that completion (or non-completion) of the survey had no impact on patient treatment, nor was it compulsory to participate in or complete the survey. Dentists were not aware which patients did and did not participate in the study in order to avoid bias about which options they would present to the visiting patient.

Patient sample size (n) was calculated according to Dillman (2009) with an expected sampling error of 5%, with the presumption of choosing either one of two responses: yes or no. To meet this criterion, 384 surveys would need to be completed by patients.

4.3.4 Data Analysis

Each participating dentist was given a code and a research assistant generated a master list. Numbered blocks of patient surveys were distributed to each participating dental office with the corresponding “dentist” code added once the surveys were collected. Dentists were blind to the individual patients participating in the study, and investigators blinded to the dentists’ identities as the research assistant maintained and secured the master list. This coded list was discarded after all patient and dentist surveys
were returned and matched. This precaution also protected dentists’ anonymity, while allowing matching and analysis of dentist and patient responses.

Statistical analyses were undertaken using statistical package IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Questions were analyzed using descriptive statistics and analysis of variance measures (ANOVA) and t-tests between the two groups as appropriate to investigate differences.

4.4 Results

4.4.1 Demographics

Fifty-five dentists were registered to provide IV CS with the MDA, although 14 did not meet the inclusion criteria for the study (three had limited their practices to children, five no longer practiced at the said dental clinics, and six dentists did not actually provide IV CS and declined to participate in the study). This study was intended to be province-wide; however, the majority (95%) of dentists were located in Winnipeg, the largest city in Manitoba. Characteristics of responding dentists are reported in Table 4.1. The majority was male (76%), middle aged (mean [sd] 42.6 [15.7] years), who practiced general dentistry for 20 years (43% general dentists; years in practice: mean [sd] 19.8 [13.4] years). Dentists were equally split between receiving their SGA training through continuing education (CE), a general practice residency (GRP), or a formal specialty residency (SR). Slightly more than half provided SGA services themselves, while the rest had a medical anaesthesiologist do so (SGA provider: dentist 55.7%, medical anaesthesiologist 44.3%).

A total of 505 patients participated in the study (Table 4.2). The majority were middle-aged females and males (43.8% male, 56.2% female, age: mean [sd] 41.6 [17 years]), with dental insurance (dental insurance: 69.3% yes, 30.7% no), and the majority having some post-secondary education. Patient respondents were comparable to the 2006 Winnipeg, Manitoba, Census with the exception of being more highly educated.
Table 4.1  Dentists Demographic Data (n = 21)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>42.6</td>
<td>± 15.7</td>
</tr>
<tr>
<td>Years in practice</td>
<td>19.8</td>
<td>± 13.4</td>
</tr>
<tr>
<td>Male</td>
<td>76.0%</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>24.0%</td>
<td>-</td>
</tr>
<tr>
<td>General dentist</td>
<td>43.0%</td>
<td>-</td>
</tr>
<tr>
<td>OMFS</td>
<td>24.0%</td>
<td>-</td>
</tr>
<tr>
<td>Periodontist</td>
<td>33.0%</td>
<td>-</td>
</tr>
<tr>
<td>Level of training; DS</td>
<td>0.0%</td>
<td>-</td>
</tr>
<tr>
<td>Level of training; CE</td>
<td>33.0%</td>
<td>-</td>
</tr>
<tr>
<td>Level of training; GPR</td>
<td>33.0%</td>
<td>-</td>
</tr>
<tr>
<td>Level of training; SR</td>
<td>33.0%</td>
<td>-</td>
</tr>
<tr>
<td>SGA provider; MA</td>
<td>44.3%</td>
<td>-</td>
</tr>
<tr>
<td>SGA provider; Dentist</td>
<td>51.0%</td>
<td>-</td>
</tr>
</tbody>
</table>

OMFS = oral maxillofacial surgeon, DS = dental school, CE = continuing education, GPR = general practice residency, SR = specialized residency. MA = medical anaesthesiologist

Table 4.2  Patient Demographic Data (n = 505)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>2006 Winnipeg Census</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>41.6 sd ±17.0</td>
<td>38.7</td>
</tr>
<tr>
<td>Male</td>
<td>43.8%</td>
<td>48.0%</td>
</tr>
<tr>
<td>Female</td>
<td>56.2%</td>
<td>52.0%</td>
</tr>
<tr>
<td>Insurance (Yes)</td>
<td>69.3%</td>
<td>-</td>
</tr>
<tr>
<td>Insurance (No)</td>
<td>30.7%</td>
<td>-</td>
</tr>
<tr>
<td>Level of education; ES</td>
<td>5.1%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Level of education; HS</td>
<td>26.5%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Level of education; CC</td>
<td>28.5%</td>
<td>28.0%</td>
</tr>
<tr>
<td>Level of education; U</td>
<td>29.5%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Level of education; GS</td>
<td>6.3%</td>
<td>-</td>
</tr>
</tbody>
</table>

ES = elementary school, HS = high school, CC = community college, U = university, GS = graduate school
4.4.2 Dentists’ Perception and Patients’ Reports of Dental Anxiety

Dentist and patient estimates of dental anxiety were compared using the DFAS (Figure 4.1) and IDAF-4C (Figure 4.2). A Levine’s test indicated unequal variance was found for the DFAS-fear component ($F = 7.2, p = 0.01$), therefore a 2-tailed $t$-statistic not assuming homogeneity of variance was computed to compare DFAS scores from dentists and patients. Dentists were identified as significantly overestimating their patients’ fear, $t(24.1) = 3.0, p = 0.01$, when compared to patients’ self-reports of fear. Likewise, a Levine’s test indicated unequal variances ($F = 6.0, p = 0.01$) for the DFAS-avoidance component. Low levels of avoidance were reported by both dentists and patients, using a $t$ statistic not assuming homogeneity of variance $t (24.2) = 0.7, p = 0.5$, Sig (2-tailed).

Figure 4.1 Dentists’ and Patients’ Responses of Level of Dental Fear and Avoidance using the Dental Fear and Avoidance Scale (DFAS)

<table>
<thead>
<tr>
<th>DFAS scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fear</strong></td>
</tr>
<tr>
<td>Dentist</td>
</tr>
<tr>
<td>Patient</td>
</tr>
<tr>
<td><strong>Avoidance</strong></td>
</tr>
<tr>
<td>Dentist</td>
</tr>
<tr>
<td>Patient</td>
</tr>
</tbody>
</table>

*$p < 0.01$ Error bar represents one SE
Levine’s test was utilized because t-statistics presumes that variances of the population used are equal. A Levine’s test tests the null hypothesis that the population variances are equal and that the found differences in sample variances are unlikely to have occurred based on random sampling from a population of equal variances. Therefore, a Levine’s test was applied to determine homogeneity of variance between dentists and patients DFAS and IDAF-4C responses, and the homogeneity was found to be not equal as it was less than a significance level of 0.05. Thus, the null hypothesis of equal variances was rejected and it was determined that there is a difference between the dentists and patients variances (NIST/SEMATECH, 2015).

**Figure 4.2** Dentists’ and Patients’ Responses of Level of Dental Fear and Avoidance using the Index of Dental Anxiety and Fear (IDAF-4C)

<table>
<thead>
<tr>
<th>Level of Fear and Avoidance</th>
<th>IDAF-4C scale total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists: n = 21</td>
<td>Patients: n = 504</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.02

The IDAF-4C reported similar findings as the DFAS with a significant difference noted between dentists’ estimate of patient anxiety and patient reported anxiety, $t(24.3) = 2.5, p = 0.02$, Sig (2-tailed), (Figure 4.2). Levine’s test indicated unequal variances ($F = 6.9, p = 0.01$). Further, patients’ and dentists’ responded with high reliability and consistency as identified by Cronbach alpha ($\alpha = 0.9$). Both scales confirm that dentists appear to be overestimating their patients’ dental anxiety.
No significant differences existed regarding age, gender, level of education, and dental insurance status. These data were graphed to check for any non-linear relationships using a scatter plot diagram and none were evident.

Table 4.3 provides a comparison of dentist and patient reports of low and high dental anxiety based on the DFAS and IDAF-4C scales. The DFAS-Fear scale identified 41.8% (n = 211) of patient respondents with high fear and 33.7% (n = 170) with high avoidance, with dentists reporting their patients as having higher levels of high fear (71.4%) but lower levels of high avoidance (23.8%). The IDAF-4C indicated similar findings with 45.0% (n = 227) of patients reporting high anxiety and 66.7% of dentists reporting their patients as having high anxiety.

Table 4.3  Summary: Patient Reports and Dentist Perceptions of Low and High Dental Anxiety and Avoidance

<table>
<thead>
<tr>
<th>Scale</th>
<th>Patient Frequency Low (%)</th>
<th>Dentist Frequency Low (%)</th>
<th>Patient Frequency High (%)</th>
<th>Dentist Frequency High (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFAS-Fear</td>
<td>294 (58.2%)</td>
<td>6 (28.6%)</td>
<td>211 (41.8%)</td>
<td>15 (71.4%)</td>
</tr>
<tr>
<td>DFAS-Avoidance</td>
<td>335 (66.3%)</td>
<td>16 (76.2%)</td>
<td>170 (33.7%)</td>
<td>5 (23.8%)</td>
</tr>
<tr>
<td>IDAF-4C</td>
<td>278 (55.0%)</td>
<td>7 (33.3%)</td>
<td>227 (45.0%)</td>
<td>14 (66.7%)</td>
</tr>
</tbody>
</table>

4.4.3  Sedation or General Anaesthesia Usage Compared to Patient Dental Anxiety

When asked, 44.2% of patient respondents indicated they had previously received SGA. The main reason cited was ‘only for extractions,’ (56.8%), with 36.0% ‘depending on procedure,’ and 27.9% ‘only when recommended by the dentist’ (Figure 4.3). Further, almost all patients who had received SGA in the past reported high levels of dental anxiety on both scales.
Figure 4.3  Reasons why Patients Previously had SGA

![Bar chart showing reasons why 44.2% of patients had SGA (n = 222)]

- Only for extractions: 56.8%
- Depending procedure type: 36.0%
- Only when recommended: 27.9%
- Depending procedure length: 7.2%
- Every visit: 6.8%

Error Bar represents one SE

NB: Patients had the option to select as many reasons as possible

The remaining 54.1% (n = 272) of patient respondents had never undergone SGA services during dental procedures (Figure 4.4). Further, almost all patients who reported not receiving SGA for dental treatment were found to have low levels of dental anxiety.
4.5 Discussion

4.5.1 Demographics

The dentists who participated in this study are representative of the average dentist practicing in Canada, according to the most recent Health Personnel Trends in Canada 1995-2004 report (CIHI, 2006). Demographics include average age of the study dentists being 44 years, with a similar average age for Canadian dentists, with females being slightly younger than their male colleagues (38 and 47 years, respectively) (CIHI, 2006). In addition, females comprised 27% of dentists in the Canadian workforce (n = 2,001) (CIHI, 2006), which was similar to 24% of study dentists being female.

There was an over-representation of dental specialists in this study, as evidenced by the participation of five oral and maxillofacial surgeons (OMFS) and seven periodontists/periodontal residents compared to the total of 14 OMFS and 11
periodontists registered in Manitoba in 2004 (CIHI, 2006). OMFS frequently see patients for urgent and emergent care, such as teeth extraction due to extensive pain, or dental-related disease. Since this overrepresented group of specialist dentists was part of the surveyed dentists, it may be that more dentally anxious patients were included in the patient pool by virtue of their attending these dental offices for needed treatment. However, since the focus of this research was about patients’ dental anxiety and dentist perceptions of their patients’ dental anxiety, the emphasis was not on identifying a representative general population sample of patients with dental anxiety.

Patient respondents were comparable to the 2006 Winnipeg, Manitoba, Census (Table 4.2) with the exception that this study had fewer patients in the elementary education category and 6.3% patients had acquired a graduate level education, a category not present in the 2006 Winnipeg, Manitoba, Census. The Canadian Health Measures Survey provides the most recent available statistics regarding dental insurance. It reported 62% Manitoba adults as having dental insurance (CHMS, 2009) as compared to 69.3% of study respondents who reported having dental insurance. Furthermore, it is not known, from the patients who reported having dental insurance, whether their dental insurance was private or publicly funded.

4.5.2 Patient-Reported Dental Anxiety

Study patients reported higher than average levels of dental anxiety (Table 4.3) when compared to the previous Canadian findings (Chanpong et al., 2005; Dempster, 2007; Liddell & Locker, 1997; Locker et al., 1999, 1991, 1996a). This may be because participating dentists attracted more anxious patients than an average general practicing dentist because they had the ability to provide sedations services that could deal with their patients’ high anxiety and fear. The dental literature supports this statement as previous studies have shown that patients with fear and anxiety would prefer to have their dental treatment completed while simultaneously having SGA services (Abdulwahab et al., 2010; Baker et al., 2006; Boynes et al., 2006; Chanpong et al., 2005; de Carvalho et al., 2012; Delfion, 1997; Dionne et al., 1998; Goodwin & Pretty, 2011; Morgan & Skelly, 2005; Pretty et al., 2011; Quteish Taani, 2001; Wilson et al., 2006). Another reason to explain the reported high levels of anxiety and avoidance may be the nature of the
procedures performed by OMFS. Dental alveolar surgery (tooth extraction) is one of the most regularly conducted procedures that dentists perform. Moreover, OMFS made up one quarter of all participating dentists in our survey. The literature suggests that elevated high anxiety and fear exists for patients who seek the care of OMFS (Abdulwahab et al., 2010; Baker et al., 2006; Boynes et al., 2006; Chanpong et al., 2005; de Carvalho et al., 2012; Delfion, 1997; Dionne et al., 1998; Goodwin & Pretty, 2011; Morgan & Skelly, 2005; Pretty et al., 2011; Quteish Taani, 2001; Wilson et al., 2006). In addition, many of these patients want the pharmacologic benefits that SGA provides when undergoing tooth removal (Delfion, 1997; Yusa, Onizawa, Hori, & Takeda, 2004). Part 2 of this study, ‘Dental Related Sedation and General Anaesthesia in Manitoba, Canada’, provides a more detailed analysis of the need and demand for SGA services.

4.5.3 Dentists’ Perception of Patient Dental Anxiety and Avoidance

The current survey reports dentists as significantly overestimating their patients’ level of anxiety and avoidance for dental treatment. A 22.6% difference between patients and dentists was found for the DFAS (Figure 4.1) and a 14.8% difference for the IDAF-4C (Figure 4.2). Other findings that support the results found in this study were a survey of Ontario dentists who were asked to estimate patient dental anxiety (Patodia, 2013) and a national study that asked patients to report their level of dental anxiety (Chanpong et al., 2003). Patodia (2013) found Ontario dentists tended to overestimate anxiety and fear as compared to patient results reported by Chanpong et al. (2003) in the following categories: somewhat afraid (19.9% dentists vs. 9.8% patients); very afraid (10.6% dentists vs. 2% patients); and terrified (6% dentists vs. 3.5% patients). In addition, dentists also significantly overestimated patients’ responses regarding avoidance (13.9% versus 7.6%, respectively). However, these data were not collected concurrently, in that they were collected at two different time points (2003 and 2013), with dentist data from the province of Ontario and patient data from a national Canadian survey.

The literature suggests that dentists cannot reliably recognize dental anxiety using
clinical impressions alone (Corah, 1968; Humphris et al., 1995; Patodia, 2013). Coulthard et al. (2011) suggests the use of validated questionnaires to assist dentists’ in identifying patients with moderate to high levels of dental anxiety. They developed the Indicator of Sedation Need (IOSN) as a tool to assess patients for dental sedation based upon their anxiety, treatment complexity, and medical indicators, because of the need to improve dentists’ accuracy in assessing patient anxiety. Treatment complexity was identified as a key component of the IOSN in determining which patients would benefit from sedation. Their research considers it important to evaluate treatment complexity in order to individualize patient care. In addition, dentists should discuss patients’ fears, anxiety, or concerns regarding dental care in order to help identify those patients who may be dentally anxious. Multiple assessment methods will improve assessment of patient anxiety instead of relying solely on dentists’ perception of their patients’ level of anxiety.

4.5.4 Level of Dental Anxiety and SGA Services

Patients who received SGA in the past reported high levels of dental anxiety, with low levels of anxiety reported by patients who had not received SGA. Prevalence of dental anxiety was higher in patients participating in this study than reported in general dental practices (Chanpong et al., 2005; Dempster, 2007). This would suggest that a higher percentage of patients would have reported receiving SGA. However, less than half of patients surveyed (44.2%) had had SGA before, with the majority (56.8%) having SGA for extractions (Figure 4.3). Of the 54.1% of patients who had never had SGA before, the majority (65.1%) had never been offered SGA services (Figure 4.4).

4.5.5 Contributing Factors to Patient Anxiety

No statistical difference was reported for age, gender, level of education, or dental insurance, which differs from previous research findings. Past literature reports that as a person ages their worries and fears related to dental care can vary widely. Studies reported an increase of anxiety with age (Milgrom et al., 1988), no change with age (Doerr et al., 1998), and a decrease with age, which is the more common and well supported trend (Chanpong et al., 2005; Stouthard & Hoogstraten, 1990). Concerning gender, the literature indicates females report dental anxiety more so than men.
However, Locker et al. (1991) found no significant difference between male and female reports of dental anxiety. Those with dental insurance seek dental services more frequently and as a consequence have superior oral health (Locker & Quiñonez, 2011; Millar & Locker, 1999; Sohn & Ismail, 2005). This is particularly true for Canadian residents who were identified as living in the lowest income households (Millar & Locker, 1999). Finally, when comparing anxiety to level of education, the research reports that as level of education increases, level of dental anxiety decreases (Milgrom et al., 2010; Moore, Birn, Kirkegaard, Brødsgaard, & Scheutz, 1993; Ragnarsson, 1998).

Results of this study may differ from earlier research, because this study focused on a select cohort of dentists who provide SGA services and therefore may attract a different patient cohort to their practices. Consequently, mean patient responses that past studies focused on did not necessarily correspond to this more anxious patient group that attended these specialized dental offices.

This study supports previous research in which invasive procedures are commonly recognized as a main source for dental related anxiety and as the rationale for SGA services. Oosterink, de Jongh, & Aartman, (2008) utilized a questionnaire with 67 potentially anxiety-provoking stimuli (n = 910) and reported surgical procedures (invasive stimuli) were rated the most anxiety provoking. Chanpong et al. (2005) reported that as invasiveness increased, so did patient demand for SGA and patient anxiety, with increased preference for root canal therapy and gum surgery than for extractions.

### 4.6 Conclusion

This is the first study to evaluate dentists’ perceptions of their patients’ anxiety with their patients reported dental anxiety and corresponding preference for SGA. Findings reported dentists’ as significantly overestimating patients’ anxiety and avoidance as compared to patient reported anxiety and avoidance. This cohort of patients
had higher than previously reported levels of dental anxiety than found in other Canadian-based studies; but that is not unexpected in dental practices that offer SGA. Less than half of patients surveyed (44.2%) had had SGA before, with the majority of these (78%) reporting high dental anxiety and avoidance. Of the 54.1% of patients reporting never having had SGA before, the majority (65.1%) had never been offered SGA services, with 93.8% reporting low anxiety and avoidance. Use of validated dental anxiety scales can aid dentists in identifying their patients’ anxiety levels and potentially improve patient care by utilizing SGA services.
5.0 Manuscript II: Dental-Related Sedation and General Anaesthesia Services in Manitoba, Canada

5.1 Abstract

**Background:** Patients report a desire to have dental treatments using sedation and/or general anaesthesia (SGA) services. However, limited data exists regarding patients’ preferences for SGA services, and dentists’ provision of SGA services for dental treatment.

**Objective:** To assess Manitoba dentists’ perception of patient need and demand for SGA and their patients’ reported preference for SGA services.

**Methods:** The same methodology as the first part of this study is utilized in this report. A paper-based survey was distributed to Manitoba dentists registered to provide intravenous sedation and a sample of their patients to investigate patients’ preference for SGA services. Descriptive and inferential analyses were performed.

**Results:** Twenty-one dentists (53% response) and 505 patients responded. Dentists’ significantly underestimated patient interest for SGA services, \( p < 0.01 \). As interest in SGA increased so did patients’ reported dental anxiety. Cost and lack of dental insurance were the primary reasons patients did not undergo SGA. Patients preferred more SGA services than they received. Increased preference ranged from 2.5 to 11.1-fold for procedures surveyed. Patients found intravenous (IV) conscious sedation (CS) and deep sedation (DS)/general anaesthesia (GA) to be very effective modalities at alleviating their discomfort (89.4% and 98.2% respectively).

**Conclusion:** Dentists’ underestimated patient demand for SGA services. Dentally anxious patients had greater interest in SGA although were not necessarily offered it.
Cost was a fact in patients not wanting SGA although the majority found it effective and helpful in making dental treatment comfortable.

5.2 Introduction

Patients with dental anxiety often seek out additional pharmacological interventions to supplement local anaesthesia in order to make dental treatment more comfortable and to reduce their dental anxiety. A viable adjunct to local anaesthesia that is highly effective at reducing anxiety levels is intravenous (IV) sedation and/or general anaesthesia (SGA) (Corah, 1988; Delfion, 1997; Dionne et al., 2001; Kramer et al., 2012; Pretty et al., 2011; Yusa et al., 2004). A preference for sedation and general anaesthesia (SGA) services for various dental procedures is frequently reported by patients who are dentally anxious as these patients seek out sedation services more than non-anxious patients (Allen & Girdler, 2005; Baker et al., 2006; Goodwin et al., 2012). Nevertheless, dentists tend to underestimate their patients’ desires for methods to reduce their anxiety when seeking dental care (Baron et al., 1990; Hunt et al., 2011).

Dentists can take additional training beyond their undergraduate dental education in order to be able to offer a variety of sedation services. They do so because SGA training is not acquired during most dentists’ formal training (Boynes et al., 2006; Hill, Hainsworth, Burke, & Fairbrother, 2008; Morgan & Skelly, 2005). While the numbers of dentists undertaking such training can be quantified, information concerning the practice of sedation services, such as frequency, for what specific treatments, and type of sedation provided, is not readily available.

With respect to dentists’ provision of SGA services, a 2003 survey of sedation education among dentist graduates in the United States found that 93.7% of respondents recognized a need from their patient population for sedation services (Boynes et al., 2006). Need and demand for SGA was also reported in a United Kingdom mail questionnaire of 179 consultant restorative dentists, with 95% indicating restorative treatment should be provided under sedation. However, despite this claim, only one-
third of respondents actually provided sedation for their patients (Morgan & Skelly, 2005).

Patient preference for SGA services has been previously reported. A 1995 Gallup telephone survey reported 65% of American adults (n = 1,008) preferred an anaesthetic option that would allow them to be conscious but pain-free, and 56% expressed a preference for anaesthesia-induced amnesia (Delfion, 1997). Another American telephone survey (n = 400) identified 18.1% of adults indicating they would visit a dentist more often if given medication to decrease their nervousness, with a further 8.6% stating they would prefer to have their dental treatment done with SGA services if available (Dionne et al., 1998). A recent study in England evaluated the Indicator of Sedation Need (IOSN) sedation-screening tool. It found that the total need for sedation was 5%, with females being 3.5 times more likely to be placed in the high need group than males (Pretty et al., 2011). This study did not account for patients who were fearful and did not visit their dentist; however, when these non-attendees were taken into account, the need for sedation was estimated to be 6.9% (Goodwin & Pretty et al., 2011). A survey of patients receiving emergency dental care in the United Kingdom found 56% preferred their dental treatment be done under sedation (Baker et al., 2006). A study by Chanpong et al. (2005) using a Canadian telephone survey, found that 11.4% of respondents with no/low fear and 31.1% of those with high fear, were definitely interested in SGA. However, they also noted that when these adult patients were combined with those who may be interested in this service “depending on the cost”, over half of the adult population reported interested in the no/low fear group with greater than 85% interest in the high fear group.

To date, no study exists that directly compares patients’ need and demand for anaesthesia services with dentists’ perception of the sedation services requested by their patients concurrently. The literature suggests that factors related to SGA provision include high cost to the dentists and patients, lack of insurance coverage by patients, and dentists not offering SGA to patients (Goodwin & Pretty et al., 2011). Dentists may recognize the benefit of these services, but they but do not routinely provide them (Boyle et al., 2009; Boynes et al., 2006; Moore & Brødsgaard, 2001; Ryding & Murphy, 2007).
The results of such research would be of interest to the dental profession in order to ensure patient needs are being met. The purpose of this manuscript is to assess Manitoba dentists’ perception of their patients’ need and demand for sedation and general anaesthesia and their patients’ reported preference for SGA services.

5.3 Methods

The methods undertaken to complete this survey questionnaire were discussed in Part 1: Assessing Patients’ Dental Anxiety in Manitoba Canada. A summary is presented below.

5.3.1 Study Participants

Forty-one dentists registered with the Manitoba Dental Association as IV conscious sedation (CS) providers were contacted to participate in this study. Further, a sample of adult patients from each of these dental practices was self-selected to participate in this study. Ethics approval was granted from the University of Toronto, Toronto, Ontario, Canada (Protocol # 29591).

5.3.2 Survey Questionnaire

Separate questionnaires were developed to assess patient receipt and preference for SGA and dentist provision of SGA services. Definitions and clinical examples regarding sedation and/or general anaesthesia (SGA) services were provided to aid respondents in answering the survey questions. No personal information was collected. Both questionnaires were pilot-tested with their respective respondent types to verify overall clarity, language, and design.

The definition used for IV CS, “Refers to medication delivered though the IV that gives you the feeling of being lightly asleep but able to be aroused by light touch or someone’s voice and having some memory of the procedure.” While the definition used for IV DS, “Refers to medication delivered through the IV which gives you the feeling of
being deeply asleep, but able to be aroused by repeated touch or painful touch and having no memory of the procedure.” Finally the definition used for GA, “Refers to medication delivered through the IV, mask, or breathing tube and being totally asleep, but not able to be aroused awake, and having no memory of the procedure.”

5.3.3 Data Collection

Surveys were provided to the participating dentists to leave in their offices for their patients to complete. Thus, a direct clinical relationship, rather than an arbitrary pool of patients and dentists were surveyed. Survey completion time was less than ten minutes, and it was clearly stated that completion (or non-completion) of the survey had no impact on patient treatment, nor was it compulsory to participate or complete the survey. Dentists were not aware which patients did and did not participate in the study in order to avoid bias about which options they would present to the visiting patient.

Sample size (n) was calculated according to Dillman (2009) with an expected sampling error of 5%, with the presumption of choosing either one of two responses: yes or no. The estimated number of patients needed participate in this study was (n = 384)

5.3.4 Data Analysis

Statistical analysis compared responses of individual dentists to their patient population using SPSS version 22.0. Questions were analyzed using descriptive statistics and t-tests between the two groups as appropriate to investigate differences between the groups.

5.4 Results

A total of 21 dentists (53% response rate) and 505 patients completed the survey questionnaire. Demographic data for participating dentists and patients are
discussed in Part 1: Assessing Patients’ Dental Anxiety in Manitoba Canada.

5.4.1 Interest in Sedation and General Anaesthesia

A significant difference in patient interest and dentists’ perceived patient interest in SGA is reported in Figure 5.1. This difference was noted for the three levels of interest asked about. More specifically, dentists indicated that 55.9% of patients were “not interested” in SGA compared to patient responses of 31.1%, t(26.44) = 4.72, 𝑝 = 0.01, Sig (2-tailed). Patients reported being “possibly interested in SGA depending on cost” more often than dentists perceived; 19.6% versus 33%, t(12.3) = 3.1, 𝑝 = 0.01, Sig (2-tailed). Finally, 37.7% of patients reported being “definitely interested in SGA” as compared to dentists who thought only 24.5% of their patients were definitely interested in SGA services, t(13.6) = 4.7, 𝑝 = 0.01, Sig (2-tailed).
In addition, SGA interest was analyzed based on patient reported anxiety and avoidance scores using the Dental Fear and Avoidance Scale (DFAS) and the Index of Dental Anxiety and Fear (IDAF-4C) scales (Figure 5.2). Results indicate that patients’ interest for SGA was higher in patients with higher levels of dental anxiety. More specifically, patients with “definite interest” for SGA services (n=193) had roughly a two-fold increase in anxiety and avoidance responses compared to patients with “no interest.”
Figure 5.2  Patients’ SGA Interest Compared to Their Anxiety and Avoidance Scores

Reasons why patients were not interested in SGA were asked along with dentists’ perceptions of patient reasons (Figure 5.3). The most cited reasons for disinterest for SGA services were reported by both dentists and patients as being the cost of SGA services, no dental insurance, absence of perceived need for SGA services, lack of interest in SGA, anxiety towards SGA, and long wait times before being able to undergo SGA services. For each of these reasons, dentists consistently overestimated their patients’ perception of why they would not be interested in SGA services as compared to what patients reported.
Figure 5.3  Patients’ Reasons and Dentists’ Perceived Patient Reasons for Not Having SGA Services

![Bar chart showing patients' and dentists' reasons for not having SGA services.](image)

5.4.2 Preference for Sedation or General Anaesthesia

Dentists closely matched the needs of their patients on a procedure-specific basis when providing intravenous (IV) conscious sedation (Figure 5.4). Findings indicate tooth extraction as the primary dental procedure for which SGA services are preferred. A very similar trend was reported regarding IV deep sedation and/or general anaesthesia (DS/GA).
Patients’ Preference and Dentists’ Perceived Patient Preference for IV CS

Preference for IV CS

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Dentist</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>11.6</td>
<td>15.8</td>
</tr>
<tr>
<td>Filling</td>
<td>17.3</td>
<td>20.6</td>
</tr>
<tr>
<td>Crown and Bridge</td>
<td>22.7</td>
<td>24.8</td>
</tr>
<tr>
<td>RCT</td>
<td>30.0</td>
<td>38.4</td>
</tr>
<tr>
<td>Perio</td>
<td>35.0</td>
<td>35.8</td>
</tr>
<tr>
<td>Implant</td>
<td>28.3</td>
<td>35.5</td>
</tr>
<tr>
<td>Extraction</td>
<td>49.0</td>
<td>56.2</td>
</tr>
</tbody>
</table>

Error Bar represents one SE

RCT= root canal therapy, Perio= periodontal/ gum surgery

Patients’ (n = 222) preferences for IV CS for specific procedures were compared to procedures for which the same patient had previously received IV CS (Figure 5.5). A significant preference for IV CS existed for all procedures. Differences between what patients preferred versus what they actually received were: cleaning 4.0-fold, filling 2.5-fold, crown and bridge 4.8-fold, root canal therapy 5.1-fold, periodontal surgery 6.1-fold, extractions 2.6-fold, and implant surgery 11.1-fold differences. Extractions are the procedure for which IV CS is most commonly performed (22%); however, 56.2% would have preferred IV CS but did not receive it. Overall, the findings demonstrate that patients desire more IV CS services for all procedures as compared to what they actually received, especially for the more invasive procedures, such as root canal therapy, periodontal surgery, implants and tooth extractions. Similar findings were also reported
when patients were asked about DS/GA, with differences between patient preference and what they received being: cleaning 2.3-fold, filling 1.4-fold, crown and bridge 3.2-fold, root canal therapy 5.3-fold, periodontal surgery 10.8-fold, extractions 2.5-fold, and implant surgery 9.8-fold differences.

Figure 5.5  Patients’ Preference for IV CS Compared to What They Reported Receiving IV CS for by Procedure

5.4.3 Effectiveness of Sedation and General Anaesthesia

Patients reported IV conscious sedation (CS) to be 89.4% effective, with 98.2% of patients reporting deep sedation or general anaesthesia (DS/GA) being effective (Figure 5.6).
5.5 Discussion

5.5.1 Interest for Sedation and General Anaesthesia Services

Dentists significantly underestimated the interest their patients have in SGA services for the three categories that were surveyed: “not interested” (55.9% dentists vs. 31.1% patients), “possibly interested depending on cost” (19.6% dentists vs. 33% patients), and for “definitely interested” (34.5% dentists vs. 37.7%, respectively) (Figure 5.1). Previous research suggests patient interest for SGA varies greatly with a range of 6.9% to 65.0% (Abdulwahab et al., 2010; Baker et al., 2006; Boynes et al., 2006; Chanpong et al., 2005; Delfion, 1997; Dionne et al., 1998; Pretty et al., 2011; Taani, 2001). Moreover, multiple studies have shown that more than 50% of patients want a pharmacologic effect that would prevent them from remembering their surgery (Foley, 2002; David Locker & Quiñonez, 2011; Ng & Leung, 2008; Pretty et al., 2011; Vermaire et al., 2008). Furthermore, two studies reported dentists as recognizing the need for SGA services in more than 90% of their patients (Boynes et al., 2006; Morgan & Skelly,
2005); however, the latter study only shows one-third actually providing sedation for their patients.

Patients’ interest in SGA increased with higher levels of patient anxiety and avoidance (Figure 5.2), with an approximate two-fold increase in interest for SGA services observed between those with low anxiety and high anxiety.

Dentists’ perceived patient interest in SGA for specific procedures correlated well with the needs and demands of their patients, although dentists’ still slightly underestimated patients’ needs and demands in general. This was evident for both IV CS (Figure 5.4) and IV DS and/or GA levels of SGA. Further, as the procedures became more invasive, the perceived need and demand for SGA services increased. This was especially true for extractions and perceived need for DS and/or GA as patients self-reported a 69.9% need and demand whereas dentists reported that they felt 80% of their patients expressed need or demanded SGA for this procedure. Also, more patient respondents (n = 156) identified they had interest in SGA services for specific procedures (Figure 5.1) compared to those patients’ who identified that they were interested in SGA services in general (Figure 5.4).

Dentists appear good at matching the needs and demands of their patients for specific treatments, but significantly underestimate their patients’ general interest for SGA services. This may be because when dentists were answering the survey questions, they were considering their patients globally or as a whole, rather than based on specific conditions. This phenomenon was also reported in a survey of adults about their estimated alcohol consumption (Russell, Welte, & Barnes, 1991). Frequency and mean number of drinks consumed increased by 23% when asked this question using specific alcohol consumption questions compared to a closed-ended question (Russell et al., 1991). The global question asked about the quantity and frequency of any alcoholic beverages consumed per day, whereas the specific question repeated the question but it specified beer, wine, or liquor. Similar to this survey when patients were asked if they would prefer SGA for individual procedures (the specific question), as opposed to being asked about SGA interest in general (the general question). It is possible that by allowing
the respondent the opportunity to answer the question with less ambiguity they can better focus on their thoughts regarding their individual dental care and potentially needed SGA services.

The cost of anaesthesia may also be a factor in patient interest in SGA. It was not noted when asking about SGA interest for specific procedures, but mentioned when asking about SGA interest in general; therefore, it may have factored into patients’ preferences when asked about SGA in general but not for specific procedures. It is unknown what impact the issue of cost has on preference for SGA; although cost and insurance benefits were two of the main reasons this patient population indicated that they do not undergo SGA services (Figure 5.3).

In summary, dentists who are providers of SGA services appear to perceive their patient’s preferences for SGA services regarding specific procedures but not in general. As patient anxiety increases so too does their interest for SGA services. It was identified that patients preferred SGA services for specific procedure such as tooth extraction and root canal. However, dentists were less accurate when patient interest in SGA was estimated in general terms versus for specific procedures, suggesting that a knowledge and/or diagnostic gap may exist. Both the specific and general interest questions related to patient preference for SGA supported that dentists underestimate SGA interest overall. The findings of this study support the finding that dentists do not accurately identify general patient need with respect to providing SGA services, but do appear to identify need based on individual procedures.

5.5.2 Preference for Sedation and General Anaesthesia

Patient respondents demanded more SGA services for all dental services that were surveyed, but particularly for the more invasive procedures (Figure 5.5) Dental implants and periodontal surgery were found to be the two procedures with the greatest need and demand, with an 11.1-fold and 6.1-fold times patient increase respectively for IV CS and an 9.8-fold and 11.0-fold patient increase for IV DS and/or GA. However, even the less
invasive procedures such as a cleaning and fillings showed increased need and demand (4.0-fold and 2.5-fold increase, respectively). These findings are similar to previous research in this field (Chanpong et al., 2005). This suggests that patients clearly desire SGA services, even though they are not routinely offered them as an option during their dental treatment.

5.6 Conclusion

This is the first study to evaluate dentists’ perceptions of their patients’ general interest in SGA, and interest based on specific dental procedures, compared to patients corresponding preference for SGA concurrently. Findings indicate that dentists’ underestimated patient general need and demand for SGA services, but were more aligned with patients’ preference for SGA based on specific procedures. Dentally anxious patients’ had greater interest in SGA service, but were not necessarily offered SGA because of their anxiety; however, even without considering patient anxiety levels, dentists tended to underestimate patient preference for SGA. Cost was identified as a factor by patients in not having SGA services. The majority of patients reported IV CS and DS/GA as highly effective; yet the financial cost associated with receiving SGA may be a consideration in whether patients decide to have SGA services with dental treatment.
Chapter 6

6.0 Discussion

6.1 Patient Interest in Sedation

Dental anxiety is one of the primary reasons patients avoid seeing their dentist and for which they request SGA services (Armfield et al., 2006; Chanpong et al., 2005; Coulthard et al., 2011; Dempster, 2007; Smith & Heaton, 2003). Thus, the inquiry into patients’ reported dental anxiety and dentists’ perceived patient dental anxiety allows for a direct comparison to evaluate how accurately and precisely dentists assess their patients’ dental anxiety, and in turn may appropriately determine if certain patients could benefit from sedation and/or general anaesthesia (SGA) services.

The dentists surveyed in this two-part study were registered providers of IV CS and had undergone additional training to be able to deliver this service. Part of that training involves learning why patients require SGA. Therefore, these dentists should be aware of patients presenting with anxiety surrounding their dental care. This was not found to be true as dentists significantly overestimated their patients’ dental anxiety levels when evaluated with two validated anxiety scales, the DFAS and IDAF-4C.

While dentists significantly overestimated dental anxiety in their patients, they significantly underestimated patients’ general interest in SGA. For example, dentists were 35% less inclined than their patients to presume they were ‘definitely interested’ in SGA. In addition, patients who were ‘definitely interested’ in SGA were found to have high dental anxiety, which would make them more likely to want SGA services. Dentists were better able to match their patients’ preference for IV CS or DS and/or GA when asked about specific procedures. Nonetheless, analysis revealed that patients wanted SGA services more frequently than dentists perceived them to need and/or demand. Therefore, this study supports the finding that dentists do not accurately perceive individual patient need, although they can estimate which individual procedures are associated with a patient preference for SGA services. This suggests that dentists are likely not meeting the needs and demands of their patients in terms of SGA services as related to dental anxiety.
6.2 Patients' Preference Compared to their Anxiety Results

Patients’ self-reported anxiety responses were compared to their procedure-specific preference for SGA services. It is noteworthy that for both IV CS and DS/GA, as the procedures increased in invasiveness, patients’ anxiety levels decreased (Figure 7.5 and Figure 7.6). The postulated rationale for these findings is complex. First, the more invasive procedures tend to be completed with SGA services more often. Thus, patients know that if and when these procedures are to be undergone, there is a safe and effective way to manage their worries and discomfort. However, as a result of not having SGA for the less invasive procedures, patients may have a greater opportunity to develop added anxiety surrounding these less involved treatments. Second, patients may be potentially more anxious because these procedures that are perceived by dentists as less invasive, are actually experienced as quite invasive by patients. For example, cleaning teeth around inflamed gingiva, which is a common treatment need, can be painful. In some circumstances, the presenting patient may need to have an injection of local anaesthesia to reduce pain in the treatment area, with the administration of local anaesthesia being itself a painful and anxiety-provoking procedure. Even fillings can take considerable time to complete, require multiple local anaesthetic injections, and may cause significant post-operative discomfort. Third and finally, the procedures that are classically thought of as being less invasive are performed with a much higher frequency than those, which are more invasive. Consequently, patients may be more likely to associate anxious feelings with these more common but potentially more painful procedures. Dentists can provide SGA services for these patients; however, they did not do so.

It has been shown that dentists may rely on interpersonal skills to strengthen the dentist-patient relationship and compensate for patient anxiety and worry for these more simple treatments, rather than offering SGA services (Armfield & Heaton, 2013; Kleinknecht et al., 1984; Milgrom, 1986). Therefore, dentists who recognize anxiety in their patients may be over-estimating the patient preference for good chair-side manner to alleviate anxiety, rather than the pharmacological option of sedation for common procedures. As a result, patients’ may have higher anxiety with less invasive procedures because they have a history of frequent negative experiences, which would account for
our findings.

6.3 Overall Study Strengths and Limitations

Strengths of this study included our survey method of simultaneously questioning dentists’ and their respective patients’ perceptions of SGA services. No study to date has done this. This method allowed for direct comparisons regarding dentist and patient perceptions of dental-related anxiety, avoidance, and interest in SGA services.

Twenty-one dentists (53% response rate), and 505 patients participated in the study. This exceeds previous dental- and medical-related surveys in the province of Manitoba, which have reported approximately 50% response rates (Brothwell & Gelskey, 2008; Milnes, Tate, & Perillo, 1995; Sisler, Brown, & Stewart, 2004). Further, the sample size (n) calculation for patient respondents assumed a sampling error of 5%, which identified a sample size of 384 patients. The study patient sample exceeded this with a response rate of 505 patients.

A limitation of this study is potential response bias. Patients who rarely visit the dentist because of anxiety are less likely to be surveyed through a convenience sample conducted at dentists’ offices. It is agreed that dentally anxious patients often avoid dental treatment (Delfion, 1997), and therefore there is a question as to how representative patients attending dental offices are in terms of their levels of dental anxiety. However, many patients seek out dentists who provide sedation because these services help alleviate dental anxiety by making dental treatment more comfortable and less anxiety provoking. For this reason, dentists who provide sedation services may in fact have a larger number of patients who are dentally anxious than the average general dental practice.

The dentists being surveyed included an over-representation of the province’s oral maxillofacial surgeons, who are also certified to provide sedation services. These dentists frequently see patients for urgent and emergency care, such as teeth extracted due to extensive pain or disease. Since this group of specialist dentists was part of the
surveyed dentists, it may be that more dentally anxious patients were included in the patient pool by virtue of their attending these dental offices for needed treatment. However, the focus of this research was about patients’ dental anxiety and dentists’ perceptions of their patients’ dental anxiety; therefore, the emphasis on identifying a representative general population sample of patients with dental anxiety is of less importance than our ability to directly compare dentist and patient responses.

In our study, data analysis was conducted with responses pooled across all the dentists and patients. We did not match dentists’ responses to individual patients’ responses regarding their corresponding dentist; therefore, no comparison could be made between individual dentists and patients. Furthermore, while we asked dentists to consider their patients in general, dentists could have had their most or least anxious patient on their mind when responding to this questionnaire. However, we believe our results provide a concurrent sampling between dentists and patients, which is an improvement over non-concurrent samples. In addition, patients were from a similar geographic area.

6.4 Future Research Directions

This current study focused solely on adults. However, a recent report from CIHI (2013) reported that children with early childhood caries constitute the largest number of general anaesthetics performed at outpatient hospitals throughout Canada. Children from less affluent neighborhoods, of aboriginal decent, and from rural areas are at greatest risk for day surgery to restore their oral health (CIHI, 2013). Therefore, a study that similarly surveys dentists and non-adult patients at the same time would be beneficial in determining how this patient cohort’s needs and demands are addressed in relation to SGA services.

Further, more studies are needed to investigate the prevalence of dental anxiety from patients who attend non IV CS-registered dental practices. This would be of interest as it is possible the patients surveyed in this study had inflated dental anxiety because their dentists were IV CS-providers.
6.5 Conclusion

This study was unique in that it reported perceptions from dentists and patients concurrently. It reported dentists to perceive patients to have higher dental anxiety than patients reported. Dental anxiety is a key determinant of who should receive and would benefit from the known and proven anxiety-alleviating effects of SGA. Further, it identified dentists as underestimating patient preference for SGA as compared to patients’ reported preference. Patients reported a desire to receive SGA services more so than they previously had, been offered, and for a wider variety of dental treatments. This was specifically true for invasive procedures, such as tooth extractions. Patient knowledge about SGA services appears to be lacking and greater patient education regarding SGA services is needed. Finally, both dentists and patients could benefit from the use of a validated anxiety and/or sedation assessment scale/tool to best determine patients’ anxiety levels with the hope of achieving optimal patient treatment planning and care.

Studying the issue of dentists’ perception of and patient beliefs about their dental anxiety and patients’ need and demand for sedation is important in understanding the current need for dental sedation and/or general anaesthesia services in Manitoba, and potentially other provinces in Canada.

Similarities found in this study as compared to previous dental research are as follows:

- Dentists overestimate dental anxiety and underestimate the need and demand for SGA services.
- Patients are demanding SGA services more frequently when they undergo a wide variety of dental treatment, not just tooth extractions.
- IV CS and DS and/or GA are capable of providing patients with a comfortable environment to have their dental treatment completed.
- Financial constraints of patients are of primary concern for patients to not go through with SGA services.
Differences found in this study as compared to previous dental research are as follows:

- Patients and dentists reported higher patient dental anxiety than previously found in Canada.
- No significant relationship was found between dental anxiety as compared to age, gender, patients’ dental insurance, and level of education.

This study improves our understanding of dentist and patient interest in, and preference for SGA in the province of Manitoba. However, it goes further to further our understanding of and future research needed in dental anxiety and avoidance and SGA services nationwide. These findings will help to guide patient-centered care for patients.
Chapter 7

7.0 Additional Figures

The figures below were not included in either of the above manuscripts. However, they do display data that was collected and analyzed and provide further insight into the findings of this study.

**Figure 7.1** Patients’ Preference and Dentists’ Perceived Patient Preference for IV DS/GA

![Bar chart showing preference for IV DS/GA](image)

RCT = root canal therapy, Perio = periodontal/gum surgery, Implant = implant surgery

Patients were asked the procedures for which they would prefer IV DS/GA, and dentists were asked the procedures for which their patients would prefer IV DS/GA. The results indicated that dentists matched the needs of their patients on a procedure-specific level relatively closely (Figure 7.1).
Patients’ preference for IV DS/GA Compared to What They Reported Receiving IV DS/GA for by Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Receive</th>
<th>Prefer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>4.6</td>
<td>10.5</td>
</tr>
<tr>
<td>Filling</td>
<td>10.5</td>
<td>14.9</td>
</tr>
<tr>
<td>Crown and Bridge</td>
<td>6.1</td>
<td>8.3</td>
</tr>
<tr>
<td>RCT</td>
<td>8.3</td>
<td>43.6</td>
</tr>
<tr>
<td>Perio</td>
<td>4.6</td>
<td>49.5</td>
</tr>
<tr>
<td>Extraction</td>
<td>32.7</td>
<td>80.0</td>
</tr>
<tr>
<td>Implant</td>
<td>5.5</td>
<td>53.9</td>
</tr>
</tbody>
</table>

Error Bar represents one SE

RCT= root canal therapy, Perio= periodontal/ gum surgery, Implant= implant surgery

Patients’ (n=222) preferences for IV DS/GA services as they related to specific procedures were compared to procedures for which they had previously received IV DS/GA. An increase for IV DS/GA services existed for all procedures regarding the findings for IV DS (Figure 7.2). These increases were: cleaning 2.3-fold, filling 1.4-fold, crown and bridge 3.2-fold, root canal therapy 5.3-fold, periodontal surgery 10.8-fold, extractions 2.5-fold, and implant surgery 9.8-fold.
Patients who previously had SGA services for specific dental treatments were compared to their anxiety and avoidance responses. Almost all of patients reported high anxiety and avoidance based on the cut-points.

DFAS: $\geq 5 =$ dentally anxious
IDAF-4C: $\geq 3 =$ dentally anxious
Patients who have not received SGA before and their reasons why not compared to anxiety and avoidance scores

<table>
<thead>
<tr>
<th></th>
<th>DFAS Fear</th>
<th>DFAS Avoid</th>
<th>IDAF-4C+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never had</td>
<td>3.7</td>
<td>3.9</td>
<td>2.1</td>
</tr>
<tr>
<td>(n = 273)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not offered</td>
<td>3.9</td>
<td>3.6</td>
<td>2.2</td>
</tr>
<tr>
<td>(n = 182)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not thought of</td>
<td>4</td>
<td>3.6</td>
<td>2.3</td>
</tr>
<tr>
<td>(n = 72)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Declined</td>
<td>3.1</td>
<td>2.5</td>
<td>1.9</td>
</tr>
<tr>
<td>(n = 12)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DFAS: ≥5 = dentally anxious
IDAF-4C: ≥3 = dentally anxious

Patients who had not previously had SGA services for specific dental treatments were compared to their anxiety and avoidance responses. Almost all of patients reported low anxiety and avoidance based on the scale cut-points.
Patients’ preferences for SGA services for specific procedures were compared to their anxiety and avoidance results (Figure 7.5 and Figure 7.6). It is noteworthy that for both levels of sedation as the procedures increased in invasiveness, patients’ anxiety levels decreased.
Figure 7.6 Patients’ Preference for IV DS/ GA Based on Their Dental Anxiety and Avoidance Scores

<table>
<thead>
<tr>
<th>Procedure</th>
<th>DFAS Fear</th>
<th>DFAS Avoid</th>
<th>IDAF-4C+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning (n = 53)</td>
<td>6.6</td>
<td>6.1</td>
<td>3.43</td>
</tr>
<tr>
<td>Filling (n = 75)</td>
<td>6.4</td>
<td>5.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Crown and Bridge (n = 100)</td>
<td>6.1</td>
<td>5.5</td>
<td>3.16</td>
</tr>
<tr>
<td>RCT (n = 220)</td>
<td>5.1</td>
<td>4.4</td>
<td>2.69</td>
</tr>
<tr>
<td>Perio (n = 250)</td>
<td>4.9</td>
<td>4.3</td>
<td>2.58</td>
</tr>
<tr>
<td>Implant (n = 272)</td>
<td>4.7</td>
<td>4</td>
<td>2.48</td>
</tr>
<tr>
<td>Extraction (n = 395)</td>
<td>4.5</td>
<td>3.9</td>
<td>2.45</td>
</tr>
</tbody>
</table>

RCT = root canal therapy, Perio = periodontal/gum surgery, Implant = implant surgery
DFAS: \( \geq 5 \) = dentally anxious
IDAF-4C: \( \geq 3 \) = dentally anxious
Patients were asked to report what type of SGA service they expected to receive on the day of their dental procedure. Roughly 20% of patients were not certain of the type or level of SGA they were having on the day of their dental treatment.
Appendix A - Introductory Letter

October xx, 2013.

Dr. __________
123 Streetsville Ave.
Winnipeg, Manitoba
A1B 2C3

Dear Dr. __________

My name is Jonathan Campbell. I am a dental anesthesiology resident at the University of Toronto. I am conducting a study entitled "Dental sedation and general anesthesia in Manitoba: A survey of need, demand, perceptions, and barriers" as part of my Masters of Science thesis to assess dentists' and patients' attitudes towards intravenous sedation and general anesthesia services within Manitoba.

Your current registration with the Manitoba Dental Association as a provider of intravenous sedation qualifies you to participate in this unique study. The goal of the study is to acquire a comprehensive understanding of dentists' and patients' attitudes, behaviors, and practice patterns regarding sedation and general anesthesia services. Your answers are vital to improve the understanding of sedation services in Manitoba dental practices today.

Your participation would include completing a short paper survey and granting me permission in order to provide your patients with an equally short in-office paper survey that can be easily be completed before their appointment. This would be facilitated by having two small boxes in your office, one advertising the survey and the other for patients to drop the completed surveys into.

This study is not intended to test your knowledge on this subject and there are no right or wrong answers. The time frame to complete these surveys is around ten minutes. This is an anonymous and confidential study. No personal information is required. Participants may refuse to participate or withdraw at any time without negative consequences.

I will be following this letter up with a personal phone call to you in a few weeks to clarify any questions or concerns you may.

Your participation and insight is essential to the success of this project and is greatly appreciated.

Please inform me of your decision to participate in this survey by _____.

If you have questions, please email at jondds.campbell@mailutoronto.ca

If you have questions about your rights as participants, please contact the Office of Research Ethics at ethics.review@utoronto.ca

I look forward to your response and thank you for your participation!

Sincerely,

Dr. Jonathan Campbell DH, DDS
Principal investigator.
M.Sc. Candidate (Dental Anaesthesia)
Appendix B - Dentist Survey

UNIVERSITY OF TORONTO
FACULTY OF DENTISTRY

Dental'Sedation:'
Need,'Demand,'Perceptions,'and'Barriers'

Dr. Jonathan Campbell, DDS

jondds.campbell@mail.utoronto.ca
Dr. ________________
123 Streetsville Ave.
Winnipeg, Manitoba
A1B 2C3

Dear Dr. ________________

My name is Jonathan Campbell. I am a dental anaesthesiology resident at the University of Toronto. I am conducting a study entitled "Dental Sedation: Need, Demand, Perceptions, and Barriers" as part of my Masters of Science thesis to assess dentists’ and patients’ attitudes towards intravenous sedation and general anesthesia services within Manitoba.

You have been selected to participate in this survey because you are one of the few dentists registered to provide intravenous sedation in Manitoba. This qualification means that you have received specialized training in sedation services or have a qualified professional who can provide these services working with you to treat your patients and are therefore in the best position to comment on sedation for dental patients. The aim of the survey is gauge attitudes, behaviors, and practice patterns regarding sedation and general anesthesia services. Your answers are vital to an understanding of sedation services in Manitoba dental practices today.

This survey is not intended to test your knowledge on this subject and there are no right or wrong answers. The time to complete the survey is approximately ten minutes.

This is an anonymous and confidential study. No personal information is required. To maintain anonymity, please do not include any personal information when completing this survey. You may refuse to participate or withdraw at any time without negative consequences. Your consent to participate is implied upon completion and return of this survey by mail. Finally, all participants are invited to review the graduate thesis in the Harry R Abbot Dentistry Library in 2015.

Your participation and insight is essential to the success of this project and is greatly appreciated.

Please return the completed survey in the enclosed self-addressed envelope provided by January 24, 2013.

If you have questions, please email at jondss.campbell@mail.utoronto.ca.

If you have questions about your rights as participants, please contact the Office of Research Ethics at ethics.review@utoronto.ca

I look forward to your response and thank you for your participation!


Sincerely,

Dr. Jonathan Campbell DDS
Principal Investigator,
M.Sc. Candidate [Dental Anaesthesia]
Faculty of Dentistry, University of Toronto
The following survey relates to dentists’ attitudes towards and practice of sedation and general anesthesia services (SGA) within Manitoba.

Please see the terms below which are used throughout the survey.

**Intravenous (IV)**
- Route of administration of medicines into veins via plastic catheter or needle.

**Sedation and general anesthesia (SGA) services includes the three following levels.**

**IV Mild or Moderate, Conscious Sedation**
- Refers to medication delivered through the IV which gives the feeling of being lightly asleep, but able to be aroused with little memory of procedure.
- **Example:** A benzodiazepine was administered IV and a few moments later you ask the patient "Do you feel relaxed?" they respond verbally. They might remember you asking them this at the end of the visit.

**IV Deep Sedation**
- Refers to medication delivered through the IV which gives the feeling of being deeply asleep, but able to be aroused with repeated or painful touch with no memory of procedure.
- **Example:** A benzodiazepine, opioid, and propofol bolus was administered IV and a few moments later you ask the patient "Do you feel relaxed?" there is no response, but when the injections for local anesthesia are provided they move their hand towards their face. They cannot remember the injections at the end of the visit.

**General Anesthesia (GA)**
- Refers to medication delivered through the IV, mask, or endotracheal tube with the patient totally asleep, unarousable with painful stimulation, and no memory of the procedure.
- **Example:** A volatile anesthetic gas is being delivered through a nasal endotracheal tube or IV propofol is used to induce a GA. When the patient undergoes injections for local anesthesia no movement is noted. They cannot remember the injections at the end of the visit.

Please return the completed survey in the self-addressed envelope to:

Dr. Jonathan Campbell  
c/o Faculty of Dentistry, University of Toronto, Discipline of Anaesthesia  
124 Edward St., Toronto, ON M5G 1G6
1. Are sedation and general anesthesia (SGA) services provided in your practice?
   Please refer to page 1 for definitions.
   
   ○ YES
   ○ NO

2. If you answered "NO" in question 1. Please indicate the challenges you are faced with?
   (Check ALL that apply)
   Rank your TOP 3 choices (place the number 1,2,3 beside the appropriate reason)
   Then proceed to question #4.
   
   ○ No patient need
   ○ Patients are not demanding SGA services
   ○ Lack of experience or training
   ○ Cost too high to self
   ○ Not in my office but I refer these cases
   
   Who do you refer these cases to? __________________________
   
   ○ Inadequate fee/renumeration for service
   ○ SGA services are unsafe
   ○ Strict provincial regulatory guidelines
   ○ Negative previous experience
   ○ Other (state reason) __________________________

3. Who provides SGA services in your office for your patients? What is the percentage of the time services are provided? (Check ALL that apply) Please refer to page 1 for definitions.
   
   ○ Provide own sedation ________%
   ○ Medical Anesthesiologist ________%
   ○ General/Family Practice Anesthetist ________%
   ○ Other __________________________ ________%
4. What age groups are SGA services being offered to in your practice? Indicate percentages.
   Please refer to page 1 for definitions.
   
   ○ 12 to 15 years old! ______%!
   ○ 16 to 19 years old! ______%!
   ○ 20 to 29 years old! ______%!
   ○ 30 to 44 years old! ______%!
   ○ 45 to 64 years old! ______%!
   ○ 65+ years old! ______%!

5. What are your patients’ interests in SGA services for dental treatment? Indicate percentages.
   Please refer to page 1 for definitions.
   """
   ○ Not Interested! ! ! ! ! ______%!
   ○ Possibly interested depending on cost! ! ______%!
   ○ Definitely interested! ! ! ! ______%!
   """
   Total = 100%

6. Why are your patients not interested in SGA services? (Check all that apply). Indicate percentages.
   Please refer to page 1 for definitions.
   """
   ○ Lack of interest!
   ○ High cost!
   ○ Fear of IV sedation for general anesthesia!
   ○ Long wait time for referral!
   ○ Distance is too far for referral!
   ○ Lack of person to refer to!
   ○ Insurance does not cover this service!
   ○ No need for it!
   ○ Other [please state]! __________________________
   """
7. How would you rate your patients’ fear of dental treatment on the following scale? **(Please circle one)**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fear!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Moderate fear!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Extreme fear!</td>
</tr>
</tbody>
</table>

8. **(Please circle one)**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<th>7</th>
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<th>9</th>
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<td>!</td>
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<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Extreme avoidance!</td>
</tr>
</tbody>
</table>

9. **(Please circle one)**

<table>
<thead>
<tr>
<th>Disagree</th>
<th>Agree (a little)</th>
<th>Somewhat agree</th>
<th>Moderately agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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</table>

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patients feel anxious shortly before going to the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>2. Patients generally avoid going to the dentist because they find the experience unpleasant or distressing.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>3. Patients get nervous or uneasy about upcoming dental visits.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>4. Patients think that something really bad would happen to them if they visit the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>5. Patients feel afraid when visiting the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>6. Patients’ heart rate increases when they go to the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>7. Patients delay making appointments to go to the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
<tr>
<td>8. Patients often think about all the things that might go wrong prior to going to the dentist.</td>
<td>1’</td>
<td>2’</td>
<td>3’</td>
<td>4’</td>
<td>5’</td>
</tr>
</tbody>
</table>
10. If for what dental procedures do you provide IV conscious sedation? Indicate percentages. Write "N/A" if you do not perform these procedures in your office. Please refer to page 1 for definitions.

- Routine scaling/cleaning! [ ] ____%
- Fillings! [ ] [ ] ____%
- Crowns/bridges! [ ] ____%
- Root canal therapy!! [ ] ____%
- Periodontal surgery!! [ ] ____%
- Dental extractions!! [ ] ____%
- Implant surgery! [ ] ____%

11. If for what dental procedures do you provide IV deep sedation or general anesthesia? Indicate percentages. Write "N/A" if you do not perform these procedures in your office. Please refer to page 1 for definitions.

- Routine scaling/cleaning! [ ] ____%
- Fillings! [ ] [ ] ____%
- Crowns/bridges! [ ] ____%
- Root canal therapy!! [ ] ____%
- Periodontal surgery!! [ ] ____%
- Dental extractions!! [ ] ____%
- Implant surgery! [ ] ____%
12. For what dental procedures would your patients prefer IV conscious sedation? Indicate percentages. Write "N/A" if you do not perform these procedures in your office. (Please refer to page 1 for definitions.)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine scaling/cleaning</td>
<td>_____%</td>
</tr>
<tr>
<td>Fillings</td>
<td>_____%</td>
</tr>
<tr>
<td>Crowns/bridges</td>
<td>_____%</td>
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<td>_____%</td>
</tr>
<tr>
<td>Periodontal surgery</td>
<td>_____%</td>
</tr>
<tr>
<td>Dental extractions</td>
<td>_____%</td>
</tr>
<tr>
<td>Implant surgery</td>
<td>_____%</td>
</tr>
</tbody>
</table>

13. For what dental procedures would your patients prefer IV deep sedation for general anesthesia? Indicate percentages. Write "N/A" if you do not perform these procedures in your office. (Please refer to page 1 for definitions.)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine scaling/cleaning</td>
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<td>_____%</td>
</tr>
<tr>
<td>Dental extractions</td>
<td>_____%</td>
</tr>
<tr>
<td>Implant surgery</td>
<td>_____%</td>
</tr>
</tbody>
</table>
14. What are the reason(s) for you to offer patients SGA services for dental treatment? (Check ALL that apply) Please refer to page 1 for definitions.
   - Dental fear and anxiety
   - Treatment complexity
   - Treatment Length
   - Treatment invasiveness
   - General patient comfort
   - Severe gag reflex
   - Medical indicators; Example: high blood pressure, chest pain (angina), asthma, epilepsy
   - Behavioral (physical) indicators; Example: Parkinson’s, Arthritis, tremors, dementia
   - Patients request
   - Other (state reason) ___________________________

Some questions about you:

15. Are you?
   - Male
   - Female

16. What is your age? ________

17. How many years have you been in clinical practice? ________
18. Which best describes you or your practice?
   - General Practitioner
   - Oral and Maxillofacial Surgeon
   - Periodontist

19. What IV sedation training have you received?
   - Dental school
   - Continuing education
   - Graduate residency program or Advanced education in general dentistry
   - Formal graduate training program
   - Other ____________________________

20. Comments you would like to add to clarify or explain your answers would be most helpful.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Thank you for your time in completing this survey!
Appendix C - Patient Survey

Dental Sedation:
Need, Demand, Perceptions, and Barriers

Dr. Jonathan Campbell, DDS
Discipline of Dental Anaesthesiology
Faculty of Dentistry
University of Toronto
jondds.campbell@mail.utoronto.ca
November 4, 2013.

Dear Survey Participant

My name is Jonathan Campbell. I am a dental anesthesiology resident at the University of Toronto. I am conducting a study entitled "Dental sedation and general anesthesia in Manitoba: A survey of need, demand, perceptions, and barriers" as part of my Masters of Science thesis to assess dentists' and patients' attitudes towards intravenous sedation and general anesthesia services within Manitoba.

Dental patients in a variety of dental offices are being asked to complete the enclosed short survey. The survey aims is designed to understand your attitudes, behaviors, and preferences regarding sedation services. It is important to comprehend how patients like yourself feel about the need and demand for intravenous sedation or general anesthesia. Furthermore, your answers are vital to improve the understanding of sedation services in Manitoba dental practices today.

This survey is not intended to test your knowledge on this subject and there are no right or wrong answers. The time to complete the survey is approximately ten minutes.

This is an anonymous and confidential study. No personal information is required. To maintain anonymity, please do not include any personal information when completing this survey. You may refuse to participate or withdraw at any time without negative consequences. Your consent to participate is implied upon completion and return of this survey by mail. Finally, all participants are invited to review the graduate thesis in the Harry R Abbot Dentistry Library in 2013.

Your participation and insight is essential to the success of this project and is greatly appreciated.

Please return the completed survey in the enclosed envelope provided when finished to the box marked "completed surveys".

If you have questions, please email at jondds.campbell@mail.utoronto.ca.

If you have questions about your rights as participants, please contact the Office of Research Ethics at ethics.review@utoronto.ca

I look forward to your response and thank you for your participation!

Sincerely,

Dr. Jonathan Campbell, DDH, DDS
Principal investigator,
M.Sc. Candidate (Dental Anaesthesia)
The following survey relates to dentists’ and patients’ attitudes towards and practice of sedation and general anesthesia (SGA) services within Manitoba.

Please see the terms below which are used throughout the survey.

**Intravenous (IV)***

Refers to delivering medications into your body through a vein in your arm or hand. 

**Effective**

Providing you with a level of sedation where you feel comfortable enough.

Example: No pain, not aware of what was happening, sleep level of sleep.

**Sedation and General Anesthesia (SGA) Services** Includes the following levels

**IV Mild or Moderate, ‘Conscious Sedation’**

Refers to medication delivered through the IV that gives you the feeling of being lightly asleep but able to be aroused by light touch or someone’s voice and having some memory of the procedure.

Example: You are given a smaller amount of medication into your IV and after a few moments the dentist asks you if you feel relaxed? ‘Yes’ you respond, ‘Next, you have local anesthesia’ freezing ‘Injections’ and you move your hand towards your face because something feels odd. You cannot remember the injections but the nurse is there.

**IV Deep Sedation**

Refers to medication delivered through the IV which gives you the feeling of being deeply asleep, but not able to be aroused by repeated touch or painful touch and having no memory of the procedure.

Example: You are given a larger amount of medication into your IV and after a few moments the dentist asks you if you feel relaxed? ‘Yes’ you respond, ‘Next, you have local anesthesia’ freezing ‘Injections’ and you move your hand towards your face because something feels odd. You cannot remember the injections but the nurse is there.

**General Anesthesia (GA)**

Refers to medication delivered through the IV, mask, or breathing tube and being totally asleep, but not able to be aroused awake, and having no memory of the procedure.

Example: You are given general anesthesia through a breathing tube, you are asleep and when you have injections for local anesthesia ‘freezing’ you don’t feel anything & move. You cannot remember the injections but the nurse is there.

Please return the completed survey in the enclosed envelope to the box marked **Completed Survey Drop Box**
1. When was your last visit to your dentist? (Check one) (Please refer to 'page 1' for definitions.)
   - Within the last year!
   - 1 and 2 years ago!
   - 3 and 5 years ago!
   - 6 and 10 years ago!
   - More than 10 years ago!
   - Cannot remember!

2. What is the MAIN reason for NOT visiting your dentist in the last year? (Check one)
   - Cost!
   - Lack of time!
   - Your teeth have not been troubling you!
   - Fear or anxiety!
   - Other (state reason) ____________________________

3. Have you ever had sedation and/or general anesthesia for dental procedure? (Check ALL that apply) (Please refer to 'page 1' for definitions.)
   - Yes!!!!
     - Every dental visit!
     - Only when it is recommended by my dentist!
     - Depending on dental procedure!
     - Depending on dental procedure length!
     - Only for tooth extractions!
     - Other (state reason) ____________________________
   - No!
     - Never been offered this service!
     - Never thought to try it!
     - Declined!
4. What type of anesthesia will you have today for your dental procedure?
   Please refer to page 1 for definitions.
   - Local anesthesia (“freezing”)
   - Mild, moderate or conscious sedation
   - Deep sedation
   - General anesthesia
   - Not sure

5. What is your interest in SGA services for dental treatment? (Check one) Please refer to page 1 for definitions.
   - Not interested
   - Possibly interested depending on cost
   - Definitely interested

6. Why are you not interested in SGA services? (Check ALL that apply) Please refer to page 1 for definitions.
   - Lack of interest
   - High cost
   - Fear of IV sedation or general anesthesia
   - Long wait time for referral
   - Distance too far for referral
   - Lack of person to be referred to
   - Insurance does not cover this service
   - No need for it
   - Other (please state)
7. ""How would you rate your fear of dental treatment on the following scale?!!
(Please circle one)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fear!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Moderate fear!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Extreme fear!</td>
</tr>
</tbody>
</table>

8. ""Rate the degree to which you avoid (for whatever reason) going to the dentist or dental hygienist?!!
(Please circle one)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not avoid!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Moderate avoidance!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>Extreme avoidance!</td>
</tr>
</tbody>
</table>

9. ""How much do you agree with the following statements regarding your level of fear and anxiety?!!

<p>| Disagree' | Agree'a little' | Somewhat agree' | Moderately agree' | Strongly agree' |</p>
<table>
<thead>
<tr>
<th>1'</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>I feel anxious shortly before going to the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(2)</td>
<td>I generally avoid going to the dentist because I find the experience unpleasant or distressing.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(3)</td>
<td>I get nervous or edgy about upcoming dental visits.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(4)</td>
<td>I think that something really bad would happen if I were to visit the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(5)</td>
<td>I feel afraid or fearful when visiting the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(6)</td>
<td>My heart beats faster when I go to the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(7)</td>
<td>I delay or making appointments to go to the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>(8)</td>
<td>I often think about all the things that might go wrong prior to going to the dentist.</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
</tr>
</tbody>
</table>
10. For what dental procedures do you receive IV conscious sedation? 

(Check ALL that apply.) Please refer to page 1 for definitions.

- Routine scaling/cleaning
- Fillings
- Crowns/bridges
- Root canal therapy
- Periodontal/gum surgery
- Dental extractions
- Implant surgery

11. For what dental procedures do you receive IV deep sedation or general anesthesia? 

(Check ALL that apply.) Please refer to page 1 for definitions.

- Routine scaling/cleaning
- Fillings
- Crowns/bridges
- Root canal therapy
- Periodontal/gum surgery
- Dental extractions
- Implant surgery
For what dental procedures would you prefer IV Sedation or General Anesthesia? Please refer to page 4 for definitions.

- Routine scaling/cleaning
- Fillings
- Crowns/bridges
- Root canal therapy
- Periodontal/gum surgery
- Dental extractions
- Implant surgery

For what dental procedures would you prefer IV Sedation or General Anesthesia? Please refer to page 4 for definitions.

- Routine scaling/cleaning
- Fillings
- Crowns/bridges
- Root canal therapy
- Periodontal/gum surgery
- Dental extractions
- Implant surgery
What are the reason(s) for you to have IVGAS Services for your dental treatment? (check all that apply. Please refer to page 1 for definitions.)

- Dental fear and anxiety
- Treatment complexity
- Treatment length
- Treatment invasiveness
- General comfort
- Severe gag reflex
- Medical indicators; Example: High blood pressure, chest pain (angina), asthma, epilepsy
- Behavioral/physical indicator; Example: Parkinson’s, Alzheimer’s, Arthritis, tremors, dementia
- Other (state reason)

Please indicate if you find IV conscious sedation effective compared to what you expected it would be like. (check box) Please refer to page 1 for definitions.

- Very effective
- Somewhat effective
- Not effective
- Never had IV conscious sedation before

Please indicate if you find IV deep sedation or general anesthesia effective compared to what you expected it would be like. (check box) Please refer to page 1 for definitions.

- Very effective
- Somewhat effective
- Not effective
- Never had IV deep sedation or general anesthesia before
17. What dental procedure are you here for today? (Check ALL that apply.)

- Routine scaling/cleaning
- Fillings
- Crowns/bridges
- Root canal therapy
- Periodontal/gum surgery
- Dental extractions
- Implant surgery
- Other (state reason):

Some questions about you:

18. Are you?

- Male
- Female

19. What is your age?

20. Are you covered by dental insurance?

- Yes
- No

21. What is your highest level of schooling you have completed? (Check one)

- Elementary (0 to 9 years)
- High School (9 to 12 years)
- Community college/technical school (13 to 14 years)
- University degree/bachelors or equivalent (16 to 17 years)
- Graduate degree (over 16 years)
22. Please write down the name of the dentist you are seeing today.

23. Any comments you would like to add to clarify or explain your answers would be most helpful.

Thank you for your time in completing this survey!
References


