

**Teledentistry content worldwide and in Canadian dental and dental hygiene curricula**

by

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**Teledentistry content worldwide and in Canadian dental and dental hygiene curricula**

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the degree of Master of Science

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## Abstract

**Objectives:** Despite teledentistry's (TD) expanded utilization, it has yet to be fully adopted by oral health care professionals in their training and practice. The present study undertook a scoping review to explore TD incorporation in the training of oral health care providers worldwide and a survey at Canadian dental and dental hygiene programs.

**Methods:** The Joanna Briggs Institute's methodology was used for the scoping review performed by two reviewers. Studies published between 1989 and June 4<sup>th</sup>, 2022, were searched using "teledentistry" and "education" as initial keywords. An anonymous survey with thirty-seven questions was distributed among all ten dental and thirty-five dental hygiene programs across Canada. The survey focused mostly on TD teaching (methods employed, content taught, and barriers to implementing TD), with descriptive (frequency, maximum, minimum, mean, etc.) and inferential (Pearson chi-square for odds ratio and Fisher's exact test) data analyses using SPSS®. A  $p$  – value < 0.05 was considered statistically significant.

**Results:** A total of 2180 documents were found; nineteen were eligible for data extraction. Didactic education and hands-on practice were the most employed training methods worldwide. All of the dental (n=10) and 68% (n=24) of dental hygiene programs responded to the survey; of the thirty-four programs, eighteen had TD content, including three dental programs. An average of  $9.22 \pm 4.86$  hours was reported for teaching TD, with lecture format as the most employed approach and using TD in dental practice as the most covered topic. While 53% of the dental hygiene programs employed formative and summative assessments, only one dental program reported having an assessment for this content. Moreover, programs that dedicated less than nine hours to this content were less likely to address more than seven TD-related topics (OR=0.14).

**Conclusion:** There is a variation in the existing TD educational programs, from content to assessment in both the scoping review and survey. Less than half of the dental hygiene and 30% of the dental programs in Canada incorporated TD content. However, the sparsity of TD educational programs emphasizes the necessity for its future planning.

## **Lay Summary**

The need for at-distance patient-dentist communication increased during the recent COVID-19 pandemic since dentistry was recognized as a high-risk occupation for disease transmission via aerosol-generating procedures. Although the demand for teledentistry (telecommunication for dental practices) increased, professionals' lack of knowledge was raised as one of the barriers to this technique's implementation. Therefore, I explored the incorporation of teledentistry content in oral health care professionals' education and training around the world by reviewing the existing literature and in Canada by sending surveys to all dental and dental hygiene programs. I found that there is sparsity in evidence toward incorporating this content in the professionals' training globally. Also, I found that this content is addressed in only half of the dental-related curricula in Canada. Therefore, this study's findings can be beneficial to planning the future or improving the existing teledentistry content.

## **Preface**

This thesis is an original, independent work by Anahita Bakhshaei. Data presented herein were collected by reviewing the existing literature on teledentistry in oral health care providers' training, and through a survey sent to all Canadian dental and dental hygiene programs. The survey component of this project (reported in chapter 3) was approved by The Behavioral Research Ethics Board at the University of British Columbia (Certificate Number: H22-00019).

As the lead author, I was in charge of writing a research protocol, article screening, data extraction, and writing the manuscript of the scoping review, as well as writing the research proposal, survey development, ethics approval, data collection, data analysis, and manuscript preparation for the survey project. I also contributed to the concept and research design of this study.

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## **List of Abbreviations**

ACFD- Association of Canadian Faculties of Dentistry

BC- British Columbia

CAPHD- Canadian Association of Public Health Dentistry

COVID-19 – Coronavirus Disease of 2019

DH- Dental Hygiene

DMD- Doctor of Dental Medicine

FOD -Faculty of Dentistry

IADR- International Association of Dental Research

JB- Joanna Briggs Institute

PRISMA- Preferred Reporting Items for Systematic Reviews and Meta-analyses

SARS-CoV-2- severe acute respiratory syndrome coronavirus 2

TD- Teledentistry

UBC – University of British Columbia

US- The United States of America

VDH- Virtual Dental Home

## Acknowledgments

I would like to express my sincere gratitude to my supervisor, Dr. Mario Brondani. Thank you for constantly supporting and guiding me throughout the past two years. Your invaluable insights, patience, and feedback have been influential in this project, and your mentorship has been an inspiration to me. I am truly grateful for all the opportunities you have provided me with.

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I extend my sincere appreciation to Dr. Swathi Ramchandran, the second reviewer and co-author of the scoping review project. Despite other commitments, you dedicated your time and effort to the lengthy process of literature screening and article editing, and your contribution has been critical to the success of this project.

I am also grateful to the faculty members of the dental and dental hygiene programs who participated in our study. Your time and efforts were essential to our research, and this study would not have been possible without your support.

I would like to acknowledge the support of my fellow graduate students, faculty members, and staff at the UBC Faculty of Dentistry. The encouragement and support have been a source of motivation throughout this journey. I am also grateful to the UBC Faculty of Dentistry for providing financial support that helped facilitate participation in our survey.

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I also would like to acknowledge that an abstract of this thesis was presented at the Canadian Association of Public Health Dentistry (CAPHD) on October 7<sup>th</sup>, 2022, UBC Dentistry research day on February 24<sup>th</sup>, 2023, and International Association of Dental Research (IADR) on June 24<sup>th</sup>, 2023.

## **Dedication**

I dedicate this work to my beloved parents, Farnaz and Hossein, who have been a constant source of encouragement and support throughout my academic pursuits and my decision to immigrate to another country. Your unconditional love and support have been my anchor through the challenges and difficulties of this journey. I am forever grateful for your sacrifices and the values you instilled in me.

To my lovely brother, Kiarash, who has always been my best friend and a source of emotional support for me.

I also dedicate this work to all the devoted healthcare professionals and students who strive to continuously learn and improve their knowledge to provide the best possible care for their patients.



## Chapter 1: Introduction

Following the rapid spread of the Coronavirus Disease 2019 (COVID-19) via infected aerosols and saliva droplets contaminated with the SARS-CoV-2 virus, the delivery of oral health care was initially placed on hold in earlier 2020. With the challenges arisen during the COVID-19 pandemic, teledentistry (TD) gained momentum as a viable alternative for certain modalities of patient management.<sup>1-3</sup>

TD is an inseparable category of telemedicine,<sup>4</sup> a form of healthcare<sup>5</sup> identified by Sood et al. as *"being a subset of telehealth, [that] uses communications networks for delivery of healthcare services and medical education from one geographical location to another, primarily to address challenges like uneven distribution and shortage of infrastructural and human resources"*.<sup>6(p576)</sup> Telemedicine and TD have the potential for improving access and quality of care at a lower cost; however, its cost-effectiveness remains a topic of debate.<sup>7</sup>

### 1.1 Teledentistry, Oral health care providers' knowledge, and dental education

Teledentistry dates back to 1989 when it was presented at a conference funded by the Westinghouse electronics system group and the University of Maryland in Baltimore, to explore the status of dental informatics in the practice, education, and research areas of dentistry.<sup>8</sup> However, TD is believed to have been first implemented into practice in a US military servicing troops in remote, rural, and US underserved areas in 1994.<sup>9</sup>

Several definitions for TD exist,<sup>4,10,11</sup> including *"the use of health information technology and telecommunications for oral care, consultation, education, and public awareness with the broad goal of improving oral health"*,<sup>10(p201)</sup> used herein and recognized as a combination of telecommunication and dentistry involving the exchange of images and information virtually.<sup>4,12</sup>

TD has been implemented at various levels together<sup>13,14</sup> or separately,<sup>15–18</sup> and includes teleconsultation, tediagnosis, teletriage, and telemonitoring. Teleconsultation, the most common type of teledentistry,<sup>19–21</sup> refers to the appointment where the patient converses with an oral health care provider<sup>[1]</sup> using store-and-forward or real-time telecommunication.<sup>22</sup> In the former, the collected information and images from the patient are stored and sent for consultation, diagnosis, and treatment options purposes, while the latter involves simultaneous communication between patient and oral health care providers, likely leading to a diagnosis and subsequent treatment.<sup>23</sup> With the information provided during either in-person consultation<sup>18</sup> or teleconsultation,<sup>24</sup> tediagnosis may follow to diagnose an oral condition or identify a chief complaint.<sup>2</sup> Teletriage then informs on the best course of action in a timely manner.<sup>25,26</sup> Lastly, telemonitoring is utilized to replace recurrent dental visits aimed mainly at information-seeking or prescription of medications.<sup>27</sup> However, this virtual mode of dental care delivery is limited to activities that care providers can perform virtually (i.e., screening, consultation, triaging), and does not include dental procedures that are required to be performed in clinical settings.<sup>28</sup> It also assumes health technology literacy and easy access to such technology by those involved.<sup>10</sup>

As TD has been known for its ability to improve access to certain modalities of oral health care, it can be an alternative to fill the gap when such access is limited or non-existing,<sup>29,30</sup> particularly to certain groups or populations experiencing oral health inequalities.<sup>28,31</sup> Penchansky and Thomas<sup>33</sup> have initially conceptualized 5 ‘As’ of access to care, including accessibility as the distance between the care provider and consumer and has been identified as an influential factor contributing to oral health inequalities, along with affordability (e.g., ability to cover financial and

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<sup>[1]</sup> Oral health care providers refer to dentists, dental hygienists and dental therapists.

incidental costs), availability (e.g., supply and demand of the services), accommodation (e.g., the ability of the services to accommodate the needs of the consumer), and acceptability (e.g., the extent to which the consumer accepts the service and the provider accepts the consumer/insurance).<sup>29,33,31</sup> Awareness of the services that require communication and information was introduced as the sixth 'A' by Saurman in 2016.<sup>34</sup> Despite the premises brought up by TD, members of marginalized communities, such as Indigenous Peoples, low-income families, people with disabilities, and those living in remote and rural areas, continue to experience suboptimal access to care in various ways,<sup>35</sup> and the integration of technology in healthcare necessitates careful consideration to avoid exacerbating existing inequities.<sup>36</sup>

However, the effectiveness of teledentistry requires a comprehensive understanding of patients' perspective regarding its various aspects, including easiness of use, impact on access to care, and so on.<sup>37</sup> In previous studies, patients demonstrated positive views on teledentistry, and even in some situations they considered it comparable to in person consultation.<sup>37,38</sup>

### **1.1.1 Barriers and facilitators to utilizing teledentistry**

Several barriers to TD implementation have been identified, from its limited cost-efficacy to patients' lack of motivation and oral health care providers' lack of knowledge in this regard.<sup>39,40</sup> Thus, dental professionals encountered several pitfalls in using TD. For instance, a variety of challenges were met related to understanding issues associated with using virtual care tools, obtaining remote consent, lack of reimbursement codes, and cost coverage by insurance companies.<sup>28</sup> While the advancement in technology has reduced the cost of telecommunication equipment and has made TD more cost-effective,<sup>40</sup> some efforts have been made in terms of reimbursement and billing, such as introducing reimbursement policies and billing codes for telehealth consultations by different jurisdictions.<sup>28,41</sup>

A scoping review by Tan et al. in 2021 highlighted individuals' experience, training, good quality data and information, federal and state grants, and data security as facilitators for adopting TD.<sup>42</sup> In order to implement TD in practice, educating care providers regarding its legal, technological, and ethical aspects is crucial.<sup>42</sup> Yet, the educational advancement in some telehealth aspects like telemedicine is yet more extensive than in teledentistry.<sup>4</sup>

Simultaneous with considering TD as an alternative in dental practice during the recent pandemic, investigating oral health care providers' knowledge and awareness of teledentistry regained popularity, and studies have attempted to explore these issues further.<sup>19,20</sup>

### **1.1.2 Oral health care providers' knowledge and awareness of teledentistry**

Similar to the TD concept, exploring dental professionals' knowledge and awareness toward it is not a novel topic, and the current pandemic has heightened the need to broaden their education in the TD field.<sup>45,46</sup> Case in point, the extent of unpreparedness and insecurity for teledentistry implementation in practice among dental professionals was presented in Raucci-Neto et al.'s study.<sup>25</sup> In that study, the level of readiness varied among professionals based on their years of practice. Specialists and professionals with more than ten years of working experience were more prepared to use TD than general dentists and newly graduated practitioners, probably due to greater knowledge of oral and dental diseases, leading to greater confidence in diagnosis and treatment.<sup>25</sup>

On the other hand, knowledge and positive attitude toward TD among dental professionals seem to increase following TD-focused activities.<sup>47,48</sup> Although the exposure to teledentistry and the dissemination of knowledge behind such technology in dental and dental hygiene programs have been reported to increase the probability of its implementation, this cannot guarantee its actual uptake and utilization in practice.<sup>16,44,47</sup> Nevertheless, alternatively to educating already

practicing providers about the benefits of TD, training students in dental and dental hygiene programs surfaces as a suitable opportunity to offer both practical and fundamental knowledge for TD and empower future providers to more likely utilize this technology once they enter the profession,<sup>44</sup> similarly to the adoption of telemedicine in undergraduate medical programs.<sup>49</sup>

### **1.1.3 Teledentistry education and training**

Methods of TD undergraduate education vary from a single didactic session<sup>47</sup> to a comprehensive fifteen-week course including both didactic and clinical content.<sup>50</sup> The teledentistry program at New York University College of Dentistry, for example, exposes dental and dental hygiene students to teledentistry through lectures, hands-on practice using intraoral cameras through clinical simulation, and group discussions about the suitability of TD.<sup>51</sup>

However, studies investigating teledentistry in the dental undergraduate and dental hygiene curricula are sparse,<sup>47,48,52</sup> and mostly do not fully discuss the extent to which this content is actually delivered. Only one study addressing two different points of view regarding the inclusion of TD in the undergraduate curriculum included Canada.<sup>44</sup> However, that study did not explore how TD is incorporated into Canadian dental and dental hygiene programs' curricula, and across the globe. Likewise, a brief search of the ten Canadian dental and thirty-five dental hygiene programs' websites did not indicate any available information regarding the education and training of a TD-related subject or the existence of such content. Moreover, there is no scoping or systematic review investigating and summarizing the existing literature to better inform the teaching of TD for future oral health care providers. Therefore, this study aims to fill the research gap by conducting a scoping review and a survey study to address two-fold objectives and research questions presented below, respectively.

## **1.2 Research questions and objectives**

### **1.2.1 Research questions (and related sub-questions)**

1. How is TD taught in undergraduate, graduate, postgraduate, diploma, and continuing oral health-related education worldwide?

*1.1 What are the teledentistry training and education objectives?*

*1.2 What are the teledentistry training and education content?*

*1.3 What are the teledentistry training and education delivery methods?*

*1.4 What are the teledentistry training and education assessment techniques?*

2. How is teledentistry taught in dental and dental hygiene programs across Canada?

### **1.2.2 Objectives**

1. To gain an overview of existing undergraduate, graduate, postgraduate, diploma, and continuing education involving TD in oral health-related education for dentists, dental hygienists, and dental therapists across the world.
2. To determine how teledentistry is incorporated into all the Canadian dental undergraduate and dental hygiene curricula.

*2.1 To map out the teledentistry content in Canadian dental and dental hygiene programs.*

*2.2 To identify the teledentistry methods of delivery, assessment techniques, and pedagogy employed/should be employed in Canadian dental and dental hygiene programs.*

*2.3 To assess the perceived barriers and facilitators in adopting teledentistry in Canadian dental and dental hygiene programs' curricula.*

After this brief introduction of TD, followed by my research questions and objectives in Chapter One, I describe a scoping review that I published at the European Journal of Dental Education in Chapter Two and present the results of a national survey in Chapter Three, with its manuscript under preparation for submission at the Journal of Dental Education. I then finalize my thesis with a general discussion, conclusion, and future directions in Chapter Four. Such arrangement likely led to some repetition of content so that I could fully situate each Chapter accordingly.

## **Chapter 2: Teledentistry within oral health care providers' training: A scoping review**

### **2.1 Summary**

**2.1.1 Objective:** Despite teledentistry (TD) ubiquitous utilization, it has yet to be fully adopted by professionals in their training . This study explored TD incorporation in the training of oral health care providers.

**2.1.2 Methods:** This review included studies on the TD content offered to oral health care providers. The JBI (Joanna Briggs Institute) methodology was used, and two reviewers screened the literature. Studies published between 1989 and June 4<sup>th</sup>, 2022, were searched using “teledentistry” and “education” as initial keywords. The searched databases included: MEDLINE, Cochrane Library, CINAHL, EPPI, Scopus, Epistemonikos, ERIC, MedEdPORTAL, ProQuest Dissertations and Theses Global, and Google Scholar. All of the relevant literature, regardless of their language, were added. The data were extracted using an extraction table and are presented in tabular and narrative summary formats.

**2.1.3 Findings:** A total of 2180 documents were found, and 1804 documents were screened by the title and abstract after deduplication; fifty-nine were selected for full-text review; nineteen were eligible for data extraction. Of all studies, 63.15% were published after the COVID-19 pandemic. Practicing TD and TD reimbursement were some of the addressed topics. Didactic education and hands-on practice were the most employed training methods. Self/peer evaluations and surveys were among the employed assessment techniques.



**2.1.4 Conclusions:** TD education has been emphasized during the COVID-19 pandemic. There is a variation in the existing TD educational programs, from addressing topics to assessment techniques. However, the number of educational programs on this topic is sparse.

## 2.2 Introduction

Although teledentistry was introduced more than two decades ago, it gained momentum as a viable alternative for certain modalities of patient management amidst the Coronavirus Disease 2019 (COVID-19) pandemic<sup>1,2,3</sup> that placed the practice of dentistry initially on hold while the profession organized itself to comply with physical distancing and required protective equipment despite the lack of agreements on the level of such requirements.<sup>39,53,54</sup> Patients also had their routine care postponed either by choice or because they could not find a dental care provider for much-needed treatment; this situation was exacerbated within communities already experiencing oral health inequalities.<sup>55</sup>

Subsequent to several challenges that arose during the COVID-19 pandemic, such as a shortage of protective equipment and staff, reduced patient numbers, and the need to eliminate waiting rooms, as well as pre-existing issues related to access to care, significant changes have been made to healthcare delivery.<sup>1,56</sup> Meanwhile, patients' perspectives on using TD during the pandemic were examined by Rahman et al. in 2020 and depicted their positive attitude in different domains, including patient satisfaction, easiness of use, and improved access to care.<sup>37</sup>

Teledentistry application during the COVID-19 pandemic affirmed its significance and potential for long-term usage in the dental profession. However, its impact on those with long-lasting access to care issues is not yet fully determined.<sup>15,21,26,57</sup> In the middle of the COVID-19 pandemic, teletriage proved beneficial for obtaining the medical and dental history, exploring symptomatology, and providing provisional diagnosis without the necessity of the patient's physical assessment and close contact. This was not only helpful in reducing (and likely eliminating) the risk of SARS-CoV-2 infection but also in preventing unnecessary commuting.<sup>58</sup>

Moreover, TD offered the opportunity of constant monitoring and virtual visits to care providers and patients in quarantine while still propitiating rapport building and patient compliance.<sup>1</sup>

Nonetheless, lack of knowledge about the use of TD and the uncertainties about reimbursement and insurance billing processes have been identified as the main barriers preventing its use in practice.<sup>10</sup> While some efforts have recently been made to overcome the reimbursement issue by releasing billing codes for TD,<sup>59</sup> the lack of knowledge has still remained a serious concern.<sup>46,60</sup> Adequate knowledge and skills can enable oral health care providers to apply TD in their practice.<sup>46</sup> A variety of TD training programs targeting both students and professionals has been presented in the literature.<sup>46,47,61</sup>

Although there is some evidence of TD adoption in the different levels of oral health-related education (e.g., undergraduate, postgraduate),<sup>47,48,62</sup> it remains unknown the extent to which this content is actually delivered.<sup>44</sup> A comprehensive systematic scoping review can investigate and summarize the existing literature to better inform the teaching of TD for future oral health care providers; as of October 2021, there was no scoping or systematic review on this topic.

The proposed review aims to address the research question "How is TD taught in undergraduate, graduate, postgraduate, diploma, and continuing oral health-related education?", along with the following sub-questions:

- What are the teledentistry training and education objectives?
- What are the teledentistry training and education content?
- What are the teledentistry training and education delivery methods?
- What are the teledentistry training and education assessment techniques?

## **2.3 Methods**

This review and its protocol <sup>[2]</sup> adhered to the JBI (Joanna Briggs Institute) methodology for scoping reviews,<sup>63</sup> although other guidelines for scoping reviews exist.<sup>64</sup> Subsequent to identifying the research questions, the following steps were followed: identifying relevant studies, selecting eligible studies, charting the data, and collating and summarizing the results. Quality appraisal of the data was not conducted as this review aims to map all research activities in the TD field.

### **2.1.1 Inclusion criteria**

#### **2.1.1.1 Participants**

In accordance with the review's objective, only studies that considered oral health care providers are included. This involves practicing professionals (e.g., dentists, dental hygienists, and dental therapists) and students at different levels of oral health-related majors.

#### **2.1.1.2 Concept**

The primary concept understudy in this review is "Teledentistry", with the aforementioned definition, in the education and assessment of oral health care providers' knowledge, attitude, and awareness.

#### **2.1.1.3 Context**

This study attempted to include all TD educational content targeting oral health care providers, including curriculum content of courses, modules or sessions, didactic and/or exposure material, etc.

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<sup>[2]</sup> The protocol is registered and is available at the OSF website: <https://doi.org/10.17605/OSF.IO/6MP7C>

#### **2.1.1.4 Types of study**

All scholarly and grey literature, without any language limitations, with qualitative, quantitative, and mixed-methods study designs, are included in this review. Review articles and meta-analyses were also considered for inclusion, and only studies with available full text were included.

#### **2.1.2 Search strategy**

The systematic search strategy followed three steps. Initially, MEDLINE (Ovid) and CINAHL (EBSCO) databases were searched using the keywords "teledentistry" and "education" to explore the available literature in the field, and the first five articles aligned with the study's concept and objective were selected to extract the proper text words. Subsequently, the analyzed text words used in the relevant articles' abstracts and titles and their indexed terms were utilized to develop a comprehensive search strategy with specific keywords in all databases (Table 2.1). The selected articles' reference lists were also examined for additional literature. The Cochrane Database of Systematic Reviews, MEDLINE (Ovid), CINAHL (EBSCO), EPPI, Scopus, ERIC, and MedEdPORTAL databases were searched. ProQuest Dissertations and Theses Global and Google Scholar were considered databases for grey literature. Studies published between 1989 and June 4<sup>th</sup>, 2022, were identified.

**Table 2.1: Search strategy**

Date	Databases	Search #	Searched keywords
Jan 10, 2022	Medline (Ovid) & CINAHL(EBSCO)	S1	Teledentistry
		S2	S1 AND Education
Jun 4, 2022	Medline (Ovid) & CINAHL(EBSCO)& Cochrane Database of Systematic Reviews & Google scholar & Eppi & Epistemonikos & Scopus & MedEdPORTAL & ProQuest Dissertations and Theses Global & ERIC	S3	(teledentistry OR tele-dentistry OR telehealth in dentistry OR telemedicine in dentistry OR ehealth in dentistry OR e-health in dentistry OR dental informatics) AND (Oral health care provider* OR oral health professional* OR dentist* OR dental hygienist* OR Dental therapist* OR dental student* OR dental hygiene student* OR dental therapy student*) AND (Education OR Training OR Curricul* OR pedagogy OR didactic)

### 2.1.3 Study selection

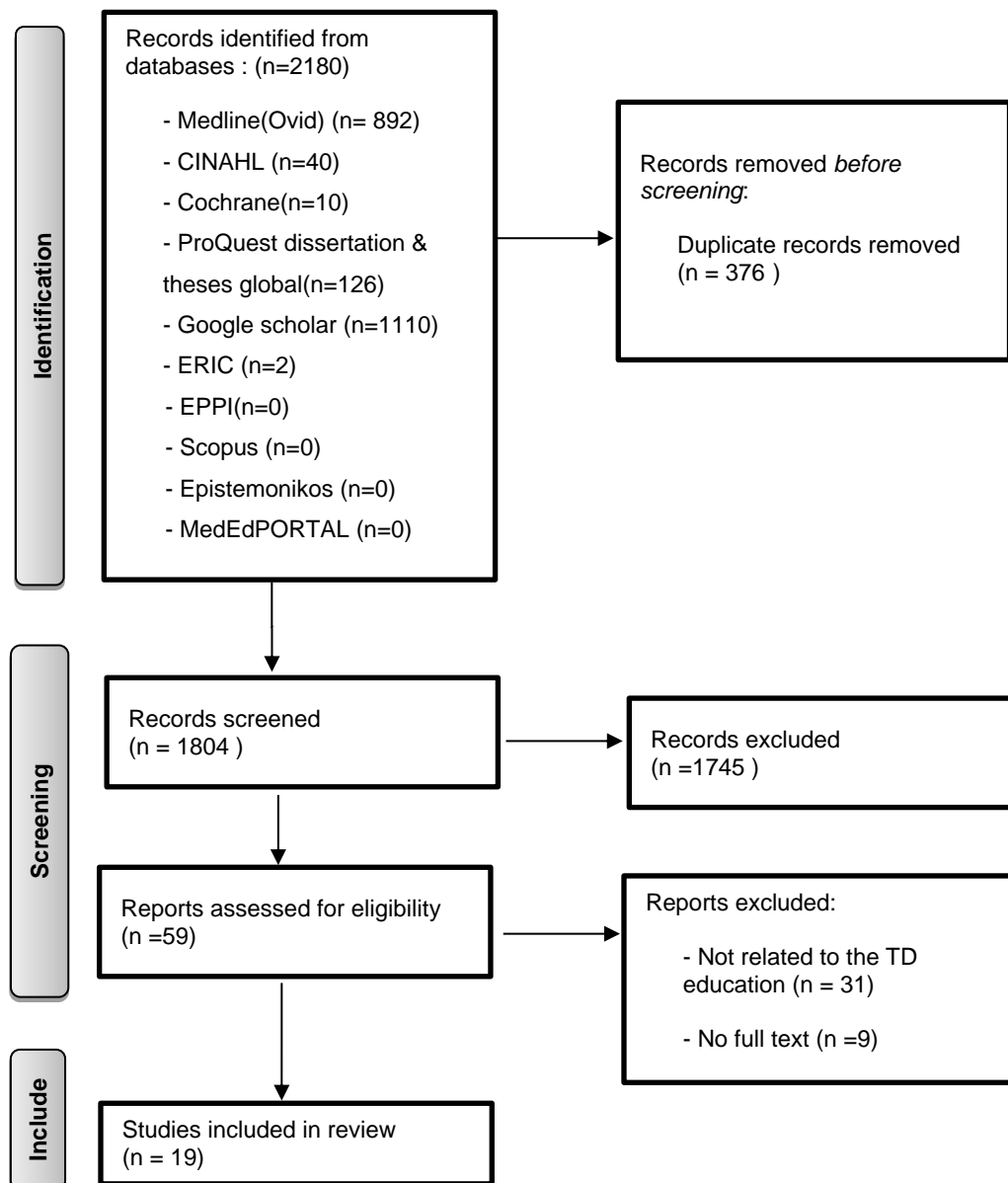
Following the search, all articles were exported to Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia), and duplicates were removed. Two reviewers independently screened titles and abstracts based on the above inclusion criteria in June and July 2022. The reviewers met to discuss the process and any controversy in their opinions was resolved. The selected documents' full-text review was performed by the same reviewers following the screening process to determine the study's inclusion in the data extraction and analysis. Detailed reasons for the articles' exclusion were recorded.

The Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping reviews (PRISMA) flow diagram was used to map out the searched databases, the number of identified, included, and excluded records, and the exclusion reasons in this scoping review<sup>65</sup> (Figure 2.1).

### 2.1.4 Data extraction

A data extraction tool was drafted according to JBI guidelines<sup>63</sup> and the reviews' objective, and it was piloted in two studies. The draft was revised as needed with the third author, and some modifications regarding adding programs' specific characteristics columns (e.g., programs' objectives, content, methods of delivery, and assessment techniques) were made.

**Figure 2.1. PRISMA Scoping Review Flowchart.**



### **2.1.5 Data analysis**

In this review, the data regarding the number of TD oral health care providers' training programs, countries, level of training, format, content, hours, and assessment techniques were analyzed.

### **2.1.6 Data presentation**

Following data analysis, a table of characteristics, with information in terms of the authors, year of publication, title, source, country, and brief results regarding the programs' components and details, was created to present the data (Table 2.2). A narrative summary was also used to explain the results further.

## **2.2 Results**

A total of 2180 documents were found, and 376 were excluded as duplicates. The number of documents selected from each database is indicated in the PRISMA scoping review flowchart (Figure 1). The 1804 remaining documents were screened by title and abstract; fifty-nine studies were selected for full-text review; nineteen were eligible for data extraction.

A summary of the nineteen included articles in this review is presented in Table 2.2. The reported number of articles addressing a specific component shown in the results may overlap, as each publication may have addressed more than one component from the extraction table.



**Table 2.2: Summary of teledentistry (TD) educational and training programs based on the research reports.**

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
Alabdullah (2020, US)	-To explore factors associated with the future use of teledentistry among predoctoral dental students	Cross-sectional (Survey)	N/A	<i>Suggesting:</i>  -Attitude and behavior-altering education toward TD  -Education on experiences related to teledentistry	<i>Suggesting:</i>  -Didactic  -Hands-on practice	N/A	Undergraduate level
Amin et al. (2021, Canada)	To discuss the advantages and disadvantages of adopting teledentistry into the predoctoral dental curriculum.	Discussion	N/A	<i>Suggesting:</i>  -Intra-oral cameras utilization  -Regulatory issues regarding patients' data transmission  - Proper TD billing and coding	<i>Suggesting:</i>  -Fundamental knowledge  -Practical utilization	N/A	Undergraduate level
Best (2017, US)	N/A	PowerPoint presentation (grey literature)	To enhance Pediatric Clinical Experiences and prepare trainees for advanced roles in oral health	-SDF application  -Teledentistry clinical case review  -Teledentistry image capture  -Lecture on teledentistry/telehealth	-Clinical rotations  -Simulation  -Case review  -Small group discussion  -Lecture	N/A	-Dental students  -Dental Hygiene students  -Pediatric Nurse Practitioner trainees  -Nutrition students

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
				-Proper referral note  -How teledentistry would fit into their scope of practice  -Intraoral image capturing  -Providing diagnosis and treatment plan			
Cooper (2007, US) <sup>66</sup>	-To examine student knowledge, attitudes, and confidence levels before and after completion of a course on teledentistry.	Cross-sectional (Survey)	-To raise the dental hygiene student's awareness concerning the public and community health issues associated with access to care	-Utilizing intraoral cameras  -Storing the images	-Didactic  -Clinical education  -Utilizing intraoral cameras	- Ability to assemble the intraoral camera  -Ability to locate the correct window on the computer software  -Capturing standardized intraoral images of a classmate  -Storing photographs in an assigned folder on the computer software  -Image quality	-Dental hygiene students/ undergraduate level

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
da Costa et al. (2021, Brazil)	To analyze the factors that affect implementing a TD system in dental health public services.	Mixed-methods	N/A	-Teleconsultation  -Santa Catarina Telehealth Center (SC-TC) virtual platform resources  -Intervention protocol	-Lectures (Onsite and online)  -Teleconsulting  -Instruction manuals	N/A	-General dentists
Fortich-Mesa et al. (2019, Colombia)	-To determine the impact of teledentistry applications on clinical practice in different specialties based on the current evidence in the literature	Systematic review	- To avoid careless service	<i>Suggesting:</i> -Practice of teledentistry  -TD legal and ethical implications  -Technological implications  -Clinical methods for patient care	N/A	N/A	N/A
Gill (2022, US)	N/A	Perspective	-To facilitate patient care and  -To prepare dentists to use TD in practice	<i>Suggesting:</i>  -TD scheduling  -TD coding and billing  - Health Insurance Portability and Accountability Act (HIPAA) requirements  -Telehealth etiquette	N/A	N/A	-Predoctoral dental curricula  <i>Suggesting:</i>  -Students  -Clinicians

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
Giraudeau et al. (2022, France)	To examine the self-perceived knowledge, attitudes, and practices of TeleDentistry (TD) among dentists in private practice in France.	Cross-sectional (Survey)	N/A	-TD regulations  <i>Suggesting:</i> -Theoretical aspects of TD  -Evidence-based research	-Online training module  -Practicing TD	N/A	-Undergraduate dental programs  -Dental residency  -Continuous education
Kopycka-Kedzierawski et al. (2018, US)	To describe advancement and uses of TD at the University of Rochester's Eastman Institute for Oral Health as an integral component of oral health care system and its relation to the general telemedicine initiative within the Medical Center.	Report	To provide dental assistants with the ability to image children's teeth for a dental assessment.	-Obtaining clinically acceptable intraoral images  -Imaging children's Teeth  -Image transmission to the dentist for assessment  -Defining dental informatics in a general sense  -The electronic patient record, dentistry in the post-genomic era	-Imaging synthetic dental model (typodont) and adult volunteer  -PowerPoint presentation	N/A	-Childcare center telehealth assistants

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
Levine et al. (2008, US)	To meet the critical thinking and information management competencies set forth by CODA and to achieve the goal of a dental school curriculum based on the principles of evidence-based inquiry.	Report	<ul style="list-style-type: none"> <li>- To teach students the required fundamental computer and Internet skills to function within the dental school environment</li> <li>-To introduce all students to the library/learning resources center, evidence-based dentistry concepts, information databases and search strategies, critical appraisal of information, and dental informatics</li> </ul>	<ul style="list-style-type: none"> <li>-Database searching</li> <li>-Clinical search topics chosen by the students</li> <li>-Dental informatics (i.e., the practice of dentistry in the digital era)</li> <li>-Evidence-based dentistry</li> <li>- Critical thinking and evaluation of resources</li> </ul>	<ul style="list-style-type: none"> <li>- lecture (including dental informatics)</li> <li>- Class discussion</li> </ul> <p>(The program also included hands-on training in database searching that was not related to TD)</p>	<ul style="list-style-type: none"> <li>-Online questionnaire</li> <li>-written assignments</li> <li>-Students were evaluated on a Pass/Fail basis.</li> </ul>	-Dental undergraduate students
McFarland et al. (2017, US)	To conduct a formative evaluation of the UNMC (the University of Nebraska Medical Center) TD program and to evaluate the effectiveness of the TD training program for oral health and other health professionals	Cross-sectional (Survey)	<ul style="list-style-type: none"> <li>-To incorporate TD into dental education</li> <li>- To provide a statewide network of oral health expertise</li> </ul>	<ul style="list-style-type: none"> <li>- TD consultations methods</li> <li>- Guides to facilitating TD training and record keeping</li> <li>-Billing for TD consultations</li> <li>-TD definition</li> <li>-Technology</li> <li>-Scheduling TD consultation</li> </ul>	<ul style="list-style-type: none"> <li>-Powerpoint and video clips on TD consultation methods</li> <li>-TD training evaluation forms</li> <li>-Web-based TD training modules</li> <li>-Real-time patient consultation</li> <li>-Ground rounds</li> <li>-Using Vidyo videoconferencing</li> </ul>	N/A	<ul style="list-style-type: none"> <li>-Dental students</li> <li>-Dental assistants</li> <li>-Dentists</li> <li>-Dental hygienists</li> <li>-Other health professionals (office manager, paediatric dental resident, nursing student, health planner, infection prevention, LPN, preceptor, public health consultant, public health nurse, registered nurse, social</li> </ul>

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
					for telehealth consultation		worker, and specialty clinic receptionist.)
McLeod (2020, US)	-To identify and compare the self-reported knowledge and attitudes of teledentistry (TD) among dental (DDS) and dental hygiene (DH) students at the University of North Carolina at Chapel Hill, Adams School of Dentistry, before and after an educational intervention.  -To understand students' perspectives on how TD should be adopted into their curriculum since it is not currently included.	longitudinal mixed-methods study	N/A	-TD definition and related terms  -Models of delivery  -Access to care statistics in North Carolina  -TD governing laws  -Role of dental hygienists  -Working under general supervision  -Reimbursement for TD events through Medicaid  -Examples of TD's potential use in the curriculum  -Example of TD consultation between a provider and patient  - TD potential in alleviating the oral health crisis in North Carolina	- Pre-recorded lecture  -Lecture  -Video  -Small group discussion  -Single large group discussion	N/A	-Dental hygiene students  -Dental students

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
				<p>-Students' preferred topics and methods of TD education</p> <p>-Identifying challenges and potential solutions to implement TD in DDS or DH curriculum.</p>			
Nassani et al. (2021, Saudi Arabia)	To assess the knowledge, attitudes, and practice of TD among DPs in Saudi Arabia and the association with their qualifications and clinical experience.	Cross-sectional (Survey)	N/A	N/A	<p><i>Suggesting:</i></p> <p>-Lectures</p> <p>-hands-on workshops</p>	N/A	<p><i>Suggesting:</i></p> <p>- All dental practitioners</p> <p>- Periodic continuous education programs</p>
Patel(2020, US)	- To explore if high-fidelity simulation exercises can teach telehealth foundational skills to support dental students as they become comfortable with this mode of care, and if this can be	Report	To study the feasibility of teaching and implementing telehealth into its preclinical and clinical and educational models	-TD encounters(consultation s) with cases on post-operative sensitivity, stress-triggered TMD, and Primary Herpetic Gingivostomatitis	- 2 time-limited synchronous teledentistry encounters using live actors as patients	<p>-Pre-intervention survey</p> <p>-Concurrent evaluation by a faculty member</p> <p>-Rating self-performance by reviewing the encounters videos by each student after 3 weeks</p> <p>-Post-intervention survey</p>	-Dental undergraduate students

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
	created and implemented in a timely fashion as part of a summer rotation						
Ramesh (2013, India)	To assess the knowledge and attitudes regarding teledentistry among dentists of Udaipur	Cross-sectional (Survey)	N/A	<i>Suggesting:</i>  - Benefits of new technology through programs conducted in universities, teaching hospitals, and medical institutions.  -Collaborations between academia, government and industry for further elaboration of teledentistry	N/A	N/A	<i>Suggesting:</i>  -Dentists (especially those with fewer qualifications and work experience)
Ray (2021, US)	-To design and implement a VDH model for AL residents through the educational program  -To evaluate the effectiveness of the educational program	Cross sectional (Survey)	-To design and implement a VDH Model for assisted- living (AL) residents through designing a VDH educational program delivering preventive and therapeutic care at an AL facility for memory care residents	-Using the portable dental equipment safely and effectively  -Applying SDF  -Using and navigating through TD software  - Challenges of delivering care to an older adult population with dementia	-Delivering didactic information in person and through online training modules  - Hands-on use and operation of the portable dental equipment and handheld radiograph device  - Applying SDF on extracted teeth set in plaster	-Several examinations requiring an 80% pass rate  -Pretest/ posttest survey on the addressed topics in the course	-Dental hygiene students  <i>Suggesting:</i>  - Long-term care staff



Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
	through students' knowledge, clinical confidence, and perspectives				- Navigating through and using the TD software  -Providing patient care		
Shivu (2021, India)	To evaluate knowledge, awareness and attitude about teledentistry among practicing dentists	Cross-sectional (Survey)	-To upgrade the knowledge about teledentistry among dental practitioners	N/A	N/A	N/A	-Dental practitioners  -Continuous dental education programs  -workshops
Summerfelt et al. (2010, US)	-To provide information about the PPACA and the Arizona affiliated practice dental hygiene model  -To define teledentistry  -To identify the used digital equipment  -To give an overview of NAU's teledentistry training	Report	(For the second project):  -To Evaluate the adequacy of student training with portable digital equipment and the diagnostic efficacy of students' digital products	-Capturing intraoral images  - exporting data methods  -Teledentistry equipment training  -Working with image and data management software	-Reading manufacturer's instructions  -Simulation  -Hands-on practice in the fields	- Completion of the manufacturer's certification examination  -Completion of process evaluations in all related techniques including the ability to assemble and disassemble all of the portable digital equipment.  - Providing opinions on the adequacy of the six-hour training with the portable x-ray equipment	-Community programs: dental hygiene students  -Other programs: community health organization personnel, dentists, and dental hygienists

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
	<p>-To give an overview of the NAU's first TD experience</p> <p>- To present the NAU students' evaluation results on their ability to acquire diagnostically efficacious digital data</p> <p>- To summarize details of remote applications of teledentistry-assisted, affiliated practice dental hygiene workforce model successes</p>						
Weintraub (2020, US)	- To compare Summit participants' understanding of TD, its benefits, challenges, solutions, and the role of	Cross-sectional (Survey)	N/A	<p>- Describing the use of telemedicine</p> <p>- TD demonstration</p> <p>-The role of TD in the provision of the VDH System of Care in the community site</p>	<p>-Oral presentations</p> <p>-Breakout groups discussions</p>	N/A	<p>- Experts in telemedicine, information technology, oral health, and related policy</p> <p>-Leaders</p>

Author (Year and country)	Study objective	Study Type	TD program's objectives	TD program's content	TD program's methods of delivery	TD program's assessment techniques	TD program's learners/ educational level
	dental hygienists, pre- and post- Summit.			Group discussions on: - Private practice -Community -Education -Information technology -Policies -Finance/ reimbursement			in dental education, advocacy, business, organized dentistry  - Dental hygiene representatives, health insurers, foundations and legislators  -Students (dental students, dental hygiene undergraduate and MSc students)

### **2.1.7 Study characteristics**

The included studies were from seven countries: the United States of America - US (n=12), Brazil (n=1), France (n=1), India (n=2), Saudi Arabia (n=1), Colombia (n=1), and Canada (n=1). Of all studies, sixteen (84.22%) were published between 2011-2022, and twelve (63.15%) after the COVID-19 pandemic. Nine cross-sectional (survey), four reports, two mixed-methods, one systematic review, one grey literature, and two perspective studies were among the included literature. Among the nineteen studies, four provided suggestions about TD education instead of information on the existing programs.

While thirteen studies addressed teledentistry education at an undergraduate level, mainly in the US (n=11), seven considered incorporating this topic at the continuing education, postgraduate, general practice, or specialty residency levels. Dentists were the target population in 36.84% of the studies, and dental and dental hygiene students, dental hygienists, and dental assistants were among the remaining studied populations.

### **2.1.8 Teledentistry training and education's objectives**

The overarching training objective stated in the literature was to improve the oral health care professionals' TD knowledge. However, other objectives were mentioned in studies, including developing a statewide TD network.<sup>48</sup>

### **2.1.9 Teledentistry programs content**

Although TD programs' contents vary based on the program and school, from program to program and school to school, some topics were more popular than others. TD consultation methods,<sup>47,48,67-70</sup> using TD software and,<sup>48,61,70,71</sup> capturing intra-oral images and/or utilizing intraoral cameras,<sup>44,50,51,61,72</sup> reimbursement and billing for TD,<sup>44,47,48,69,73</sup> and potential legal or

ethical issues regarding teledentistry<sup>44,47,71,74</sup> were among the common addressed or suggested subjects in the programs.

Data records keeping and exportation, as well as the definition and history of teledentistry, were other topics of interest in the programs.<sup>44,48,61</sup> Additionally, in the University of North Carolina teledentistry program, TD definition, its models of delivery, and examples of TD use in the curriculum were also discussed.<sup>47</sup>

The dedicated time to teledentistry content also varies based on the program and topic. Some programs integrated the TD content as part of an existing course or module albeit with limited hours of instruction,<sup>70</sup> while others offered as a standing-alone course or module over a fifteen-week program.<sup>50</sup> For instance, at the University of Idaho, TD content was integrated into the Virtual dental home education, with 1.25 hours of didactic TD software education, 0.5 hours of laboratory experience with the software, and an eight-hour rotation of practicing the VDH education altogether.<sup>70</sup> Meanwhile, at the University of Minnesota, TD education was offered during fifteen-weeks, with four weeks of didactic and clinical education on using intra-oral cameras. The rest of the program addressed imaging with the cameras and storing them in software.<sup>66</sup>

#### **2.1.10 Teledentistry programs' methods of delivery**

Regarding the methods of delivery, didactic education and hands-on practice were the most prevalently utilized and recommended methods, followed by small/large group discussions. Based on the reports, lectures varied in terms of mode of delivery (i.e., online or in-person), duration, and pedagogies utilized (i.e., PowerPoint presentations, pre-recorded video clips, etc.).

### **2.1.11 Teledentistry programs assessment methods**

The assessment methods were reported only in fewer numbers of publications. Three out of five studies with a report of assessment methods utilized surveys as an evaluation tool.<sup>67,70,75</sup> A grading system requiring an 80% pass rate for examinations,<sup>70</sup> and an evaluation based on a pass/fail basis were also implemented.<sup>75</sup>

## **2.3 DISCUSSION**

This scoping review explored the teledentistry content in the oral health professionals' training at all educational levels. Out of the 1804 publications found, 1785 were excluded at the title and abstract screening and the full-text review stages due to mainly addressing TD as a tele-education alternative and not exploring TD content in education.

Although teledentistry was first introduced in 1989, there was a boost in the number of studies reporting on TD after the COVID-19 pandemic, given that it was considered an alternative solution to the changes in dental patient care and oral professionals' education at the time.<sup>67</sup> However, this topic may have been considered more important in some countries than others, given the significant differences in the number of studies that addressed TD education in the US (n=11) compared to Canada (n=1), as an example. An uneven distribution of the scholarly work in telehealth education and training was also discussed in a review by Edirippulige and Armfield, emphasizing the lack of evidence in some countries, including Canada and the Scandinavian regions.

Some studies focused on the education and training of oral health care providers,<sup>51,61,67,70,72,75,76</sup> while others have the training's information in the context of knowledge, awareness, and attitude.<sup>47,48,50,77,78</sup> While TD training at different educational levels has been suggested in various studies,<sup>44,77,79</sup> Amin et al. addressed different issues preventing TD

incorporation into the undergraduate level. The opponents of adopting such content to the undergraduate dental curriculum suggested an already packed dental undergraduate curriculum, faculty shortage, and lack of legislation as barriers.<sup>44</sup> Meanwhile, a lack of knowledge among dental professionals was also reported by Nassani et al., accompanied by recommendations for incorporating TD education in the predoctoral curricula, postgraduate and continuing education programs.<sup>77</sup> Considering TD education benefits, it has been emphasized as an opportunity for upgrading professionals' knowledge.<sup>3</sup>

The educational programs' goals and objectives are often developed following the identification of target learners, and they are considered crucial as the curricular content and delivery methods are determined based on those. Moreover, they play a role in facilitating communication of what the program is about and provide a basis for its assessment.<sup>80</sup>

Recognizing oral health care providers as the target group in TD educational programs led to considering improving their TD knowledge as the overarching objective within the included publications.<sup>81</sup>

Additional to this overarching aim, secondary objectives were also mentioned based on the programs' context and focus. In a study by Ray et al., they utilized a virtual dental home (VDH) as a teledentistry method to provide care for special care populations. Therefore, improving the dental students' perspective toward VDH utilization as an alternative mode of providing care in the assisted living facility is another objective of their TD programs.<sup>70</sup>

Among the reported TD educational topics in the publications, the ones concerning TD implementation into practice (e.g., TD consultation methods, capturing intra-oral images, using TD software), reimbursement and billing, and legal issues of implementing TD were the most popular. Information on the teledentistry definition and its history, fitting TD into the professionals'

scope of practice, and teledentistry clinical case reviews were among the addressed content in some TD programs<sup>47,48,51</sup>

In a review on telehealth education in the allied health professionals' curricula, content related to telehealth practice was one of the articles' most addressed topics, similar to the present review. However, reimbursement and billing were not among the reported topics.<sup>82</sup>

One of the main challenges educators continue to face is to improve the learning environment to suit students' different learning styles pertaining to any topic. In turn, delivering the required knowledge and skills involves choosing suitable teaching methods that should also resemble real-world tasks.<sup>83</sup> In dental education, lecturing has been the traditional delivery method of choice for content, although they have long been criticized as lacking application and critical thinking.<sup>84,85</sup> Lectures aside, practicing along with simulation, group discussion, self-reflection, and other pedagogies that provide a safe environment for students have been suggested.<sup>86</sup>

For the teledentistry content, didactic lecture format and hands-on practice were reported to be the most utilized delivery approaches, followed by other forms, including simulation. In the New York University faculty of dentistry TD program, dental and dental hygiene students participated in a clinical simulation to have exposure to teledentistry and intra-oral cameras while having small group rotations of hands-on exercises and group discussions.<sup>51</sup>

The University of Nebraska TD program is comprised of various teaching methods, including presentations and video clips. In this program, theoretical information was provided using PowerPoint presentations, video clips, and the TD community grand rounds, which were real-time TD consultations with patients seeking faculty members' expertise from rural and remote areas.<sup>48</sup>



Role-playing was also among the utilized delivery methods. Synchronous teledentistry sessions were designed using actors to provide students with patient encounters in one study.<sup>67</sup> Case scenarios and role-playing involving the practice of telehealth have also been utilized in educating other disciplines' professionals, including medicine and pharmacy.<sup>87</sup>

In health care professional education, evaluation is considered an opportunity for determining the students' capacity to incorporate their knowledge into a similar situation to their real-life working practice,<sup>88</sup> and assessment is known as a useful approach to frame learning.<sup>89</sup> Based on Miller's four-layer classification of knowledge level and its accompanied assessment methods, various assessment techniques can contribute to different levels of learning, from evaluating the 'knowing', the 'showing how' to the 'doing it'.<sup>88,90</sup>

Nevertheless, among the included studies in this review, only 26.31% had some form of assessment. The majority (60%) of the included publications reporting on evaluation utilized pre- or post-interventional surveys as assessment tools.<sup>67,70,75</sup> Similarly, surveys were shown to be the most utilized tool in the evaluation of other telehealth disciplines' education and training.<sup>91</sup> More specifically, students at the Houston School of Dentistry were evaluated by a faculty member, while providing reflections on their recorded TD videos.<sup>67</sup> Such evaluation indicated to be informative of students' perspective on the program, meeting the learning objectives, and the program's organization quality.<sup>75</sup>

In another program, after four weeks of instruction and practice, students were assessed in terms of their ability to work with intraoral cameras, the quality of their captured images, and how they stored these images on computer software.<sup>66</sup>

It is noteworthy that in designing the type of implemented assessment techniques, the amount of time dedicated to a topic should also be taken into consideration.<sup>92</sup> As mentioned earlier, the program that dedicated four weeks of training had a different approach to evaluation compared to those that dedicated different amounts of time to TD education. Meanwhile, although the variation in dedicated hours to the TD topic is evident in the literature, the ideal number of hours for delivering this content effectively is still unknown.

## **2.4 Strengths And Limitations**

To our best knowledge, this study is the first scoping review assessing teledentistry content in oral healthcare professionals' education and training and follows the JBI guideline for Scoping Reviews. Multiple databases were searched to include all the available literature on the topic. Moreover, two independent reviewers screened the literature, and any discrepancies between them were resolved by discussion.

However, this study also has various limitations. Despite our best efforts in searching all the keywords relevant to the topic in the databases related to the oral health discipline, there still might be some publications that have been missed. Since the debate around teledentistry has increased after the COVID-19 pandemic, new articles in TD education were likely published after June 4<sup>th</sup>, 2022. Although there was no limitation on the language the literature was published, only English key words were used to search for them. In turn, any literature published without indexing its text with English keywords was not captured. This review used a specific definition of teledentistry, and it was not within its scope to cross-check if that definition matched or differed from the definition offered or utilized by the included studies. Finally, due to the inherited scope of this review, there was a lack of quality appraisal of publications, which may lead to a wide variety of the publications' qualities and the impossibility of synthesizing our findings.

## **2.5 Conclusion**

Teledentistry gained momentum during the COVID-19 pandemic as an alternative to providing certain modalities of oral health care. Consequently, the necessity for educating professionals in this regard was brought forward to enhance their knowledge and abilities for its utilization. This review explored the existing TD educational programs and presented variations in their objectives, content, delivery methods, assessment techniques, and duration. Despite such variation, this information may help design future or improve existing teledentistry content, given the sparsity of evidence on TD educational programs. Meanwhile, most of the studies addressed TD education at the undergraduate level in the US, and reports on TD educational programs in other countries, including Canada were rare, leaving it unknown the extent to which TD content is incorporated in their oral care providers' education outside the US.

## **2.6 Future Directions**

A systematic review of the literature presented herein and those published after June 4<sup>th</sup>, 2022 is warranted to appraise their quality. Moreover, this study's findings can be beneficial to future curriculum planning considering TD incorporation.

In the next chapter, the findings of a comprehensive national survey that was conducted to assess the implementation of teledentistry content in dental and dental hygiene programs across Canada are presented. This national survey aims to investigate the presence and educational approaches utilized for teledentistry content within undergraduate dental and dental hygiene programs.

## **Chapter 3: Teledentistry content in Canadian dental and dental hygiene curricula**

### **3.1 Summary**

**3.1.1 Objectives:** Teledentistry (TD) can be defined as the combination of telecommunication technology and dentistry. Although during the COVID-19 pandemic, its usage surged significantly, its full adoption into oral health care has not yet been achieved. Meanwhile, lack of knowledge was among the recognized barriers to TD implementation, and there is sparsity in the extent to which TD is addressed in the undergraduate curriculum in Canada. Therefore, I explored how TD is incorporated into Canadian dental and dental hygiene programs' curricula.

**3.1.2 Methods:** An anonymous survey with thirty-seven questions was distributed among all ten dental programs and thirty-five dental hygiene programs across Canada. The survey mainly focused on TD teaching (methods employed, content taught, and barriers to implementing TD), with descriptive (frequency, maximum, minimum, mean, etc.) and inferential (Fisher's exact test and Chi-square for odds ratio) data analyses using SPSS®. A  $p$  – value < 0.05 was considered statistically significant.

**3.1.3 Findings:** All of the dental (n=10) and 68% (n=24) of dental hygiene programs responded to the survey; eighteen had TD content, including three dental programs. An average of  $9.22 \pm 4.86$  hours was reported for teaching TD, with lecture format as the most employed approach and using TD in dental practice as the most covered topic. While 53% of the dental hygiene programs employed formative and summative assessments, only one dental program reported having an

assessment for this content. Moreover, programs that dedicated less than nine hours to this content were less likely to address more than seven topics (OR=0.14).

**3.1.4 Conclusion:** The TD educational programs differ in terms of content and assessment. Less than half of the dental hygiene and 30% of the dental programs incorporated TD content, which emphasizes the necessity for incorporating and designing such content in future curriculum planning.

### 3.2 Introduction

A lack of knowledge on teledentistry (TD) among dental professionals is reported in the literature, accompanied by recommendations for incorporating TD education in the predoctoral curricula, postgraduate and continuing education programs targeting oral health care professionals.<sup>77</sup>

While TD training at different educational levels has been suggested in various studies,<sup>44,77,79</sup> Amin et al. discussed the necessity of TD incorporation into the undergraduate level. However, an already packed dental undergraduate curricula, faculty shortage, and lack of legislation are among the recognized barriers to TD adoption into the curriculum.<sup>44</sup>

The variations in the existing literature on TD education differ in their objectives, delivery methods, duration, content, and assessment techniques.<sup>47,48,52</sup> However, an uneven distribution of scholarly work worldwide in telehealth (including teledentistry) education and training was also discussed in the literature previously, emphasizing the lack of evidence on this topic in some countries, including Canada. The only study reporting from Canada discussed the pros and cons regarding the inclusion of TD in the undergraduate curriculum,<sup>44</sup> but did not explore how TD is incorporated into Canadian dental and dental hygiene programs' curricula. Moreover, a brief search of the ten Canadian dental and thirty-five dental hygiene programs' websites did not indicate any available information regarding the education and training of a TD-related subject or the existence of such content.

Therefore, I proposed to explore how TD is incorporated into Canadian dental and dental hygiene programs' curricula.

### **3.3 Methods**

#### **3.3.1 Research Design**

The ethics approval from The University of British Columbia Office of Research Ethics Behavioural Research Ethics Board (H22-00019) was obtained. This study followed a descriptive approach research design,<sup>93</sup> and it was implemented in eleven months (Appendix A).

#### **3.3.2 The Survey Questionnaire**

To investigate how teledentistry is addressed as a curriculum content in all the Canadian dental and dental hygiene programs, a thirty-seven-item survey was developed in English and French, using the Qualtrics® platform, based on the existing literature.<sup>10,23,44,94,95</sup> The survey was pilot tested by five faculty members and graduate students at UBC prior to distribution to ensure the language clarity and comprehensiveness of the questions. Based on the assessments, question resequencing and minor language revisions were applied to increase its readability and acceptability. On average, the time required to complete the survey was estimated to be about ten minutes.

The introduction page of the survey, which is an invitation and consent for participation, included a definition of TD, the main goal of this study, and information about confidentiality. The survey consisted of different questions format, including closed- and open-ended, multiple-choice, text entry, and Likert scale (Appendix B, C). To address the study objectives, different questions with various characteristics were designed and are described as follows:

- Demographic questions: eight demographic questions were designed to identify the respondents' programs (undergraduate dental program, dental hygiene programs (two-year diploma/three-year diploma/bachelor's degree), the name of their institution, gender, age, graduation year, presence or absence of clinical practice experience, and years of clinical

practice, etc. Although the name of the participating institution was asked to track the responses, this information is not reported in the results, and respondents were also notified in this regard.

- TD definition question: Because of variations in the definition of TD, respondents were asked to define “teledentistry” in a text entry box in case of disagreement with the definition provided.
- TD content existence question: To address the first objective, one question was asked about the current inclusion of teledentistry in their programs. Different sets of queries showed up based on their answers to this question, using display logic for thirty questions.
- Barriers and facilitators to TD education questions: Questions about the barriers and facilitators to implementing TD in the curriculum were also designed to address objective #3, based on the information in the previous literature on this topic.<sup>44</sup>
- Methods of delivery questions: The employed delivery approaches for teledentistry content, including lecture format, small and large group discussions, simulation, etc., were identified in the previous literature. Therefore, objective #2 (and to some extent #3) were covered by questions referring to teaching approaches for teledentistry education and having these formats as options.<sup>94</sup>
- TD educational topics questions: The possible topics covered based on the available literature regarding TD (i.e., the definition, forms, and history of TD,<sup>23</sup> TD in practice,<sup>95</sup> barriers of TD adoption,<sup>10</sup> etc.) were provided in questions in this regard.
- Likert-scale statements question: Ten statements in a Likert-scale format and without a neutral option were designed to assess the respondents’ views on different aspects of TD education. Although there are controversial opinions on eliminating the neutral option in



survey questionnaires, this decision was made because the midpoint option seems to have been overused to express neutrality or simply a lack of opinion.<sup>96</sup>

- Assessment techniques questions: a list of assessment techniques + others were offered, as assessment techniques are an essential element of course planning and can provide helpful insight for the future planning of TD teaching.<sup>97</sup>

### **3.3.3 Participants and Data Collection**

The survey was disseminated via email from June 10<sup>th</sup>- July 19<sup>th</sup>,2022, to all ten dental programs and thirty-five dental hygiene programs across Canada (Appendix D). In order to increase the response rate, an email reminder was sent out to non-responding programs after a week after the first email. Two other reminders were sent out two and three weeks after the first email to those who have not responded yet, respectively. To increase participation, respondents were given the option to provide their emails or contact information at the end of the survey in case they want to be considered for a random draw of one of five \$50 gift cards.

The purposefully targeted sample for the survey was the total existing sample of forty-five dental and dental hygiene programs in Canada. Within each program, their respective faculty members, including full-time faculty members, sessional instructors, and guest lecturers who would be knowledgeable about the curricula were sought. The potential respondents for the survey were initially identified from the dental and dental hygiene programs' websites. They were asked to either fill out the survey themselves or to forward the survey's link to an individual who is more informed or involved in teaching a course/module with content related to "the use of telehealth systems and methodologies in dentistry",<sup>11</sup> including TD to dental undergraduate and dental hygiene students.

In order to maintain confidentiality, links to both English and French versions of the survey were sent to the respondents, and the responses were collected through an anonymous link. Moreover, the respondents' data with identifiable information (those who provided their contact information for the draw purposes) were anonymized prior to data analysis, which was outlined in the informed consent.

### **3.3.4 Data Analysis**

Following the surveys' de-identification, data were imported from Qualtrics<sup>XM</sup> to SPSS software version 28.0 (SPSS Inc., IL, USA). Initially, data were screened for missing values and outliers. Due to designing the questions with a feature in Qualtrics preventing the respondents from advancing to the next question without answering the previous one, no missing values were found in the data. Also, no outliers were found in the data.

Because the survey contained several multiple-response questions,<sup>[3]</sup> each option was dichotomized using “0=no” and “1=yes”. Also, in case respondents selected more than one option for a question, each combination of selected options was assigned a unique code to keep a record of the complete answers provided by the respondents. The Likert-scale statements included four options: “Strongly agree”, “Somewhat agree”, “Strongly disagree” and “Somewhat disagree”. To simplify data analysis, the responses were dichotomized, with the “Strongly agree” and “Somewhat agree” options being merged as well as the “Strongly disagree” and “Somewhat disagree” options.

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<sup>[3]</sup> Multiple-response questions: Questions that allow the respondents to select more than one answer option from a list of choices.

Subsequently, descriptive and inferential analyses were run. The descriptive analysis included determining the frequency of responses, maximum, minimum, mean, and range, with the aim of identifying the general trends of data.

For the inferential statistics, Fisher's exact test was carried out to indicate any significant association between the Likert-scale statements results, as the dependent variable, and the existence of TD content in programs, as the independent variable.<sup>98</sup> Because of the study's small sample size and having more than 20% of cells with expected frequencies  $< 5$ , Fisher's exact test was run to obtain an accurate  $p$ -value.<sup>99</sup> Moreover, the Pearson chi-square for odds ratio test was used to report the likelihood of the occurrence of an event compared to others.<sup>98</sup> A  $p$  – value  $< 0.05$  was considered statistically significant.

### **3.4 RESULTS**

I received responses from thirty-four programs : ten undergraduate dental and twenty-four dental hygiene programs. These thirty-four responses came from forty-two individuals; three gift cards were sent to the draw winners selected among those who provided their contact information and replied to our winner's announcement email. Although more than one individual responded for a particular program, the programs were the primary units of analysis. Therefore, the survey's response rate was 100% ( $n=10$ ) for undergraduate dental and 68% ( $n=24$ ) for dental hygiene programs. The results related to the forty-two respondents' opinions are reported separately at the end of this section.

#### **3.4.1 Teledentistry educational programs**

##### **3.4.1.1 Descriptive characteristics**

Although eighteen out of thirty-four dental and dental hygiene programs had TD content, only three dental programs offered this content. The fifteen dental hygiene programs that offered

this content comprised two-year, three-year, and four-year dental hygiene, with some offering more than one type of dental hygiene program. (Table 3.1)

Among the eighteen programs addressing the TD content, only one had it as a separate module and/or course. TD content is currently offered completely mandatorily in twelve programs, while four offer some components, mainly “the introductory and general ones”, as mandatory and some others, including “TD experiments”, as optional.

Thirteen programs offered TD in “multiple academic years”, while two dental undergraduate programs addressed this topic in “a single academic year”.

An average of  $9.22 \pm 4.86$  hours (four to twenty hours) was reported for teaching TD content. Programs that dedicated less than nine hours to this content were less likely to address more than seven topics, compared to those spending nine hours and more for TD teaching (OR=0.14, 95% CI [0.02, 0.93])<sup>[4]</sup>.

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<sup>[4]</sup> Pearson Chi-square for odds ratio test was run to indicate the likelihood of this occurrence.

**Table 3.1: Teledentistry content existence based on the program types**

<b>Program type</b>	<b>TD content existence</b>	<b>Number of programs*</b>
Undergraduate dental program	Yes	3
	No evidence of a TD content	7
	<b>Total</b>	<b>10</b>
Dental hygiene program – 2-year diploma	Yes	11
	No evidence of a TD content	2
	<b>Total</b>	<b>13</b>
Dental hygiene program- 3-year diploma	Yes	6
	No evidence of a TD content	6
	<b>Total</b>	<b>12</b>
Dental hygiene program – bachelor’s degree (4-year program)	Yes	2
	No evidence of a TD content	2
	<b>Total</b>	<b>4</b>

\*The number of reported programs presented in this table exceeds the total number of thirty-four programs, as some institutions offer more than one type of dental hygiene program.

### **3.4.1.2 Methods of Delivery**

All eighteen programs with teledentistry content in their curriculum adopted the “lecture format” approach as a delivery method either alone or in combination with others. “Hands-on practice” and the “small group discussion” were the second most popular approaches (n=10), followed by simulation (n=7) and large group discussion (n=6). Interestingly, “large group discussion” and “hands-on practice” methods were only employed in the dental hygiene programs

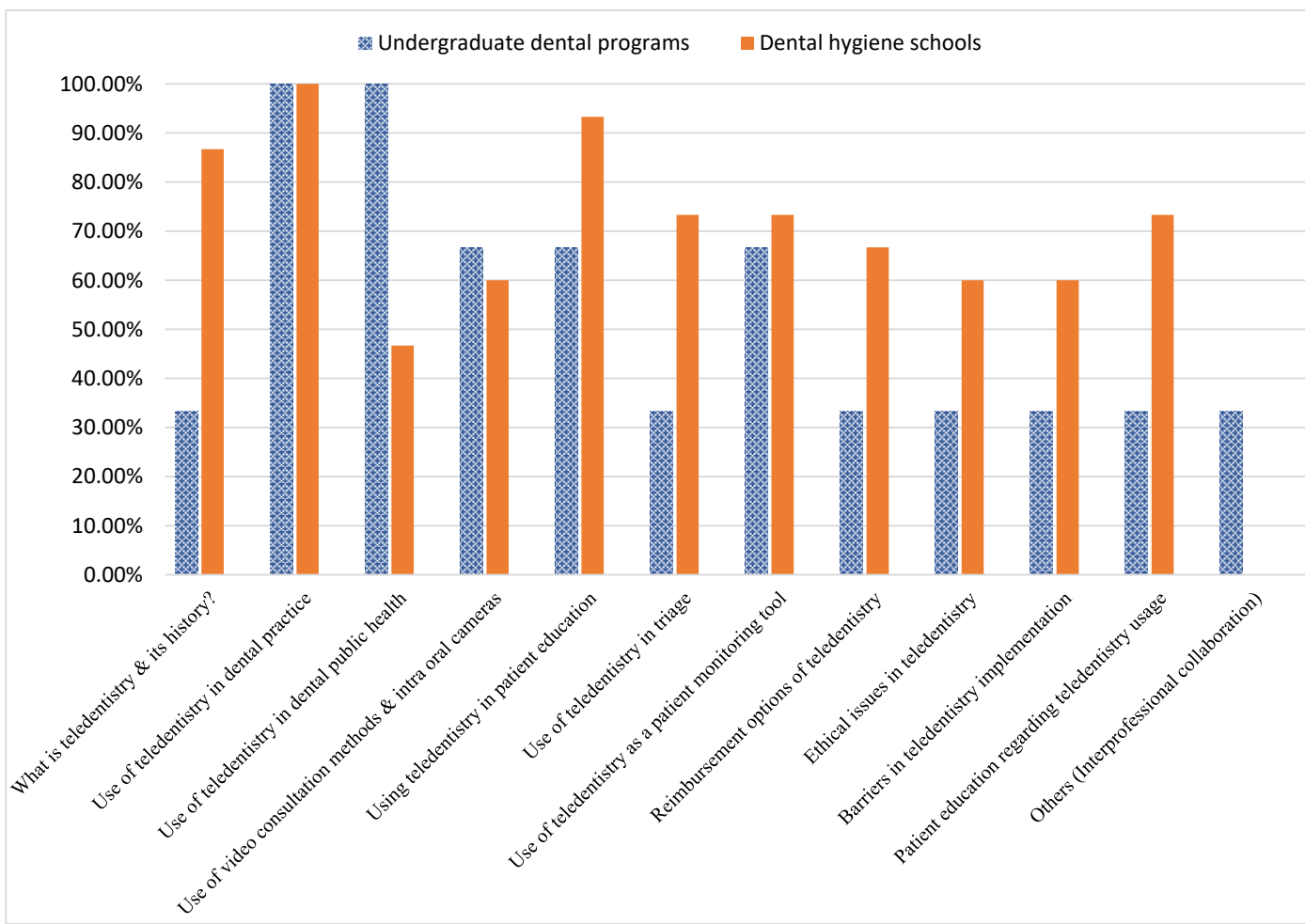
and none of the undergraduate dental programs. Moreover, two dental hygiene programs were reported using all the presented methods in the question.

### 3.4.1.3 Addressing topics

Among the programs covering TD content, only 38.88 % (n=7) addressed all the listed topics in the survey. While "using TD in dental practice" was the most frequently taught topic and was covered by all, "Barriers in teledentistry implementation" and "Ethical issues in teledentistry" were the least frequently taught topics. Additionally, respondents mentioned "Interprofessional collaboration for using TD" as another topic that was addressed. (Figure 3.1)

Although all dental programs included content on the “Use of teledentistry in dental public health”, less than half of dental hygiene programs (seven out of fifteen) addressed this topic.

**Figure 3.1. Addressed TD topics based on the program type.**



#### 3.4.1.4 Assessments techniques

Assessments for TD content were employed in fourteen programs , including one undergraduate dental program. Of all the 44.4% (n=8) programs used formative and summative assessment techniques (Table 3.2).

**Table 3.2: Employed assessment techniques categorized by the program type.**

<b>Employed assessment techniques</b>	<b>Program type</b>		<b>Total (n=18)</b>	<b>Percentage (%)</b>
	Undergraduate dental programs (n=3)	dental hygiene programs (n=15)		
No assessment	2	2	4	22.2
Examination (Final exams, mid-term exams, quizzes, OSCE, etc.)	0	2	2	11.1
Self-reflections	0	2	2	11.1
Examination + PBL/CBL/DALE assessment	0	1	1	5.6
Examination + Self-reflection + Case report + Final projects	0	1	1	5.6
Examination + Final projects	0	2	2	11.1
Self-reflection + Final projects	0	1	1	5.6
Examination + Case report +Final projects	0	1	1	5.6
Examination + Case report	0	2	2	11.1
Self-reflection + Case report + Final projects	0	1	1	5.6
Self-reflection + PBL/CBL/DALE assessment + Peer and mentor feedback	1	0	1	5.6

The majority of programs (55.55%, n=10) used multiple assessment techniques. “Examination (Final exams, mid-term exams, quizzes, OSCE, etc.)” was the most used technique (n=8), followed by “Self-reflections” (n=6) and “Final projects” (n=6). “Peer and mentor



feedback” was another technique used in only one of the undergraduate dental programs (Table 3.2).

### **3.4.2 Respondents’ Characteristics and Opinions on teledentistry education**

Following the request for sending the anonymous link to different individuals identified as key-informed persons, forty-two responses were obtained from thirty-four programs. Of note, one out of the forty-two respondents selected the option “TD should not be addressed”, leading to the premature termination of the survey. Although this respondent did not answer the remaining survey questions, the following reason was offered for choosing the “TD should not be addressed” option: *“Teledentistry is a valid and useful means of communication, but not an end in itself. In my opinion, its teaching is not yet sufficiently relevant in the current context.”* The exclusion of this answer led to forty-one respondents presented herein.

#### **3.4.2.1 Respondents’ Characteristics**

The respondents spent an average of 9.44 minutes completing the survey. The majority of them were females (61%, n=25), and 92.68% reported having experience in clinical practice. The respondents’ clinical practice experience ranged from four to forty-five years, with an average of nineteen years. Only 29.26% (n=11) of the respondents had teledentistry training during their own education, with five of them going through this training during their undergraduate dental and dental hygiene education (more information on the respondents’ characteristics is provided in Appendix E).

### 3.4.2.2 Respondents' definition of teledentistry

To get a sense of how the respondents interpreted the term teledentistry, they were asked to indicate their agreement with the definition provided on the first page of the survey.<sup>[5]</sup> In case of disagreement, they must provide their own definition in a designated text entry box. While Thirty-five individuals confirmed their agreement with the provided description of the term, six respondents provided their comments or own definitions of TD as below:

- 1- *"Including the use of other sources such as smartphones and socials" (Representative of an undergraduate dental program without a currently addressing TD content)*
- 2- *"Providing a consult over the phone or via Zoom/Team with a patient." (Representative of a dental hygiene program without currently addressing TD content)*
- 3- *"The same, but also including sort of hands-on care, when we can instruct the client to apply fluoride (varnish) or something like that." (Representative of a dental hygiene program with a currently addressing TD content)*
- 4- *"Using information and communication technologies in different ways to provide valuable oral care and services to patients and their families with the ultimate goal of improving their health, quality of life and well-being." <sup>[6]</sup> (Representative of an undergraduate dental program without currently addressing TD content)*
- 5- *"Yes I agree but would also consider teledentistry to indicate phone consultations first and foremost. The term is dated and may need to change with the current use of tech being so*

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<sup>[5]</sup> "the use of health information technology and telecommunications for oral care, consultation, education, and public awareness with the broad goal of improving oral health" <sup>10(p201)</sup>

<sup>[6]</sup> In French: " Utilisation des technologies de l'information et de la communication selon différentes modalités pour offrir des services et des soins buccodentaires de valeur aux patients et à leurs familles dans le but ultime d'améliorer leur santé, leur qualité de vie et leur bien-être."

*prevalent.” (Representative of a dental hygiene program with a currently addressing TD content)*

- 6- *“But what about digital dental care? And an app to check on the patient? Is that the same as TD?” (Representative of a dental hygiene program with a currently addressing TD content)*

Respondents were then presented with the remaining questions to either express their perspective about TD content or to report the features of current TD content in their programs.

#### **3.4.2.3 Teledentistry education pedagogy: respondents’ Perspective**

A total of twenty respondents reported that they either did not have TD content or were unsure if such content was included in their curricula. As a result, they were presented with a set of questions seeking their opinions on the characteristics that TD content should have to meet their expectations for this type of educational content.

More than half of the respondents (n=11) preferred TD content incorporation in “a single academic year”. Also, 70% of them believed that the TD content should be incorporated into a course or module rather than being offered as a standing-alone course or module. Only four individuals preferred offering this content as a completely optional topic and others believed in offering such content mandatorily. Furthermore, eight respondents expressed a preference for dedicating five to nine hours toward TD content.

Regarding the preferred approaches for the method of delivery, “Lecture format” (n=19) was mostly recommended, followed by “Small group discussion” (n=16), and suggestions on employing the simulation and hands-on practice. In addition, the majority of respondents (n=19)

believed the topic of “Use of video consultation methods and using intra-oral cameras” would be useful to address.

In terms of the content assessment, formative assessment was favored over summative by the majority of the respondents (n=14). Additionally, the "Problem-based learning (PBL) and/or Case-based curriculum (CBL) and/or Dental Applied Learning Experience (DALE)" technique was the preferred assessment approach selected by ten respondents.

#### **3.4.2.4 Barriers to teledentistry education**

The question on the barriers to TD implementation into the curriculum was answered by twenty individuals representing programs without TD content, as it focused on the reasons for not having such content. The majority (80%, n=15) of them believed that there are barriers to TD implementation into the curriculum. These respondents identified “Packed curriculum” as the most preventive barrier to TD implementation, followed by “Lack of knowledge”.

Meanwhile, thirteen individuals, who represented programs with TD content and yet experienced barriers during their teaching, responded to the question regarding perceived or experienced barriers. In this group, “Packed curriculum” (69.23%), “Shortage of faculty members” (61.53%), and “Lack of budget” (53.84%) were recognized as the most prevalent barriers. It is noteworthy that “Lack of interest” is ranked among the least prevalent barriers in both categories. (Table 3.3).

**Table 3.3: Barriers to teledentistry education.**

	Barriers	Frequency	Number of respondents to the question	Percentage
<b>Barriers to TD implementation into the curriculum</b>	Packed curriculum	11	15	73.33
	Lack of knowledge	10	15	66.66
	Lack of champions	6	15	40
	shortage of faculty members	6	15	40
	lack of budget	6	15	40
	lack of equipment	6	15	40
	Lack of interest	5	15	33.33
	Others: 1- Lack of time 2- Old-fashioned program planning 3- Unsure of the fit of this content	3	15	20
<b>Perceived or experienced barriers in teaching TD</b>	Packed curriculum	9	13	69.23
	Shortage of faculty members	8	13	61.53
	Lack of budget	7	13	53.84
	Lack of knowledge	5	13	38.46
	Lack of interest	4	13	30.76
	Lack of equipment	3	13	23.07
	Lack of champions	2	13	15.38
	Others: - Lack of guidelines for use in clinical practice (for example, regulations and reimbursement)	1	13	7

\*The sum of the frequency numbers exceeds the total number, as the question was a multiple-response question.

### 3.4.2.5 Likert-scale statements report

All respondents, regardless of the TD content being offered in their programs, answered this question and indicated their level of agreement or disagreement with statements concerning TD education. Interestingly, all of the respondents strongly or somewhat agreed to the teledentistry incorporation in the undergraduate dental or dental hygiene curricula, while this content integration in the “clinical specialty” and “dental public health specialty” was accompanied by some level of disagreement, with five and two respondents strongly or somewhat disagreeing to this matter, respectively. Meanwhile, teaching teledentistry as a separate content/module had the greatest level of disagreement, with twenty-four respondents strongly or somewhat disagreeing with it. (Table 3.4)

No significant differences were found between the two groups categorized based on TD content existence for any of the statements running Fisher’s exact test. Also, due to having constant variables in some of the statements (e.g., all the respondents chose the “Strongly agree & somewhat agree” option), running the Fisher’s exact test was not possible.

**Table 3.4: The Likert-scale statements report based on the TD content existence.**

Statements		TD content existence	Level of agreement		Fisher’s exact test results
			Strongly agree & somewhat agree	Somewhat disagree & strongly disagree	p-value
			Frequency (%)	Frequency (%)	
“Teledentistry education should be a part of dental undergraduate /dental hygiene curricula”	Yes	21	0	.a	
	No evidence of a TD content	20	0		
	Total	41			

“Teledentistry should be taught as an integrated content in the clinical specialties”	Yes	19	2	0.663
	No evidence of a TD content	17	3	
	Total	41		
“Teledentistry should be taught as an integrated content in the dental public health specialty”	Yes	21	0	0.232
	No evidence of a TD content	18	2	
	Total	41		
“Teledentistry education should be in the didactic format”	Yes	20	1	1
	No evidence of a TD content	19	1	
	Total	41		
“Teledentistry education should be in the simulation format”	Yes	20	1	0.343
	No evidence of a TD content	17	3	
	Total	41		
“Teledentistry education should be in a hands-on format”	Yes	21	0	0.488
	No evidence of a TD content	19	1	
	Total	41		
“Teledentistry should be taught as a separate course/ module in the curriculum”	Yes	9	12	1
	No evidence of a TD content	8	12	
	Total	41		
“Teledentistry education is beneficial to the oral health care professionals”	Yes	21	0	0.488
	No evidence of a TD content	19	1	
	Total	41		
“Teledentistry education is beneficial to the patients with access to care difficulties”	Yes	21	0	.a
	No evidence of a TD content	20	0	
	Total	41		

“Teledentistry education is beneficial to the patients living in the remote areas”	Yes	21	0	0.488
	No evidence of a TD content	19	1	
	Total	41		

<sup>a</sup>. No statistics were computed because of having constant variables.

### 3.4 Discussion

In this study, a survey was distributed to all Canadian dental and dental hygiene programs to explore the teledentistry content in their curricula being offered to undergraduate students. The survey had a response rate of 100% for undergraduate dental and 68% for dental hygiene programs, which is higher than the reported average response rate for electronic surveys, and this rate was also higher compared to a similar study by Brondani et al.<sup>100</sup> For the purpose of this study, programs were considered the unit of analysis, as I aimed to get an overview of the teledentistry content pedagogy offered and not the content that is taught by each individual.

This study’s findings revealed that the TD content is only addressed in 30% of all the undergraduate dental and 62.5% of the dental hygiene programs that responded to our survey across Canada. To our best knowledge, there is no similar study conducted in other countries investigating TD content education in oral-health-related programs on a nationwide scale. However, sporadic reports have emerged regarding the delivery of TD content to students. In the United States, for instance, nine dental and dental hygiene programs provide evidence of teaching TD in their curricula,<sup>47,48,50,51,67,70,101–103</sup> although the actual number of programs offering this content in the US may be higher. Moreover, one study reported the existence of TD content within dental programs curricula in France without any information regarding the number of programs addressing this content.<sup>104</sup>



These results are notable from two perspectives: the percentage difference between dental and dental hygiene programs that address this topic, and the relative lack of implemented TD educational programs in Canadian dental and dental hygiene programs.

The two-fold difference in the percentage of dental and dental hygiene addressing TD content might be related to the competencies of dentists and dental hygienists despite the overlaps of responsibilities between these two professions. While dentists are more focused on providing treatment in different modalities, alongside being responsible for oral health promotion and disease prevention, the focus of dental hygiene practice is on oral health promotion, oral disease prevention, and reducing disparities in access to care, which may lead to the inclusion of TD content more easily.<sup>105–109</sup> Meanwhile, despite teledentistry's effectiveness in different stages of treatment (consultation, triage, diagnosis, etc.), it is mostly utilized in the teleconsultation format<sup>19–21</sup> and with the aim of improving access to care.<sup>10,29,30</sup> Therefore, I speculate this as the possible reason behind implementing TD content more frequently within dental hygiene curricula compared to dental curricula. Additionally, these findings are consistent with my scoping review of literature on teledentistry educational programs in other countries, which indicates that dental hygienists are targeted more frequently for this content.<sup>47,66,69,70,101</sup>

Despite more than half of the dental hygiene programs in Canada reporting addressing TD, there may be a lack of incorporating TD content in Canadian undergrad curricula overall, which mirrors the evidence of this content not being widely addressed in oral health care providers' educational curricula globally.<sup>47,48,52</sup> Such shortfall may be due to the belief that our curricula are already overcrowded curriculum, that the TD equipment is expensive, and that our faculty members do not have enough knowledge, or will, to teach this content.<sup>44,47</sup>

Indeed, my survey's respondents identified an overpacked curriculum as one of the main barriers to TD implementation. This could be a result of guidelines set by the Association of Canadian Faculties of Dentistry (ACFD) Educational framework,<sup>107</sup> Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists guideline<sup>108</sup> and the Commission of Dental Accreditation of Canada (CDAC).<sup>110</sup> According to these frameworks, undergraduate dental and dental hygiene students require to obtain a variety and considerable amount of skills in their education, which does not include a telehealth component. Therefore, training in other skills might be prioritized over TD education. It is recommended to incorporate telehealth as a distinct component within these frameworks, even though it could be viewed as one of the factors facilitating access to care.

Moreover, lack of knowledge is recognized as another reason for not implementing TD in the curriculum by the respondents, given that only 29.26% of them had a TD education themselves during their own training. Evidence shows that having previous exposure to TD likely increases the level of knowledge, confidence, and positive attitude toward its utilization,<sup>47,66</sup> emphasizing the necessity of TD content integration into the curriculum to equip students with this skill and willingness to teach it, as clinicians and future educators.

The lack of reimbursement regulations for TD practice has been highlighted as another significant obstacle,<sup>111</sup> and a main factor causing a lack of interest in TD adoption by oral health care providers.<sup>112</sup> Therefore, the low rate of addressing TD in Canadian programs could be explained by the absence of regulations concerning TD reimbursement until recently. Some Canadian jurisdictions released these codes during the COVID-19 pandemic only later in 2020.<sup>28</sup> The development of reimbursement codes may signal an increased incorporation of TD into professional practice in Canada, which could lead to an increased need for TD education in

programs in the coming years that requires careful planning of different aspects of the course's pedagogy to ensure achieving competency for its use in practice.

As a result, to equip oral health care professionals with the necessary skills to excel in a field, it is crucial for their educational programs to employ appropriate teaching approaches that mirror real-life scenarios.<sup>83</sup> Techniques such as hands-on training and simulation are recommended to ensure TD practice and supplement traditional lecture-based teaching methods that are commonly used in dental education.<sup>84-86</sup>

In the present study, the lecture format was identified as the most utilized delivery approach for teaching teledentistry in Canada, followed by hands-on practice and small group discussion. This also aligns with the findings of my scoping review, which showed that didactic teaching and hands-on practice were the most commonly used delivery methods for teledentistry content education worldwide. Moreover, my survey results indicated that hands-on practice was only applied in dental hygiene programs and none of the undergraduate dental programs in Canada. However, the employment of hands-on practice techniques in TD education for dental students is reported in previous literature,<sup>51,67,113</sup> ranging from capturing images with intra-oral cameras to synchronous TD encounters using actors as patients. While the opportunity to practice using intra-oral cameras may easily fall within the digital aspects of clinical care,<sup>114</sup> the Schulich School of Dentistry in Canada showed that intra-oral cameras are underutilized in other educational fields as well.<sup>115</sup> Therefore, hands-on training using these cameras in a TD course will be beneficial alongside employing other methods of delivery.

According to my scoping review and survey findings, the implementation of TD in practice is discussed in dental and dental hygiene curricula worldwide<sup>47,48,51</sup> and in Canada(as provided in this study's results). However, unlike some other TD programs,<sup>44,47,71,74</sup> ethical issues related to

teledentistry are not included in Canadian dental and dental hygiene curricula. This may be a missing opportunity as many curricula already have comprehensive training in ethical practices,<sup>116</sup> and adding TD would be a natural fit. This training in ethics is mandatory to achieve competency based on the AFCD education framework and the Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists guideline.<sup>107,108</sup> Additionally, it is important to note that several ethical considerations are unique to teledentistry usage and should be emphasized. These may include maintaining patients' confidentiality during data electronic transmission, patients' data and information security, and internet fraud in medical records.<sup>115,117</sup>

As another drive for learning, students' evaluation is also an opportunity for testing health care professionals' skills in real-life scenarios, and it can be achieved through various methods.<sup>88,89</sup> Nonetheless, a scoping review on TD content globally showed that the utilized assessment techniques for TD content were rarely reported in the literature. Also, my survey indicated that 22.2% of programs with TD content did not have any assessment for this topic. Those curricula with assessments mostly employed a combination of methods, with examination being the most used format. Contrarily, surveys were more frequently employed as a means of self-evaluation or to evaluate students' knowledge and perception of the course in other studies.<sup>67,70,75</sup> For the assessment of TD content, I believe that self-reflections and final projects can be employed in combination with other techniques to increase the depth of knowledge, personalize and contextualize knowledge and promote creative thinking.<sup>118,119</sup>

Adding to the features of the existing TD programs, respondents also provided recommendations on how the TD curricula should be structured. The majority of participants suggested that TD should be offered mandatorily and integrated into another course or module. The majority of survey respondents expressed their disagreement with delivering the content as a

standalone course or module. A possible explanation for this could be that a dedicated course for a standing-alone topic requires inexistent time in an already cramped schedule or that stand-alone topics might be seen as silos of information rather than part of an interconnected web of learning.<sup>117</sup> Although the cost of specialized equipment such as intraoral cameras and computer software<sup>10</sup> might be perceived as barriers to implementing TD either as a separate course or part of an existing one, these are likely already incorporated in many programs, given the boom of digital dentistry in many curricula worldwide.<sup>120</sup> In fact, the “Use of video consultation methods and using intraoral cameras” topic was suggested by survey respondents, corroborating with the findings from Nassani et al.<sup>77</sup> and Alabdullah<sup>113</sup> studies. Lastly, respondents were asked to provide their own definition of the term "teledentistry" in case they disagreed with the one provided. Although six respondents offered their definitions, they were mostly similar to the one I gave.

### **3.5 Strengths and Limitations**

To the best of my knowledge, this is the first study exploring the TD content in Canadian dental and dental hygiene programs on a nationwide scale. Moreover, the high response rate helped me to gain a better insight into the TD content status in these programs. The survey was a comprehensive questionnaire with thirty-seven items, including various question types, with different sets of questions showing based on the respondents' answers to previous questions.

However, this study is not without limitations. Due to receiving multiple responses from individuals affiliated with the same program (I received more than one response from eight programs out of the thirty-four programs responding to the survey), and considering programs as the unit of analysis, I had to combine the responses from the same programs. Therefore, I sorted the information based on the respondents' answers to the question, “Is there teledentistry content in your program?”. When multiple responses were from the same program of the same institution,

I gave preference to answers that selected "Yes", rather than "No" or "Do not know", since they were more likely to report on the existing TD content. Moreover, I merged multiple "Yes" answers from the same institution, which might have included more details than single answers. On the other hand, the respondents who selected the "No" and "Do not know" options for the aforementioned question were led to other sets of questions, asking their recommendations for TD content pedagogy. These answers were analyzed separately on an individual level, along with the Likert scale, TD definition, and barriers to TD education questions, as they reflected personal opinions.

Another limitation of this study is the lack of uncertainty in the survey participants' abilities and knowledge to fully reflect on the TD program features, as they might not be the most knowledgeable individuals in this regard, or they might be only informed about parts of the program, which can result in the missing information. Additionally, despite having a high response rate, our sample size is small, making running regression tests not meaningful. Moreover, given the relatively small number of dental and dental hygiene programs within Canada, the generalization of the findings is not warranted.

The social desirability of answers can be considered as another limitation. Although respondents were assured that the programs' names would not be disclosed in the final report, they may have felt pressure to provide socially desirable answers since they were asked to identify their programs' names.

Another limitation is the possible misinterpretation of the questions, producing responses deviating from the actual intent. However, to overcome this issue, I pilot-tested the questionnaire before distribution and applied the required modifications. Moreover, respondents were able to include other responses if not listed, for example, under the 'others' section. Also, as some

respondents did, they could offer their own definition or understanding of teledentistry and answer the questions based on that, minimizing misinterpretation. Moreover, although not including a neutral option in the Likert-scale question may prevent its overuse, it might have been resulted in obtaining unreal opinions as respondents are not provided with the opportunity to express their neutral opinion.

Furthermore, while the utilization of telephones and smart phones to communicate with patients may be perceived as a form of practicing teledentistry, it represents one of the most basic modalities of TD, while the focus of this study is on TD education as a whole.

Follow-up studies should administer the survey in an attempt to reach out to other Canadian dental hygiene programs, as well as other dental and dental hygiene programs across the world. Ideally, one response per program should be gathered to avoid multiple answers. Also, in order to explore faculty members, dental students, and oral health care providers' perspectives on TD content incorporation in the curriculum and their intention for its utilization, a more qualitative approach is suggested.

### **3.6 Conclusion**

Only one-third of dental programs and 62.5% of the surveyed dental hygiene schools across Canada address TD, despite its importance in the education of oral health professionals. Given recent measures aimed at overcoming barriers to teledentistry implementation into practice, such as the introduction of reimbursement codes, teledentistry education in oral health professional training is highlighted and considered crucial in preparing students for using TD in their future practice. Additionally, integration of TD content into the curriculum will consequently decrease the lack of knowledge, identified as a barrier to TD implementation in both education and practice,

as today's students will be future educators. Therefore, planning for implementing comprehensive TD content using a variety of delivery methods and addressing various topics is recommended for effective teledentistry education.

In the next chapter, I have briefly discussed the findings of the scoping review and survey study and included future directions and conclusions of these two studies.



## Chapter 4: Discussion, Conclusion and Future Directions

I set up my study to answer two research questions: *How is TD taught in undergraduate, graduate, postgraduate, diploma, and continuing oral health-related education worldwide?* via a scoping review, and *'How is teledentistry taught in dental and dental hygiene programs across Canada?'* via a thirty-seven-item survey across all Canadian dental and dental hygiene programs. The scoping review is presented in Chapter Two, while the survey results are presented in Chapter Three. Ahead are the brief discussion, main conclusions, and future directions of both Chapters.

### 4.1 Discussion

During the COVID-19 pandemic, the number of studies on Teledentistry raised remarkably due to considering TD as an alternative solution to dental care and oral health care professionals' education.<sup>67</sup> In the meantime, dental professionals' lack of knowledge regarding TD is evident in the literature, suggesting the incorporation of this content in different educational levels for oral healthcare providers, which can be an opportunity to upgrade their knowledge.<sup>3,77</sup>

The results of my scoping review and survey study revealed that TD content is not being widely addressed in oral healthcare providers' educational curricula in Canada and globally.<sup>47,48,52</sup> This shortfall might be a result of several barriers mentioned in the literature, and by my study's participants, including overpacked curriculum, expensive TD equipment, Faculty members' lack of knowledge, etc.<sup>44,47</sup> Moreover, TD content is more frequently implemented in dental hygiene programs' curricula compared to undergraduate dental programs, which might be as a result of the difference in these two professions' scope of practice.<sup>105-109</sup>

Regarding the method of delivery, programs in Canada and across the world showed the same pattern in using lecture format as the most selected method for delivering the teledentistry content, mostly accompanied by hands-on training and simulation.<sup>51,67,113</sup> On the other hand, in

Canadian dental and dental hygiene programs, ethics in TD is not widely discussed, unlike other countries,<sup>44,47,71,74</sup> which can be due to having comprehensive ethics training in Canadian programs. However, these ethics courses can also easily fit TD-specific ethical considerations, including maintaining patients' confidentiality during data electronic transmission and patients' data and information security.<sup>115–117</sup>

Moreover, despite the importance of evaluation in the student's learning process, this is an overlooked field in TD education, with a lack of reports in the literature and implementation of assessment in only 22.22% of the Canadian programs, with the majority of them employing examination for students' evaluation.

## **4.2 Conclusion**

During the COVID-19 pandemic, teledentistry emerged as a viable option for providing some oral healthcare modalities, highlighting the urgent need for educating oral health professionals on this subject. However, there is a sparsity of studies reporting the inclusion of such content in oral healthcare providers' education and training. Meanwhile, my scoping review of nineteen selected publications showed that the existing teledentistry educational programs vary in terms of objectives, content, delivery methods, assessment techniques, and duration. These studies mostly focused on teledentistry education at the undergraduate level and in the US, with very few reports on teledentistry educational programs in other countries, including Canada.

Therefore, I conducted a thirty-seven-item survey across Canadian dental and dental hygiene programs, which revealed that only one-third of dental and 62.5% of dental hygiene programs address teledentistry content. My findings underscore the need to address the identified barriers to teledentistry implementation in education. Moreover, planning the content delivery in a format to ensure students' competency toward teledentistry utilization is crucial beyond lecture-

based curricula, using the information on existing TD programs and recommendations for the future.

### **4.3 Future Directions**

To help with future course planning or improving the existing content, a systematic review with a synthesis of the scoping review presented herein and the literature published after June 4<sup>th</sup>, 2022, is warranted to appraise the studies' quality. Moreover, follow-up studies with the survey being administered broadly across the world aimed at one respondent per program to avoid multiple answers are suggested. Lastly, qualitative studies of Canadian faculty members, dental students, and oral health care providers' perspectives on TD content incorporation in the curriculum and their intention for its utilization in their future practice through a qualitative approach are recommended.

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## Appendices

### Appendix A: Timetable

Months Progress	June	June- July	July-December	December- April
Ethics committee approval				
Survey data collection				
Data entry and cleaning				
Data analysis				
Writing final report and manuscript				

## **Appendix B: The survey's English version**

### **Teledentistry content in Canadian dental and dental hygiene curricula**

You are invited to participate in a research study about teledentistry (TD) in Canadian dental undergraduate and dental hygiene programs. For the purpose of this study, teledentistry is defined as "The use of health information technology and telecommunications for oral care, consultation, education, and public awareness with the broad goal of improving oral health". This study is being conducted by Anahita Bakhshaei, a graduate student in MSc in craniofacial science, under the supervision of Dr. Mario Brondani, associate professor at the University of British Columbia (UBC) Faculty of Dentistry. In this study, surveys will be disseminated to all Canadian dental and dental hygiene programs, in both English and French, via the Qualtrics® platform.

There are no risks associated with this study, and you can withdraw at any time. The survey will take approximately 10 minutes to be completed. Your responses will be collected anonymously – your email or IP address will not be linked to your response. Your responses will be gathered in the UBC Qualtrics server to keep your shared information confidential.

UBC collects the information in the survey under the authority of sections 26(c) and 26(e) of the BC Freedom of Information and Protection of Privacy Act (BC FIPPA).

We are offering a chance to win one of five \$50 gift cards upon completing the survey as a thank you gesture. In order to be considered for the draw, you will be asked to inform your email or contact information at the end of the survey, which will not be shared with anyone other than the graduate student. In order to keep track of the responses, you will be asked to identify your institution's name. Please note that this information will also not be used when reporting the findings and will be kept confidential for tracking purposes only.

Your valuable participation in this study will inform us as to whether or not-TD as a content should be addressed in the dental and dental hygiene curricula and if so, how such content should be delivered and assessed.

This study's final results will be available in the form of a graduate thesis and peer-reviewed manuscripts. In case you believe this survey does not match your field of expertise, we would appreciate it if you could forward the link to an individual who might be more informed regarding this topic.

If you have any questions, please do not hesitate to contact us:

Dr. Mario Brondani (The principal investigator): [brondani@dentistry.ubc.ca](mailto:brondani@dentistry.ubc.ca)

Anahita Bakhshaei (The researcher): [anna1921@mail.ubc.ca](mailto:anna1921@mail.ubc.ca)

By completing this survey, you are consenting to participate in this study. Thank you in advance for your thoughtful input.

This study's ethics ID number is H22-00019.

---

- For information purposes only, which of the following will apply to your school/faculty/program?

- ☐ Undergraduate dental program
- ☐ Dental hygiene program- 3-year diploma
- ☐ Dental hygiene program – 2-year diploma
- ☐ Dental hygiene program – bachelor's degree
- ☐ Other\_\_\_\_\_

Display This Question:

*If Please choose the program related to you: = Undergraduate dental program*

**For the undergraduate dental programs**

- Please choose your institution among the options:

- ☐ University of British Columbia
- ☐ University of Alberta
- ☐ University of Manitoba
- ☐ Dalhousie University
- ☐ University of Toronto
- ☐ McGill University
- ☐ Western University
- ☐ University of Saskatchewan
- ☐ Université de Montréal
- ☐ Université Laval

Display This Question:

*If Please choose the program related to you: = Dental hygiene program- 3-year diploma Or Dental hygiene program- 2-year diploma Or Dental hygiene program- bachelor's degree*

### **For the dental hygiene programs**

- Please choose your institution among the options:

- ☐ University of British Columbia
- ☐ University of Alberta
- ☐ University of Manitoba
- ☐ Dalhousie University
- ☐ Camosun College
- ☐ College of New Caledonia
- ☐ Vancouver Island University
- ☐ Vancouver College of Dental Hygiene
- ☐ Vancouver Community College
- ☐ Oulton College
- ☐ Algonquin College of Applied Arts & Technology
- ☐ APLUS Institute
- ☐ Cambrian College of Applied Arts & Technology
- ☐ The Canadian Academy of Dental Health and Community Sciences
- ☐ Canadian National Institute of Health
- ☐ Canadore College of Applied Arts and Technology
- ☐ Collège Boréal

- ☐ Confederation College
- ☐ Durham College
- ☐ Fanshawe College
- ☐ George Brown College
- ☐ Georgian College of Applied Arts & Technology
- ☐ La Cité, Niagara College Of Applied Arts & Technology
- ☐ Oxford College of Arts
- ☐ Business and Technology
- ☐ Southern Ontario Dental College
- ☐ St. Clair College
- ☐ Toronto College of Dental Hygiene and Auxiliaries Inc.
- ☐ Cégep de Chicoutimi
- ☐ Cégep François Xavier-Garneau
- ☐ Cégep de l'Outaouais
- ☐ Collège de Maisonneuve
- ☐ Cégep Edouard-Montpetit
- ☐ John Abbott College
- ☐ Saskatchewan Polytechnic

---

- For information purposes only, please identify your gender in the box below:

---

☐ Prefer not to answer

- For information purposes only, please indicate your age among the options below:

☐ 20-30 years old

☐ 31-40 years old

☐ 41-50 years old

☐ 51-60 years old

☐ over 60 years old

☐ Prefer not to answer

---

- Please provide your graduation year in the box below:

\_\_\_\_\_

☐ Prefer not to answer

---

- Do you have experience in clinical practice?

☐ Yes

☐ No

☐ Prefer not to answer

---

*Display This Question:*

*If Do you have experience in clinical practice? = Yes*

- How many years of clinical practice experience do you have?

\_\_\_\_\_



☐ Prefer not to answer

---

- How do you define the term "Teledentistry"?

☐ Same definition as the consent form

☐ Other (Please provide your definition of this term below)

---

- Have you received a teledentistry education and/or training of any kind during your education?

☐ Yes

☐ No

☐ Not sure

---

*Display This Question:*

*If Have you received a teledentistry education and/or training of any kind during your education? = Yes*

- At which level have you received your teledentistry education and/or training? ( e.g., undergraduate, graduate, continuing education, etc.)

---

- Is there a teledentistry course/content in your program currently?

☐ Yes

☐ Do not know

☐ No

---

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- How is teledentistry addressed in your program?

☐ As a content incorporated in a module

☐ As a separate course/module

☐ Other \_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- How should teledentistry be addressed in your program?

☐ As content incorporated in a module

☐ As a separate course/module

☐ Should not be addressed

☐ Other \_\_\_\_\_

*Display This Question:*

*If How teledentistry should be addressed in your program? = Should not be addressed*

- Please provide your rationale for why teledentistry should not be addressed in the curriculum:

\_\_\_\_\_

*Display This Question:*

*If How teledentistry should be addressed in your program? = Should not be addressed*

- Please use this text box if you would like to provide any additional information:

\_\_\_\_\_

*Display This Question:*

*If How teledentistry should be addressed in your program? = Should not be addressed*

- Please enter your contact information If you would like to participate in our draw:

---

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- How is the teledentistry content status?

- ☐ A mandatory content (e.g., part of the curriculum)
- ☐ An optional content (e.g., extracurricular or elective)
- ☐ Other\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- How should the teledentistry content status be?

- ☐ A mandatory content (e.g., part of the curriculum)
- ☐ An optional content (e.g., extracurricular or elective)
- ☐ Other\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- For teaching this content, which approach are you currently employing? ( Choose all that apply)

- ☐ Lecture format
- ☐ Case discussion (large group format)
- ☐ Case discussion (small group format)
- ☐ Simulation (mannequin, using intraoral cameras in the lab)
- ☐ Hands-on practice (working with patients)
- ☐ Other \_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- How many hours is dedicated to this content in total ( lecture format, case discussion, simulation, hands-on practice, etc.)?

\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- Please indicate whether this content is addressed in a single academic year or multiple years:

- ☐ A single academic year
- ☐ Multiple academic years
- ☐ Other \_\_\_\_\_

Display This Question:

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- Which approach should be employed for teaching this content? ( Choose all that apply)

☐

Lecture format

☐

Case discussion (large group format)

☐

Case discussion (small group format)

☐

Simulation (mannequin, using intraoral cameras in the lab)

☐

Hands-on practice (working with patients)

☐

Other\_\_\_\_\_

Display This Question:

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- How many hours should be dedicated to this content in total ( lecture format, case discussion, simulation, hands-on practice, etc.)?

\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- Please indicate your preference regarding whether this content is better to be addressed in a single academic year or multiple years:

☐ A single academic year

☐ Multiple academic years

☐ Other \_\_\_\_\_

---

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- Please indicate in which year(s) this content should be addressed:

\_\_\_\_\_

- In terms of the education of Teledentistry, to what extent do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Teledentistry education should be a part of dental undergraduate /dental hygiene curricula	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry education should be in the didactic format	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry education should be in the simulation format	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry education should be in a hands-on format	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry should be taught as a separate course/ module in the curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry should be taught as an integrated content in the clinical specialties (if exist)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledentistry should be taught as an integrated content in the dental public health specialty (if exist)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Teledentistry education is beneficial  
to the oral health care professionals

☐☐☐☐

Teledentistry education is beneficial  
to patients with access to care  
difficulties

☐☐☐☐

Teledentistry education is beneficial  
to patients living in remote areas

☐☐☐☐

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- Please indicate which of these topics are you addressing in this content. (Choose all that apply)

- ☐ What is teledentistry and its history?
  - ☐ Use of teledentistry in dental practice
  - ☐ Use of teledentistry in dental public health
  - ☐ Use of video consultation methods and using intra oral cameras
  - ☐ Using teledentistry in patient education
  - ☐ Use of teledentistry in triage
  - ☐ Use of teledentistry as a patient monitoring tool
  - ☐ Reimbursement options of teledentistry
  - ☐ Ethical issues in teledentistry
  - ☐ Barriers in teledentistry implementation
  - ☐ Patient education regarding teledentistry usage
  - ☐ Other \_\_\_\_\_
-

Display This Question:

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

- Please indicate the suggested topics you believe should be addressed in this content.  
(Choose all that apply)

- ☐ What is teledentistry and its history?
- ☐ Use of teledentistry in dental practice
- ☐ Use of teledentistry in dental public health
- ☐ Use of video consultation methods and using intra oral cameras
- ☐ Using teledentistry in patient education
- ☐ Use of teledentistry in triage
- ☐ Use of teledentistry as a patient monitoring tool
- ☐ Reimbursement options of teledentistry
- ☐ Ethical issues in teledentistry
- ☐ Barriers in teledentistry implementation
- ☐ Patient education regarding teledentistry usage
- ☐ Other \_\_\_\_\_

---

Display This Question:

*If Is there a teledentistry course/content in your program currently?= No*

*Or Is there a teledentistry course/content in your program currently?= Do not know*

- Are there any barriers to the teaching adoption of teledentistry in your program?

☐ Yes

☐ Do not know

☐ No

---

*Display This Question:*

*If Are there any barriers to the teaching of teledentistry in your program? = Do not know*

*Or Are there any barriers to the teaching of teledentistry in your program? = No*

- Please provide any particular reason(s) for not incorporating teledentistry content in your program:

---

---

*Display This Question:*

*If Are there any barriers to the adoption of teledentistry in your program? = Yes*

- Which of these options match the barriers to teledentistry adoption in your program? (Choose all that apply)

☐

Lack of knowledge

☐

Lack of interest

☐

Lack of equipment

☐

Lack of budget

☐

Packed curriculum

☐

Shortage of faculty members

☐

Lack of a champion

☐

Other \_\_\_\_\_

*Display This Question:*

*If Are there any barriers to the teaching of teledentistry in your program? = Do not know*

*Or Are there any barriers to the teaching of teledentistry in your program? = No*

- Please provide any particular reason(s) for not incorporating teledentistry content in your program:

\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Yes*

- Have you perceived or experienced any barriers in teaching teledentistry at your school?

☐ Yes

☐ No

*Display This Question:*

*If Have you perceived or experienced any barriers in teaching teledentistry at your school? = Yes*

-Which of these options match the perceived or experienced barriers the best? (Choose all that apply)

☐

Lack of knowledge

☐

Lack of interest

☐

Lack of equipment

☐

Lack of budget

☐

Packed curriculum

☐

Shortage of faculty members

☐

Lack of champions

☐

Other\_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently?= Yes*

- Is there an assessment for this content?

- ☐ Yes
  - ☐ Do not know
  - ☐ No
- 

*Display This Question:*

*If Is there any assessment for this content? = Yes*

- Which type(s) of assessments is employed for this content? (Choose all that apply)

- ☐ Formative assessment
  - ☐ Summative assessment
  - ☐ Other\_\_\_\_\_
-

*Display This Question:*

*If Is there any assessment for this content? = Yes*

- Which of these assessment techniques are you utilizing for this content?(choose all that apply)

☐

Examination ( Final exams, mid-term exams, quizzes, OSCE, etc.)

☐

Self-reflections

☐

Case report

☐

Final projects

☐

Applied

Problem-based learning(PBL) and/or Case-based curriculum (CBL) and/or Dental Learning Experience (DALE) assessments

☐

Other \_\_\_\_\_

*Display This Question:*

*If Is there a teledentistry course/content in your program currently? = Do not know*

*Or Is there a teledentistry course/content in your program currently? = No*

*Or If*

*Is there any assessment for this content/module? = Do not know*

*Or Is there any assessment for this content/module? = No*

- Should this content/module have an assessment?

☐

Yes

☐

Do not know

☐

No



*Display This Question:*

*If Should this content have an assessment? = Yes*

- Which type(s) of assessments should be employed for this content? (Choose all that apply)

☐

Formative assessment

☐

Summative assessment

☐

Other\_\_\_\_\_

*Display This Question:*

*If Should this content have an assessment? = Yes*

- Which of these assessment techniques should be you utilized for this content?(choose all that apply)

☐

Examination ( Final exams, mid-term exams, quizzes, OSCE, etc.)

☐

Self-reflections

☐

Case report

☐

Final projects

☐

Problem-based learning(PBL) and/or Case-based curriculum (CBL) and/or Dental Applied Learning Experience (DALE) assessments

☐

Other\_\_\_\_\_

- 
- Please use this text box if you would like to provide any additional information:

---

- 
- Please enter your contact information If you would like to participate in our draw:

---

---

End of Survey

We thank you for your time spent taking this survey.

Your response has been recorded.

---

## **Appendix C: The survey's French version**

### **Contenu de la télédentisterie dans les programmes d'études des écoles canadiennes de médecine dentaire et d'hygiène dentaire**

Vous êtes invité à participer à une étude de recherche sur la télédentisterie (TD) dans les écoles et programmes canadiens de premier cycle dentaire et d'hygiène dentaire. Aux fins de cette étude, la télédentisterie est définie comme "l'utilisation des technologies de l'information sur la santé et des télécommunications pour les soins bucco-dentaires, la consultation, l'éducation et la sensibilisation du public dans le but général d'améliorer la santé bucco-dentaire".

Cette étude est menée par Anahita Bakhshaei, étudiante diplômée en maîtrise en sciences craniofaciales, sous la supervision du Dr Mario Brondani, professeur agrégé à la Faculté de médecine dentaire de l'Université de la Colombie-Britannique (UBC). Dans le cadre de cette étude, des sondages seront diffusés à toutes les écoles et programmes canadiens de soins dentaires et d'hygiène dentaire, en anglais et en français, via la plateforme Qualtrics®.

Il n'y a aucun risque associé à cette étude et vous pouvez vous retirer à tout moment. Le sondage prendra environ 10 minutes à remplir. Vos réponses seront collectées de manière anonyme - votre adresse e-mail ou IP ne sera pas liée à votre réponse. Vos réponses seront rassemblées sur le serveur UBC Qualtrics pour garder vos informations partagées confidentielles.

L'UBC recueille les renseignements du sondage en vertu des articles 26(c) et 26(e) de la Freedom of Information and Protection of Privacy Act de la Colombie-Britannique (BC FIPPA).

Nous offrons une chance de gagner l'une des cinq cartes-cadeaux de 50 \$ en répondant au sondage en guise de remerciement. Afin d'être considéré pour le tirage au sort, il vous sera demandé d'indiquer votre adresse e-mail ou vos coordonnées à la fin du sondage, qui ne seront partagées avec personne d'autre que l'étudiant diplômé. Afin de garder une trace des réponses, il vous sera demandé d'identifier le nom de votre institution. Veuillez noter que ces informations ne seront pas non plus utilisées lors du rapport des résultats et seront gardées confidentielles à des fins de suivi uniquement. Votre précieuse participation à cette étude nous indiquera si la TD en tant que contenu doit être abordée ou non dans les programmes d'études en hygiène dentaire et dentaire et, le cas échéant, comment ce contenu doit être dispensé et évalué. Les résultats finaux de cette étude seront disponibles sous la forme d'une thèse d'études supérieures et de manuscrits évalués par des pairs.

Si vous pensez que cette enquête ne correspond pas à votre domaine d'expertise, nous vous serions reconnaissants de transmettre le lien à une personne qui pourrait être plus informée sur ce sujet. Si vous avez des questions, n'hésitez pas à nous contacter :

Dr Mario Brondani (chercheur principal) : [brondani@dentistry.ubc.ca](mailto:brondani@dentistry.ubc.ca)  
Anahita Bakhshaei (La chercheuse) : [anna1921@mail.ubc.ca](mailto:anna1921@mail.ubc.ca)

En remplissant ce sondage, vous consentez à participer à cette étude. Merci d'avance pour votre contribution réfléchie.

Le numéro d'identification éthique de cette étude est H22-00019.

---

- À titre informatif seulement, lequel des énoncés suivants s'appliquera à votre école/faculté/programme ? ( Choisissez tout ce qui correspond)

☐

Programme dentaire de premier cycle

☐

Programme d'hygiène dentaire - diplôme de 3 ans

☐

Programme d'hygiène dentaire - diplôme de 2 ans

☐

Programme d'hygiène dentaire – baccalauréat (Programme de 4 ans)

☐

Autre\_\_\_\_\_

---

*Display This Question:*

*If Veuillez choisir le programme qui vous concerne : = Programme dentaire de premier cycle*

- Veuillez choisir votre établissement parmi les options.

☐ Université de la Colombie-Britannique (UBC)

☐ Université de l'Alberta

☐ Université du Manitoba

☐ Université Dalhousie

☐ Université de Toronto

☐ Université McGill

☐ Université de l'Ouest

☐ L'Université de la Saskatchewan

☐ Université de Montréal

☐ Université Laval

---

Display This Question:

*If Veuillez choisir le programme qui vous concerne : = Programme d'hygiène dentaire- diplôme de 3 ans Or Programme d'hygiène dentaire- diplôme de 2 ans Or Programme d'hygiène dentaire- baccalauréat*

- Veuillez choisir votre établissement parmi les options.
- ☐ Université de la Colombie-Britannique (UBC)
- ☐ Université de l'Alberta
- ☐ Université du Manitoba
- ☐ Université Dalhousie
- ☐ Collège Camosun
- ☐ Collège de Nouvelle-Calédonie
- ☐ Université de l'île de Vancouver
- ☐ Collège d'hygiène dentaire de Vancouver
- ☐ Collège communautaire de Vancouver
- ☐ Collège Oulton
- ☐ Collège Algonquin d'arts appliqués et de technologie
- ☐ Institut APLUS
- ☐ Collège Cambrian d'arts appliqués et de technologie
- ☐ L'Académie canadienne de la santé dentaire et des sciences communautaires
- ☐ Institut national canadien de la santé
- ☐ Collège Canadore d'arts appliqués et de technologie
- ☐ Collège Boréal
- ☐ Collège de la Confédération

- ☐ Collège Durham
- ☐ Collège Fanshawe
- ☐ Collège George Brown
- ☐ Collège géorgien d'arts appliqués et de technologie
- ☐ La Cité, Collège d'arts appliqués et de technologie de Niagara
- ☐ Collège des arts d'Oxford
- ☐ Affaires et technologie
- ☐ Collège dentaire du sud de l'Ontario
- ☐ Collège St.Clair
- ☐ Collège d'hygiène dentaire et auxiliaires de Toronto Inc.
- ☐ Cégep de Chicoutimi
- ☐ Cégep François Xavier-Garneau
- ☐ Cégep de l'Outaouais
- ☐ Collège de Maisonneuve
- ☐ Cégep Edouard-Montpetit
- ☐ Collège John Abbott
- ☐ Saskatchewan Polytechnic

---

- À titre informatif uniquement, veuillez identifier votre sexe dans la case ci-dessous :

---

☐ Préfère ne pas répondre

---

- À titre indicatif, veuillez indiquer votre âge parmi les options ci-dessous :

☐ 20-30 ans

☐ 31-40 ans

☐ 41-50 ans

☐ 51-60 ans

☐ over 60 ans

☐ Préfère ne pas répondre

---

- Veuillez indiquer votre année d'obtention du diplôme dans la case ci-dessous :

☐ Préfère ne pas répondre

---

- Avez-vous de l'expérience en pratique clinique?

☐ Oui

☐ Non

☐ Préfère ne pas répondre

---

*Display This Question:*

*If Avez-vous de l'expérience en pratique clinique? = Oui*

- Combien d'années d'expérience en pratique clinique avez-vous?

---



☐ Préfère ne pas répondre

---

- Comment définissez-vous le terme « télédentisterie » ?

☐ Même définition que le formulaire de consentement

☐ Autre (Veuillez donner votre définition de ce terme ci-dessous)

---

- Avez-vous reçu une formation en télédentisterie et/ou une formation de quelque nature que ce soit au cours de vos études ?

☐ Oui

☐ Non

☐ Pas certain

---

*Display This Question:*

*If Avez-vous reçu une formation en télédentisterie et/ou une formation de quelque nature que ce soit... = Oui*

- À quel niveau avez-vous reçu votre formation en télédentisterie ? (par ex. premier cycle, cycles supérieurs, formation continue, etc.)

---

- Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ??

☐ Oui

☐ Ne sait pas

☐ Non

---

*Display This Question:*

*Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Comment la télédentisterie est-elle abordée dans votre programme ?

☐ En tant que contenu intégré dans un module

☐ En tant que cours/module séparé

☐ Autre \_\_\_\_\_

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Comment la télédentisterie devrait-elle être abordée dans votre programme ?

☐ En tant que contenu intégré dans un module

☐ En tant que cours/module séparé

☐ Ne doit pas être abordé

☐ Autre \_\_\_\_\_

---

*Display This Question:*

*If Comment la télédentisterie devrait-elle être abordée dans votre programme ? = Ne doit pas être abordé*

- Veuillez expliquer pourquoi la télédentisterie ne devrait pas être abordée dans le programme :

\_\_\_\_\_

---

*Display This Question:*

*If Comment la télédentisterie devrait-elle être abordée dans votre programme ? = Ne doit pas être abordé*

- Veuillez utiliser cette zone de texte si vous souhaitez fournir des informations supplémentaires :

---

*Display This Question:*

*If Comment la télédentisterie devrait-elle être abordée dans votre programme ? = Ne doit pas être abordé*

- Veuillez saisir vos coordonnées Si vous souhaitez participer à notre tirage au sort :

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Quel est l'état du contenu de la télédentisterie ?
  - ☐ Un contenu obligatoire (par exemple, une partie du programme d'études)
  - ☐ Un contenu facultatif (par exemple, parascolaire ou facultatif)
  - ☐ Autre\_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Quel devrait être le statut du contenu de télédentisterie ?
  - ☐ Un contenu obligatoire (par exemple, une partie du programme d'études)
  - ☐ Un contenu facultatif (par exemple, parascolaire ou facultatif)
  - ☐ Autre\_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Pour enseigner ce contenu, quelle approche utilisez-vous actuellement ? ( Choisissez tout ce qui correspond)

☐

Format de conférence

☐

Discussion de cas (format grand groupe)

☐

Discussion de cas (format petit groupe)

☐

Simulation (mannequin, utilisant des caméras intrabuccales en laboratoire)

☐

Pratique (travail avec des patients)

☐

Autre \_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Combien d'heures sont consacrées à ce contenu au total (format magistral, discussion de cas, simulation, travaux pratiques, etc.) ?

\_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Veuillez indiquer si ce contenu est traité au cours d'une seule année universitaire ou sur plusieurs années :

- ☐ Une seule année universitaire
- ☐ Plusieurs années académiques
- ☐ Autre \_\_\_\_\_

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Quelle approche devrait être employée pour enseigner ce contenu? ( Choisissez tout ce qui correspond)

- ☐ Format de conférence
- ☐ Discussion de cas (format grand groupe)
- ☐ Discussion de cas (format petit groupe)
- ☐ Simulation (mannequin, utilisant des caméras intrabuccales en laboratoire)
- ☐ Pratique (travail avec des patients)
- ☐ Autre \_\_\_\_\_
-

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Combien d'heures devraient être consacrées à ce contenu au total (format magistral, discussion de cas, simulation, travaux pratiques, etc.) ?

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Veuillez indiquer votre préférence quant à savoir si ce contenu est préférable d'être traité en une seule année universitaire ou sur plusieurs années :

☐ Une seule année universitaire

☐ Plusieurs années académiques

☐ Autre \_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Veuillez indiquer en quelle(s) année(s) ce contenu doit être traité :

---

- En ce qui concerne l'enseignement de la télédentisterie, dans quelle mesure êtes-vous d'accord ou en désaccord avec les affirmations suivantes ?

	Tout à fait d'accord	Plutôt d'accord	Plutôt en désaccord	Pas du tout d'accord
L'enseignement de la télédentisterie devrait faire partie des programmes d'études dentaires de premier cycle / d'hygiène dentaire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'enseignement de la télédentisterie doit être de format didactique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'enseignement de la télédentologie devrait être sous forme de simulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L'enseignement de la télédentisterie devrait être sous forme pratique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La télédentisterie devrait être enseignée comme un cours/module distinct dans le programme d'études	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La télédentisterie devrait être enseignée comme un contenu intégré dans les spécialités cliniques (si existe)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



La télédentisterie devrait être enseignée  
comme un contenu intégré dans la  
spécialité de santé publique dentaire (si  
existe)

☐☐☐☐

La formation en télédentisterie est  
bénéfique pour les professionnels de la  
santé bucco-dentaire

☐☐☐☐

La formation à la télédentologie est  
bénéfique pour les patients ayant des  
difficultés d'accès aux soins

☐☐☐☐

L'éducation à la télédentisterie est  
bénéfique pour les patients vivant dans  
les régions éloignées

☐☐☐☐

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Veuillez indiquer lequel de ces sujets vous abordez dans ce contenu. (Choisissez tout ce qui correspond)

☐

Qu'est-ce que la télédentisterie et son histoire ?

☐

Utilisation de la télédentisterie en cabinet dentaire

☐

Utilisation de la télédentisterie en santé publique dentaire

☐

orales

Utilisation de méthodes de consultation vidéo et utilisation de caméras intra-

☐

Utilisation de la télédentisterie dans l'éducation des patients

☐

Utilisation de la télédentisterie dans le triage

☐

Utilisation de la télédentisterie comme outil de suivi des patients

☐

Options de remboursement de la télédentisterie

☐

Questions éthiques en télédentisterie

☐

Obstacles à la mise en œuvre de la télédentisterie

☐

Éducation des patients concernant l'utilisation de la télédentisterie

☐

Autre \_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

- Veuillez indiquer les sujets suggérés qui, selon vous, devraient être abordés dans ce contenu. (Choisissez tout ce qui correspond)

☐

Qu'est-ce que la télédentisterie et son histoire ?

☐

Utilisation de la télédentisterie en cabinet dentaire

☐

Utilisation de la télédentisterie en santé publique dentaire

☐

Utilisation de méthodes de consultation vidéo et utilisation de caméras intra-orales

☐

Utilisation de la télédentisterie dans l'éducation des patients

☐

Utilisation de la télédentisterie dans le triage

☐

Utilisation de la télédentisterie comme outil de suivi des patients

☐

Options de remboursement de la télédentisterie

☐

Questions éthiques en télédentisterie

☐

Obstacles à la mise en œuvre de la télédentisterie

☐

Éducation des patients concernant l'utilisation de la télédentisterie

Autre \_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

- Existe-t-il des obstacles à l'adoption de la télédentisterie dans votre programme ?

☐ Oui

☐ Ne sait pas

☐ Non

---

*Display This Question:*

*If Existe-t-il des obstacles à l'adoption de la télédentisterie dans votre programme ? = Oui*

- Laquelle de ces options correspond aux obstacles à l'adoption de la télédentisterie dans votre programme ?  
(Choisissez tout ce qui correspond)

☐

Manque de connaissances

☐

Manque d'intérêt

☐

Manque d'équipement

☐

Manque de budget

☐

Curriculum étoffé

☐

Pénurie de professeurs

☐

Manque de champions

☐

Autre \_\_\_\_\_

*Display This Question:*

*If Existe-t-il des obstacles à l'adoption de la télédentisterie dans votre programme ? = Ne sait pas*

*Or Existe-t-il des obstacles à l'adoption de la télédentisterie dans votre programme ? = Non*

- Veuillez fournir toute(s) raison(s) particulière(s) pour ne pas incorporer de contenu de télédentisterie dans votre programme :

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Avez-vous perçu ou rencontré des obstacles à l'enseignement de la télédentisterie dans votre école ?

☐ Oui

☐ Non

*Display This Question:*

*If Avez-vous perçu ou rencontré des obstacles à l'enseignement de la télédentisterie dans votre écol... = Oui*

- Laquelle de ces options correspond le mieux aux obstacles perçus ou vécus ? (Choisissez tout ce qui correspond)

- ☐ Manque de connaissances
- ☐ Manque d'intérêt
- ☐ Manque d'équipement
- ☐ Manque de budget
- ☐ Curriculum étoffé
- ☐ Pénurie de professeurs
- ☐ Manque de champions
- ☐ Autre \_\_\_\_\_

---

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Oui*

- Existe-t-il une évaluation pour ce contenu/module ?

- ☐ Oui
  - ☐ Ne sait pas
  - ☐ Non
-

Display This Question:

If Existe-t-il une évaluation pour ce contenu/module ? = Oui

Q54 Quel(s) type(s) d'évaluations sont utilisés pour ce contenu ? (Choisissez tout ce qui correspond)

☐

L'évaluation formative

☐

L'évaluation sommative

☐

Autre \_\_\_\_\_

Display This Question:

If Existe-t-il une évaluation pour ce contenu/module ? = Oui

- Laquelle de ces techniques d'évaluation utilisez-vous pour ce contenu/module ?  
(Choisissez toutes celles qui s'appliquent)

☐

Examen (examens finaux, examens de mi-session, quiz, ECOS, etc.)

☐

Réflexions sur soi

☐

Rapport de cas

☐

Projets finaux

☐

Évaluations d'apprentissage par problèmes (PBL) et/ou de programmes d'études basés sur des cas (CBL) et/ou d'expérience d'apprentissage dentaire appliqué (DALE)

☐

Autre \_\_\_\_\_

*Display This Question:*

*If Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Ne sait pas*

*Or Y a-t-il actuellement un cours/contenu de télédentisterie dans votre programme ? = Non*

*Or If*

*Existe-t-il une évaluation pour ce contenu/module ? = Ne sait pas*

*Or Existe-t-il une évaluation pour ce contenu/module ? = Non*

- Ce contenu/module devrait-il avoir une évaluation ?

☐ Oui

☐ Ne sait pas

☐ Non

---

*Display This Question:*

*If Existe-t-il une évaluation pour ce contenu/module ? = Oui*

- Quel(s) type(s) d'évaluations faut-il utiliser pour ce contenu ? (Choisissez tout ce qui correspond)

☐

L'évaluation formative

☐

L'évaluation sommative

☐

Autre \_\_\_\_\_



*Display This Question:*

*If Ce contenu/module devrait-il avoir une évaluation ? = Oui*

- Laquelle de ces techniques d'évaluation devriez-vous utiliser pour ce contenu/module ?  
(Choisissez toutes celles qui s'appliquent)

☐

Examen (examens finaux, examens de mi-session, quiz, ECOS, etc.)

☐

Réflexions sur soi

☐

Rapport de cas

☐

Projets finaux

☐

Évaluations d'apprentissage par problèmes (PBL) et/ou de programmes d'études basés sur des cas (CBL) et/ou d'expérience d'apprentissage dentaire appliqué (DALE)

☐

Autre \_\_\_\_\_

- 
- Veuillez utiliser cette zone de texte si vous souhaitez divulguer des informations supplémentaires :

\_\_\_\_\_

- 
- Veuillez saisir vos coordonnées Si vous souhaitez participer à notre tirage au sort :

\_\_\_\_\_

## **Appendix D: List of dental undergraduate and dental hygiene programs in Canada**

**Dental schools:** the University of British Columbia, University of Alberta, University of Manitoba, Dalhousie University, University of Toronto, Western University, McGill University, Université de Montréal, Université Laval, and the University of Saskatchewan.

**Dental hygiene schools:** the University of British Columbia, University of Alberta, University of Manitoba, Dalhousie University, Camosun College, College of New Caledonia, Vancouver Island University, Vancouver College of Dental Hygiene, Vancouver Community College, Oulton College, Algonquin College of Applied Arts & Technology, APLUS Institute, Cambrian College of Applied Arts & Technology, The Canadian Academy of Dental Health and Community Sciences, Canadian National Institute of Health, Canadore College of Applied Arts and Technology, Collège Boréal, Confederation College, Durham College, Fanshawe College, George Brown College, Georgian College of Applied Arts & Technology, La Cité, Niagara College Of Applied Arts & Technology, Oxford College of Arts, Business and Technology, Southern Ontario Dental College, St. Clair College, Toronto College of Dental Hygiene and Auxiliaries Inc., Cégep de Chicoutimi, Cégep François Xavier-Garneau, Cégep de l'Outaouais, Collège de Maisonneuve, Cégep Edouard-Montpetit, John Abbott College, Saskatchewan Polytechnic.

## Appendix E: Survey respondents' characteristics table

Respondents' characteristics		Frequency
<b>Gender</b>	Female	25
	Male	11
	Prefer not to answer	5
	<b>Total</b>	<b>41</b>
<b>Age</b>	20-30 years old	3
	31-40 years old	8
	41-50 years old	15
	51-60 years old	12
	Over 60 years old	2
	Prefer not to answer	1
	<b>Total</b>	<b>41</b>
<b>Having experience in clinical practice</b>	Yes	38
	No	3
	<b>Total</b>	<b>41</b>
<b>Years of experience in clinical practice</b>	0-10 years	14
	11-20 years	8
	21-30 years	12
	31-40 years	5
	Over 41 years	2
	<b>Total</b>	<b>41</b>
<b>Having teledentistry training during their education</b>	Yes	12
	No	23
	Not sure	6
	<b>Total</b>	<b>41</b>