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**THE INFORMATION SEEKING PATTERNS OF DENTAL HYGIENISTS  
IN NORTHERN BRITISH COLUMBIA  
AND THEIR RESPONSE TO THE  
1993 FLUORIDE GUIDELINES**

by

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## **ABSTRACT**

Information access is necessary for the health care professional to stay current and provide good patient care. When organizations change policy or recommendations, it is important for the information to be disseminated to the practitioners in the field. The success of the information dissemination is dependent on both the organization and practitioner.

The literature indicates that most health care professionals are dependent on oral and printed information sources such as discussions with colleagues and reading journal articles. Although there has been an explosion of electronic information retrieval and communication methods, health care providers have been slow to adopt these methods. There are few studies that have specifically looked at the information-seeking practices of dental hygienists.

This descriptive study explored the methods that dental hygienists in northern British Columbia have utilized to access information. The 1993 Canadian Dental Association fluoride guidelines were used as the basis of a "case study" to investigate if dental hygienists had accessed and adopted recently revised information. A self-administered questionnaire was sent to the 130 dental hygienists registered in the North and 106 completed questionnaires were returned for a response rate of 81.5%.

The findings show that dental hygienists in northern British Columbia are utilizing traditional information sources. The most frequently utilized methods to obtain information are: discussion with colleagues, reading journal articles, and reading mailings from the British Columbia Dental Hygienists Association and the College of Dental Hygienists of British Columbia. The least utilized information sources are the indices to the literature and electronic information sources. Geographic isolation, lack

of electronic information sources and cost were identified as the top three barriers to information access. Dental hygienists need to take more professional responsibility for obtaining information. If they become "computer literate" and start to adopt the newer methods of electronic information retrieval and communications methods, they will be able to overcome some of the barriers to information access.

This group has made changes in their practice and opinions that correspond with the revisions in the 1993 CDA fluoride guidelines. However, as dental hygienists have questions and concerns about fluorides, there is still a need for more direct dissemination of information on this topic.

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## **DEDICATION**

**This thesis is dedicated to the memory of my father, John C. Knight. This was his dream for me and I wish he was alive to see it come true.**

## Chapter One

### Introduction

The twentieth century has seen an unprecedented growth of the amount of information that is available to the general public. Information is a highly regarded commodity in today's society. There has been an explosion of published materials and the development of computer hardware and software has greatly increased the ability to store information. The phenomenal growth of the information industry and the Internet demonstrates the demand for access to information.

There has also been a large explosion in the amount of biomedical information that is available to the health care practitioner. One of the most challenging responsibilities for health care providers is to keep pace with the growing knowledge base and developing technology so they may stay competent and continue to meet the health care needs of the public. Health practitioners must continue to learn and ". . . be able to adjust patterns of practice throughout a career in order to provide state-of-the-art-care" (Jeffcoat & Clark, 1995, p. 170). Professional associations, licensing bodies and educational institutions face the challenge of supporting health care providers in meeting society's health care needs. All must work together to promote ". . . a respect for science and research; a commitment to lifelong continuing education; and an environment that will lead to a highly developed sense of ethics . . ." (Neidle, 1990, p. 564).

#### Statement of the Problem

Many areas of dental and dental hygiene practice have seen recent changes requiring providers to access current information and adjust their patterns of practice.

Yet, there is limited information on how dental practitioners access information, particularly in more remote locations. This thesis examines the methods that dental hygienists in northern British Columbia have utilized to learn about and incorporate new or revised information into their practice. One particular and highly relevant area of revised information that has been recently disseminated to the dental professions is the use of fluorides. Hence, the revised fluoride guidelines introduced in 1993 by the Canadian Dental Association (CDA) have been used as a "case study" in this thesis to investigate and understand information access by dental hygienists in northern British Columbia.

In this introductory chapter, the background of the 1993 CDA fluoride guidelines is fully explained. A review of the literature on information seeking methods of health care providers, fluoride use and the prevalence of fluorosis is provided in Chapter Two.

### Background of the 1993 CDA Fluoride Guidelines

Increased research, expanded technology and changing patterns of disease are forces that impact on the practice of dentistry and dental hygiene. One particular area that has been affected by these forces is the use of, and recommendations for, fluorides. Historically, the use of fluoride in community water supplies has generated public controversy and referenda. There has often been public concern as to whether or not fluorides cause cancer, birth defects and other ills. The current issues in the dental literature focus on "how much is too much" fluoride (Burt, 1995; Clark, 1993; Horowitz, 1995; Levy, Kiritsy, & Warren, 1995; Riordan, 1993). Through the 1990s, recommendations for fluoride usage have changed and several countries are in the process of making fluoride guideline changes, particularly in the area of fluoride

supplements (Burt, 1995; Clark, 1993; Clarkson, 92; JADA, 94; Riordan, 1993).

Therefore, dental practitioners must be prepared to provide accurate information on the benefits and safety of fluorides to the public.

According to Mr. Brian Henderson, the CDA Director of Education, Accreditation and Professional Services, three dentists, Dr. Chris Clark from the University of British Columbia, and Drs. Hardy Limeback and Ralph Burgess from the University of Toronto, took the initiative to organize a national workshop on the issue of fluorides (personal communication with Mr. Henderson, July 31, 1995; Clark, 1993). On April 9-11, 1992, the workshop on fluorides was held in Toronto, during which dental scientists, dental public health and paediatric specialists reviewed and evaluated current literature on fluorides (CDHA letter to members, Sept 1992). This workshop, the Canadian Conference on the Evaluation of Current Recommendations Concerning Fluorides, was financially sponsored by Proctor and Gamble of Canada, Health and Welfare Canada, and the Medical Research Council of Canada.

The purpose of the workshop was to determine the appropriateness of the existing Canadian Dental Association fluoride recommendations (Clark, 1993). The goal was to develop revised recommendations for public exposure to fluoride at the lowest possible level, and yet maintain optimal low levels of dental caries (Clark, 1993). The conference addressed five questions " . . . how do fluorides work; is the prevalence of dental fluorosis increasing; does a particular fluoride therapy put children at risk to dental fluorosis; how much fluoride are children ingesting; and how effective is the particular therapy" (Clark, 1993, p. 272).

The importance and effectiveness of water fluoridation was reaffirmed during the conference. However, several changes to recommendations for other sources of

fluorides were made. Dietary fluoride supplementation was the most significant area of change. Previously, fluoride supplements were recommended for all children receiving water that was not fluoridated at the optimal level of 1 ppm. (Clark, 1993). The fluoride guidelines now state that dietary fluoride supplements should not be used by children under three, whether or not they are receiving fluoridated water. After the age of three, fluoride supplements should be recommended for only for individuals or groups who are at high risk for caries (Clark, 1993; Riordan, 1993). (See Appendix A for a complete copy of the 1993 CDA fluoride guidelines.)

The recommendations from the Canadian Conference on the Evaluation of Current Recommendations Concerning Fluorides were then forwarded to the Canadian Dental Association for consideration. The new recommendations were reviewed by the appropriate CDA committees and were adopted by the CDA board in April 1993 (Clark, 1993). However the new guidelines have not been universally adopted across Canada. The revisions to the fluoride supplementation schedule have created some controversy. As the national professional body, the CDA provides policy and position statements, with the provincial licensing bodies having the right to adopt or reject CDA policies (personal communication with Mr Brian Henderson, July 31, 1995). According to Mr. Henderson, Quebec has shown the most reluctance to adopt the new guidelines, most likely due to its high prevalence of caries and low number of fluoridated communities. The Quebec Order of Dentists, the Quebec Association of Paediatric Dentists and the Quebec Association of Community Health Dentists have all disagreed with CDA's new guidelines (Rafuse, 1993).

Another important group that has not adopted and implemented the new guidelines is the Canadian Paediatric Society (CPS). The CPS takes exception to the changes in

fluoride supplementation, stating that the new levels are too low and no data is available on the efficacy of caries protection at that level (Rafuse, 1993). Dr. Tony Hargreaves, a dental consultant to the British Columbia Ministry of Health who has been working with the medical community to gain their acceptance of the 1993 CDA fluoride guidelines, speculated that a lack of consultation with the medical community during the process of changing the guidelines may have contributed to their lack of acceptance after the fact. Dr. Hargreaves also states that the medical community believes that dentists are overreacting to the fluorosis problem (personal communication July 27, 1995). Mr. Henderson of the CDA, agrees that this view of overreaction to fluorosis could be related to the lack of adoption of the guidelines (personal communication July 31, 1995). Mr. Henderson and Dr. Hargreaves are in continuing contact with the medical community and working towards its acceptance of the 1993 CDA fluoride guidelines.

Health Canada has not adopted the new fluoride guidelines. Mr. Henderson was unsure why there has been a holdup of acceptance (personal communication July 31, 1995). He has been in contact with the Deputy Minister of Health Canada and has sent all documentation and reports. Sharon Amer, a dental hygienist who is an Advisor for the Issues, Analysis and Planning Unit in the Health Care and Issues Division of Health Canada was an invited observer and participant at the 1992 CDA fluoride workshop. She confirmed that Health Canada has done nothing about the guidelines (personal communication, March 6 1996). She stated that due to many recent changes and cutbacks, the fluoride guidelines are a low priority for Health Canada. According to Ms. Amer, Health Canada may not respond at all to the guidelines.

Ms. Amer suggested that the Medical Services Branch of Health Canada be contacted to see what fluoride recommendations are being followed. The Federal

Dental Therapy program, which is part of the Medical Services Branch, provides dental services to First Nations people on reserves. The federal dental therapists are, in fact, following the 1993 CDA fluoride guidelines (personal communication with Laurel White, a federal dental therapist in British Columbia, April 25, 1996)

At the provincial level, the College of Dental Surgeons of British Columbia (CDSBC), the licensing body for dentists in British Columbia, has reviewed and adopted the guidelines. The British Columbia Ministry of Health adopted the new CDA guidelines and has recommended that they be followed by health unit personnel (personal communication with Dr. Tony Hargreaves, July 27, 1995). However, since not all possible prescribers of fluoride supplements follow the same guidelines, members of the public can receive mixed messages. A family doctor or pediatrician, who are following the old fluoride guidelines, may recommend to a mother of a two year old child living in a nonfluoridated area that the child should be taking fluoride supplements. The mother may call the area health unit and be told the opposite by the community health nurse or community dental hygienist, who are following the 1993 CDA fluoride guidelines. It is not known what fluoride supplement recommendations might be made in a private practice dental office.

#### Information Dissemination of the 1993 CDA Fluoride Guidelines

Information regarding the new recommended guidelines has been made available to British Columbia dental practitioners in several different ways. The results of the April 1992 conference were published as a speciality feature article in the March 1993 issue of Journal of the Canadian Dental Association. This journal is sent to all members of the CDA, who may make it available to their employees. The College of Dental

Surgeons of British Columbia (CDSBC) sent two mailings on the recommended fluoride changes to all licensed dentists in the province. The first mailing, sent June 18, 1992, consisted of a copy of the proposed changes. An information sheet to help dentists explain the new fluoride recommendations to their patients was mailed on November 10, 1992. At that time dental hygienists were regulated by the CDSBC, but they did not receive individual mailings. It was the responsibility of the dentist to share the information with the dental hygienists and assistants employed in the office.

Dental hygienists in northern British Columbia could have received the information in other ways. Dental hygienists who were members of the Canadian Dental Hygienists Association (CDHA) were sent a mailing of the new recommendations dated September 14, 1992. The Northern British Columbia Dental Hygienists Society sponsored a day long continuing education program on May 30, 1993, in Prince George, which included a two hour section on the new recommended fluoride guidelines. During the spring of 1995 the dental services staff of the Northern Interior Health Unit sent a mailing of the speciality feature article "Appropriate Use of Fluorides in the 1990s" by Chris Clark from the March, 1993 issue of Journal of the Canadian Dental Association to all dental offices in the region of the Northern Interior Health Unit. On September 25, 1995, the Prince George and District Dental Society sponsored a continuing education course on dental controversies with Dr. John Hargreaves as the guest speaker. The use of fluorides was one of the topics discussed. The guidelines have also been a topic of discussion several times during the 1995 and 1996 sessions of the Northern British Columbia Dental Hygienists Literature Review Study Club.

While the dissemination of information regarding the 1993 CDA fluoride guidelines is ongoing, the effectiveness of this dissemination is unknown. Responses and changes

in clinical practice of individual dentists and dental hygienists are also unknown.

Access to information on the 1993 CDA fluoride guidelines and resulting practice changes by dental hygienists in northern British Columbia formed the case study for this thesis.

## Chapter Two

### Literature Review

The review of the literature will include the topics of the information-seeking methods of health care providers, the discovery of fluoride, fluoride sources and prevalence of fluorosis. An exhaustive review of the topics is beyond the scope of this thesis, however the literature selected was deemed as most relevant for dental hygienists.

#### Information-Seeking by Health Care Providers

A dictionary definition for information is "knowledge acquired through experience or study" (Collins Concise English Dictionary, 1992). For the health care provider, knowledge is acquired by both experience and study. However, even the experienced health care provider may desire additional information for decision-making and providing quality care in clinical practice. Therefore, for the purposes of this paper, information will be defined as ". . . organized data or knowledge that provides a basis for decision making" (Gravois, 1993, p. 10).

Although information is needed for decision making and providing good care, one can be overwhelmed by the amount of information that is available. There has been much discussion in the medical and dental literature about the escalating growth of information and the difficulties for the health care provider to keep up with it all (Blythe, 1992; Dee & Blazek, 1993; Gravois, 1993; Strother & Lancaster, 1986). There is general agreement that no professional can read all the published work in their field, yet many reasons exist for health practitioners to adopt systematic methods of staying current. These reasons include: patient expectations, pressures from licensing bodies

and professional associations, and the proper utilization of research and technology in practice.

Health care providers have many sources of available information. Each source of information requires different skills and resources to be properly utilized. Numerous studies have been conducted to examine the methods that health care providers use to seek information. This literature review will focus on three major categories of information sources: oral, printed, and electronic sources.

Seeking information from oral sources has been a traditional method for centuries in health care and still is a well accepted method. Examples of oral information sources are: asking a colleague, formal and informal peer discussion groups, discussions with product sales representatives, attending professional meetings and conventions, and continuing education courses. Studies show that information gained by human contact are preferred by many health care professionals (Bird & Heekin, 1994; Dee & Blazek, 1993; Gravois, 1993; Lundeen, Tenopir, & Wermager, 1994; Marshall, 1992; Strother & Lancaster, 1986). Reasons cited for the preference for oral information include: ease of accessibility; convenience; time efficiency; and the perception of it being an accurate, trusted and confidential source of information (Dee & Blazek, 1993). According to Jeffcoat & Clark (1995, p. 176), "... continuing education represents the major mechanism for lifelong learning for dentists". Continuing education and attending professional meetings can be a two way communication method as it "... represents a mechanism for clinicians to inform researchers of their needs for new research and their experience with the results of research as it is adapted in clinical practice" (Jeffcoat & Clark, 1995, p. 176).

Printed sources of information are widely available and utilized by health care providers. These sources include textbooks, journal articles, abstract services, product literature, and newsletters from professional associations and licensing bodies. Studies have varied findings regarding the value and use of printed sources of materials.

Lundeen et al. (1994) found that the majority of rural health care practitioners in Hawaii primarily utilized the following information sources: journal articles, newsletters, reports and books. However, focus groups conducted by the editors of the Journal of the American Dental Association found that dentists prefer not to read original research literature (Jeffcoat & Clark, 1995). The focus groups showed that dentists would rather read ". . . summary papers that present clinically relevant topics in a very readable form rather than as data to be interpreted by the clinician" (Jeffcoat & Clark, 1995, p. 176).

Dee & Blazek (1993) found that the number of textbooks owned ranged from zero for three physicians to 200 for two physicians in a qualitative study of information needs of 12 rural Florida physicians. The numbers of journals subscribed to by this same group ranged from zero to nine or more (Dee & Blazek, 1993). This study also found that library access did not account for differences in journal subscriptions nor the number of textbooks owned. Of the six physicians with access to a hospital library, only one used it frequently (Dee & Blazek, 1993). Given the small sample in this study, the results should not be generalized to all rural physicians.

Kunzel and Sadowsky (1991) asked a sample of general practice dentists in the United States how often they use various sources of information about patient medications and other types of medical management. The preferred choices were colleagues, the patient's physician, and the Physician's Desk Reference (PDR) which is the American counterpart to the Compendium of Pharmaceuticals and Specialties

(CPS) used in Canada. Professional meetings and journals are used less frequently for patient medications and other medical problems, perhaps because the information gained from those sources is not specific enough for individual care. Interestingly, the information source least used was the pharmaceutical representative. Kunzel and Sadowsky (1991) speculate that this may be due to skepticism of the drug industry by health care providers.

A study of factors encouraging and discouraging use of nursing research findings found that nurses ranked monthly research newsletters most helpful (Pettengill, Gillis & Clark, 1994). Nurses then preferred research meetings, continuing education programmes, computer networks, interactive software, and research study guides, in that order (Pettengill et al., 1994).

In a study on the use of information sources in the field of aging, Bird and Heekin (1994) found that journal literature ranked first. Professional meetings and discussions with colleagues were a close second and third (Bird & Heekin, 1994). Gravois (1993) found that the information sources used most frequently by dental hygienists were continuing education courses, discussions with colleagues, and journals, in that order.

The literature seems to show consistency in health care providers' preference for information gained from discussions with colleagues and journal articles. How journal articles are accessed remains a question since studies on information seeking practices show a consistent trend of low usage of library services and database searches (Bird & Heekin, 1994; Dee & Blazek, 1993; Gravois, 1993; Lundeen et al., 1994; Strother & Lancaster, 1986).

There has been an explosion of electronic information retrieval and communication methods. In the last ten years, the new field of health informatics has been developed.

Jones, Navin, Barrie, Hillan and Kinane (1991, p. 191) quoted the World Health Organization's definition of health informatics "... as the combination of technology and methodology which makes possible the computer-assisted collection, storage, processing, retrieval, distribution and management of information." As medical libraries have adjusted to the health informatics age, computer databases have replaced card catalogues. While options to access information by electronic means has grown rapidly, the preference for this method by health care professionals has not. Studies consistently show that many health care providers have low computer skills and a low interest in and ability to do on-line data base searches (Gravois, 1993; Lundeen et al., 1994; Mullaly-Quijas, Ward, & Woelfl, 1994).

A qualitative marketing study was conducted by the Midcontinental Region of the National Network of Libraries of Medicine in 1992 (Mullaly-Quijas et al., 1994). This study utilized focus groups to determine the met and unmet information needs of various health professionals. The focus groups consisted of physicians, nurses, pharmacists, hospital administrators, dentists, allied health professionals, and health sciences librarians. Compared to the other focus groups, the dentists had a low familiarity with and utilization of the National Library of Medicine. The focus group of dentists cited the use of Index to Dental Literature, Medline, the librarian, study groups, detail representatives, and personal journal collections as information sources. All of the focus groups indicated lack of time, knowledge, and computer skills as barriers to accessing information. The Mullaly-Quijas et al. (1994) study was conducted with a limited number of small focus groups in Omaha, Nebraska and two other nearby cities, so the views are not necessarily representative of all health professionals.

A study of the information-seeking behaviours of medical, pharmacy, nursing, and science faculty at the University of Illinois at Chicago was conducted in 1991 (Curtis, Weller, & Hurd, 1993). Overall, this study found a definite preference for use of paper indices over computer methods for completing literature searches. While Index Medicus and Medline were widely used by all four groups, other databases were seldom used by the medical, pharmacy and science faculty. Nursing faculty responses showed greater use of major indices and databases in multiple fields of study. The authors conclude that, even as new formats become available for accessing literature, the traditional formats continue to be used. Curtis et al. (1993) recommends that training sessions on the use of electronic databases must be tailored to the audience and its specific needs. If university faculty need time and training to use the electronic databases, these same conclusions are probably even more applicable to health care practitioners.

For those who do use library services, there can be a positive impact on their clinical decision making. Hospital librarians in Rochester, New York developed a research project to explore the impact of library services on the clinical decision making of physicians (Marshall, 1992). The participating physicians were asked to request information related to a clinical case and then evaluate its impact on the care of their patients. Four hundred and forty-eight physicians agreed to participate in the study, but only 227 returned the questionnaires. Responding physicians reported the following behaviours as a result of the library information: a change of advice to the patients (71%), a change in treatment (59.6%), a change of diagnostic tests (50.5%), and change in drugs (45.2%) (Marshall, 1992). This study demonstrates how accessing information through a library can have a positive impact on patient care.

The Internet offers new information options to health care providers. Tietze and Huber (1995) discuss the Internet options which are available to nurses such as the "gophers" of Nurse and Nightingale, bulletin boards posting nursing information, and E-mail lists of nursing interests. Tietze and Huber (1995) state that, although there are many sources of electronic information currently available to nurses, their use by nurses is not widespread. In an editorial in the Journal of the American Dental Association, Meskin (1995) discusses how few dentists have accessed the information superhighway. For dentists that are learning to utilize the Internet, opportunities for information exchange are available. For example, an orthodontic electronic bulletin board was started in 1994 (Zernik, 1994). This electronic study club provides subscribers with an opportunity to discuss cases, journal articles and new technologies (Zernik, 1994).

While multiple sources of information are available, many health care professionals only utilize a few of the methods. This may limit their ability to remain current and provide quality care for their patients. Yet, health care providers have a professional obligation to keep pace with the growing knowledge base and developing technology of their field. A recent example of a significant change in the knowledge base in the practice of dental hygiene is the new recommendations governing the use of the various sources of fluorides. In Chapter One, these new recommendations have been discussed. The following section provides an overview of the use of fluorides.

### Fluorides

During the early 1900s, investigations began as to why people in certain geographic areas exhibited mottled enamel. Mottled enamel or fluorosis is an aesthetic condition of

the teeth that can range in severity from faint white streaking to brown staining and pitting (Pendrys, 1991). Dr. Frederick McKay, investigating this problem in Colorado, attributed this condition to something that was present in the drinking water (Burt, 1992). Dr. H. Trendley Dean, a public health officer began working on the investigation in 1931 and shifted the emphasis from mottled enamel to the observed phenomenon of the fewer caries that was associated with it (Burt, 1992). In 1931, a scientist with Alcoa identified the agent as fluoride, which sometimes occurred naturally in water sources (Burt, 1992).

After this discovery, Dr. Dean wanted to determine if the possibility of adding fluoride to water would decrease the caries rate, which was much higher in the 1930s and 1940s than present day caries rates (Burt, 1992). By 1945, the range of .7 ppm to 1.2 ppm had been determined as the optimum amount to add to drinking water which would decrease caries without causing mottled enamel (Burt, 1992). Since then, many cities and towns in North America have added fluoride to their drinking water supplies. January 1995 was recognized as "...the 50th anniversary of the first controlled additional fluoride to a public water supply" (Burt, 1995, p. 37).

In the 1940s and early 1950s fluoride was not readily available to the general public. Over the years, however, fluoride has become available in many forms such as toothpaste, mouth rinses, topical applications at the dental office, and dietary supplements. A halo or diffusion effect has also occurred as fluoride can be found in substances such as infant formula, infant food, juice, soda, and canned foods which are prepared with fluoridated water and then later consumed in nonfluoridated communities (Levy et al., 1995). Fluoride also occurs naturally in a number of substances such as bottled water, tea, chicken, fish, and seafood (Levy et al., 1995).

Today, people are exposed to multiple fluoride sources, and while the overall prevalence rate of caries has dropped significantly, concern over fluorosis has risen. The teeth most susceptible to fluorosis are the permanent maxillary incisors which are forming at ages 22 to 25 months (Nourjah, Horowitz, & Wagener, 1994). The inappropriate use or incorrect amounts of fluoride at this time would be the primary cause of dental fluorosis. Swallowing of fluoridated dentifrices, excess exposure to fluoride in food and drinks, inappropriate prescribing practices of providers, and incorrect usage of fluoride supplements by patients can all lead to dental fluorosis. A number of articles and studies have discussed and attempted to measure a person's overall fluoride intake (Lewis et al., 1994; Levy 1992; Levy et al., 1995; Nourjah et al., 1994). Other studies have investigated the prevalence and severity of dental fluorosis (Clark, Hann, Williamson & Berkowitz, 1993, 1994; Eilwood & O'Mullane, 1995; Nowjack-Raymer, Selwitz, Kingman, & Discoll, 1995; Riordan, 1993).

The 1986 National Health Interview Study conducted in the United States collected information on current use of fluoride-containing products (Nourjah et al., 1994). In this study, data was examined to determine fluoride intake for children younger than two years old. They found that nearly half of these children were reported to use at least one type of fluoride product. By age three, almost 96% of the children were using at least one type of fluoride product. Nourjah et al. (1994) suggested that health care providers and parents should be better educated about fluoridated dentifrices and supplements, particularly when they live in fluoridated communities. Unfortunately, many adults are not aware of the fluoridation status of their community (Bernard-Bonnin et al., 1993; Nourjah et al., 1994).

Parents are also often unaware of the actual fluoride content of products they are using for their children. A study in 1991 at Regina's Child Health Clinics surveyed 293 parents on their use of fluoride and vitamin supplements (Kot & Hasselback, 1993). Fifty-three per cent of the respondents indicated using a fluoride supplement for their child, but a follow-up check on the supplement name brand showed that only 39% were actually giving a fluoride supplement (Kot & Hasselback, 1993).

Ingestion of toothpaste by young children is another potential method for the development of dental fluorosis. In Canada, there is almost universal use of fluoridated toothpaste, yet parents are often unaware of the large amount of fluoride, 1000-1100 parts per million (ppm), that exists in most major brands of toothpaste. In a paper for the 1992 CDA fluoride workshop, Levy reviewed the literature regarding fluoride intake from fluoride dentifrices. Levy (1992) concluded that the literature shows that young children are ingesting large amounts of fluoride from fluoridated toothpastes.

While the availability of multiple fluoride sources has lowered the overall caries rate, there are concerns about the rising potential for dental fluorosis. As a result, a number of studies have been conducted to determine the prevalence and severity of dental fluorosis.

A study of the prevalence of dental fluorosis was conducted by Nowjack-Raymer et al. (1995) on children who had participated in an eight-year clinical trial of the effectiveness of three different school-based fluoride procedures. Children were randomly assigned to one of three groups: (a) rinsing once a week with .2% neutral sodium fluoride; (b) chewing, rinsing, and swallowing a neutral 2.2 mg sodium fluoride tablet on a daily basis; or, (c) using both procedures. At a follow-up examination in 1992, 448 children were examined for fluorosis levels using Dean's Fluorosis Index.

Overall the prevalence of fluorosis was low with only 4.5% or 20 participants having fluorosis. No statistically significant differences in fluorosis prevalence were found by treatment method, age or teeth affected (Nowjack-Raymer et al., 1995).

There were six children in the Nowjack-Raymer et al. study (1995) who exhibited moderate or severe fluorosis. The investigators questioned the parents of these children to try to understand why this had occurred. This further investigation found that ". . . all of the children presenting with moderate or higher classifications of fluorosis had ingested quantities of fluoride greater than optimal from sources other than the fluoride regimens at school" (Nowjack-Raymer et al., 1995, p. 169). Primarily these children had been exposed to high levels of fluoride earlier than 5 years old. Nowjack-Raymer et al. (1995) concluded that under strict supervision, school-based fluoride programs can be used safely in nonfluoridated communities.

Although American studies on this subject are numerous, Clark (1994) states that little research on the prevalence of dental fluorosis has been conducted in Canada. In a recent study, Clark et al. looked at exposure to fluoride sources, the prevalence of caries, and severity of fluorosis of school age children in two communities in British Columbia: Kelowna which is fluoridated at 1.2 ppm and Vernon which has less than 0.1 ppm fluoride in the water (Clark, Hann, Williamson, & Berkowitz, 1994a, 1994b). In this same study, Clark et al. (1993) also investigated the children and parents' level of aesthetic concern with fluorosis.

Schools in both cities were stratified by socioeconomic status and then randomly selected to participate in the study. A total of 3126 children from ages six to 14 were asked to participate in the study. Five hundred and ten children from Vernon and 621 children in Kelowna participated in the study (Clark et al., 1993, 1994a 1994b). They

were examined for prevalence of dental caries using the modified D<sub>1</sub> D<sub>2</sub> MFS index, and severity of fluorosis using the Tooth Surface Index of Fluorosis (TSIF). The D<sub>1</sub> D<sub>2</sub> MFS index counts numbers of tooth surfaces with incipient caries and cavitated caries, as well as missing and filled tooth surfaces. The TSIF scale runs from 0 to 7 with 0 representing no fluorosis present. At the time of the examination, children were asked if they liked the colour of their front teeth (Clark et al., 1993). Parents were asked to complete a questionnaire on demographic information, fluoride exposure, dietary history, and level of concern about the colour of their child's teeth (Clark et al., 1993, 1994a, 1994b).

In that study, Clark et al. (1994a, 1994b) found that children with lifelong exposure to fluoridated water had 35% fewer caries or filled tooth surfaces than those with no systemic fluoride exposure. Children who had taken fluoride supplements for at least four years had a 26% reduction in caries or filled tooth surfaces than those with no systemic exposure (Clark et al., 1994a 1994b). Sixty per cent of the children examined had fluorosis on at least two tooth surfaces, with the majority (52%) at a 1 level on the TSIF (Clark et al., 1993). Clark et al. (1993) found only seven per cent of the children in Vernon and 10% of the children in Kelowna to have fluorosis levels of two or more. The children and their parents in the TSIF score range of four or more did have aesthetic concerns about tooth colour (Clark et al., 1993).

Burt (1995) discusses the varying viewpoints on the prevalence and importance of fluorosis. One point of view is that most people with mild fluorosis do not know that they have it and are unconcerned. On the other hand, others are concerned that fluorosis could become a public health issue and jeopardize the caries reduction seen from the use of fluorides (Burt, 1995). While dental practitioners may vary on their viewpoints on

fluorosis, it certainly has generated much discussion in the recent literature (Burt, 1995; Clark, 1993; Clark, et al., 1993; Pendrys, 1991; Riordan, 1993). Also, various organizations have held meetings to discuss the optimum level of total fluoride intake. A European meeting was held in Brussels in 1991, the Canadian Dental Association held a workshop in 1992, the American Dental Association had a conference in 1994, and the American Association for Public Health Dentistry held a symposium on fluoride in October 1994 (Burt, 1995; Clark, 1993; Clarkson, 1992; JADA, 1994).

After organizations meet on issues, such as fluoride, and make policy decisions, it is important for the information to be disseminated to the practitioners in the field. The success of the information dissemination is dependent on both the organization and the individual practitioner.

### Summary of Literature Review

The literature was reviewed to determine the information-seeking practices of health care professionals. Overall, health care providers seem to prefer oral and printed sources of information. Health care professionals tend to have low computer literacy skills and to be uncomfortable in the electronic environment. Lack of time, low computer literacy, and lack of familiarity with databases are often cited as barriers to information access. Many health care providers do not access libraries and their services, even when they are in close proximity.

The literature was searched to identify studies that looked specifically at the information-seeking practices of dentists and dental hygienists. However, this author and others (Gravois, 1993; Kunzel & Sadowsky, 1991; Norton & Yaegar, 1992) have found few published studies on the practises of this group alone. Some studies on the

topic of information-seeking practices of health care practitioners have included dentists but not dental hygienists in their research. Given the lack of research in this area, it is difficult to determine if dentists and dental hygienists differ in their information-seeking methods from other health care personnel. There are reasons why there could be differences. Typically dentists and dental hygienists work in solo offices and have limited daily contact with colleagues as compared to those in medical professions. Also many provinces and states have mandatory continuing education requirements for re-licensure of dentists and dental hygienists. Therefore, professionals in the dental profession often depend upon the lecture format of continuing education courses as their primary source of information. Given the lack of information on this group, particularly in Canada, further exploration is warranted.

This literature review has also presented a brief discussion on fluoride including: its discovery, multiple sources, and concern over fluorosis. The research has shown a rise in the numbers of children with mild fluorosis. Dental hygienists must be able to access information regarding fluorides so they may properly counsel patients on the correct use and safety of fluorides.

### Purpose of the Study

The purpose of this research was to determine how dental hygienists in northern British Columbia access information. This research project explored what information sources are utilized and valued by northern dental hygienists. Barriers to accessing current information were also identified. Additionally, demographic information on dental hygienists in northern British Columbia was gathered.

The research questions were:

1. Which information sources do dental hygienists utilize?
2. Which information sources do dental hygienists regard as most helpful?
3. What are the barriers to accessing current information?
4. What are the methods by which dental hygienists received information regarding the 1993 CDA fluoride guidelines?
5. Have dental hygienists made any changes in their opinions, use, and recommendations of fluorides as a result of the 1993 CDA fluoride guidelines?

#### Significance of the Study

This research provides important information regarding dental hygienists in northern British Columbia. Several conclusions and recommendations have been made based on the findings. These conclusions and recommendations will be of value and interest to the British Columbia Dental Hygienists Association (BCDHA), the professional association, to the College of Dental Hygienists of British Columbia (CDHBC), the licensing body and to educational institutions that provide dental hygiene entry education and continuing education courses.

## Chapter Three

### Methods and Materials

The purpose of this study was to determine the information needs and information-seeking methods of dental hygienists in northern British Columbia. As a case study, the research investigated how this group had received information on the CDA 1993 fluoride guidelines. The response to this information and subsequent practice changes has been explored.

#### Population

According to the College of Dental Hygienists of British Columbia (CDHBC), as of July 14, 1995, there were 1634 registered dental hygienists in British Columbia. Two hundred of the 1634 had non-practising registration status. As of July 1995, there were 932 dental hygienists who were current members of the British Columbia Dental Hygienists Association (BCDHA), the professional association. While all dental hygienists in British Columbia must be registered and licensed by CDHBC, membership in BCDHA is voluntary.

A bias could be introduced if the population was defined by those dental hygienists who are members of BCDHA. Therefore, it was decided to approach the CDHBC for a mailing list of dental hygienists. Permission to contact registered dental hygienists in northern British Columbia by mail was obtained from the College of Dental Hygienists of British Columbia in October, 1995 (see Appendix B for the written statement of permission). The mailing labels were provided by the CDHBC.

### Study Population

The study population for this research consisted of the 130 dental hygienists in northern British Columbia registered with CDHBC. For the purposes of this survey, northern British Columbia was identified as the districts of Northwest, Prince George, and Peace River as defined by the College of Dental Hygienists of British Columbia (see Figure 1). These are the same northern districts as defined by the previous licensing body, the College of Dental Surgeons of British Columbia. This is also the region that is identified as the northern component of the British Columbia Dental Hygienists Association.

The geographic definition of this area is 100 Mile House and north to the Yukon Border, and from the Alberta border to the Queen Charlotte Islands. There are two major highways that travel north to south and east to west in this area. Extreme weather conditions during the winter makes road, air and ferry travel time consuming, at times unpredictable, and even dangerous. The economy in the northern region is primarily resource based. As of the 1991 Census, the total population for northern British Columbia was 319,953 (Statistics Canada). The largest city in this area is Prince George which had a population of 69,653 at the time of the 1991 Census (Statistics Canada). The 1996 population of Prince George is approximately 75,000 (personal communication with Prince George City Hall, April 22, 1996).

Figure 1

CDHBC Registration Districts  
Which are Subdivisions of  
Electoral District 1

North West District

- Burns Lake
- Houston
- Smithers
- The Hazeltons
- Terrace
- Kitimat
- Prince Rupert
- Queen Charlottes
- Stewart
- Bella Coola

Peace River District

- Tumbler Ridge
- Chetwynd
- Dawson Creek
- Fort St John
- Fort Nelson

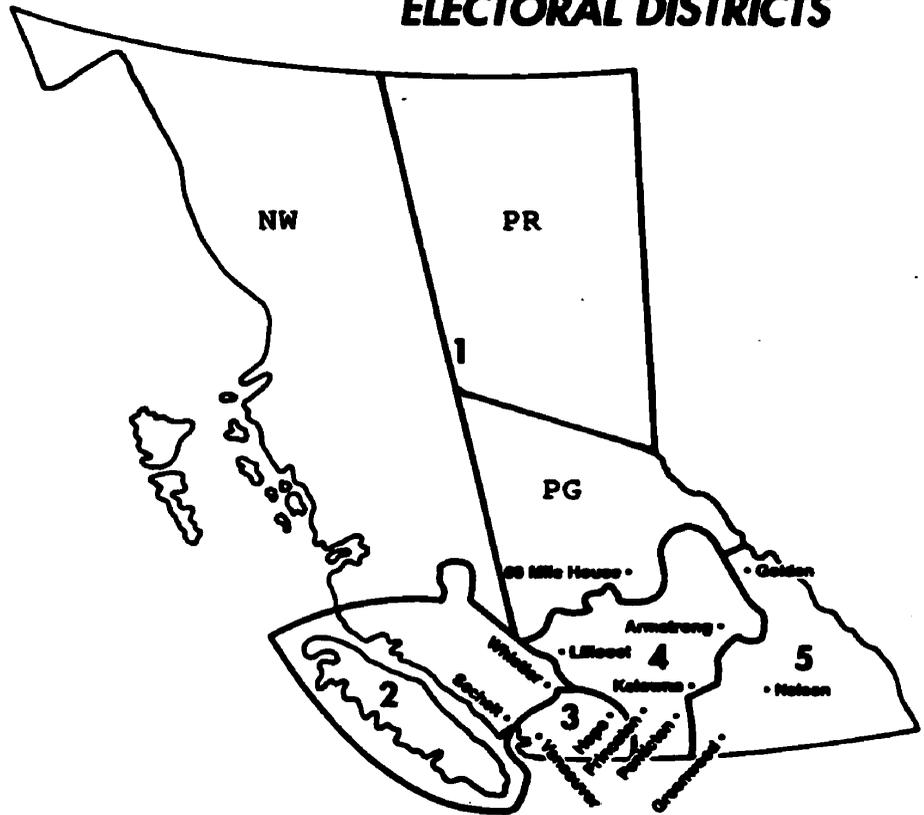
Prince George District

- Mackenzie
- Fort St. James
- Fraser Lake
- Vanderhoof
- Prince George
- McBride
- Valemont
- Quesnel
- Williams Lake
- 100 Mile House

COLLEGE OF DENTAL HYGIENISTS OF BRITISH COLUMBIA

**SCHEDULE "A"**

**BRITISH COLUMBIA  
ELECTORAL DISTRICTS**



**LEGEND**

- 1 - CARIBOO NORTH**
- 2 - VANCOUVER ISLAND/COAST**
- 3 - LOWER MAINLAND**
- 4 - OKANAGAN**
- 5 - KOOTENAYS**

## Research Design

The design was a cross-sectional, descriptive study. A questionnaire for self-administration was developed by the author during August, September, and October of 1995 and designed for coded data entry. The survey consisted of three sections: (a) demographics with 16 closed ended questions; (b) response to the 1993 CDA fluoride guidelines with nine closed-ended, and one open-ended questions; and, (c) information seeking practices with five Likert-type scale design questions, two closed-ended questions, and two open-ended questions. (See Appendix C for copy of questionnaire and cover letter.)

Participants were also asked if they would be willing to participate in further discussion of the issues by telephone. If willing, they were asked to give their name and telephone number and sign a consent form included with the mail questionnaire. This was strictly voluntary and all further information obtained by telephone was to be kept strictly confidential. However, it was not necessary to contact respondents by telephone due to the acceptable response rate by mail (81.5%).

On October 25, 1995, the proposal was submitted to the UNBC Research Ethics Committee. Approval for the study was granted on November 28, 1995 (see Appendix D).

To help ensure validity of the questionnaire, a pilot study was conducted. Pilot testing of the questionnaire was conducted on a convenience sample of seven dental hygienists in parts of the province other than the north. The questionnaire was mailed on November 16, 1995 to eight practising dental hygienists with an explanation of the purpose of the pilot test and instructions for participation. Participants were asked to read the cover letter that would accompany the survey, complete the survey and

participate in a follow-up phone call. Phone contact was made by this investigator with seven of the eight dental hygienists between November 28 and December 3, 1995. The eighth dental hygienist was not contacted as a correct phone number could not be obtained for that person.

Information was sought on the appearance and layout of the questionnaire, length of time to complete the questionnaire, and clarity of instructions and questions.

Completing the questionnaire took an average of thirty minutes for the seven pilot study participants. Feedback on the cover letter and questionnaire was positive. Several suggestions were made for slight layout changes and clarification of a few questions.

The seven dental hygienists involved with the pilot test were asked to mail their completed surveys back to the investigator. The data from the pilot study surveys was not utilized in the actual study. The thesis committee was notified of the pilot study results and subsequent modifications to the questionnaire.

Three sets of mailing labels were obtained from the CDHBC in December, 1995. Since December would not be a good month for mailing out a survey, it was decided to wait until January, 1996. The first mailing took place on January 8, 1996 and consisted of a cover letter, questionnaire, and a stamped, self-addressed reply envelope.

Subjects were informed that the questionnaire had been numbered for the purposes of checking responses, but that all responses would remain anonymous and confidential.

A two week deadline (January 24, 1996) was given in the cover letter for returning the survey. A reminder postcard to all potential participants was mailed on January 15, 1996.

The response rate for the first mailing was 71 per cent (93 out of 130). Two were returned as non-deliverable. On January 30, 1996 a second mailing was sent to the 35

non-respondents, consisting of a cover letter, survey and stamped self-addressed return envelope. One was returned as non-deliverable. The second mailing produced thirteen more responses, giving a total return rate of 81.5 per cent (106 out of 130). Response by CDHBC district is shown in Table 1.

Table 1

Number of Respondents by CDHBC District

CDHBC District	Total Number of Dental Hygienists	Frequency of Responses	Per cent Response
Northwest	38	29	76.3%
Peace River	12	10	83.0%
Prince George	<u>80</u>	<u>67</u>	<u>83.7%</u>
Total	130	106	81.5%

While developing the questionnaire, it was determined that it would be helpful to have a method of identifying the district the respondent was from without infringing upon anonymity. Asking respondents to indicate their community or town would have jeopardized the promise of anonymity as there are a number of northern communities with only a few dental hygienists. Although most respondents would probably not know which CDHBC district they were in, it was speculated that they would be able to identify their health unit region. Although the health units regions do not exactly match the CDHBC districts, this would permit an assessment of response by geographic area.

(See Figure 2 for a map of British Columbia Health Units.) Table 2 presents the response of dental hygienists by health units.

Table 2

Number of Respondents by Health Units

Health Unit	Frequency of Responses	Per cent Response
Northern	53	50.0
Skeena	24	22.6
Peace River	7	6.6
Cariboo	18	17.0
did not know	<u>4</u>	<u>3.8</u>
Total	106	100.0

Figure 2

Health Regions of Interest for Thesis

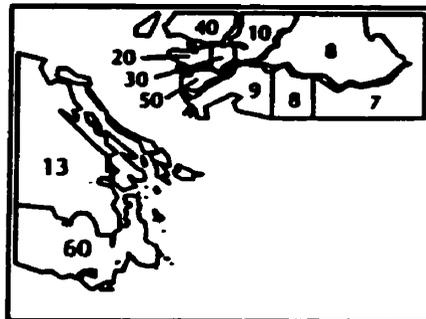
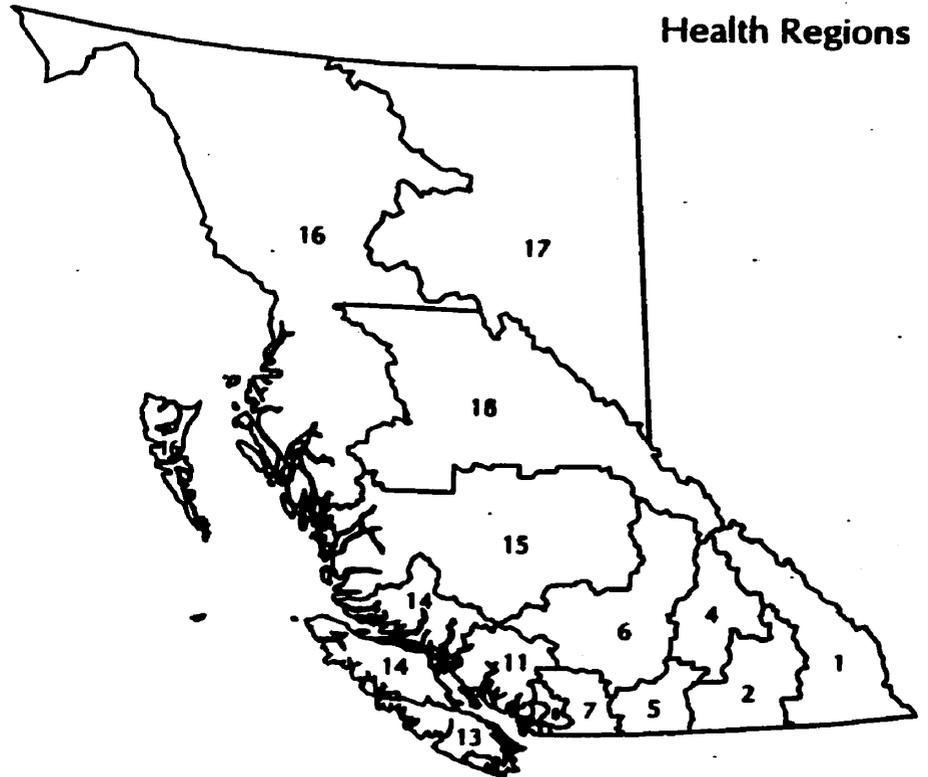
British Columbia  
Health Regions

15 Cariboo  
100 Mile House  
Williams Lake  
Quesnel  
Bella Coola

16 Skeena  
Queen Charlottes  
Prince Rupert  
Stewart  
Kitimat  
Terrace  
The Hazeltons  
Smithers  
Houston

17 Peace River  
Tumbler Ridge  
Chetwynd  
Dawson Creek  
Fort St John  
Fort Nelson

18 Northern Interior  
Mackenzie  
Fort St James  
Burns Lake  
Fraser Lake  
Vanderhoof  
Prince George  
McBride  
Valemont



HEALTH REGIONS

- |                              |                               |
|------------------------------|-------------------------------|
| 1. East Kootenay             | 14. Upper Island              |
| 2. Central Kootenay          | 15. Cariboo                   |
| 4. North Okanagan            | 16. Skeena                    |
| 5. South Okanagan            | 17. Peace River               |
| 6. South Central             | 18. Northern Interior         |
| 7. Upper Fraser Valley       | 20. Vancouver                 |
| 8. Central Fraser Valley     | 30. Burnaby                   |
| 9. Boundary                  | 40. North Shore               |
| 10. Simon Fraser             | 50. Richmond                  |
| 11. Coast Caribaldi          | 60. Capital Regional District |
| 13. Central Vancouver Island |                               |

Prepared by: Health Economics & Planning Branch, Ministry of Health & Ministry Responsible for Seniors  
Map Source: CSIR, Ministry of Government Services

In order to enhance the response rate, a statement of endorsement of the study was sought from BCDHA. An article about the study was also submitted to OUTLOOK, the quarterly publication of the British Columbia Dental Hygienists Association. The article was submitted in time for the Winter publication which was scheduled for a mid-January release. The article was accepted for the Winter issue and a statement of endorsement was given by the Executive Council of BCDHA and included with the article. The impact of the article in the OUTLOOK Winter issue on the response rate is not known.

#### Data Analysis

The Statistical Package for the Social Sciences (SPSS) for Windows, version 6.1, was used for data analysis. Data analysis included the calculation of descriptive statistics and cross-tabulations.

## Chapter Four

### Results

The objectives of the research were to: (a) investigate the information needs and access for dental hygienists in northern British Columbia, (b) learn how they accessed information on the 1993 CDA fluoride guidelines, (c) determine the response of this group to the 1993 CDA fluoride guidelines, (d) explore if there were any differences between the responses by health unit region or graduation year range, and (e) describe the characteristics of northern British Columbia dental hygienists.

#### Dental Hygienists in the North

The study population for this study consisted of one hundred and thirty dental hygienists in northern British Columbia. The total response rate was 81.5 percent (106 out of 130). Of the 106 respondents, 102 were females (96.2%) and 4 were males (3.8%). The age range for the study population was from 22 to 49 years old, with a mean age of 33 years.

Table 3

#### Age Categories of Northern British Columbia Dental Hygienists

Range	n	Per cent
20-29 years	35	33.0
30-39 years	52	49.1
40-49 years	19	17.9
Total	106	100.0

The range of years for graduation from dental hygiene school was 1966 to 1995.

Table 4 shows the range of dental hygiene graduation years for respondents. Although the average age of the northern dental hygienist is 33 years, in terms of experience, the majority of northern dental hygienists are young practitioners. Table 4 shows that out of 106 respondents, 62 (58.5%) have less than 5 years of practice experience and, furthermore, 86 (81%) have less than 10 years of experience.

Table 4

Northern British Columbia Dental Hygienists' Graduation Year Ranges  
From Dental Hygiene School

Range	n	Per cent
1966-70	4	3.8
1971-75	6	5.7
1976-80	4	3.8
1981-85	6	5.7
1986-90	24	22.6
1991-95	<u>62</u>	<u>58.5</u>
Total	106	100.0

For many years there has been a perceived shortage of dental hygienists in British Columbia, especially in the north. As of March 15, 1987, there were 24 licensed dental hygienists in northern British Columbia with five in the Northwest district, three in the Peace River district and 16 in the Prince George district (telephone communication with Sarah Barwick, Administrator for CDHBC, March 18, 1996). The last ten years have seen a rapid growth in the number of licensed dental hygienists in northern British Columbia.

Dental hygienists currently practising in northern British Columbia have come from a variety of programs. However, it is clear from Table 5 that the dental hygiene program at the College of New Caledonia has provided the majority of dental hygiene practitioners, 51 (48.1%) in northern British Columbia. This is followed by 13 (12.3%) of the respondents from the University of Alberta and 10 (9.4%) from dental hygiene schools in the United States. Out of the 106 respondents only 17 report holding degrees beyond the dental hygiene diploma or associate degree. Of those 17, 16 (16.8%) have a Bachelors degree and one (1.1%) has a Masters degree.

Table 5

**Northern British Columbia Dental Hygienists' Schools of Dental Hygiene Graduation**

School	n	Per cent
College of New Caledonia	51	48.1
University of Alberta	13	12.3
U.S. schools	10	9.4
University of British Columbia	7	6.6
Ontario schools	7	6.6
Camosun	5	4.7
Vancouver Community College	5	4.7
University of Manitoba	4	3.8
Dalhousie University	2	1.9
Wascana	1	.9
Canadian Forces	<u>1</u>	<u>.9</u>
Total	106	100.0

A majority of the respondents, 92 (86.8%) stated that they were members of the British Columbia Dental Hygienists Association. Fourteen (13.2%) are not members of the professional association. The membership chair of BCDHA was contacted by

phone on March 4, 1996 to enquire whether these numbers correspond to its membership figures for the North. According to BCDHA, the percentage of northern dental hygienists who are members is 83%. The actual BCDHA figures on numbers of dental hygienists in the northern component vary from CDHBC since they include student members.

The current employment situation of this study population was 94 (88.7%) working and 12 (11.3%) not employed. Of the 12 not employed, three specified that they were on maternity leaves. Dental hygienists may be employed in more than one type of practice settings. Respondents were asked to check all their employment settings. Table 6 shows that the majority of respondents, 86 (81.1%), are working in private practice. Of those 86 respondents, 62 (58.5%) are working in one private practice office, and 24 (22.6%) are employed in two or more private practice offices. Seven (6.6%) are employed in public health, nine (8.5%) in education, and none in sales. For the "other" category, one reported working part-time in a hospital setting for a half day a week.

Table 6

Employment Settings for Northern British Columbia Dental Hygienists

Employment setting	n	average # of days per week	S.D.
private practice	86	3.24	1.55
public health	7	0.27	1.03
education	9	0.26	1.03
sales	0	0.00	0.00
other	1	0.01	0.05
n=96			

When asked about breaks in dental hygiene employment, 63 (59.4%) reported having no major breaks in dental hygiene employment. Twenty (18.9%) have had less than one year break in dental hygiene employment, 20 (18.9%) have had from one to three years break in employment. Only two (1.9%) have had a break in employment for four to six years and one (.9%) reported a longer break. These numbers would seem consistent with a workforce that has recently entered the field, even though it is dominated by women in childbearing years.

The questionnaire was designed to explore the study population's sense of geographic and practise isolation. Some dental hygienists in northern British Columbia may live and practise in smaller communities where there are either no or very few other dental hygienists in the area. Physical distance from other dental hygienists and professional activities could lead to a sense of geographic isolation. When asked if they feel they are practising in geographic isolation, 50 (53.25) dental hygienists answered "no" and 44 (46.8%) answered "yes".

Unlike medical health care professionals, dental professionals often practise in solo private practice offices. Typically, the dental office will employ only one dental hygienist. This lack of daily communication with other dental hygienists while actually in the employment setting could lead to a sense of practise isolation. When asked if respondents consider they are in an isolated practise setting, 75 (79.8%) answered "no" and 19 (20.2%) answered "yes".

Health unit regions were cross-tabulated with geographic isolation and practise isolation responses. Table 7 shows that overall the sense of geographic isolation is greater than the sense of practise isolation for dental hygienists in all the health unit regions. Table 7 also shows that more dental hygienists in the Skeena and Peace River

health unit regions experience a sense of geographic isolation compared to those in the Northern Interior and Cariboo health unit regions.

Table 7

**Sense of Geographic and Practise Isolation for Northern British Columbia Dental Hygienists by Health Unit Region**

Health Unit Region	<u>Geographic Isolation</u>		<u>Practise Isolation</u>	
	No	Yes	No	Yes
Northern Interior	38	10	44	4
Skeena	3	17	13	7
Peace River	0	6	3	3
Cariboo	9	8	13	4
Do Not Know Health Unit	0	3	2	1

The questionnaire asked if other hygienists are employed where the respondent works, 68 (72.3%) responded "yes" and 26 (27.7%) responded "no". Eighty-nine (94.7%) reported that there were other dental hygienists who practise in their community. The results also found that 27 (29%) respondents have professional discussions with other dental hygienists on a daily basis, 27 (29%) on a weekly basis, 31 (33.3%) on a monthly basis and 8 (8.6%) on a yearly basis. These findings show that the majority of dental hygienists in northern British Columbia have fairly regular contact with other dental hygienists. This corresponds with the finding of a lower sense of practise isolation by respondents than was expected by this investigator.

The respondents were asked about their computer skills and computer access. In terms of skills, 42 (39.6%) reported little or no computer skills, 44 (41%) reported use of computers for games and entertainment, 64 (60.4%) reported word processing ability, but only 18 (17%) reported use of spread sheets, nine (8.5%) can navigate the Internet and only one (.9%) can programme. The figures for computer access is similar, 59 (55.7%) have access to a computer with a fax modem, 37 (34.9%) to a CD-Rom, 30 (28.3%) have access to an e-mail account, 26 (24.5%) to the Internet and 37 (34.9%) report no access to any of the above.

### Summary

The dental hygiene workforce in northern British Columbia is dominated by females in their twenties and thirties. The workforce is also young in terms of work experience with 58.5% having graduated within the last five years. The primary form of employment for dental hygienists in the north is in private practice. Presently, there is a high employment rate of registered dental hygienists. A large proportion of dental hygienists in northern British Columbia belong to the professional association on a voluntary basis. There is a significant sense of geographic isolation for dental hygienists in the Skeena and Peace River geographic areas. Dental hygienists in northern British Columbia do not exhibit advanced computer skills. The majority also lack access to computer services such as e-mail and the Internet which inhibits their ability to access current information.

### Information Seeking Patterns

This section of the questionnaire was designed to investigate the information seeking methods and information needs of the study population. The first three questions listed

various information sources with a degree of use scale. A Likert-type rating scale assessed the range of use from 1 (daily) to 5 (never used).

Table 8 shows that the most frequently used information source in this section by dental hygienists was discussion with colleagues on a daily or weekly basis. This would correspond with the earlier finding that there is often more than one dental hygienist in an employment setting. Thirty-five (33%) indicated they participate in a literature review study club on a monthly basis. This corresponds with the number of members in the literature review study club based in Prince George. The other information sources listed in Table 8 are primarily used on an occasional or never basis.

Table 9 shows the utilization of printed information sources by northern British Columbia dental hygienists. Respondents reported journal articles are used most frequently. However, the journal articles that are read must be from personally subscribed journals or other sources that are readily available, as the Dental Index to the Literature and other health care literature indices are seldom used. Fifty-three (53%) indicated they never use the Dental Index to the Literature and 76 (75.3%) have never used any other indices to the literature. Mailings from the professional association and licensing bodies are a well utilized information source on a monthly or occasional basis. This would correspond with the fact that most of these mailings are on a monthly or quarterly basis.

Table 8

**Northern British Columbia Dental Hygienists' Utilization of Information Sources**

Information Sources	<u>Frequency</u>					$\bar{X}$
	Daily (1)	Weekly (2)	Monthly (3)	Occasion (4)	Never (5)	
	%	%	%	%	%	
Discussion with colleagues ( $n=106$ )	27.4	34.0	21.7	17.0	0.0	2.3
CE lecture courses ( $n=102$ )	0.0	0.0	12.7	86.3	1.0	3.88
Professional meetings or conventions ( $n=106$ )	0.0	0.0	11.3	84.0	4.7	3.93
Discussions with sales representatives ( $n=106$ )	0.0	0.9	13.2	49.1	36.8	4.2
Contact with hygiene program ( $n=106$ )	3.8	3.8	3.8	47.2	41.5	4.2
Literature review study club ( $n=106$ )	0.0	0.0	33.0	13.2	53.8	4.21
Educational video programs ( $n=106$ )	0.0	0.0	1.9	63.2	34.9	4.33
Clinical CE courses ( $n=105$ )	0.0	0.0	1.0	52.4	46.7	4.46
Clinical Study Club ( $n=105$ )	0.0	0.0	0.0	14.3	85.7	4.86

Table 9

**Northern British Columbia Dental Hygienists' Utilization of Printed Information Sources**

Printed Information Sources	<u>Frequency</u>					$\bar{X}$
	Daily (1)	Weekly (2)	Monthly (3)	Occasion (4)	Never (5)	
	%	%	%	%	%	
Journal articles ( $n=106$ )	1.9	6.7	48.6	39.0	3.8	3.4
Mailings from professional association ( $n=106$ )	0.9	1.9	54.7	41.5	0.9	3.4
Mailings from license body ( $n=106$ )	0.9	0.9	42.5	54.7	0.9	3.5
Textbooks ( $n=106$ )	2.8	7.5	30.2	52.8	6.6	3.5
Product literature ( $n=104$ )	0.0	3.8	23.1	66.3	6.7	3.8
Research abstract services ( $n=104$ )	0.0	1.9	24.0	49.0	25.0	4.0
Dental Index to Literature ( $n=100$ )	0.0	0.0	11.0	36.0	53.0	4.42
Other Indices ( $n=101$ )	0.0	0.0	5.0	19.8	75.2	4.70

Of particular interest is the very low usage of electronic or computer information services by dental hygienists. Table 10 indicates that while a few have utilized e-mail, the vast majority of respondents indicated they have never accessed the Internet,

Medline or CINAHL by CD-Rom, or Grateful Med or Carl Uncover for information or recent literature.

Table 10

**Northern British Columbia Dental Hygienists' Utilization of Electronic Information Sources**

Electronic Information Sources	<u>Frequency</u>					$\bar{X}$
	Daily (1) %	Weekly (2) %	Monthly (3) %	Occasion (4) %	Never (5) %	
E-mail (n=106)	3.8	3.8	0.9	9.4	82.1	4.6
Internet (n=105)	0.0	0.0	1.0	5.7	93.3	4.92
Medline (n=105)	0.0	0.0	0.0	1.0	99.0	4.99
CINAHL (n=105)	0.0	0.0	0.0	1.0	99.0	4.99
Grateful Med (n=105)	0.0	0.0	0.0	0.0	100.0	5.0
Carl Uncover (n=105)	0.0	0.0	0.0	0.0	100.0	5.0

The study population was then asked to indicate the helpfulness of the various information sources in keeping up to date in dental hygiene practice. These questions were also of a Likert-type design with a scale of 1 (very helpful) to 5 (not helpful) and 6 (never used). Interestingly, the totals in the "never used" category of the helpfulness

questions did not match the totals of the "never used" category in questions on the utilization of information sources. When answering this section, respondents may have never used a method but still thought that it could be a helpful source of information.

The "never used" category was dropped for data analysis of these questions.

Table 11 indicates that, overall, professional meetings, discussions with colleagues, and continuing education lecture courses are perceived as the most helpful information sources. Discussions with sales representatives are considered to be the least helpful information source. Table 12 indicates that reading journal articles are perceived as the most helpful information source. The next two most helpful methods are mailings from the professional associations and licensing bodies. Reading product literature is considered to be the least helpful in keeping up to date in dental hygiene practise.

With respect to the helpfulness of electronic or computer information sources, the vast majority of respondents indicated they had never used these methods. Out of 105 responses, 89 (84.4%) had never used e-mail. Out of 104 responses, 94 (90.4%) had never used dental conferences on the Internet, 101 (97.1%) have never used the CD-Rom versions of Medline or CINAHL and 102 (98.1%) have never used Grateful Med or Carl Uncover. Those that had tried e-mail are divided on how helpful they consider it as an information source. The few that had tried other methods do consider them to be helpful.

Table 11

**Northern British Columbia Dental Hygienists' Ranking of Helpfulness of Information Sources**

Information Source	<u>Degree of Helpfulness</u>					$\bar{x}$
	Very Helpful (1)	Helpful (2)	Neutral (3)	Little Help (4)	Not Helpful (5)	
	%	%	%	%	%	
Professional meetings (n=103)	57.3	26.2	10.7	5.8	0.0	1.7
Discussions with colleagues (n=105)	48.6	31.4	16.2	3.8	0.0	1.8
CE lecture courses (n=100)	43.0	48.0	8.0	1.0	0.0	1.7
CE clinical courses (n=62)	51.6	33.9	8.1	6.5	0.0	1.7
Literature review study club (n=64)	39.1	20.3	23.4	12.5	4.7	2.2
Contact with hygiene program (n=74)	29.7	28.4	20.3	14.9	6.8	2.4
Educational videos (n=75)	14.7	36.0	28.0	18.7	2.7	2.6
Clinical study club (n=35)	31.4	28.6	5.7	28.6	5.7	2.5
Discussions with sales reps (n=80)	1.3	7.5	38.8	42.5	10.0	3.5

Table 12

**Northern British Columbia Dental Hygienists' Ranking of Helpfulness of Printed Information and Electronic Sources**

Information Sources	<u>Degree of Helpfulness</u>					$\bar{X}$
	Very Helpful	Helpful	Neutral	Little Help	Not Helpful	
	(1)	(2)	(3)	(4)	(5)	
	%	%	%	%	%	
Journal articles (n=102)	39.2	43.1	16.7	1.0	0.0	1.9
Professional association mailings (n=103)	37.9	39.8	17.5	4.9	0.0	1.9
License body mailings (n=104)	36.5	39.4	18.3	5.8	0.0	1.9
Textbooks (n=96)	33.3	30.2	24.0	11.5	1.0	2.2
Research abstract Services (n=78)	32.1	39.7	20.5	7.7	0.0	2.0
Dental Index to Literature (n=54)	25.9	20.4	35.2	13.0	5.6	2.5
Product literature (n=101)	12.9	23.8	33.7	26.7	3.0	2.8
Other Indices (n=44)	20.5	20.5	36.4	15.9	6.8	2.7
E-mail (n=16)	18.8	37.6	12.5	18.8	12.5	2.7
Dental conferences on Internet (n=10)	10.0	30.0	30.0	30.0	0.0	2.8

In order to determine what might be useful information sources for this study population, it was necessary to identify perceived barriers to accessing information. A Likert-type design question allowed respondents to rate various barriers from 1 (high) to 5 (low). As shown in Table 13, the top three barriers identified were geographic isolation, lack of electronic information sources, and costs. Lack of journals and lack of access to library services were generally considered to be low barriers to accessing information.

Respondents were asked to indicate how the professional association, the licensing body and educational institutions should allocate resources to improve access to information. Respondents could check more than one answer. The three most commonly preferred methods were: supply packages of references and journal articles, supply research abstracts, and offer continuing education courses on how to access information. The formation of an e-mail study club or discussion groups were least preferred. Those that checked the other category indicated that they wanted more continuing education courses brought to their area. The choices indicate in Table 14 reflect the general lack of computer skills by the study population.

Table 13

**Northern British Columbia Dental Hygienists' Ranking of Barriers to Information Access**

Potential Barrier	Perception of Barrier					$\bar{X}$
	Very High (1)	High (2)	Medium (3)	Low (4)	Very Low (5)	
	%	%	%	%	%	
Geographic isolation ( $n=105$ )	37.1	21.9	22.9	5.7	12.4	2.3
Lack electronic information sources ( $n=104$ )	39.4	16.3	13.5	9.6	21.2	2.6
Costs ( $n=104$ )	19.2	30.8	26.0	14.4	9.6	2.6
Time ( $n=105$ )	18.1	24.8	29.5	18.1	9.5	2.8
Shortage of CE courses ( $n=104$ )	24.0	17.3	33.7	13.5	11.5	2.7
Lack of study club ( $n=104$ )	27.9	8.7	12.5	7.7	43.3	3.3
Lack of computer skills ( $n=105$ )	22.9	10.5	25.7	11.4	29.5	3.1
Lack of library services ( $n=105$ )	20.0	12.4	19.0	8.6	40.0	3.4
Practice isolation ( $n=99$ )	15.2	13.1	32.3	9.1	30.3	3.3
Lack of research analysis skills ( $n=105$ )	9.5	13.3	31.4	21.9	23.8	3.4
Lack access journal articles ( $n=105$ )	10.5	4.8	21.9	16.2	46.7	3.8
Other barriers ( $n=9$ )	33.3	11.1	22.2	11.1	22.2	2.8

Table 14

**Information Methods that Northern British Columbia Dental Hygienists Would Prefer to Have Developed**

Method	n
Supply packages of references and journal articles	94
Supply research abstracts	60
CE on how to access information	52
CE courses by teleconference	50
CE on computer skills	47
Formation of DH Home Page on the Internet	39
Formation of e-mail informal discussion group	29
Formation of e-mail study club	26
Other	11

When asked to make a number one choice from all of the above, the respondents again indicated their preference of supplying packages of references and journal articles on a topic. Continuing education courses on computer skills and continuing education courses by teleconference were the second and third choices in that order.

The last two questions in this section were open-ended which gave respondents an opportunity to comment on accessing information and on the mandatory continuing education system for dental hygiene re-licensure in British Columbia. Sixty-nine respondents made comments to either one or both of these open-ended questions. There was overlap in the comments made to both questions. One reason for the overlap could be the order of physical appearance of the questions. The question asking for comments on accessing information was at the bottom of page nine.

Respondents may have answered before turning the page and seeing the next question specifically on continuing education. Another factor could be that dental personnel are so ingrained to perceiving continuing education courses as their primary method of accessing information that they may not be able to separate the two concepts. The responses to these two questions were collapsed and examined for themes. The themes that emerged from the responses are discussed in Chapter Five.

### Summary

Overall, the results indicate that dental hygienists in northern British Columbia are utilizing traditional information sources. The most frequently utilized methods to obtain information are: discussions with colleagues, reading journal articles, and reading mailings from the professional association and licensing bodies. Information sources used on an occasional basis for this group include attendance at professional meetings, continuing education courses, reading textbooks, and product literature. The least utilized information sources are the indices to literature and electronic information sources. Northern dental hygienists consider professional meetings, discussions with colleagues, continuing education courses, journal articles, and mailings from the professional association and licensing body the most helpful sources of information.

Geographic isolation and lack of access to electronic information sources are considered to be the major barriers to information access. Lack of access to journal articles is the lowest barrier to information access. Dental hygienists in northern British Columbia would like to have several information sources further developed with information supplied by reference lists and packages of journal articles as their first choice.

### Response to the 1993 CDA Fluoride Guidelines

The first question in this section was a multi-item listing of possible ways to have learned about the 1993 CDA Fluoride Guidelines. Respondents were asked to check all methods that applied and several indicated more than one source of learning about the guidelines. There was also the option of checking that they were unaware of the guidelines. Five out of 106 respondents (4.7%) indicated that they were unaware of the guidelines. Three of these five respondents asked the author of this study to send the guidelines to them. Table 15 shows the most frequently checked categories were learned from CE courses, from reading journals, from mailings, discussions with colleagues, and learned while in dental hygiene program, in that order.

Table 15

#### Northern British Columbia Dental Hygienists' Methods of Learning about the 1993 CDA Fluoride Guidelines

Methods of learning	n	
CE Courses	48	
Reading Journals	48	
Mailings	44	
Discussions with colleagues	42	
Dental Hygiene program	41	
Employer	24	
Other sources	6	
Unaware of 1993 guidelines	5	
Sales representatives	1	
Dental conference on Internet	1	<b>N=106</b>

If respondents checked mailings, they were asked to identify where the mailing came from. This could be a difficult question to answer as the mailings were sent approximately three years ago. Two (1.9%) did not identify the source, two (1.9%) said

they came from the Ministry of Health, and four (3.8%) stated the mailings came from the Canadian Dental Association. Fifteen (14.2%) indicated that the mailing was from the Canadian Dental Hygienists Association. Twenty-one (19.8%) indicated that the mailings came from the College of Dental Surgeons of British Columbia. At that time the CDSBC was the licensing body of dental hygienists but did not send a direct mailing to dental hygienists. CDSBC was relying on the dentists to relay the information to the dental hygienists and dental assistants employed in their offices. Yet, only 24 (22.5%) checked that they learned about the guidelines from their employer. Five of the twenty-four respondents were employed in public health and therefore their employer is the Ministry of Health.

Since dental hygienists may have learned about the guidelines from multiple sources, they were asked to indicate the most valuable or beneficial source of information. Table 16 shows that respondents to this question indicated that their dental hygiene program, continuing education courses, and mailings were the most valuable sources of information on the guidelines. The most valuable source of learning about the fluoride guidelines while in their dental hygiene program corresponds with the earlier finding that 62 (58.5%) of the northern British Columbia dental hygienists are in the graduation year range of 1991-1995.

Table 16

**The Most Valuable Learning Sources of The 1993 CDA Fluoride Guidelines  
for Northern British Columbia Dental Hygienists**

Source	n
Dental Hygiene Program	29
CE Courses	21
Mailings	17
Discussions w/colleagues	8
Reading Journals	7
Employer	6
Other	1
	<b>n=89</b>

The study population was asked how the 1993 CDA fluoride guidelines had changed their daily practice. Table 17 indicates the respondents have responded to the guidelines with changes in their clinical practice. The majority have made changes in their daily practice in terms of discussions with patients, oral hygiene instructions, recommendation of fluoride supplements and to whom they give in-office fluoride treatments, in that order. No significant differences in responses were found by either health unit region or graduation year range.

**Table 17**  
**Practice Changes By Northern British Columbia Dental Hygienists as a Result of the 1993 CDA Fluoride Guidelines**

Area of Practice	Yes %	No %
Discussions with patients on fluorides (n=97)	90.7	8.2
OHI on use of fluorides (n=95)	80.0	20.0
Fluoride supplements (n=92)	76.1	23.9
In-office fluoride application (n=92)	65.2	34.8

The next question addressed changes in opinions about fluorides as a result of the guidelines changes. Table 18 shows that, while the majority of respondents have changed their opinions about who should receive fluoride and concern about fluorosis, they have not changed their opinion about the effectiveness of fluorides or water fluoridation. This corresponds with the guidelines which recommend changes in who should be receiving fluorides based on the underlying concern of a rising prevalence of fluorosis. However, the 1993 CDA guidelines reaffirm the effectiveness and continued use of water fluoridation for caries reduction. No significant differences in responses were found by either health unit region or graduation year range.

Table 18

**Opinion Changes About Fluorides by Northern British Columbia Dental Hygienists as a Result of the 1993 CDA Fluoride Guidelines**

Opinion	Yes %	No %
Who Should Receive Fluoride ( <u>n</u> =104)	85.6	14.4
Concern about Fluorosis ( <u>n</u> =101)	71.3	28.7
Effectiveness of Fluorides ( <u>n</u> =97)	18.6	81.4
Water Fluoridation ( <u>n</u> =97)	10.3	89.7

The 1993 CDA fluoride guidelines have not been adopted across Canada. As described in Chapter One, the guidelines have not progressed through Health Canada and the Canadian Paediatric Society still follows the older guidelines when prescribing fluoride supplements. Two of the questions looked for dental hygienists' knowledge in this area. When asked if the Health Canada has accepted the guidelines, 80 (75.5%) indicated that they did not know, 19 (17.9%) said "yes" and six (5.7%) said "no" (N=106). When asked if the Canadian Paediatric Society has accepted the guidelines, 90 (84.9%) did not know, six (5.7%) said "yes" and nine (8.5%) said "no" (N=106). Since the Canadian Paediatric Society is still following the older fluoride supplement dosage schedule, this is an area of potential confusion for patients. The general public

may receive conflicting information from their medical doctor and dental office on the recommended dosage of fluoride supplements.

It is a challenge for dental professionals to remain current in the recommended usage of fluoride since fluorides come in many forms and the knowledge base continues to change. The respondents were asked in what areas of fluoride they needed more information and they could check more than one area. The three most frequently checked areas were fluoride supplements, fluoride safety, and self applied fluorides. The results in Table 19 give guidance to the development of future continuing education courses.

Table 19

Northern British Columbia Dental Hygienists' Need for More Information on Fluorides

Need more information	n
Fluoride supplements	46
Fluoride safety	37
Self applied fluorides	36
Fluorosis	32
Types of fluoride	30
Effectiveness of fluoride	30
In office fluorides	28
Water fluoridation	17
Other	8
<b>N=106</b>	

The study population was asked how often they receive questions from patients about fluorides and what concerns patients express regarding fluorides. Interestingly, 83 (79.8%) of the respondents are asked about fluorides by patients less than three times a week. Seventeen (16.3%) are asked four to six times a week and only four

(3.8%) are asked seven to nine times a week (n=104). Patients who do ask questions are concerned about the topics listed in Table 20.

Table 20

**Patient Concerns about Fluorides As Reported by Northern British Columbia Dental Hygienists**

Patient Concerns	n
Fluoride Safety	82
Fluoride Effectiveness	66
Fluoride Supplements	59
Fluorosis	56
Water Fluoridation	45
Types of Fluorides	13
Other concerns	9
<b>n=104</b>	

The last question in this section of the survey was an open-ended opportunity for respondents to make comments regarding the 1993 CDA fluoride guidelines and their effect on clinical practice. A low response to this question was expected. Nevertheless, 35 respondents took the opportunity to comment. Responses covered a broad range of ideas and concerns that are discussed in Chapter Five.

**Summary**

While there are concerns and questions about the 1993 CDA fluoride guidelines, the guidelines have had an impact on the clinical practice and opinions of dental hygienists in northern British Columbia. The changes in practice and opinions seem to correspond with the major changes in the 1993 CDA guidelines on fluoride supplements and who should be receiving fluorides. However, there is still a need for more information

regarding fluorides to be directly disseminated to dental hygienists in northern British Columbia. According to the respondents, patients in northern British Columbia do not seem to be overly concerned about fluoride. However, it is important that dental hygienists are able to accurately address the patient concerns and questions that do occur. The majority of dental hygienists in northern British Columbia are not aware of the response of other organizations to the 1993 CDA fluoride guidelines. Therefore, they are not aware of the potential for conflicting information to be given to the general public.

## Chapter Five

### Discussion and Implications

The purpose of this research was to determine the information needs and information-seeking methods of dental hygienists in northern British Columbia. The 1993 CDA fluoride guidelines offered an opportunity to determine how a group of health professionals, specifically dental hygienists, obtained and incorporated revised information into practice. The results of this exploratory study show that the majority of respondents have obtained the information and incorporated it into their clinical practice. However, the findings reveal that this group has difficulties with accessing information and has many questions about fluorides and the 1993 CDA fluoride guidelines. Explanations for the findings are offered.

#### Dental Hygienists in the North

The recent growth in the number of dental hygienists in northern British Columbia appears to be eliminating the perceived historical shortage of the profession in this region. In 1987 there were 24 licensed dental hygienists in the northern part of British Columbia (personal communication with Sarah Barwick, Administrator for CDHBC, March 18, 1996). As of January, 1996 there were 130 licensed dental hygienists in the same geographic areas (number supplied by CDHBC). A contributing factor to this rapid growth is undoubtedly the establishment of a dental hygiene program in Prince George at the College of New Caledonia (CNC). The program started in 1987 with the first graduating class in 1989. Although, not all CNC dental hygiene graduates have

stayed in the North, the percentage of study respondents who graduated from CNC reflects the influence of establishing a dental hygiene program in the North.

Other benefits to the development of the dental hygiene profession have occurred from the establishment of a dental hygiene program in the North. Faculty and graduates from the CNC dental hygiene program have been instrumental in the establishment of the Northern British Columbia Dental Hygienists Society (NBCDHS), a local component of the British Columbia Dental Hygienists Association (BCDHA). Graduates of the CNC program started a literature review study club and faculty have served as mentors for the study club which is based in Prince George. Dental continuing education programs are offered at the College of New Caledonia making more continuing education credits accessible to dental hygienists in the North.

Historically, the majority of dental hygienists in northern British Columbia felt isolated compared to their counterparts in the Lower Mainland, due in part to the few numbers of dental hygienists in northern British Columbia. This study shows that the feeling of isolation is changing. Dental hygienists in the Northern Interior Health Unit region have little sense of geographic isolation compared to dental hygienists in the other three health unit regions. The growth in numbers of dental hygienists and of professional activities have probably influenced this change of attitude.

Dental hygienists in the Cariboo Health Unit have less sense of geographic isolation than those in the Skeena and Peace River Health Units. This may be partially due to the fact that they can take better advantage of the professional opportunities in Prince George. The majority of dental hygienists in the Cariboo are only one to three hours drive from Prince George. However, those in the Skeena or Peace River Health Unit regions would have to make a five to eight hour drive, one way, to participate in

professional activities in Prince George. During the winter, driving to Prince George becomes more difficult and the expense of airfare also inhibits their ability to travel.

Membership in a professional association has many benefits, especially as an information source for those practicing in more remote locations. While BCDHA has always enjoyed a relatively high voluntary membership, January and February 1996 saw a further increase in membership. Both the membership chair and executive director of BCDHA speculate that this increase corresponds with the current licensing renewal cycle (personal communications with Nancy Sewell and Cindy Ewan, March 4, 1996). The College of Dental Hygienists of British Columbia (CDHBC) now requires proof of malpractice insurance as a part of licensure. One way of obtaining malpractice insurance is through membership in the Canadian Dental Hygienists Association (CDHA) of which BCDHA is a provincial component. Although CDHBC has no vested interest in promoting membership in BCDHA, this serves as an illustration of how the requirements of one organization can impact on another.

#### Information Seeking Methods

The purpose of this study was to determine how dental hygienists in the North access information. The majority of dental hygienists in northern British Columbia are recent graduates with nearly 60% of respondents having graduated within the last five years. Recent graduates may not have been in practice long enough to experience and appreciate the major shifts in the dental hygiene knowledge base that have taken place. Therefore, they may not yet appreciate the importance of information access. Nevertheless, as the workforce matures, information access will become a more important issue.

One of the research questions of the study was which information sources do dental hygienists utilize and find most helpful? This study found that presently, the majority of dental hygienists in the North depend on the traditional methods of information access. Discussions with colleagues, continuing education courses, professional meetings, journal articles and mailings from the professional association and licensing bodies were identified as the most frequently utilized and helpful information sources. These findings are consistent with the literature reviewed (Bird & Heekin, 1994; Dee & Blazek, 1993; Gravois, 1993; Lundeen, et al., 1994). In a similar study on dental hygienists' information seeking and computer application practices, Gravois (1993) found that dental hygienists in Alaska, Delaware and Idaho used journals, newsletters, CE courses, and discussions with colleagues most often for professional development. She also found that this group used the following sources for information: browse journals, books and newsletters; ask a colleague; ask the dentist; and CE courses (Gravois, 1993).

In the past, continuing education courses by teleconference were available from University of British Columbia, however they were discontinued several years ago. A number of respondents suggested that teleconferences be reinstated as they have found them to be helpful information sources and accessible to those who live in smaller communities.

One information source that is easily available at a low cost to northern dental hygienists is not being fully utilized. The Northern British Columbia Literature Review Study Club is based in Prince George but it is designed for distance participation. Yet, over half of the respondents indicated that they had never participated in the study club.

Respondents to this survey show a low utilization of the Index to Dental Literature

and other literature indices. Part of the problem may be due to the limited physical location of these literature indices. A paper copy of the Index to Dental Literature and CINAHL is located at the College of New Caledonia library. Medline and CINAHL are available on CD-ROM at the University of Northern British Columbia library. The general lack of advanced computer skills could also contribute to the low utilization of the literature indices by electronic means. Another contributing factor could be a lack of familiarity with literature indices. A number of respondents commented on the questionnaire that they did not know what the Index to Dental Literature, CINAHL, and Medline were. This suggests that dental hygienists in northern British Columbia need further education and support on how to access information via the literature indices.

Similar to other health care providers (Lundeen, et. al., 1994; Meskin, 1995; Mullaly-Quijas, et al., 1994), dental hygienists lag behind in their use of computers and electronic methods for information access. Gravois (1993) found that dental hygienists have limited application of computers for information access such as on-line literature searches. This study has shown that while a number of dental hygienists in the North own or have access to computer equipment and electronic information sources, their computer skills are not very advanced. Therefore, they are not able to take full advantage of modern technology for improved information access. Nevertheless, responses to the open-ended questions on this survey, showed a growing recognition of the need to learn or improve computer skills. Several respondents commented on how increased computer literacy would enhance their access to information. Such skills could definitely help overcome geographic isolation. Several respondents suggested that the CDHBC should consider allowing continuing education credits for taking computer courses and other non-dental topics on a limited basis. Presently, the

CDHBC will only consider topics directly related to the practice of dental hygiene for continuing education points (Registrant's Handbook, 1995).

Two questions gave the respondents an opportunity to comment on information access and the mandatory continuing education system for dental hygienists in British Columbia. While there is general acceptance and approval of mandatory continuing education for dental hygiene re-licensure, northern dental hygienists, especially those outside of the City of Prince George, expressed the view that they are at a definite disadvantage due to the cost of travel, time off work, child-care while out of town, and the low availability and variety of courses. These items were identified as high to medium barriers to information access. Some respondents felt that hygienists in more "remote" locations should be on a different continuing education system than those in the lower mainland. The general consensus was that information and continuing education should be more accessible through a variety of methods and media.

Concerns and difficulties were also expressed regarding the CDHBC's approach to continuing education. Several respondents stated that there had been delays in knowing if a course was going to be accepted by CDHBC for CE credit and in receiving notification of their CE standing. Currently, CDHBC sends one letter a year to members regarding their continuing education points, the same procedure that was followed by CDSBC when they were the regulatory body of dental hygienists. Several respondents suggested that CDHBC was being overzealous in its approach to continuing education by being too restrictive in what courses they would accept for CE credit. Due to the number of phone calls that CDHBC has received over the last year, the College is already aware of some of these concerns and its Quality Assurance committee is reviewing and assessing the mandatory continuing education system for re-licensure

(comments of Nancy Harwood, Registrar of CDHBC at NBCDHS meeting, April 14, 1996).

Geographic isolation was identified as the primary barrier to information access, yet it does not need to be a barrier. There are a number of potential information sources such as the Literature Review Study Club, education video courses, literature indices, research literature abstract services, and the Internet that many of the dental hygienists in northern British Columbia have not utilized. They may find these information sources can help them overcome the barrier of geographic isolation. There is a professional obligation to learn about the options and develop the skills necessary to utilize various information sources. However, dental hygienists in the north would appreciate the support of BCDHA, CDHBC, and educational institutions in the development and utilization of new avenues of information access. As Curtis et al. (1993) stated, training sessions must be tailored to the audience and their specific needs. Education and training in the newer methods of information access could help overcome many of the barriers identified by respondents.

#### Response to the 1993 CDA Fluoride Guidelines

As shown in this study, the majority of dental hygienists in northern British Columbia did access information on the 1993 CDA fluoride guidelines. Access to this information has led this group to change their opinions about fluorides, make changes in their use of fluorides in practice, and change recommendations on fluorides to patients. Northern dental hygienists received this information from a variety of methods, but many respondents indicated that they have further questions and points of confusion about

the guidelines and proper use of fluorides. Therefore, there is still a need for continued dissemination of information on fluorides and their appropriate use for caries reduction.

The CDA 1993 fluoride guidelines stated that fluorides such as dietary supplements and in-office topical applications should be given to individuals at high risk for caries. Clark (1993, p. 277) acknowledges that ". . . difficulty arises when attempting to define high risk." Presently there is no generally accepted or accurate screening test that predicts caries risk (Clark, 1993). Therefore, prediction of caries risk is highly dependent on the knowledge and experience of practitioners (Clark, 1993). Several respondents commented that they were not comfortable identifying individuals at high risk for caries. This could be due to their lack of professional experience since nearly 60 % of the respondents have less than five years experience as dental hygienists.

With limited experience, dental hygienists are likely to be more dependent on information to help them make decisions about fluoride recommendations. This study shows that the information must be directly disseminated to dental hygienists. At this time, continuing education courses, journal articles and mailings from the professional association and licensing body seem to be the best methods to transmit information to dental hygienists in the workforce. Responses from recent graduates shows that dental hygiene programs have been successful in educating their students about the CDA 1993 fluoride guidelines.

This survey has shown that dental hygienists are unaware of the responses of other organizations to the 1993 CDA fluoride guidelines. They are also unaware of the potential for conflicting information to be given to patients by different health care providers. By not being aware of this conflict, dental hygienists may not be able to respond effectively to patient's questions.

Given the historical controversy regarding fluoride, the investigator had expected to find that dental hygienists received many questions on fluoride from their patients. However, the results suggest that general public concern about fluoride may not be as high as thought by the investigator. One must be cautious about this conclusion for two reasons. First, the information was obtained through a second party and not directly from a study of the general public. Secondly, perceptions and concerns about fluorides of people who seek dental care could be different than those of the general public. Of those patients who asked questions about fluoride, safety was the primary issue.

The last question in the section on the 1993 CDA fluoride guidelines was an open-ended opportunity for respondents to make any comments they would like regarding the 1993 CDA fluoride guidelines. The comments covered a broad range of ideas and concerns. Several themes emerged in the comments recorded for this question. First, some respondents were concerned that not all dental personnel, including dentists, dental hygienists and dental assistants were familiar with the CDA 1993 fluoride guidelines. This perception is reinforced by the fact that five of the respondents to this survey checked that they did not know about the guidelines and asked that a copy be sent to them. Similarly it is likely that other dental hygienists and dental assistants may not know about the guideline changes. The CDSBC only sent a direct mailing to dentists which gave dentists the responsibility to share the information with their employees. This method of information dissemination did not appear to be very successful with the dental hygiene respondents. It is unknown if dental assistants receive information on the revised fluoride guidelines from their employers. Their independent access to information is probably less than that of dental hygienists. Yet, dental assistants typically apply many of the in-office fluorides, since they see

the majority of children and teen-age patients on a regular basis.

Secondly, respondents who practise in more rural areas and areas without fluoridated water supplies were concerned about the future caries rate. A major concern with the guidelines is that the reduced use of fluoride supplements may increase the caries rate in general and especially the baby bottle caries rate. This was a concern from both private practise and community health dental hygienists. A possible rise in caries rates as a result of reduced use of fluoride supplements was the argument presented by Dr. John Osterman, a community health officer in the article "MDs Call for More Study Before Endorsing Dentists' New Recommendations on Fluoride" by Rafuse (1993).

Thirdly, the topic of fluorosis was also raised in the comments. While several hygienists commented they now have an increased awareness of looking for fluorosis, others do not believe the level of fluorosis is that high. This corresponds with Burt's (1995) comments on the varying professional viewpoints on the prevalence and importance of fluorosis.

#### Limitations of the Study

There are limitations to the design and findings of this study.

1. The study population was limited to dental hygienists. A study of dental hygienists, dentists and dental assistants would have allowed comparisons of information seeking methods and awareness of the 1993 CDA fluoride guidelines.
2. There could be a response bias. While a response rate of 81.5 % was obtained, the opinions of non-respondents are unknown. There may be differences between respondents and non-respondents with respect to the variables under

consideration.

3. When subjects know they are participating in a study, they may give what they think are expected professionally and socially acceptable answers. While a self administered questionnaire provides a degree of anonymity, the findings may still be influenced by social desirability factors. However, based on the range of responses, the author has assumed that the responses are both valid and reliable.
4. Only one area of British Columbia was surveyed. While the response rate (81.5%) allows for generalizations for the north, one should be careful about making generalizations from this study to other parts of the province or to Canada.

#### Implications of the Findings

The findings of this research have implications for individual members of the dental hygiene profession, CDHBC the licensing body, BCDHA the professional association, and education institutions.

#### Implications for members of the profession.

Dental hygienists have a professional responsibility of lifelong learning to remain current in practise. Today's environment offers many options to access information for lifelong learning. However, many dental hygienists are still dependent on the more traditional information sources which will prove to be inadequate in the future. This is especially true if continuing education requirements become more self-directed. Dental hygienists must learn to take advantage of the nontraditional information sources and modern technology for improved information access. They must be willing to learn new skills and make both a time and financial investment. Improving their computer literacy

would be an appropriate step in becoming more self-directed in continued learning. Dental hygienists who live in remote locations must be willing to address their own information needs as they cannot be dependent on others to provide opportunities for them. There are many potential ways for dental hygienists in remote locations to access information: involvement in a study club, e-mail discussion groups, the Internet, better use of libraries and literature indices, abstract services, and continued contact with dental hygiene programs after graduation. Dental hygienists who do not learn how to access information in today's environment will quickly fall behind in providing optimum care for patients.

Given the changing knowledge base of fluorides, individual dental hygienists must ensure that they continue to access information on this topic to remain current. The intent of the 1993 CDA fluoride guidelines is to continue to maintain a low caries rate, while reducing the risk of dental fluorosis. There is a need to closely monitor the effects of the fluoride guidelines on the oral health of the general public. This is a unique opportunity for dental hygienists to participate in research on the effects of the changes.

#### Implications for CDHBC.

Dental hygiene became a self-regulating health occupation under the British Columbia Health Professions Act in 1995. CDHBC is the governing body of dental hygienists under this Act with the prime mandate of protection of the public. CDHBC has a number of other duties and objectives that are outlined in the Registrants' Handbook. The objective "...to establish and maintain a continuing competency program to promote high practice standards amongst registrants" (Registrants'

Handbook, 1995, p. 13) is of relevance to this thesis. CDHBC has a responsibility to support dental hygienists' efforts to access information.

At this time, dental hygienists seem to see information access and continuing education as similar concepts. The CDHBC could help dental hygienists recognize the differences between these two concepts and develop their ability to access newer nontraditional information sources. One way may be to allow a limited number of continuing education credits to be obtained from non-dental topics such as computer courses.

The CDHBC is in a position to facilitate a variety of methods by which dental hygienists can achieve lifelong learning. CDHBC should continue to monitor the mandatory continuing education system to ensure it is the best way to encourage lifelong learning. They should look for methods of measuring continuing learning other than by the number of continuing education courses taken. If a self-directed CE program is initiated, CDHBC should help facilitate dental hygienists in gaining the skills to operate in such a system.

CDHBC serves as an information source. CDHBC should continue to supply information through mailings as this study has shown that it is a well utilized method of information for dental hygienists in northern British Columbia.

#### Implications for BCDHA.

BCDHA is the professional association of dental hygiene with a mandate to serve its members. One of the functions of both the provincial and local components of the association has been to sponsor continuing education programs. They can also help facilitate a variety of methods by which dental hygienists can obtain continuing

education credits such as supporting the reinstatement of teleconferences. However, BCDHA should also help dental hygienists recognize the professional importance of lifelong learning and that information-seeking is more than just attending continuing education courses. One method could be to provide abstracts of research articles and reference lists on timely topics or help support dental hygienists who would like to develop a business in providing that type of information. BCDHA should continue its support of study clubs and could initiate a pilot project of an e-mail discussion club. BCDHA should investigate how they could provide information via the Internet. BCDHA could offer a continuing education course on how to access information. They could consider sponsoring the course throughout the province and underwrite some of the costs, if necessary. The northern component, NBCDHS, should also examine how they can support the northern members in learning how to better access information. A course on fluorides would also be timely.

BCDHA serves as information source and should continue to supply information through mailings as this study has shown that they are a well utilized method of information for dental hygienists in northern British Columbia.

#### Implications for educational institutions.

There are implications in two areas for educational institutions. One is in respect to the curriculum for basic dental hygiene education and the other is providing continuing education for practising dental hygienists. Given the growing and changing knowledge base of dental hygiene, the most important skill that students can learn today is how to access information for lifelong learning. Joshi and Douglass (1992) suggest that dental curricula should de-emphasize factual content and expand on information retrieval and

problem solving skills. Colleges with dental hygiene programs should examine their curricula to ensure that students are familiar with: (a) basic computer literacy skills, (b) electronic methods of information access; and (c) how to use a library, especially the indices to literature. Computer literacy is essential for today's health care provider to help them cope with rapid changes in the knowledge base. This is particularly critical for health care practitioners who live in more remote areas and practise in isolation.

Currently, across Canada there is a wide variation in the design and length of dental hygiene educational programmes. Yet, all dental hygiene curricula should be preparing students for the challenge of lifelong learning. There is debate on how this can best occur. Laddered programmes and two year programs already experience limitations on how much more can be added to the curriculum. There are several options that are currently considered to provide more time in a programme: (a) shifting some components of the programme to prerequisites, (b) an additional semester, or (c) a change in the mix of didactic and clinical hours with less emphasis on clinical training. The dental hygiene programme at the College of New Caledonia has recently moved the anatomy and physiology course from first year dental hygiene to a prerequisite course for admission into the program. Several possibilities are being considered to fill that time such as: (a) increased communications, (b) computer literacy, and (c) health informatics.

There is a long standing debate with respect to whether dental hygienists should received a four year baccalaureate training which would provide graduates with an underpinning of basic and social sciences, instill a better understanding of enquiry and research methods, and increase their appreciation of lifelong learning. Across the country dental hygiene educators, accreditation bodies, licensing bodies and

professional associations continue to debate the issues surrounding the appropriate education level for entry level dental hygienists.

The findings of this research also has implications for educational institutions in regards to practising dental hygienists. As colleges and universities look to providing continuing education opportunities for community users, they could look to the information needs of practising dental hygienists. They could develop group continuing education courses or offer individual tutoring in how to access information and improve their computer literacy. As continuing education courses are developed, education institutions should explore other methods of offering continuing education besides the traditional lecture course. If possible, continuing education courses should also be delivered by teleconference to assist dental hygienists living in smaller centres. Dental hygiene programs should also make themselves available as an information source to practising dental hygienists.

Libraries at the educational institutions should examine why there is under use of their services by practising dental hygienists and other health care providers. Dental hygienists are interested in learning how to access nontraditional information sources. Libraries could offer courses or individual tutoring for practising health providers in electronic information access. They could develop methods to ensure that health professionals are aware of the services that are offered. Access to the literature indices should be "user friendly" and accessible to health professionals outside of Prince George. Libraries must continue to extend themselves beyond their physical facilities.

### Future Research

1. A replication of this study on dental hygienists' information access should be conducted throughout British Columbia. There could be similarities or differences in problems of information access for dental hygienists in other "remote" areas of British Columbia, such as the Kootenays and upper Vancouver Island, as well as in the Lower Mainland. A larger and more in-depth study on the information-seeking methods of dental hygienists would be helpful to CDHBC and/or BCDHA for the development of a strategic plan for improved information access.
2. A study of a larger population could uncover differences in information-seeking methods and awareness of the 1993 CDA fluoride guidelines by other variables such as year of graduation, school of dental hygiene graduation, advanced education, age or type of practice setting.
3. There should be continued follow-up research on the knowledge level and practices of dental hygienists in respect to fluorides. A study of the response by dentists and dental assistants to the 1993 CDA fluoride guidelines should also be conducted.
4. A study of other health care providers such as dentists, nurses, or physiotherapists, in northern British Columbia could help determine if their information access patterns and problems are similar.
5. This study has shown a rapid growth in the supply of dental hygienists in one area of British Columbia. Are other areas of the province experiencing similar growth? Further research should look at the need for numbers of dental hygienists in British Columbia. This would have implications for educational

institutions and CDHBC.

### Conclusion

**"Dental hygienists function within a constantly changing information environment"** (Gravois, 1993, p.3). In order to be current in the practise of their profession, dental hygienists must know how and where to acquire information. This exploratory study has shown that dental hygienists in northern British Columbia are primarily dependent on traditional sources of information. To overcome the geographic restrictions that this group faces for information access, they will need to do several things: (a) understand their personal responsibility to seek out and learn how to access non-traditional information sources, (b) become more computer literate, (c) learn to communicate with other dental hygienists via e-mail and the Internet, and (d) better utilize the literature indices.

While dental hygienists in northern British Columbia have an individual professional responsibility to access information, they can be supported in their efforts by various organizations. The implications of the findings of this study will be sent to CDHBC, BCDHA and the Continuing Education Department of CNC. Hopefully this will lead to improved information access for dental hygienists in more remote sections of the province.

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## APPENDICES

**Appendix A**

**The Canadian Dental Association  
1993 Fluoride Guidelines**

**REPORT OF THE WORKING GROUP OF THE CANADIAN  
WORKSHOP ON THE EVALUATION OF CURRENT RECOMMENDATIONS  
CONCERNING FLUORIDES**

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**Introduction**

Fluoride has been proven to be an effective and inexpensive way of preventing tooth decay, and its introduction into community water supplies, toothpastes, rinses and other products has contributed to a dramatic decrease in the development of tooth decay for all ages of people. In a continuing attempt to realize these benefits, a National Workshop on Fluorides was held in Toronto on April 9-11, 1992, where dental public health and pediatric dentistry specialists, and dental scientists from across North America reviewed and evaluated current literature on the utilization of fluorides. The workshop was sponsored by Proctor and Gamble of Canada, Health and Welfare,

Canada, and the Medical Research Council of Canada.

**Purpose of the Workshop**

The purpose of this workshop was to determine the appropriateness of the current recommendations made by the Canadian Dental Association concerning the concentration of fluoride compounds, the amount used, and the frequency of use for the various methodologies of fluoride administration that are currently available in Canada. The Workshop also sought to determine whether currently recommended dosages need to be adjusted to ensure an optimal dosage from all sources sufficient to sustain the current level of

prevention of dental caries without increasing the risk of dental fluorosis.

### Reasons for the Changes

In reviewing the procedures used for caries control which involve the use of fluorides, the goal of the Workshop was to develop revised recommendations which would keep the exposure to fluoride at the lowest possible level consistent with caries control. This Workshop recognized the principle that concentrations of fluoride in the materials used and the dosage regimens which were established when fluoridation was first introduced may no longer be appropriate at present when most Canadians are exposed to fluoride from more than one source. Since there is now a wealth of information available, decisions regarding the recommendations were based upon scientific or empirical evidence, or public health needs. As these considerations change in the future, further revisions will undoubtedly be needed.

One of the signs that fluoride consumption has reached optimum levels is that children protected by fluorides may exhibit nearly undetectable dental fluorosis or mottling which is a sensitive indicator of exposure to fluoride from all sources before the child reaches the age of six years, the most critical period being from birth to three years. When fluoride in the drinking water was the only significant source of fluoride, about 12% of children exhibited the mildest forms of dental fluorosis. Currently, with exposure to fluoride from other sources, such as toothpastes, dietary supplements, processed foods and beverages, and drinking water, the prevalence of the mildest forms of dental fluorosis has increased both in fluoridated and in non-fluoridated communities. Although this increase pertains to mild fluorosis, there is a slight increase also in the moderate to severe forms in fluoridated communities. While current levels of fluorosis in North America do not constitute a health problem, dental fluorosis may become a public health issue in the future, and the value of fluoride for controlling dental caries may be undermined by the public concern.

### Summary of Recommendations

The Workshop developed a number of recommendations. The most important is a recommendation reaffirming the role of community water fluoridation as an equitable, effective and economical means of delivering fluoride to groups and individuals, especially to those who have little or no access to other sources of fluoride or other preventive technologies. The Workshop emphasized that there is no evidence that fluoridation at current recommended dosages represents a risk to general health. However, it was suggested that there should be periodic re-evaluation of recommended fluoride concentrations in the context of the total potential fluoride intake.

The Workshop also proposed significant changes to the current recommendations on fluoride supplements which were first introduced to provide a systemic source of fluoride to infants and children living in non-fluoridated areas. While supplements can prevent dental caries, they are not very effective because compliance with the daily regimen is low, and, moreover, the children who use them are usually from well-educated families who are also more preven-

tion oriented than the population at large. The Workshop participants also concluded, after reviewing the current epidemiological studies, that fluoride supplements are associated with an increased risk of dental fluorosis. There is good evidence indicating that fluoride supplements are often prescribed by physicians and dentists without evaluating the infant's ingestion of fluoride from drinking water at home and from infant feeding practices. Moreover, current research indicates that children, on average, consume about 30 percent of the toothpaste that is used when they are three years old, and this amount diminishes as they reach school age. With the increasing use of fluoridated toothpastes by infants, a new source of systemic and topical fluoride is now available which was not widely available when the current guidelines on supplements were formulated. To prevent a potential increase in moderate-to-severe fluorosis, the Workshop recommended new guidelines for the use of fluoride supplements and a new dosage schedule. The new regimen considers the critical periods during which dental fluorosis develops, especially on anterior teeth, and the increasing evidence that fluoride intake in early childhood may be derived from fluoridated dentifrices, foods and drinks. The proposed recommendations suggest that supplements should not be prescribed for children less than three years of age, and that they should be targeted only for individuals or groups at high risk to dental caries. The Workshop also favored reducing the fluoride concentrations used with 3, 4, and 5-year old children from 0.5 to 0.25 mg F for children using fluoridated dentifrices.

Fluoride dentifrices were endorsed as effective delivery systems, although many children under the age of 6 tend to increase their intake of fluoride by swallowing the toothpaste. The Workshop accordingly recommended that children under the age of 6 should brush under supervision of an adult no more than twice a day with a fluoridated toothpaste. Only a pea-sized amount of toothpaste should be dispensed, preferably by the supervising adult, and swallowing any toothpaste should be discouraged.

The role of professionally applied topical fluorides (solutions, gels and varnishes) was reviewed and their selective use with individual patients at risk for dental caries was endorsed. This topic was included for discussion, not because of any evidence that professionally applied topical fluorides caused dental fluorosis, but because of the potential for gastric irritation from the ingestion of excessive fluoride. The Workshop, for practical reasons, recognized that a one minute application of a professionally applied topical fluoride treatment may be appropriate given patient management considerations, however, it should be recognized that a one-minute procedure will not realize the same level of benefits as a four-minute application.

Finally, it was agreed that fluoridated mouthrinses were valuable in dental public health school programs for at risk groups, and use at home by individual patients who may be at moderate to high-risk to dental caries was also endorsed.

**Recommendations: General consensus was achieved by the Working Group on the following statements:**

**Water fluoridation**

1. Water fluoridation at recommended levels is endorsed and encouraged because:
  - a) Water fluoridation is an efficacious/effective measure for preventing dental caries in all age groups.
  - b) Water fluoridation equitably provides the greatest benefits for those who have limited access to other sources of fluoride or other caries preventive technologies.
  - c) At recommended doses, there is no evidence that water fluoridation presents a risk to general health.
  - d) Water fluoridation is the preferable source of systemic and topical fluoride for prevention of dental caries.
2. A scientific panel should be convened to review and evaluate the data concerning standards on the minimal, optimal and maximum concentrations of fluoride in fluoridated communities, and the maximum allowable concentration of fluoride for naturally fluoridated water because of the:
  - a) potential risk of dental fluorosis (a side effect which may or may not be an esthetic concern in the future but is not a major dental health problem at this time);
  - b) increased exposure of the public to a variety of different sources of fluorides;
  - c) evidence that increased exposure to fluorides has increased the prevalence of fluorosis;
  - d) impact of variations in ambient temperature and humidity, and the increased use of air-conditioning throughout Canada that need to be considered for the determination of optimal fluoride concentrations.
3. Fluoride levels in community water supplies should be monitored and adjusted routinely to prevent wide fluctuations in fluoride concentrations.
4. Manufacturers should provide labelling on foods and beverages to indicate the fluoride content of the product.
5. The Canadian Government should institute legislation requiring manufacturers to provide information on the fluoride content of their products.
6. Standards, e.g. milligrams of fluoride per unit volume, should be developed for reporting the fluoride concentrations in products.
7. The Canadian Government should assign a senior dental

officer as a spokesperson and expert to provide the official government position, and to coordinate and help disseminate information on issues relating to water fluoridation.

**Fluoride Supplements**

- 1) Fluoride supplements:
  - a) should not be recommended for children less than three years old;
  - b) should be targeted only for individuals or groups at high risk to dental caries;
  - c) should be sold in a chewable or lozenge form only and as a behind-the-counter product;
  - d) should not be recommended in fluoridated areas;
  - e) should be packaged with a written dosage regimen.
- 2) The use of fluoride supplements may be appropriate for targeted individuals and groups for children three years and older in areas with less than or equal to 0.3 ppm fluoride in the water. Evaluation of all fluoride intake from ingested fluids should be considered prior to their use.

**Dosage Schedule**

Age of Child	Fluoride in Water Supply less than 0.3 ppm
3, 4 and 5 years	0.25 mg*
6 or more	1.00 mg

\*if there is not regular use of fluoridated toothpaste, then 0.5 mg is recommended

- 3) The estimation of the mean fluoride ingested from all fluid sources should include all home and child care water sources, and the possible impact of water filtration devices within the home.
- 4) Commercial interests should be formally requested to formulate proper dosage regimens both for chewable fluoride and multivitamin supplements.

**Fluoride dentifrices**

1. The following guidelines are proposed for children under 6 years of age who use fluoridated toothpaste:
  - a) brushing should normally be twice a day;
  - b) brushing should be supervised by an adult;
  - c) a pea-sized amount of toothpaste (or a single ribbon/strip of dentifrice not to exceed half the length of the head of a child-sized toothbrush) should be dispensed, preferably by the supervising adult;
  - d) swallowing should be discouraged (after brushing spit out, rinse with water and spit out the rinse).
2. The above guidelines should be made available to the public either through product labelling on the package or by product inserts.
3. Product labelling or package inserts containing these guidelines should be included in the criteria for awarding the CDA Seal of

Recognition for dentifrices containing fluoride in the 1000 - 1100 ppm range.

4. Studies to investigate the efficacy/effectiveness of a lower-dose fluoride dentifrice, i.e. 500 ppm, for use by children under 6 years of age should be encouraged.

5. Manufacturers should be discouraged from marketing toothpastes which, because of their taste or appeal, encourage swallowing or excessive use.

6. Manufacturers should be discouraged from marketing toothpastes that have 'extra strength' fluoride content (i.e. greater than 1100 ppm).

#### **Professionally-applied Topical Fluorides (solutions, gels and varnishes)**

1. The selective use of professionally-applied topical fluorides (gels and varnishes) should be endorsed. The decision to use topical fluorides will be based on the assessment of caries risk of patients as determined by the dentist.

2. Scientific evidence from clinical trials indicates that a prophylaxis prior to a professionally-applied topical fluoride application is not necessary, however, if a professional prophylaxis is performed selectively prior to the application of topical fluoride, a non-fluoridated prophylaxis paste is recommended.

3. Studies on the effectiveness of professionally-applied topical fluorides with a reduced concentration of fluoride should be promoted.

4. The following procedures for the professional application of fluoride gels should be encouraged:

a) Apply for 4 minutes in well-fitting trays with absorbent liners (custom trays).

b) Use only a ribbon of gel in each tray, approximating 2.5 ml in each full-size tray but less in small trays for children.

c) If custom trays are used, only 5-10 drops of gel should be dispensed.

d) Place the patient in an upright position during application.

e) Use suction to remove excess saliva/gel mixture during and after the procedure.

f) Remove excess gel at the conclusion of the procedure.

g) Instruct the patient to spit out as much of the material as possible following the removal of trays and not to rinse, eat or drink for 30 minutes after the procedure.

#### **Fluoride Mouthrinses**

1. The use, in dental public health school programs, of fluoridated mouthrinses (currently 0.2% sodium fluoride administered weekly or biweekly) should be considered only in high-risk populations aged 6 years and over.

2. Self-applied, daily rinse programs using over-the-counter or specially-formulated fluoride mouthrinses (0.05% sodium fluoride) should be used only in moderate to high-risk individuals who are aged 6 years and over.

3. All over-the-counter fluoride mouthrinses which are used daily (0.05% sodium fluoride) should be labelled to indicate that they should not be used by children under the age of 6 years.

4. Manufacturers of over-the-counter fluoride mouthrinses should be encouraged to develop alcohol-free products or products with a reduced alcohol content. Is this feasible or necessary?

5. The Health Protection Branch of Health and Welfare Canada should reconsider its approval of 0.2% sodium fluoride mouthrinses that can be purchased over-the-counter.

#### **Self-applied Fluoride Gels**

1. Self-applied (toothbrushing) fluoride gels should not be used in children under 6 years of age and should not be routinely used by adults when regular toothpastes are used.

2. The daily use of fluoride gels in customized trays for individuals at high risk to dental caries may be appropriate. If gels are used by children under the age of 6 years, this should be done only on the direction of a dentist in order to minimize the risk of ingestion. If customized trays are used, only 5-10 drops of gel should be dispensed. When customized trays can't be used because of patient management considerations, the application of the gel with a toothbrush may be appropriate for high-risk individuals. This brushing should be closely supervised by an adult.

**Appendix B**

**Approval of Research from CDHBC**

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**COLLEGE OF DENTAL HYGIENISTS OF BRITISH COLUMBIA**

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Suite 219, Yarrow Building  
645 Fort Street  
Victoria, British Columbia  
V8W 1G2

Telephone: (604) 383-4101  
Facsimile: (604) 383-4144

October 16, 1995

To Whom It May Concern:

This is to advise you that the Board of the College of Dental Hygienists of British Columbia has passed a resolution approving the release to Patricia Covington of the names and addresses, but not the telephone numbers, of the registrants of this College for the purpose of conducting specific academic research relating to the response of dental hygienists to fluoride guidelines adopted by the Canadian Dental Association in 1993, and to how hygienists seek and gain information to remain current in practice.

The Board's approval is contingent on Patricia Covington certifying that the information provided to her will not be used for any purpose other than that specified. A copy of this certification is attached.

I trust this is satisfactory.



Nancy Harwood, DipDH, LLB  
Registrar

attachment

### Certification of Use of Personal Information

I, Patricia Covington, hereby certify that I will use the registrants' names and addresses provided to me by the College of Dental Hygienists for the purpose only of conducting the specified academic research (response of dental hygienists to the fluoride guideline changes adopted by CDA in 1993 and how hygienists seek and gain information to remain current in practice), as part of my current course of studies at the University of Northern British Columbia, and that I will not use the information, nor allow or cause it to be used, for any purpose other than this academic research.

Signed:

Patricia Covington - Prince George

on Oct 22, 1995.

**Appendix C**

**Cover Letter and Questionnaire**

## THE UNIVERSITY OF NORTHERN BRITISH COLUMBIA

3333 University Way  
Prince George, B.C.  
Canada V2N 4Z9  
Tel.: (604) 960-5555  
Fax: (604) 960-5794



January 8, 1996

Dear Ms. [REDACTED],

I am an instructor in the dental hygiene programme at the College of New Caledonia and also a graduate student in the Community Health Masters programme at the University of Northern British Columbia.

My thesis topic is designed to assess how dental hygienists outside of the lower mainland access information to remain current in practice. This is always a challenge, but particularly for those of us who live in the north. I want to determine what are the preferred methods of accessing information and what other methods could be developed. I am asking you to help me with this task. I am particularly interested in the flow of information regarding fluorides.

Your name and address were obtained from the College of Dental Hygienists of British Columbia by permission of the board. The survey takes approximately 30 minutes to complete. **YOUR INPUT IS VERY VALUABLE.** This information can help determine the needs of dental hygienists in northern British Columbia.

Participation in this study is voluntary. All individual responses will be anonymous and kept confidential. The coding system is only for a second mailing and computer data entry. I will not have access to the master list. Recommendations based on the findings will be made to the Continuing Education Department of the College of New Caledonia, the College of Dental Hygienists of British Columbia, and the British Columbia Dental Hygienists Association as appropriate. If you have any concerns about this study or your rights as a research subject, please contact Dr. Bill Morrison, Dean of Graduate Studies at UNBC, (604) 960 5821.

Your prompt response is appreciated. Please mail your completed questionnaire **ON OR BEFORE JANUARY 24, 1996.** Thank you for your time and cooperation on this questionnaire.

Sincerely,

A handwritten signature in cursive script that reads "Patricia Covington". The signature is written in black ink and is located below the typed name.

Patricia Covington, R.D.H., B.Sc.  
2459 Lisgar Crescent  
Prince George, B.C.  
(604) 563 7430      covington@cnc.bc.ca

## SECTION A: DEMOGRAPHICS

The following questions ask about your personal background and experiences. This is simply to see if people with different backgrounds might have different opinions. Your answers will be anonymous and kept confidential.

A1. Year of birth: 19\_\_\_\_

A2. Gender: [ ] male (1)  
[ ] female (2)

A3. Are you a member of the British Columbia Dental Hygienists Association?

\_\_\_\_\_ Yes (1)      \_\_\_\_\_ No (2)      \_\_\_\_\_ Do not know (3)

A4. Year of dental hygiene graduation      19 \_\_\_\_

School of dental hygiene graduation \_\_\_\_\_

In what province or state \_\_\_\_\_

A5. What degrees, beyond the dental hygiene diploma, do you have? Check the highest level that applies to you.

Degree	Year graduated
_____ Bachelor (1)	19 ____
_____ Masters (2)	19 ____
_____ Ph.D (3)	19 ____
_____ Non applicable (4)	

A6. Have you had any major breaks in continuous dental hygiene practice since graduation? Examples would be time off for infant or child care, extended illness, further education, or unable to find employment as dental hygienist. Please calculate **TOTAL** time off during dental hygiene career.

\_\_\_\_\_ None (1)  
 \_\_\_\_\_ Less than 1 year (2)  
 \_\_\_\_\_ 1-3 years (3)  
 \_\_\_\_\_ 4-6 years (4)  
 \_\_\_\_\_ Other \_\_\_\_\_ (5)

A7. What is your category of current employment? Please check all that apply.

- One private practice office  
 Two or more private practice offices  
 Public health  
 Education  
 Sales  
 Other, please explain \_\_\_\_\_  
 \_\_\_\_\_  
 Not employed as dental hygienist at this time

If not presently employed as dental hygienist please skip questions 8-13, go directly to question #14.

A8. How much are you currently working? Please fill in the number of days to all categories that apply to your employment situation.

- Number of days per week in private practice  
 Number of days per week in public health  
 Number of days per week in education  
 Number of days per week in sales  
 Number of days per week in other

A9. Are other hygienists employed where you work?  Yes (1)  No (2)

A10. Are there other hygienists who practice in your community?

Yes (1)  No (2)  Do not know (3)

A11. What is the frequency of professional discussions that you have with other dental hygienists? Please check one.

- daily (1)  
 1-2 times weekly (2)  
 1-2 times monthly (3)  
 1-2 times a year (4)

A12. Do you consider that you practice in an isolated geographic location?

\_\_\_\_\_ Yes (1)      \_\_\_\_\_ No (2)

A13. Do you consider that you practice in an isolated practice situation?

\_\_\_\_\_ Yes (1)      \_\_\_\_\_ No (2)

A14. What is your health unit region?

- \_\_\_\_\_ Northern Health Unit      (1)
- \_\_\_\_\_ Skeena Health Unit      (2)
- \_\_\_\_\_ Peace River Health Unit      (3)
- \_\_\_\_\_ Cariboo Health Unit      (4)
- \_\_\_\_\_ Do not know      (5)

A15. What is the level of your computer skills? Please check all that apply.

- \_\_\_\_\_ Little or no computer skills
- \_\_\_\_\_ Games and entertainment
- \_\_\_\_\_ Word processing
- \_\_\_\_\_ Spread sheets
- \_\_\_\_\_ Can surf in the Internet
- \_\_\_\_\_ Able to do own programming

A6. Do you own or have access to any of the following? Please check all that apply.

- \_\_\_\_\_ Computer with fax modem
- \_\_\_\_\_ CD-Rom
- \_\_\_\_\_ E-mail account
- \_\_\_\_\_ The Internet
- \_\_\_\_\_ None of the above

## SECTION B: FLUORIDES

In 1992 and 1993, the Canadian Dental Association went through the process of evaluating and changing the fluoride guidelines. New recommendations were made during that process. The information has been disseminated to practitioners in various ways. The questions in this section deal with dental hygienists' responses to the 1993 guidelines. There are no right or wrong answers. It is your personal opinions and experiences that are important. All answers will be anonymous and confidential.

**B1. How did you find out about the Canadian Dental Associations 1993 fluoride guideline recommendations? Please check all that apply.**

- Unaware of 1993 CDA fluoride guidelines
- Learned while in dental hygiene program
- Mailings from whom? \_\_\_\_\_
- Employer
- Continuing education course(s)
- Reading journals
- Discussions with colleagues
- Sales representatives
- Dental exchanges on Internet
- Other method please explain \_\_\_\_\_

**B2. Which of the above choices was the most valuable or beneficial source of information.**

\_\_\_\_\_

**B3. Please indicate what changes, if any, you have made in your daily practice due to the new recommendations.**

- a. Your recommendation of fluoride supplements? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- b. To whom you give office fluoride treatments? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- c. Your oral hygiene instructions on fluoride? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- d. Your discussions with patients on fluoride? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- e. Please explain any other changes \_\_\_\_\_

\_\_\_\_\_

B4. Have the new recommendations influenced your opinion about fluorides? Please indicate any changes.

- a. Water fluoridation? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- b. Effectiveness of fluorides? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- c. Who should receive fluorides? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- d. Concern over fluorosis? \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2)
- e. Please explain any other opinion changes on fluorides.
- 

B5. Approximately how many times a week are you questioned about fluoride by your patients? Please check one only.

- \_\_\_\_\_ Less than 3 times a week (1)
- \_\_\_\_\_ 4-6 times a week (2)
- \_\_\_\_\_ 7-9 times a week (3)
- \_\_\_\_\_ 10 or more times a week (4)

B6. What are the areas of patient concern regarding fluoride? Please check all that apply.

- \_\_\_\_\_ Fluorosis
- \_\_\_\_\_ Fluoride supplements
- \_\_\_\_\_ Safety of fluoride
- \_\_\_\_\_ Water fluoridation
- \_\_\_\_\_ Type of fluoride they should use
- \_\_\_\_\_ Effectiveness of fluoride
- \_\_\_\_\_ Other

Please specify \_\_\_\_\_

Over the years, different organizations have made various recommendations on the dosage level of fluoride supplements that should be prescribed. This can lead to confusion for dental personnel and the general public. Please answer questions 7 and 8 based on your current knowledge of the recommended dosages for fluoride supplements.

B7. Has Canada Health accepted the 1993 Canadian Dental Association guidelines for fluoride?

- \_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2) \_\_\_\_\_ Do not know (3)

B8. Has the Canadian Paediatric Society accepted the 1993 Canadian Dental Association fluoride supplement guidelines?

\_\_\_\_\_ Yes (1) \_\_\_\_\_ No (2) \_\_\_\_\_ Do not know (3)

B9. What areas of fluorides do you need more information about? Please check all that apply.

- \_\_\_\_\_ Fluorosis
  - \_\_\_\_\_ Fluoride supplements
  - \_\_\_\_\_ Safety of fluorides
  - \_\_\_\_\_ Water fluoridation
  - \_\_\_\_\_ Type of fluorides
  - \_\_\_\_\_ Effectiveness of fluorides
  - \_\_\_\_\_ In office topicals
  - \_\_\_\_\_ Self applied topicals
  - \_\_\_\_\_ Other
- Please specify \_\_\_\_\_

B10. Are there any comments you would like to make regarding the 1993 CDA fluoride guidelines and how they have/have not affected your clinical practice?

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## SECTION C: INFORMATION SEEKING

There are many sources of information available to today's health practitioner. I am interested in what information sources are being utilized in northern British Columbia and what ones could be better developed. There are no right or wrong answers. It is your personal opinions and experiences that are important. All answers will be anonymous and confidential.

**D (daily)      W (weekly)      M (monthly)      O (occasionally)      N (never)**

**C1. Which (if any) of the following do you participate in to access information? Circle the most appropriate level for each line.**

	<u>D</u>	<u>W</u>	<u>M</u>	<u>O</u>	<u>N</u>
Professional meetings/conventions	1	2	3	4	5
Discussion with colleagues	1	2	3	4	5
Discussions with sales representatives	1	2	3	4	5
Contact with dental hygiene teaching institutions	1	2	3	4	5
Literature review study clubs	1	2	3	4	5
Clinical study clubs	1	2	3	4	5
Educational video programs	1	2	3	4	5
Continuing education courses (lecture format)	1	2	3	4	5
Continuing education courses (clinical hands on format)	1	2	3	4	5

**C2. Which of the following PRINTED information sources do you use? Circle the most appropriate level for each line.**

	<u>D</u>	<u>W</u>	<u>M</u>	<u>O</u>	<u>N</u>
Textbooks	1	2	3	4	5
Dental Indexes to the literature	1	2	3	4	5
Other Indexes to literature (such as CINAHL)	1	2	3	4	5
Journal articles	1	2	3	4	5
Research abstract services (such as Perio Reports)	1	2	3	4	5
Product literature	1	2	3	4	5
Mailings from professional associations	1	2	3	4	5
Mailings from licensing body	1	2	3	4	5

**C3. Which of the following ELECTRONIC OR COMPUTER INFORMATION SERVICES do you use? Circle the most appropriate level for each line.**

	<u>D</u>	<u>W</u>	<u>M</u>	<u>O</u>	<u>N</u>
e-mail	1	2	3	4	5
dental exchanges on the Internet	1	2	3	4	5
Medline (CD Rom)	1	2	3	4	5
CINAHL (CD Rom)	1	2	3	4	5
Grateful Med	1	2	3	4	5
Carl Uncover	1	2	3	4	5

C4. How **HELPFUL** is each of the following information sources for keeping up to date in dental hygiene? Circle the most appropriate level for each line.

	<b>Very Helpful</b>				<b>Not helpful</b>	<b>Never used</b>
Professional meetings/ conventions	1	2	3	4	5	6
Discussions with colleagues	1	2	3	4	5	6
Discussions with sales representatives	1	2	3	4	5	6
Dental hygiene teaching institutions	1	2	3	4	5	6
Literature review study clubs	1	2	3	4	5	6
Clinical study clubs	1	2	3	4	5	6
Educational video programs	1	2	3	4	5	6
Lecture continuing education courses	1	2	3	4	5	6
Clinical continuing education courses	1	2	3	4	5	6
Textbooks	1	2	3	4	5	6
Dental Index to the literature	1	2	3	4	5	6
Other Indexes to literature	1	2	3	4	5	6
Reading journal articles	1	2	3	4	5	6
Research abstract services (such as Perio Reports)	1	2	3	4	5	6
Reading product literature	1	2	3	4	5	6
Mailings from professional associations	1	2	3	4	5	6
Mailings from licensing body	1	2	3	4	5	6
E-mail	1	2	3	4	5	6
Dental exchanges on the Internet	1	2	3	4	5	6
Medline (CD Rom)	1	2	3	4	5	6
CINAHL (CD Rom)	1	2	3	4	5	6
Grateful Med	1	2	3	4	5	6
Carl Uncover	1	2	3	4	5	6
Others (write in)	1	2	3	4	5	6

C5. What are the **BARRIERS** you face when trying to access information? Circle the appropriate level of difficulty for each line.

	High		Mod		Low
Geographic isolation	1	2	3	4	5
Practice isolation	1	2	3	4	5
Lack of a study club	1	2	3	4	5
Lack of computer skills	1	2	3	4	5
Lack of access to electronic information sources	1	2	3	4	5
Lack of access to journals	1	2	3	4	5
Lack of access to library services	1	2	3	4	5
Lack of research analysis skills	1	2	3	4	5
Shortage of continuing education courses	1	2	3	4	5
Shortage of time	1	2	3	4	5
Costs	1	2	3	4	5
Other (write in)	1	2	3	4	5

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C6. In order to improve your access to information, what methods would you prefer that the professional association, licensing body and educational institutions dedicate their resources to? Please check all that apply.

- Continuing education courses on computer skills  
 Continuing education courses on how to access information  
 Continuing education courses by teleconference  
 Formation of e-mail study club  
 Formation of e-mail groups for informal discussions on professional issues  
 Formation of dental hygiene home page on the Internet  
 Supplying research abstracts  
 Packages of references and journal articles on current topics  
 Please write in any other suggestions
- 

C7. Of all the choices in question number 6, please indicate what would be your #1 choice.

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C8. Are there any comments you would care to make regarding accessing information.

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C.9 Are there any comments you would care to make regarding the required continuing education system in B.C.?

\_\_\_\_\_  
\_\_\_\_\_

C10. Would you like a summary report of this study? [ ] Yes (1) [ ] No (2)

**THANK YOU VERY MUCH FOR TAKING THE TIME TO REPLY!**

**THANK YOU FOR YOUR PARTICIPATION IN THE MAIL SURVEY.** Would you be willing to participate in further discussion with me by telephone on these issues? This would be strictly voluntary and all discussion would be kept confidential. If so, please read and sign the consent form.

I, \_\_\_\_\_ would be willing to participate in further discussion on the 1993 CDA fluoride guidelines and accessing information with Patricia Covington by telephone. I realize that this is strictly voluntary and not a requirement of participation in the mail survey. I understand that if I agree to participate in a telephone discussion, that I may withdraw from that part of the study at any time. All comments made in a telephone interview will be kept strictly confidential.

Signature: \_\_\_\_\_ Telephone number: \_\_\_\_\_

Please fold the completed questionnaire, place into the stamped, addressed envelope, and return to Patricia Covington.

**Appendix D**

**UNBC Research Ethics Committee Certificate  
of Ethics Approval**

**UNBC Research Ethics Committee  
Certificate of Ethics Approval**

**Name of Researcher:** Patricia Covington

**Title of Research Project:** A Pilot Investigation of the Information  
Seeking Habits of Dental Hygienists and Their Response to the 1992  
Canadian Dental Association Fluoride Guidelines

**I certify that this project was given ethics approval by the UNBC  
Research Ethics Committee.**

Signed:

WR Mont Date: 25/10/95

Dean of Research and Graduate Studies

## Appendix E

### Definition of Terms

**BCDHA** British Columbia Dental Hygienists Association, the provincial professional association that dental hygienists may belong to on a voluntary basis. BCDHA is a provincial component of the Canadian Dental Hygienists Association.

**CDHA** Canadian Dental Hygienists Association, the national professional association that dental hygienists may join.

**CDHBC** The College of Dental Hygienists of British Columbia, the licensing body of dental hygienists in British Columbia, which was established March 1, 1995, by the Health Professional Council. All practising dental hygienists in British Columbia must be registered and licensed by this body.

**CDA** Canadian Dental Association, the national professional association that dentists may join.

**CDSBC** The College of Dental Surgeons of British Columbia, the licensing body of dentists in British Columbia. All practising dentists in British Columbia must be registered and licensed by this body. CDSBC was previously the licensing body of dental hygienists in British Columbia.

**Competence** The ability to apply the profession's current knowledge base to patient care with integrity (Nash, 1994).

**Continuing Education** Education beyond the basic preparation required for the profession. The primary goal of continuing education is the promotion of optimal health services through educational activities that refresh, update, and expand the knowledge and competence of the dental hygienist (Hull & Darby, 1989). Continuing education can be on a voluntary or mandatory basis. The CDHBC required dental hygienists to obtain 75 credits hours of continuing education during a three year cycle for re-licensure.

**Dental Hygiene** A health service discipline involving both theory and practice. The practice of dental hygiene can generally be defined as a collaborative relationship in which the dental hygienists works with the client, other health care professions, and society in general, to achieve and maintain optimal oral health as an integral part of well-being (CDHA Scope of Practice, 1995).

**Dental Hygienist** A licensed primary oral health care professional who possesses a unique body of knowledge, distinct expertise, recognized standards of practice and a Code of Ethics. As integral members of the oral health care system, dental hygienists

provide preventive, educational, clinical and therapeutic services (CDHA Management of Dental Hygiene Care, 1992).

**Fluorosis** Histologically, this condition is defined as the presence of a hypomineralized subsurface zone, lying beneath a well-mineralized enamel surface layer (Pendrys, 1991). It is an aesthetic condition that can range in severity from faint white streaking or flaking appearance to brown staining and pitting (Pendrys, 1991). Mottled enamel is the original term for this condition. It is still used for the more severe cases of fluorosis.

**Health Informatics** The combination of technology and methodology which makes possible the computer-assisted collection, storage, processing, retrieval, distribution and management of information (Jones, et al., 1991).

**Information** Organized data or knowledge that provides a basis for decision making (Gravois, 1993).

**Lifelong Learning** Formal and informal study intended to maintain competence. Lifelong learning is a basic tenet of professionalism (CDHA Scope of Practice, 1995).

**NBCDHS** Northern British Columbia Dental Hygienists Society, which is a local component of BCDHA.