COVID-19 vaccination in Canadian dental schools



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DEDICATION

To my beloved Telma, Vinicius, Giovanna, and Matheus for their consistent support and encouragement throughout this journey.

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LIST OF ABBREVIATIONS

HCWs: Healthcare Workers

CDA: Canadian Dental Association

WHO: World Health Organization

SARS-CoV-2: Severe Acute Respiratory Syndrome 2

VOI: Variants of Interest

VOC: Variant of Concern

OHCWs: Oral Healthcare Workers

SAGE: The Strategic Advisory Group of Experts

OR: Odds Ratio

aOR: Adjusted Odds Ratio

ABSTRACT

Introduction: The COVID-19 pandemic caused a broad disruption worldwide due to its rapid spread and high mortality rates, affecting most humans' socioeconomic status and well-being. Due to the elevated risk of infection, all healthcare providers were included in the priority group to receive the vaccine as soon as it became available to protect the workforce and continue essential services. Despite receiving priority for COVID-19 immunization, hesitancy and concerns regarding the new vaccine have emerged among healthcare professionals. According to the World Health Organization, vaccine hesitancy is one of the top ten issues that can threaten global health. It was a significant issue during the COVID-19 crisis. Healthcare workers worldwide, including dentists and dental students, have shown vaccine hesitancy. However, more data is needed for this group in Canada, highlighting the necessity for further research.

Objective: This study aims to: 1) document the COVID-19 vaccination experience among students, academic and support staff in Canadian dental schools during the COVID-19 pandemic; and 2) document time to vaccination among students and employees, controlling for age.

Methods: This study is based on data from a prospective cohort study between April 2021 and May 2022, which included 600 participants from 10 Canadian dental schools. Univariate and multivariate logistic regression were performed to identify COVID-19 vaccination acceptance predictors and factors associated with late vaccination. Descriptive statistics were used to observe the distribution of time to vaccination between age groups of employees and students to investigate vaccine hesitancy tendencies.

Results: Overall, 600 participants answered the baseline survey in April 2021. Most participants (n = 411, 70%) were female and students (n = 315, 52, 5%), and the average age was 36 years old. A large majority (545; 91%) reported being vaccinated with at least one dose of the COVID-19 vaccine, and only 38 (6%) did not report any vaccination. Among the 91% vaccinated participants, more than 70% received a first dose, and 18% a second dose.

The mean vaccination time for respondents who received the first COVID-19 vaccine since the vaccination was available in Canada was approximately three months and around six months for the second dose. Students presented more outliers for later vaccination time, particularly in younger age groups, indicating delays in vaccination. No associations were found between sociodemographic factors and COVID-19 vaccine acceptance. Individuals aged 50-59 were less likely to delay the COVID-19 vaccine than the rest of our sample (Univariate: Odds Ratio (OR): 0.36, 95%CI: 0.13-0.8 and Multivariate: adjusted OR: 0.16, 95%CI: 0.05-0.5).

Conclusion: Despite the presence of outliers indicating later vaccination among students, our findings demonstrated that dental students, faculty, and support staff from Canadian dental schools showed significant acceptance of the COVID-19 vaccine, which is vital for safeguarding public health, ensuring the continuity of dental education and patient care, and promoting a culture of responsibility, professionalism, and ethical practice within the dental community.

RÉSUMÉ

Introduction: La pandémie du COVID-19 a provoqué un grand une grande perturbation mondiale en raison de sa propagation rapide et de ses taux de mortalité élevés, affectant le statut socioéconomique et le bien-être de la plupart des humains. En raison du risque élevé d'infection, tous les travailleurs du domaine de la santé ont été inclus dans le groupe prioritaire pour recevoir le vaccin contre le COVID-19 dès qu'il est devenu disponible, afin de protéger la main-d'œuvre et de continuer les services essentiels. Malgré la priorité pour recevoir l'immunisation, de l'hésitation et des préoccupations concernant les nouveaux vaccins ont émergé parmi les professionnels de santé. Selon l'Organisation mondiale de la santé, l'hésitation à se faire vacciner est l'un des dix principaux problèmes qui peuvent menacer la santé mondiale. Cela a été un problème plus évident pendant la pandémie en raison des nouveaux vaccins disponibles. Plusieurs professionnels de santé autour du monde, y compris les dentistes et les étudiants en odontologie, ont hésité à se faire vacciner. Cependant, il y a un manque de données pour cette population spécifique dans le secteur dentaire au Canada, soulignant la nécessité de recherches supplémentaires.

Objectif: Cette étude vise à 1) documenter l'expérience de vaccination contre le COVID-19 parmi les étudiants, le personnel académique et le personnel de soutien dans les écoles dentaires canadiennes pendant la pandémie de COVID-19, et 2) observer les tendances du temps de vaccination, en comparant les différences entre les étudiants et les employés selon les groupes d'âge.

Méthodes: Cette étude est basée sur les données d'une étude de cohorte prospective entre avril 2021 et mai 2022, qui a inclus 600 participants provenant de 10 écoles dentaires canadiennes. Des

régressions logistiques univariées et multivariées ont été effectuées pour identifier s'il existe des prédicteurs d'acceptation de la vaccination et les facteurs associés à une vaccination tardive. Afin de détecter les tendances de vaccination tardive, des statistiques descriptives ont été utilisées pour observer la distribution du temps de vaccination entre les groupes d'âge des employés et des étudiants.

Résultats: Au total, 600 participants ont répondu à l'enquête de base en avril 2021. Parmi eux, 545 (91 %) ont déclaré être vaccinés avec au moins une dose du vaccin contre le COVID-19 au début de l'étude (avril 2021), ce qui représente la grande majorité, et seulement 38 (6 %) n'ont déclaré aucune vaccination. Parmi les participants vaccinés (91 %), plus de 70 % ont reçu la première dose et 18 % la deuxième dose. La majorité des participants (n = 411, 70 %) sont des femmes et des étudiants (n = 315, 52, 5%), et l'âge moyen des participants est de 36 ans. Le temps moyen de vaccination pour les répondants ayant reçu la première dose du vaccin contre le COVID-19 depuis que la vaccination avait commencé au Canada était d'environ trois mois, et d'environ six mois pour la deuxième dose. Les étudiants présentaient des valeurs aberrantes pour le temps de vaccination, en particulier les plus jeunes, indiquant des retards dans la vaccination. En même temps, les employés montraient généralement un temps de vaccination moyen plus bas par rapport aux étudiants, indiquant une vaccination plus précoce. Aucune association n'a été trouvée entre les facteurs sociodémographiques et l'acceptation du vaccin. Les participants dans le groupe d'âge de 50 à 59 ans étaient moins susceptibles de retarder la vaccination par rapport au reste de notre échantillon (Univarié: Rapport de cotes (RC): 0,36, Intervalle de confiance (IC) 95%: 0,13-0,8 et Régression multiple: RC ajusté: 0,16, Intervalle de confiance (IC) 95%: 0,05-0,5).

Conclusion: Malgré la présence de valeurs aberrantes indiquant une vaccination plus tardive chez les étudiants, nos résultats indiquent que les étudiants, le personnel académique et le personnel de soutien dans les écoles dentaires canadiennes ont démontré une acceptation significative de la vaccin du COVID-19, ce qui est essentiel pour protéger la santé publique, assurer la continuité de l'éducation dentaire et des soins aux patients, et promouvoir une culture de responsabilité, de professionnalisme et de pratique éthique au sein de la communauté dentaire.

PREFACE

This thesis follows the manuscript-based thesis model, incorporating a manuscript that has been prepared to be submitted. The title of the manuscript is: "COVID-19 Vaccination in Canadian Dental Schools." The manuscript included presents a brief literature review, study methodology, and main findings, followed by a discussion section. It represents a significant contribution to the ongoing discourse surrounding COVID-19 vaccination efforts within the context of dental education and practice. The manuscript was included in the body of the Thesis after the literature review. This thesis explores the COVID-19 vaccination experience among students and employees in Canadian dental schools from April 2021 to May 2022. There are nine chapters. Following the introduction of the topic, Chapter Two provides a literature review, including significant information on the COVID-19 vaccination topic, contextualizing the research within the existing body of knowledge. Chapter 3 provides the rationale of the research, followed by chapter 4, where the specific objectives are stated. Chapter five includes the manuscript, outlining the research methodology employed, data collection methods and analytical approaches. Chapter six comprehensively discusses the findings, including future research directions. Finally, chapter seven summarizes the conclusion of this study. The authors' collaboration and insights have been invaluable in shaping the content and direction of this work.

CONTRIBUTION OF AUTHORS

Isabella Turquete: BDS, MSc. Candidate. Responsible for conceptualizing, visualization, formal analysis, investigation, and validation of the Thesis project. Writing—Author of the original Thesis draft, including tables and graphs; reviewed and edited.

Paul Allison: Professor, Faculty of Dental Medicine and Oral Health Sciences, McGill University. Supervisor of the candidate. Responsible for Project administration, supervision, conceptualization, funding acquisition, resources, investigation, visualization, methodology, and writing - review and editing the Thesis.

Sreenath Madathil: Assistant Professor, Faculty of Dental Medicine and Oral Health Sciences, McGill University. Assisted in planning and executing statistical analyses for the project while participating as a committee member to review and enhance its quality.

1. INTRODUCTION

The SARS-CoV-2 disease responsible for the COVID-19 pandemic comes from a large family of coronaviruses that cause human respiratory diseases [1,2]. In December 2019, the first case of COVID-19 was reported in Wuhan City, China; in late December, a cluster of cases emerged [3]. Two months later, due to the rapid spread and severity of the COVID-19 disease in several countries, WHO announced it as a pandemic [3,4].

The COVID-19 pandemic has caused unprecedented disruption worldwide due to its rapid spread and high mortality rates, affecting the socioeconomic status and well-being of most humans. Throughout the pandemic, healthcare workers (HCWs), especially those on the front lines, were identified as a high-risk group for infection [15-21]. Oral healthcare personnel were determined as one of the most vulnerable groups among all HCWs at potential risk of COVID-19 infection due to the close contact with patients and the daily occupational exposure, which includes aerosolgenerating procedures [25-29]. Many efforts were directed toward developing vaccines against COVID-19 to avert the pandemic. In December 2020, Health Canada authorized the first COVID-19 vaccine, the Pfizer-BioNTech [42]. The priority groups to receive the vaccine were HCWs, elderly long-term care residents, and adults residing in remote and isolated Indigenous communities [42]. Canadian dental professional regulatory authorities and the Canadian Dental Association (CDA) and other organizations strongly encouraged dental practitioners to get the COVID-19 vaccine as soon as it became available. They also outlined preventive measures such as protective equipment, including N95 masks, and rigorous hand and surface sanitization [31].

Despite receiving priority for COVID-19 immunization, levels of vaccine hesitancy among HCWs and oral practitioners worldwide emerged. Vaccine hesitancy is a "delay in accepting or refusing

vaccines despite availability of vaccination services" [57]. In 2019, the World Health Organization (WHO) defined vaccine hesitancy as one of the top ten issues that can threaten global health. [58]. Healthcare professionals play a significant role in fighting vaccine hesitancy in the general population because they are seen as one of the most reliable sources of advice. It emphasizes the relevance of researching vaccine hesitancy among dental students who will soon become dental professionals.

Vaccine hesitancy has been reported among dental students in different parts of the world [51,54,55]. However, few data are available for this group in Canada, highlighting the necessity for further research.

2. LITERATURE REVIEW

2.1. THE COVID-19 PANDEMIC

Coronaviruses are a large family of viruses that cause respiratory diseases in humans, from a usual cold to serious diseases such as Severe Acute Respiratory Syndrome 2 (SARS-CoV-2), responsible for the COVID-19 Pandemic [1, 2]. The first COVID-19 case was reported in Wuhan City, China, in December 2019, and on 31 December 2019, a cluster of cases was reported [3]. On 5 January 2020, WHO published our first Disease Outbreak News on the new virus. In late January 2020, after failing to control the spread of cases, the World Health Organization (WHO) declared the outbreak a public health emergency of international concern. Two months later, on 11 March 2020, due to the rapid spread and severity of the disease in several countries, WHO announced it was a Pandemic [3,4]. After that, the number of reported cases and deaths has become increasingly higher all over the globe. On a global scale, on 31 March 2024, there were more than 775 million reported cases of COVID-19 and around 7 million deaths, qualifying the COVID-19 pandemic as one of the most mortal in history [4,5].

Individuals infected by COVID-19 may experience different symptoms, from undetectable or mild to severe manifestations, requiring medical attention or hospitalization [2,4,6]. Older adults or those with certain medical conditions, such as cardiovascular disease, diabetes, chronic respiratory disease, and cancer, are at significant risk of developing severe illnesses [2,4,7]. The novel coronavirus is transmissible from direct and indirect contact with infected people or surfaces via respiratory droplets or aerosols that remain in the air, mainly in indoor places [2,4]. All viruses change over time, including SARS-CoV-2, which causes COVID-19 disease [8]. Many alterations typically do not alter the virus's characteristics significantly. Nevertheless, certain modifications

could influence aspects like its transmission, the severity of the illness it causes, or the efficacy of vaccines, treatments, diagnostic tools, and other public health and social measures [8]. These modifications are called mutations, and viruses with mutations are called variants.

With the emergence of new variants that posed an increased risk to global public health, in late 2020, the WHO classified some variants as Variants of Interest (VOI) and Variants of Concern (VOC), aiming to prioritize worldwide monitoring and research efforts. A Variant of Interest (VOI) refers to a SARS-CoV-2 variant with genetic changes predicted or known to affect virus characteristics such as transmissibility, virulence, antibody evasion, susceptibility to therapeutics and detectability. A VOI may also be identified because it has an increased ability to spread compared to other circulating variants. A Variant of Concern (VOC) classifies a SARS-CoV-2 variant meeting the criteria of a VOI while also exhibiting potential for adverse changes in disease severity, disrupting health systems' ability to manage COVID-19 cases, or significantly reducing the efficacy of available vaccines [8]. As of March 2023, WHO classified VOI using established scientific nomenclature systems with Greek letters [8]. Currently circulating variants of interest (VOIs) as of 9 February 2024 are XBB.1.5/23, XBB.1.16/23B, EG.5, BA.2.86[§]/23I and JN.1 as the latest variant identified as of February 2024 [8,9].

2.1.2. The Pandemic in Canada

Since late January 2020, when WHO declared the SARS-CoV-2 disease outbreak a public health emergency of international concern, the Public Health Agency of Canada, which had for several weeks been monitoring the situation in China, activated its Health Portfolio Operations Centre and triggered the Federal/Provincial/Territorial Public Health Response Plan for the Biological Events. These crucial steps have helped to ensure improved coordination across the country. The Canadian

government has developed policies and action plans to respond to the virus's threats to public health. Working with international partners, provincial and territorial administrations, and other stakeholders, it aims to reduce the adverse effects of the rapidly developing public health crisis on society, the economy, and health [10].

The Prime Minister of Canada announced on March 16, 2020, additional steps being taken as part of the government's comprehensive response to COVID-19 to contain the spread of the disease, such as avoiding non-essential travel outside the country and taking self-isolation measures, except for essential workers [11].

At the start of the COVID-19 pandemic, no regulations existed for safely providing dental care. The absence of guidelines and high transmission risks led most countries to limit oral treatments to emergencies. This restriction was also applied to dental schools. Eventually, dental clinics reopened under strict infection control guidelines from oral health professional organizations, institutions, and regulatory bodies like the Public Health Agency of Canada, Health Canada - COVID-19 Task Force, and the Canadian Dental Association (CDA), which had to update their protocols based on new information continually [12].

In late March 2020, all provinces and territories in Canada declared a state of emergency. Each province or territory has different emergency regulations, with powers that may include closing bars and nightclubs, restricting restaurants' ability to serve people, restricting public gatherings, and not allowing people to visit hospitals or retirement homes [13].

As of September 2021, with the advanced distribution of the COVID-19 vaccines, students were expected to return to the fall semester for in-person activities. Health precautions, such as the mask

regulation, were put into place. Concerns about the vaccination obligation were present in universities. Some attempted to enforce it, while others lacked the means to do so [14].

COVID-19 vaccination mandates in Canada are the responsibility of provinces, territories, municipalities, and the federal government in the case of federal public services and federally regulated transportation industries. Dental schools attempted to require the vaccine passport due to the high risk of infection imposed by the aerosol-generating procedures.

2.1.3. The Pandemic and its Impact on Healthcare Care Workers

The COVID-19 pandemic has caused unprecedented disruption worldwide due to its rapid spread and high mortality rates, affecting the socioeconomic status and well-being of most humans. The healthcare sector reached a breaking point because of the high proportion of COVID-19 infections and hospitalizations. Healthcare workers (HCWs), particularly those working on the front line, remained one of the most affected groups during the pandemic, classifying them as high-risk group infection [15-21]. According to Nguyen LH et al (2020), front-line HCWs have a threefold increase in the risk of infection for COVID-19 compared to the general population, even after additional risk factors are considered [15]. Additionally, there is an increased risk of physical illnesses, including mortality, psychiatric problems, and various physical health issues for healthcare personnel [18-21]. Amongst the most prevalent mental health disorders experienced by healthcare workers was post-traumatic stress disorder, followed by anxiety, depression, and distress [19,21]. It might be due to extreme pressure from workloads or working longer hours, to extreme pressure from workloads or working longer hours isolation from family members and indirect COVID-19 complications [20]. Because of the elevated risk of being infected, all healthcare providers across the globe were included in the priority group to receive the COVID-19 vaccine when available to protect the workforce and allow the continuation of essential services [22].

At the start of the pandemic, public health measures had to be taken to control the spread of the disease, including suspending non-acute health procedures in multiple parts of the world. In Canada, all provinces and territories declared a state of emergency in March 2020 [23], and the public authority required the suspension of oral healthcare services, except for emergency care. This non-pharmaceutical restriction was implemented in numerous countries worldwide [24]. However, after a period of suspension, dental offices and dental schools in Canada were allowed to provide non-acute dental care again, following some protocols emphasized by the government, mainly during the reopening phase.

2.1.4. The pandemic and its effects on dental practice

Oral healthcare work settings represent a potential risk of cross-infection between dental professionals and patients due to their close contact and daily occupational exposure, including aerosol-generating procedures [25-29]. Therefore, oral healthcare personnel were identified as one of the most vulnerable groups among all HCWs at potential risk of COVID-19 infection [28]. Since the risk of SARS-CoV-2 transmission and infection in dental settings is presumed to be significantly high, infection control measures had to be taken to control the transmission and spread of the virus [29-31].

By the beginning of the pandemic and during lockdown periods, dental treatment had been generally suspended or postponed, except for urgent care. Oral healthcare workers (OHCWs) have enhanced their infection control practices in response to COVID-19, including extra protection in

their daily routines such as the use of N95 masks, complete eye protection, face shields and protective outwear, and strict surface and hand sanitization [30-31].

The CDA recommended preventive actions such as getting vaccinated when the vaccine becomes available, including boosters (extra dose of the vaccine after having completed the vaccine series), for all dentists and staff; using personal protective equipment, including N95 respirators; rigorous hand and surface sanitization; and recommending that dentists and dental office staff remain hypervigilant in their personal lives to guarantee a safe workplace [31].

Many studies reported the prevalence of SARS-CoV-2 among OHCWs worldwide [32-39]. However, despite the potential risk of infection faced by OHCWs, the prevalence of COVID-19 presented low rates [32,33,35,38,39]. Ferreira et al. (2020) found similar infection results when comparing oral health professionals and the general population [35]. Mksoud M. et al. (2022) outlined that the risk of SARS-CoV-2 transmission was not higher among the dental team compared to the general population, demonstrating that following hygienic regulations and infection control measures ensure the safety of the dental team and their patients [37]. This indicates that the current infection control recommendations may be sufficient to prevent infection in dental settings. Low COVID-19 infection was also observed among Canadian OHCWs. Canadian dentists showed a low prevalence of infection from July 29, 2020, through February 12, 2021 [38]. According to Rock, Madathil, Khanna, et al., dental hygienists in Canada do not have a higher incidence rate of COVID-19 than the general population [39].

The low prevalence of COVID-19 infection within a high-risk population demonstrates that the dental personnel followed the public health guidelines for disease control and prevention. The cumulative effect of all the different protective measures that have been employed, including the

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use of personal protective equipment, pre-procedural screening of clients, social distancing, and other public health measures, was able to protect them.

2.2. COVID-19 VACCINE

A vaccine can stimulate herd immunity within societies, thereby lowering disease incidence, interrupting transmission, and alleviating the disease's social and economic impact. Vaccines come in a variety of forms, including protein-based, nucleic acid-based, inactivated, live attenuated, and viral vector-based. Each vaccine type has a unique structure and pros and cons regarding immunogenicity, safety, convenience of administration, and efficacy [40].

Parallel with the continuous endeavors to reduce the spread of infection, creating a COVID-19 vaccine became the goal for global health organizations. Many efforts were directed toward developing vaccines against COVID-19 to avert the pandemic. With numerous clinical vaccine trials in progress, the timeline for public distribution of a safe and effective vaccine was estimated to be between late 2020 and 2022 [41].

The COVID-19 vaccines were developed rapidly compared to traditional vaccines. Vaccine development was a complex and time-consuming process that typically takes 10–15 years. However, due to the severity of the novel SARS-CoV-2 virus and the unprecedented disruption on healthcare systems as well as economies throughout the world, the COVID-29 vaccine development took between 12 to 16 months since the pre-clinical studies to Phase IV consisting of the emergency use authorization, manufacturing, and distribution [40].

On December 2, 2020, the United Kingdom became the first country to approve the COVID-19 vaccine, BNT162, developed by Pfizer and BioNTech via Emergency Use Authorization (EUA),

which is an mRNA vaccine, a new type of vaccine with no previous proof. mRNA vaccines do not use live viruses to trigger an immune response. Instead, they teach your cells how to make a protein that will trigger an immune response. Once triggered, your body produces antibodies. These antibodies help you fight the infection if the virus enters your body in the future. WHO approved BNT162 for emergency use on December 31, 2020, for easier global manufacturing and distribution. Several countries, including the United States, Canada, Russia, China, and India, adopted similar processes to approve COVID-19 vaccine candidates [40]. The scientific community was compelled by this novel coronavirus to employ non-traditional methods to speed up vaccine development.

2.2.1. Vaccination in Canada

On December 9, 2020, Health Canada authorized the first COVID-19 vaccine, the Pfizer-BioNTech [42]. Even though the vaccination program in Canada varied across provinces, HCWs and long-term care residents were determined as priority groups to receive the COVID-19 vaccine on December 14, 2020 [43]. In Quebec, beginning on 14 December 2020, patients in residential and long-term care facilities, which accounted for the great majority of COVID-19-related deaths, was the first in the province to get the Pfizer-BioNTech vaccine. Vaccinations were administered to patients on-site [43]. The next group was individuals residing in private senior housing complexes and remote settlements, such as Indigenous communities. These age categories then received the vaccine in the following order: 80 years of age and up, 70 to 79, 60 to 69, and 60 and under with additional risk factors [43].

Vaccination was not mandatory in Canada for dental professionals or university students at the beginning of the vaccination plan. However, the Canadian Dental Association (CDA) encouraged

dentists and the whole dental team to get the COVID-19 vaccine as soon as it becomes available. The CDA also outlined preventive actions such as full vaccination, including boosters (extra doses after completion of the regular vaccine series), for all dentists and staff; the use of personal protective equipment, including N95 respirators and total eye protection; strict surface and hand sanitization; and the recommendation for dentist and dental office staff to remain hyper-vigilant in their personal lives to guarantee a safe workplace [31].

Several vaccines for COVID-19 were authorized and available for use in Canada by March 08, 2024. These included messengers ribonucleic acid (mRNA) vaccines, the Moderna and Pfizer-BioNTech vaccines, and a protein subunit vaccine, the Novavax Nuvaxovid vaccine [44]. Everyone 5 years of age and over was advised to be vaccinated with at least one dose of the COVID-19 vaccine in Canada as of 20 April 2024. Children 6 months to under five years of age who are at high risk for severe illness due to COVID-19 were also advised to be vaccinated against COVID-19 [44].

2.2.2 Concerns towards the COVID-19 vaccine

Despite receiving priority for COVID-19 immunization, vaccine hesitancy among healthcare professionals emerged. In a study of acceptance of a potential COVID-19 vaccine among HCWs in Israel, the authors reported high levels of mistrust among medical professionals [45]. Participants mentioned being concerned about the quick creation of the vaccine. The findings also suggest that vaccination compliance, even among those with medical knowledge, depends on a personal risk-benefit assessment that may be impacted by misinformation about the safety of vaccines [45]. A scoping review of COVID-19 vaccine hesitancy among HCWs found that, on

average, more than 22% of HCWs worldwide were hesitant about receiving the vaccine [46]. Similar concerns were pointed out among oral healthcare providers.

Many studies, including dental professionals and students, indicated numerous concerns about the COVID-19 vaccine [47-55]. Amidst several reasons for not getting vaccinated, the most emphasized were fear of side effects, lack of information, the belief that the development time of the vaccines was short, concerns about vaccine safety and efficacy, distrust of regulatory agencies and politicization regarding the vaccine process, and concerns about commercial profits were stated to be associated with vaccine hesitancy among dental professionals and students [47-54] Dentists and dental students who received influenza vaccines during past seasons are more likely to accept the COVID-19 vaccine [48,54,55]. Understanding their worries is crucial to recognizing possible barriers and facilitators related to vaccination, not only for the COVID-19 vaccine but also for others like flu and hepatitis.

2.3. VACCINE HESITANCY

The topic of vaccine hesitancy has been discussed for many years. In 1999, the Director-General of the World Health Organization created The Strategic Advisory Group of Experts (SAGE) on Immunization to advise WHO in its operation. The SAGE has become the WHO's principal advisory body on vaccination and immunization. The SAGE met at least twice a year to discuss specific topics, and in cooperation with WHO, they developed the work priorities and meeting agendas [56]. In one of the annual meetings in November 2011, the SAGE observed with concern the topic of vaccine hesitancy because both developed and developing countries reported that it was affecting vaccine uptake. These reports led the SAGE to request the establishment of a working group on vaccine hesitancy, and it was identified as one of the new priority topics [57].

As of November 2014, the working group on vaccine hesitancy published a report defining vaccine hesitancy and its scope. The report also described the determinants of vaccine hesitancy and how to tackle this issue with different frameworks and end models [57].

Vaccine hesitancy refers to "delay in accepting or refusing vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence". Complacency refers to not perceiving the need for vaccines; convenience is related to vaccine accessibility; and confidence is regarding distrust in vaccines or providers. The SAGE acknowledged that vaccine hesitancy exists on a spectrum ranging from complete acceptance to absolute refusal of some or even all vaccines [57].

In 2019, before the COVID-19 pandemic, the WHO determined vaccine hesitancy as one of the top ten issues that can threaten global health because some diseases close to eradication were resurging. Vaccination is one of the most affordable methods to prevent diseases. It prevents 2 to 3 million deaths annually, and another 1.5 million can be avoided, if vaccination rates increase worldwide [58]. Therefore, further research on vaccine hesitancy is crucial to understand and address this issue.

Confidence in health services and professionals is crucial regarding vaccine hesitancy [57]. Healthcare professionals play a significant role in fighting vaccine hesitancy in the general population, particularly those who work in communities because they are seen as one of the most reliable sources of advice. HCWs are also in the best position to understand hesitant patients, respond to their safety concerns, and advocate for vaccines, explaining the substantial benefits of vaccination [48]. A protected workforce can be crucial for fighting vaccine hesitancy in the general

population, but only if health professionals are not hesitant. Otherwise, it is not apparent how medical personnel can inspire trust in patients and advise them to get the available vaccines if they are hesitant [55]. It emphasizes the relevance of conducting research on vaccine hesitancy among dental professional students, who will soon become health professionals and dental professionals themselves.

2.3.1. COVID-19 vaccine hesitancy - Dental students and Dental professionals

Despite the worldwide enthusiasm for the COVID-19 vaccine, hesitancy to get vaccinated has increased and more broadly discussed, capturing the attention of the media, the scientific community, and policymakers.

Vaccine hesitancy has been reported among dental students in different parts of the world [51,54,55]. However, few data are available for this group in Canada, highlighting the necessity for further research. In 2021, Kalekar et al. reported that dental students are more hesitant than medical students in the US, whereby medical students were 2.7 times more likely to accept the COVID-19 vaccine [51]. The authors hypothesized that relevant education may be a reason for this difference, mentioning that the curricula in medical school and medical residency programs include education on vaccines, while dental school curricula lack this focus [51]. Given the current global struggle with vaccine hesitancy, mainly due to the pandemic, medical and dental schools need to review how they should approach this topic. A practical solution would be incorporating vaccine hesitancy education into university curricula, providing future clinicians with guidance, enabling them to confidently recommend vaccines and effectively respond to hesitant individuals [51].

2.3.2. Canadian Model on determinants of vaccine hesitancy

In 2011, Guay and Coll developed a model to identify vaccine hesitancy in a workshop on the Cultural and Religious Roots of Vaccine Hesitancy: Explanations and Implications for the Canadian Healthcare System. The model they developed supports identifying hesitant people through the determinants of vaccine hesitancy. The model indicates that vaccine hesitancy ranges from complete refusal to eventual acceptance. According to the Canadian framework for the determinants of vaccine hesitancy, there are three main elements: the individual reflection and decision-making process, which include primarily factors that come from people's personal opinions; the role of public health, outlining vaccination programs, promotion and communication, for instance; and the role of healthcare professionals comprising, for example, counselling and recommendation. From the framework, we can observe that despite the important role of HCWs in advocating for vaccination, they can also present themselves as hesitant. The framework also demonstrates that the determinants of vaccine hesitancy are related to several factors, indicating a complexity in mitigating. [57].





Adapted from the model "Cultural and Religious Roots of Vaccine Hesitancy: Explanations and Implications for the Canadien Healthcare System", Guay and Coll, 2011.

2.3.3. COVID-19 Vaccine Hesitancy in Canada

Like other countries, Canada experienced vaccine hesitancy towards the novel COVID-19 vaccine. However, vaccine acceptance levels across time have shown higher results and low vaccine hesitancy. Vaccine hesitancy may vary across different backgrounds and regions. Few studies are available on vaccine hesitancy and acceptance among HCWs [39,59]. Most research on vaccine hesitancy in Canada includes the general population [60-64]. Furthermore, most studies focus on vaccine intention and factors associated with vaccine hesitancy or the willingness to accept vaccines instead of vaccine uptake and vaccination trends over time.

HCWs have shown great vaccine acceptance. According to Rock, Madathil, Khanna, et al. (2022), dental hygienists in Canada showed high vaccine acceptance, with only 4.7% of participants indicating vaccine hesitancy as of February 2021 [39]. S. Dzieciolowska et al. explored the acceptance of the COVID-19 vaccine among HCWs, such as physicians, nurses, healthcare managers, pharmacists, and others. They found high vaccination acceptance (94%), and approximately one-fifth of respondents refused vaccination. However, most of those who refused were open to vaccination later [59]. A survey with 39,297 Canadians from June to November 2020 on attitudes related to COVID-19 vaccines revealed that 65% of Canadians intend to take a vaccine, approximately 15% are unwilling, and 20% are unsure. The authors also outlined minimal coverage of vaccine conspiracies in Canadian mainstream media. Instead, mainstream media coverage has focused on stories about development, provision, and access, with wide-scale vaccination highlighted as the solution to the pandemic [60]. In a survey of individuals in Saskatchewan between 4 May 2020 and 3 April 2021, 76% of participants stated they had received or would receive a vaccination, 13% said they were unsure, and the remaining 11% said they would not receive one [61]. A study among young adults in Canada from Alberta, Ontario, and Quebec

about COVID-19 vaccine hesitancy in June 2021 found that most study participants were not hesitant regarding the COVID-19 vaccine, have been vaccinated or will be vaccinated as soon as they were eligible. The authors also revealed that poverty, low level of education, and distrust towards the government are associated with higher odds of being vaccine-hesitant [62].

Overall, vaccination against COVID-19 has been demonstrated to be crucial to mitigate the impacts of the pandemic. While vaccine coverage is essential for achieving herd immunity and controlling transmission, vaccine hesitancy poses a significant challenge that demands attention. Understanding the factors contributing to hesitancy and the pivotal role of healthcare workers in fostering vaccine acceptance is paramount in ensuring widespread immunization and safeguarding public health. Moving forward, targeted interventions and communication strategies tailored to address hesitancy concerns are imperative to bolster vaccination efforts and combat the spread of COVID-19.

3. RATIONALE

The COVID-19 pandemic has posed significant challenges to global public health and highlighted the critical role of healthcare workers, including oral healthcare personnel, in combating infectious diseases. As frontline workers, dental professionals are exposed to unique risks due to close patient contact and the performance of aerosol-generating procedures. Despite being prioritized for vaccination, reports of vaccine hesitancy among healthcare workers have surfaced globally.

Understanding vaccine patterns among healthcare professionals, particularly among future dental practitioners, is paramount in the ongoing efforts to mitigate the spread of infectious diseases and build public trust in vaccination programs. As the next generation of oral healthcare providers, dental students are poised to influence patient attitudes and behaviours toward vaccination. Yet, despite evidence of vaccine hesitancy among dental students in various regions, there remains a dearth of research specifically addressing this issue within the Canadian context.

This study aims to fill this gap by exploring the vaccination trends during the pandemic among dental students and employees in Canada. This research seeks to inform targeted interventions and educational strategies to foster vaccine confidence among future oral healthcare professionals by identifying perceptions surrounding vaccine acceptance or refusal.

The scarcity of research and literature on vaccine hesitancy among dental schools, university employees, and even dentists emphasizes the significance of conducting this study across different educational settings throughout Canada. Therefore, this study has the potential to offer valuable insights that will contribute to further research not only in the Canadian literature but also in the broad dental community.

4. STUDY OBJECTIVES

The overall goal of this research is to provide an overview of the COVID-19 vaccination experience among students, faculty, and support staff from 10 Canadian dental schools during the COVID-19 pandemic. This study also analyzed vaccination acceptance-related factors and the vaccination time distribution among study participants.

The specific aims of this study are:

1) To document COVID-19 vaccination coverage among students, academic and support staff in Canadian dental schools during the COVID-19 pandemic.

2) To investigate factors associated with vaccination acceptance.

3) To describe the patterns of vaccination over time, comparing vaccination rates between students and employees.

5. MANUSCRIPT

COVID-19 vaccination in Canadian dental schools

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Abstract:

Introduction: Vaccine hesitancy is one of the top ten issues that can threaten global health. It was a major issue during the COVID-19 crisis due to the development of new vaccines. Healthcare workers, including dental students worldwide, have shown vaccine hesitancy. However, few data are available for this group in Canada, highlighting the necessity for further research. This study aimed to document the COVID-19 vaccination experience among students and employees in Canadian dental schools during the COVID-19 pandemic.

Methods: This study is based on data from a prospective cohort between April 2021 and May 2022, including 600 participants from 10 Canadian dental schools. Logistic regression models were performed to identify predictors of COVID-19 vaccine acceptance and late vaccination. In order to detect hesitation tendencies, descriptive statistics were used to observe the distribution of time to vaccination between age groups of employees and students.

Results: Out of 600 participants at baseline (70% female; average age 36 years old), 91% received at least one dose of the COVID-19 vaccine (n=545). No associations were found between sociodemographic factors and COVID-19 vaccine acceptance. Individuals aged 50-59 were less likely to delay the vaccination than most of our sample. Students presented more outliers for later vaccination time, particularly in younger age groups, indicating delays in vaccination.

Conclusion: Despite the presence of outliers indicating later vaccination among students, most individuals in our sample accepted the COVID-19 vaccine, and our study did not reveal predictors of vaccine acceptance and hesitancy. This may be attributed to the small number of unvaccinated individuals. Also, we noted that people aged 50-59 years were less likely to be vaccinated later than most of the sample.

Keywords: COVID-19, COVID-19 vaccine, vaccine hesitancy, vaccine acceptance, dental students' vaccination.

Abbreviations

HCWs: Healthcare care workers OHCWs: Oral Healthcare Workers CDA: Canadian Dental Association WHO: World Health Organization CITF: COVID-19 Immunity Task Force
1. Introduction

Oral healthcare work settings represent a potential risk of cross-infection between professionals and patients due to their proximity and a daily practice that often includes aerosol-generating procedures [1-5]. Therefore, oral healthcare professionals were identified as one of the most vulnerable groups among all healthcare workers (HCWs) at potential risk of COVID-19 infection [5]. Several studies have reported the prevalence of SARS-CoV-2 among oral healthcare staff worldwide [6-10], including among dentists and dental hygienists in Canada [11,12].

Since COVID-19 vaccines were distributed, they have effectively decreased disease severity [13-15]. In December 2020, Health Canada authorized the first COVID-19 vaccine, the Pfizer-BioNTech. The priority groups to receive the vaccine were the HCWs, elderly long-term care residents, and adults residing in remote and isolated Indigenous communities [20]. The Canadian Dental Association (CDA) then encouraged dental practitioners to get the COVID-19 vaccine as soon as it became available [16-19].

Despite receiving priority for COVID-19 immunization, hesitancy among healthcare professionals emerged [21-31]. On average, 22% of HCWs worldwide hesitated about receiving the COVID-19 vaccine [22]. Similar concerns are pointed out among oral healthcare providers, including fear of side effects, lack of information, short-term development, and concerns about vaccine safety and efficacy [23-30]. Vaccine hesitancy is defined as a "delay in acceptance or refusal of vaccines despite availability of vaccination services" [32,33]. In 2019, the World Health Organization (WHO) defined vaccine hesitancy as one of the top ten issues that can threaten global health. [33]. Healthcare professionals play a significant role in fighting vaccine hesitancy in the general population because they are seen as one of the most reliable sources of advice [24]. Vaccine hesitancy has been reported among dental students in different parts of the world [27, 30]. However, more data is needed for this group in Canada, highlighting the necessity for further research. The scarcity of research and literature on vaccine hesitancy in Canadian dental schools emphasizes the significance of conducting this study across different educational settings. Therefore, this study has the potential to offer valuable insights contributing to further research.

In this context, this study aimed to 1) document the COVID-19 vaccination experience among students, academic and support staff in Canadian dental schools during the COVID-19 pandemic and 2) To observe the trends in vaccination time, comparing the differences between students and employees within age groups.

2. Methods

2.1. Study population

This study used data from a large cohort study conducted between April/May 2021 and May 2022. Its protocol followed the Reporting guidelines of observational studies in Epidemiology (STROBE).

The study sample comprised members from all dental schools in Canada, making this a pan-Canadian study, albeit limited to cities. There are ten dental schools in Canada in 9 cities in 7 provinces. 600 participants were recruited through invitations distributed within schools to students, faculty, and support staff. Participants were invited electronically. They received a link to the password-protected study database, and after signing the consent form, they were able to complete the questionnaires. The process was done in a unified manner across all ten schools over an approximately six-week period until the sample size requirement was achieved. We collected data from all subjects monthly, over 12 months using online questionnaires. Eligible individuals included current trainees (dental students, dental hygienist students, dental residents, and graduate students), part-time and full-time academic staff (including clinical and non-clinical professors), and part-time and full-time support staff, including dental assistants, dental hygienists, sterilization technicians, receptionists, and office and administrative staff. They had to have worked or studied at the dental school during the 12-month follow-up period.

2.2. Data collection

Data were collected online through the 'LimeSurvey' platform. After recruitment, participants responded to the questionnaire every four weeks from March 2021 to April 2022. Participants could create their login and password for the system and complete the questionnaire using any device. The survey and deidentified data are hosted at secured servers behind a firewall at McGill University. The questionnaire included the COVID-19 Immunity Task Force (CITF) indicators and data pertinent to our study [34]. A complete CITF core data set questionnaire was used at baseline, and an adapted version was used for each of the 12 monthly follow-ups. The core data set of the CITF questionnaire is a standardized instrument [35]. It was pretested in two other cohort studies about COVID-19 incidence among dentists and dental hygienists in Canada [28,29]. The baseline questionnaire contained questions applied only at baseline, including demographics, current health status, work information, including work setting and role in the university, and the potential for exposure (for example, through the provision of clinical care). The monthly followup questionnaires collected information on COVID-19 tests and symptoms, work, social and other activities such as if participants left their homes, in-person dental care episodes, work with coworkers or alone, vaccination information, COVID-19 anxiety, among others.

2.3. Ethical considerations

Study protocol and ethics approval were obtained from the ethics review boards at McGill University at first (IRB Review Number: A12-M69-20B / (20-12-047) since the project principal investigator was from McGill University. Ethical approval was subsequently obtained from the other nine universities in the study. Participants consented online and then were given access to study questionnaires. This study complies with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines.

2.4. Statistical analysis

The analyses in this study included data on variables collected at baseline and during the followup months. The baseline variables are age, sex at birth, the province where the university is located, the primary role occupied in the dental school, self-reported chronic conditions, influenza vaccination history, COVID-19 vaccination status, the number of vaccine doses received, and the date when participants received the first and second dose. The variables vaccination status, vaccine doses, and the date of vaccination were also collected during the eleven follow-up months. Discrete variables were reported as numbers and proportions in each category. In order to examine the vaccination time distribution among students and employees by age group, the mean, median, standard deviation, and quartiles were provided. As a result, we can examine vaccination time trends, spot outliers, and identify any patterns of vaccination delay.

To document the trends in vaccination within our sample over time, besides the baseline description, we provided the cumulative proportion of vaccination since the vaccine was available in Canada and during the study follow-ups, as well as vaccine doses taken by participants.

Outcomes of interest

Primary outcome: The primary outcome was "Vaccine acceptance," which is described as the vaccination status of participants as of baseline (April 2021). Participants self-reported whether or not they had received at least one dose of the COVID-19 vaccine as of baseline. We chose to use the reported vaccination status of respondents at baseline because, at that time, the vast majority of them were already vaccinated with at least one dose of the COVID-19 vaccine.

Secondary outcome: The secondary outcome is the "Vaccination time", defined as the duration it took for participants to receive at least one dose of the vaccine since vaccination was available in Canada (December 2020). We were interested in identifying any factors associated with the time to get vaccinated. We created a new variable called "Vaccination Time", and to be able to calculate the time, we used the date participants provided for when they received their first dose of the vaccine, taking December 14, 2020, as the baseline for calculation – when the vaccine was made available in Canada. There are two categories within "Vaccination Time": "late vaccination" and "early vaccination." Participants were classified into these categories based on trends observed in our dataset and Canadian vaccination coverage. We noted that most of our sample got vaccinated between March 2021 and July 2021, a pattern also observed among the Canadian population. Therefore, we defined all participants vaccinated after 01 May 2021 as having "late vaccination" and those vaccinated until 30 April 2021 as having "early vaccination."

Independent variables influencing the outcome

Age: Participants reported their age in years at baseline. We classified our population into age categories based on the Canadian government's vaccine coverage classification [36]. Based on our sample, we divided the age range into five categories (18–29, 30-39, 40–49, 50–59, and 60–87).

Sex at birth: Self-reported sex at birth by respondents. They were given the options: male, female, and prefer not to answer. Because so few participants selected "prefer not to answer," we divided the respondents into male and female categories for the statistical analysis.

Province of the dental schools: Participants reported the province where the university/dental schools they attend is located. There were ten Canadian dental schools located in 7 provinces: Quebec (n=114) which is the sum of three universities, Ontario (n=165), Nova scotia (n=74), British Columbia (n=62), Alberta (n=50), Manitoba (n=60), Saskatchewan (n=75). Since most of our sample originated from Quebec and Ontario we combined them into three categories: Quebec (n=114), Ontario (n=165) and Others (n=321).

Role: The primary role at the dental schools occupied by participants. They were classified as dental students, dental hygienist students, residents (general practice resident or specialty training), graduate students (MSc or Ph.D.); Faculty staff; and support staff including dental assistants, dental hygienists, sterilization technicians, receptionists, and office staff. For this research, we reclassified them into two categories: students and employees, because they have different experiences.

Chronic Conditions: The presence or absence of the chronic illnesses specified in the questionnaire was reported by the participants. The medical conditions were obesity, cancer, diabetes, HIV/ other immune deficiency, asthma, chronic lung disease, chronic liver disease, a chronic blood disorder, chronic kidney disorder, chronic neurological impairment, organ or bone marrow transplant, heart condition, high blood pressure, and other comorbidities. We grouped Chronic conditions into two categories to be used in the analysis: present or not, as defined by the participants.

Flu vaccine history: Reported vaccination by participants against Flu in the past season (2020). It is a binary variable, and they had to choose "yes or no".

Regression analysis

Vaccine acceptance (defined previously) was used as the primary outcome of interest to conduct a logistic regression analysis since we were interested in observing whether there were any statistical associations with the independent variables. Vaccination time was used as the secondary outcome in the regression analysis to identify if time duration (early or late vaccination) might influence the outcome.

Variables that we assumed might be associated with vaccine acceptance and vaccination time were first assessed through univariate logistic regression providing crude odds ratio (OR) and 95% confidence intervals (CI). In a subsequent step, we performed a forced-entry multivariate logistic regression procedure providing an adjusted odds ratio (aOR) to identify covariates associated with acceptance of the COVID-19 vaccine and vaccination time. When any of the covariates included in the model had missing values, the data related to a respondent were excluded. Statistical analyses were performed with RStudio software, version 2023.06.0+421 (Copyright (C) 2022 by Posit Software, PBC).

3. Results

3.1. Basic demographic information

The baseline survey was completed by 600 participants in April and May 2021. The median age of participants was 36 years old. Most of the participants identified as female (n = 411, 70%), with

52.5% (n=315) reporting their primary role in dental schools as students and 47.5% (n=285) as employees. By the end of May 2021, out of the 600 participants, 545 (91%) self-reported being vaccinated with at least one COVID-19 vaccine, and 38 (6%) did not report any vaccination. Most participants came from Quebec (n = 114, 19%), followed by Ontario (n=103, 17%). Among the 600 respondents, 459 (76,5%) reported having no chronic conditions, and 350 (58%) reported being vaccinated for the flu vaccine in the past season (2020).

Table 1 summarizes the sociodemographic data. The data were collected from April to May 2021 to April to May 2022. During the study period, 266 participants (44.3%) were lost to follow-up.

3.2. COVID-19 vaccination in Canadian dental schools

The large majority of individuals in our sample accepted the COVID-19 vaccine. Vaccination started in Canada on December 14, 2020; therefore, when our study began in April 2021, the vaccination program in Canada was advanced.

The proportion of participants who have received at least one dose of the COVID-19 vaccine has not undergone significant changes during the study time because we had a large vaccination uptake as of baseline (April 2021), with more than 90% of our sample already vaccinated, increasing to 97% by May 2022 when the study finished. The proportion of unvaccinated respondents decreased over time, with only 2.1% indicating vaccine hesitancy at the end of the study. Vaccination status over the study time can be seen in **Table 2**.

When eligible, participants were able to take a second dose of the COVID-19 vaccine and an additional dose later. **Table 3** reveals a notable increase in respondents who received two or more vaccines as time advanced. In April 2021, more than 70% were vaccinated for the first dose, and 108 participants (18%) had received two or more vaccine doses. By October 2021, these figures

surged to 93.4% of participants vaccinated with two or more doses, slightly increasing to 94.6% at the end of our study (May 2022). According to the Health Agency Canada's classification, participants who have received two doses are considered fully vaccinated. The cumulative percentage of individuals in our sample vaccinated with at least one dose and those fully vaccinated exhibited comparable patterns, with a considerable spike between March and July 2021, when most of them got vaccinated. Our results align with the vaccination coverage in Canada at the same period, as seen in **Figure 1**. Participants aged 50 to 59 represent the group with the highest vaccination coverage, but vaccine uptake was similar by sex and role.

There was no statistically significant relationship between COVID-19 vaccine acceptance and factors such as self-reported chronic conditions, past flu vaccination status, age groups, sex, primary role at university, and provinces – **Table 4**. We found that individuals aged 50-59 were less likely to delay the vaccine than most sample participants (**OR**: 0.36, **95%CI**: 0.13-0.8 and a**OR**: 0.16, **95%CI**: 0.05-0.51, univariable and multivariable analysis respectively) – **Table 5**.

3.3. Vaccination time - Since December 2020

The mean time participants took to get vaccinated for the first dose was 110 days, approximately three months (range:1-285 days; SD:33.5 days), while for the second dose was 175 days, approximately six months (range: 30-364 days SD: 40.1 days), since 14 December 2020 when the vaccine was available in Canada. The median time was 113 days for the first dose (25th and 75th percentiles were 89 and 128 days, respectively) and 184 days for the second dose (25th and 75th percentile were 172 and 195 days, respectively). The Interquartile Range (IQR) of vaccination time varies across age groups and roles, indicating different levels of spread in vaccination times within each group. A number of observations that deviated from the norm vaccination time were

detected. These outliers represent participants who received their vaccination significantly earlier or later than the majority in their age group. Employees generally showed lower median vaccination times compared to students, indicating earlier vaccination. Employees also revealed more consistency in vaccination time across most age groups with a narrower spread in vaccination times, suggesting more coherent vaccination practice. Students exhibit a broader spread in vaccination times across most age groups, suggesting more variability in when they got vaccinated. They also presented more outliers, notably for individuals in younger age groups (18-29 and 30-39 years old) who had their vaccinations later, suggesting more cases of individuals delaying their immunization. The results of the vaccination time distribution among study participants based on age group are displayed in **Figure 2**.

4. Discussion

This study sheds light on vaccination uptake during the COVID-19 pandemic among students, faculty and support staff in Canadian dental schools, exploring vaccination trends over time. As of April 2021 (study baseline), our findings demonstrated high COVID-19 vaccination acceptance by dental students and employees working in Canadian dental schools, with less than 3% of respondents not reporting any vaccination by the end of the study (May 2022) and up to 96% of participants vaccinated. Due to very low vaccination hesitancy rates, our study did not have statistical power to examine factors associated with hesitancy. Our findings also indicated that students were delaying the vaccine more than employees.

To our knowledge, this is the first study, including all dental schools in Canada, that looked at actual COVID-19 vaccination rates. One of the few studies we found in Canada on vaccination acceptance among healthcare professionals, conducted in 2021, comprehended a range of HCWs,

although no oral healthcare practitioners. The study revealed high vaccination acceptance among participants and low hesitancy, aligning with our findings [37]. The other two existing studies on COVID-19 vaccination among Canadian healthcare workers, in addition to not including dental professionals, focused solely on vaccine intentions and did not provide data on vaccination coverage [38,39]. Most studies published worldwide analyzed intention to receive the COVID-19 vaccine instead of actual vaccination uptake [26,27,30,31,40,41]. Our research obtained a more comprehensive overview of COVID-19 vaccination uptake by including students and employees from different dental schools in Canada.

Our study's findings revealed high vaccination acceptance, corroborating with previous research on Quebecers' intentions to receive the COVID-19 vaccine. Specifically, a cross-sectional study conducted among the Quebec population between April and December 2020 indicated a high intention to accept the vaccine, with acceptance rates ranging from 66% to 76%. The authors also revealed that the intention to be vaccinated increased with age and level of education. Our study indeed reassured these findings, aligning the intention to be vaccinated with the actual vaccine acceptance [42].

In contrast to the high acceptance of the COVID-19 vaccine from our study sample, dental students elsewhere have been documented to be hesitant for different reasons [27,43,44]. These findings may differ from ours due to factors such as the date when studies were conducted, the difference in sample size, the sociodemographic characteristics, contextual factors, and notably how factors associated with vaccine hesitancy were addressed in different countries and work settings.

Our findings demonstrated no relationship between COVID-19 vaccine acceptance and sociodemographic or other variables. Other studies with dental students showed that gender, age, and being a dental student did not influence the willingness to receive the vaccine [27,41]. Rock,

Madathil, Khanna, et al. (2022) also found no statistically significant relationship between COVID-19 vaccine acceptance and age, sex, ethnicity, province of practice or community served among Canadian dental Hygienists [12]. The fact that we did not find an association between any factors and vaccine acceptance is likely related to the high vaccination uptake in our sample and low vaccine hesitancy. Consequently, we do not have enough power to encounter such an association.

Since the numbers or outcomes did not vary, we chose to evaluate the data in our study using the sex at birth rather than the reported gender. According to the literature, both have been utilized in related investigations.

Our study outlined that participants within the group aged 50-59 years old were less likely to delay the vaccination. Similar results were found in a study with Palestinian dental students, in which experience with the influenza vaccine predicted willingness to get the COVID-19 vaccine [41]. Older age was included in Canada's priority group for vaccination [20]. It might explain why those aged 50-59 in our sample were less likely to delay the vaccine since they were included in one of the first groups eligible for vaccination.

Regarding vaccination time, students demonstrated a significant difference from the average time compared to employees, implying delays in vaccination. This could be due to various factors like accessibility, awareness, or hesitancy. Regardless, most of our sample were vaccinated with at least one dose as of April 2021, which could be those with priority due to health conditions or for being in frontline roles.

5. Strengths

To the best of authors' knowledge, this is the first study including all dental schools across Canada, in which we explore the vaccination experience, coverage and related factors among dental students, faculty and support staff. The Pan-Canadian study included people from 9 provinces, making our sample diverse. This study offers valuable insights regarding the COVID-19 vaccination experience among dental students and employees in several educational settings. As healthcare professionals, dentists and dental students are responsible for prioritizing patient safety and public health. They will be considered reliable sources of information, and they will be able to advocate for increasing vaccination uptake in the general population. They might help people fight their concerns related to many other types of vaccines, such as Flu and Hepatitis. Upholding high vaccination standards aligns with the ethical principles of beneficence and nonmaleficence, demonstrating a commitment to protecting the health and well-being of patients and the broader community.

6. Limitations

This study is part of a prospective cohort study conducted during the pandemic, in which the primary goal was to document the COVID-19 infection rates in Canadian dental schools and COVID-19-related factors. The study design might introduce bias since it was not designed to assess the vaccination experience of respondents. We also analyzed self-reported data, and it is possible that social desirability bias occurred in a dental school sample, leading to some participants reporting as vaccinated when they had none or failing to respond to the question. In addition, since it was a longitudinal study with eleven months of follow-up, the issue of loss to follow-up limits the generalizability of the results.

6. Conclusion

The proportion of respondents who accepted vaccination in our study corroborates with the results from other studies performed in Canada [36,37,44]. Based on our findings, dental students, faculty, and support staff from Canadian dental schools demonstrated significant vaccination acceptance and low vaccine hesitancy despite the presence of some outliers cases among students indicating delays. A positive attitude towards vaccines among future dental professionals is vital for safeguarding public health, ensuring the continuity of dental education and patient care, and promoting a culture of responsibility, professionalism, and ethical practice within the dental community.

CRediT authorship contribution statement

Isabella Turquete: Conceptualization, visualization, formal analysis, investigation, validation, Writing – original draft, Writing – review & editing. **Paul Allison**: Project administration, supervision, conceptualization, funding acquisition, resources, data curation, investigation, visualization, methodology, Writing – review & editing. **Sreenath Madathil**: Investigation, visualization, data analysis, methodology, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Figures and Tables

	n	%
Age group		
18-29	293	49
30-39	88	15
40-49	75	12.5
50-59	94	16
60-87	39	6.5
Missing	11	1
Sex		
Female	411	68.5
Male	179	30
Missing	10	1,5
Province of the university		
Ouebec	114	19
Ontario	103	17
Others*	383	64
Role in the university		
Student	315	52.5
Employee	285	47.5
Presence of chronic condition		
Yes	132	22
No	459	76.5
Missing	9	1.5
Flu vaccine in the past season	-	110
Ves	350	58
No	177	29.5
Missing	73	12.5
COVID 10 vegoine	15	12.0
Vos	545	01
No	38	51
Missing	17	3
Veccine time	17	5
Diran	407	60
Madama	407	08
AstroZonoco	32 24	9
Asuazelleca	∠4 117	4 10 5
In person dental care	11/	19.3
Vas	207	10 5
No	221	47.5 267
Missing	83	13.8
11133111g	05	15.0

 Table 1: Social demographic characteristics of students and

 employees from Canadian dental schools at baseline (n=600)

*Other provinces: NS, QC, ON, MB, SK, AB and B

Vaccine status	April 2021 (n=600)	October 2021 (n=408)	April 2022 (n=334)
Vaccinated	545 (91%)	394 (96.5%)	326 (97.5%)
Non-vaccinated	38 (6.3%)	13 (3.2%)	7 (2.1%)
Missing	17 (2.8%)	1 (0.2%)	1 (0.3%)

Table 2: COVID-19 vaccination status of study participants vaccinated with at least one dose.

 Table 3: Vaccination trends over the study among study participants.

Vaccine Doses	April 2021 (n=600)	October 2021 (n=408)	April 2022 (n=334)
One	437 (73%)	394 (96.5%)	326 (97.5%)
Two or more	108 (18%)	381 (93.4%)	316 (94.6%)
Missing	55 (9%)	17 (4.2%)	13 (4%)

Variables	Vaccine acceptance						
		Univariable			Multivariable		
	OR	95% C.I.	P value	aOR	95% C.I.	P value	
Sex (n = 579)							
Female	1						
Male	0.93	0.47-1.96	0.9	1.05	0.48-2.50	>0.9	
Age-group $(n = 579)$							
18-29 y.o.	1						
30-39 y.o.	1.71	0.63-5.97	0.3	2.80	0.77-13.7	0.2	
40-49 y.o.	1.17	0.46-3.58	0.8	1.77	0.47-7.12	0.4	
50-59 y.o.	1.85	0.69-6.47	0.3	3.12	0.74-14.4	0.13	
60-87 y.o.	1.00	0.33-4.37	>0.9	2.80	0.77-13.7	0.2	
Role in the university $(n = 583)$							
Employee	1						
Student	0.91	0.46-1.75	0.4	1.57	0.50-4.55	0.4	
Province $(n = 583)$							
Ontario	1						
Others*	0.65	0.13-2.71	0.6	0.61	0.12-2.60	0.5	
Quebec	0.35	0.08-1.00	0.087	0.34	0.08-1.02	0.5	
Presence of chronic condition (n	n = 580)						
No	1						
Yes	0.95	0.45-2.17	0.9	0.70	0.31-1.70	0.4	
Flu vaccine in the past season (n	n = 519)						
No	1						
Yes	0.70	0.30-1.49	0.4	0.84	0.35-1.83	0.7	

Table 4 - Predictors of COVID-19 vaccine acceptance in Canadian Dental Universities as of Baseline -April 2021(Univariable and Multivariable regression analysis results)

CI: Confidence Interval; OR: odds ratio; y.o.: year old. aOR: adjusted Odds Ratio. *Other provinces: NS, QC, ON, MB, SK, AB and BC.

Variables	Time to vaccination					
	Univariable			Multivariable		
	OR	95% C.I.	P value	aOR	95% C.I.	P value
Sex $(n = 534)$						
Female	1					
Male	0.95	0.56-1.58	0.9	1.37	0.76-2.41	0.3
Age-group $(n = 534)$						
18-29 y.o.	1					
30-39 y.o.	1.16	0.59-2.18	0.7	0.86	0.38-1.86	0.7
40-49 y.o.	1.65	0.86-3.08	0.12	1	0.40-2.43	>0.9
50-59 y.o.	0.36	0.13-0.81	0.024	0.16	0.05-0.51	0.003
60-87 y.o.						
Role in the university $(n = 538)$						
Employee	1					
Student	1.21	0.76-1.95	0.4	0.81	0.39-1.72	0.6
Province $(n = 538)$						
Ontario	1					
Others*	3.50	1.49-10.3	0.001	4.77	1.93-14.5	0.002
Quebec	5.81	2.29-17.9	< 0.001	7.55	2.88-23.9	< 0.001
Presence of chronic condition $(n = 535)$						
No	1					
Yes	0.96	0.53-1.65	0.9	1.35	0.68-2.57	0.4
Flu vaccine in the past season $(n = 479)$						
No	1					
Yes	0.65	0.40-1.08	0.093	0.59	0.35-1.02	0.058

Table 5: Predictors of time to receive the COVID-19 vaccine in Canadian dental universities. (Univariable and multivariable regression analysis results)

CI: Confidence Interval; OR: odds ratio; aOR: adjusted odds ratio; y.o.: year old. *Other provinces: NS, QC, ON, MB, SK, AB and BC

Figure 1: Cumulative percentage of COVID-19 vaccination among the general Canadian population and among study participants - since vaccination started in Canada in December 2020.



Cumulative percentage of vaccination among the study population

Report Month

Cumulative percentage of vaccination among the general population in Canada

Cumulative percent of people vaccinated



Report week

Figure 2: Vaccination time among study participants by age and role since vaccination started in Canada in December 2020.





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6. DISCUSSION

Investigating COVID-19 vaccination uptake in dental educational settings is crucial to mitigate the spread of the virus and ensure the safety of students, faculty, staff, and patients. Due to routine aerosol-generating procedures, dental professionals and students are considered a high-risk population for infections [25-29]. They dedicate a substantial portion of their time to providing clinical care to patients under the guidance of professors. Even "preclinical trainees" have extensive hours of practical training and simulations in campus laboratories, necessitating inperson attendance and the use of aerosols, albeit with mannequins. During the pandemic, students and their instructors were among the most consistently present on university campuses throughout Canada.

Our study sheds light on vaccination uptake during the COVID-19 pandemic among students and employees in Canadian dental schools, exploring vaccination trends over time. Our study demonstrated high COVID-19 vaccination uptake by dental students and employees working in Canadian dental schools, with less than 3% of respondents not reporting any vaccination by the end of the study and up to 96% of participants vaccinated by April 2022. Due to our study's main goal being to investigate COVID-19 infection rates in the population of interest, as well as the very low vaccination hesitancy rates observed, our study did not have the statistical power to examine factors associated with hesitancy. However, our findings did indicate that students were delaying vaccination slightly more than employees.

Most studies published worldwide analyzed intention to receive the COVID-19 vaccine instead of actual vaccination uptake [50,51,54,55,63,64]. A study investigating the COVID-19 vaccination experience among United States dental professionals and dental students demonstrated a large

percentage of vaccination acceptance among the study population (94% of participants accepted the COVID-19 vaccine) despite concerns about being vaccinated [47]. The high vaccination uptake in this study aligns with our findings, and the similarity between the study samples emphasizes it. Our research provided a more comprehensive overview of COVID-19 vaccination experiences based on various backgrounds by including students and employees from different dental schools in Canada.

The findings from this study revealed a high vaccination acceptance, corroborating with previous studies on Quebecers' intentions to receive the COVID-19 vaccine [65,66]. According to surveys conducted among the Quebec population in 2020, enquiring about their intention to receive the COVID-19 vaccine before it became available, university students (79%), HCWs (75%), people over 60 years old (83%), and people with chronic conditions (79%) showed a high intention to get vaccinated [65]. A cross-sectional study conducted between April and December 2020 also indicated a high intention to accept the COVID-19 vaccine among the public in Quebec, with acceptance rates ranging from 66% to 76%. The authors outlined that people's intentions increased with age and level of education [66]. Our study indeed confirmed these findings, aligning the intention to be vaccinated with the actual vaccine acceptance from our research.

As of June 2021, all individuals over 12 years old became eligible for vaccination in Canada [67,68]. At that time, more than half of Canadians were already vaccinated with at least one dose, with a progressive increase in vaccination rates as time advanced [69]. This suggests that people who demonstrated a positive attitude about the vaccine during previous surveys might have accepted the vaccine, contributing to high vaccination uptake in Canada.

Our study included staff members and dental, dental hygiene and graduate students and residents from Canadian dental institutions. The vaccination acceptance rate in our study was comparable to other studies with general college students [63] and dental students [64], in which most intended to be vaccinated. Canadian dental hygienists also demonstrated high vaccination acceptance, indicating that 89.4% of participants had received the vaccine by January 2022 [39].

In contrast to the high acceptance of the COVID-19 vaccine from our study sample, dental students can demonstrate being hesitant towards the COVID-19 vaccination [51] and may experience more hesitancy than dental practitioners [70,71]. These discordant findings may differ from our findings due to several factors, among them, the date when studies were conducted, the difference in sample size and the sociodemographic variables, contextual factors, and notably, the way factors associated with vaccine hesitancy were addressed in each educational and work setting. Educating healthcare students about vaccination during their training may be a means of addressing hesitancy and promoting vaccine acceptance throughout their careers.

Our results indicate that between December 2020 and April 2021(the month of baseline data collection in our study), more than 70% of participants reported being vaccinated with the first dose of the COVID-19 vaccine. This is similar to data provided by the Canadian government showing that, as of June 2021, 56.7% of the total population in Canada had received a first dose of vaccine [72]. Similarly, a study among Czech Dentists found that from December 2020 to June 2021, 79,6% of participants were fully vaccinated [73]. Vaccine mandates for public gatherings were announced across Canadian provinces between August and September 2021 [74]. The first province to announce it was Quebec (August 5, 2021) and the last was Prince Edward Island (September 21, 2021). It took one to four weeks between the announcement and the

implementation [74]. Although the vaccine mandate seems to increase vaccination uptake in certain provinces in Canada [74], our findings showed high vaccination coverage even before the mandate was announced. This might be related to the experience of our study sample, as some universities may have mandated dental students and dental school employees to have vaccines to allow them to attend clinics and classes [14].

Our findings demonstrated no relationship between COVID-19 vaccine acceptance and sociodemographic or other variables. Other studies with dental students showed similar results regarding predictors of willingness to get the COVID-19 vaccine acceptance [51,63]. According to Kalekar et al. (2021) in their study regarding COVID-19 vaccine hesitancy and acceptance among dental and medical students, neither student type (medical or dental), nor gender were associated with COVID-19 vaccine acceptance [51]. A systematic review among college students worldwide also outlined that age and gender did not influence vaccination willingness [63]. Rock, Madathil, Khanna, et al. (2022) also found no relationship between COVID-19 vaccine acceptance and age, sex, ethnicity, province of practice or type of community served (urban/rural) among Canadian dental hygienists [39]. Overall, these align with our results, which do not show any factors associated with vaccine acceptance. The fact that we did not find a relationship between socio-demographic factors and vaccine acceptance is related to the high vaccination uptake in our sample and low vaccine hesitancy. Consequently, we do not have enough statistical power to demonstrate such an association if it exists.

Since the numbers or outcomes did not vary, we chose to evaluate the data in our study using the sex at birth rather than the reported gender. According to the literature, both have been utilized in related investigations.

Our study found that participants aged 50-59 years old and those who received the flu vaccine in the past season (2020) were less likely to delay their COVID-19 vaccine. Similar results were found in a study with Palestinian dental students, which found that experience with the influenza vaccine predicted willingness to get the COVID-19 vaccination [64]. Other studies also demonstrated an association between prior flu vaccination and COVID-19 vaccine acceptance [75,76]. Older age was included in Canada's priority group for immunization [77]. It might explain why those aged 50-59 in our sample were less likely to delay the vaccine since they were included in one of the priority groups. According to the Canadian government website, older age (50-80 years old and over) represented the group with more people vaccinated as of April 2021 [78], which is similar to our findings for the same period, which showed that the older participants represented the group with the high vaccination coverage by April 2021.

Regarding the time to vaccination, our results indicated that employees from Canadian dental schools exhibit more consistent vaccination practices across age groups, showing earlier vaccinations. Students exhibited more inconsistency in vaccination time, with more outliers for late vaccination times, suggesting delays specific to this group, particularly among younger students (18-29 and 30-39 age groups). These findings might be taken as Canadian dental students demonstrated being more hesitant toward the COVID-19 vaccine than staff members. An explanation for why students got their vaccine later than the regular observation within our population could be due to various factors like accessibility issues, specific priority in the vaccination rollout, awareness, hesitancy, or personal choice [74].

6.1. Strengths

To the best of the author's knowledge, this is the first study to include all dental schools across Canada, in which we explore the vaccination experience, the actual vaccine uptake, and vaccination time trends among dental students, faculty, and support staff. It was a Pan-Canadian study, including people from 9 provinces, making our sample as diverse as the actual population in Canada. This study offers valuable insights regarding the COVID-19 vaccination experience among dental students and employees in educational settings. As healthcare professionals, dentists and dental students are responsible for prioritizing patient safety and public health. They will be considered reliable sources of information, and they will be able to advocate for increasing vaccination uptake in the general population. They might help people fight concerns related to many other types of vaccines, such as Flu and Hepatitis. Upholding high vaccination standards aligns with the ethical principles of beneficence and nonmaleficence, demonstrating a commitment to protecting the health and well-being of patients and the broader community.

6.2. Limitations

This study is part of a main cohort study conducted during the pandemic, in which the primary goal was to document the COVID-19 infection rates in Canadian dental schools, as well as provide valuable data on COVID-19-related factors since we were facing a new pandemic with no precedents. We analyzed self-reported data, making our findings vulnerable to bias. Consequently, our findings should be interpreted with caution. In addition, since the main cohort study that we were based on was a longitudinal study with eleven months of follow-up, the loss of follow-up limits the generalizability of the results.

6.3. Future application

To explore the factors influencing vaccination coverage in dental schools, further studies should be conducted using vaccination as the primary outcome. Furthermore, collecting qualitative data would complement quantitative data analyses investigating vaccine acceptance or hesitancy among dental school staff and students. Understanding the motivations and concerns of individuals can provide valuable insights for targeted interventions or to keep the vaccination uptake on a large scale. Behavioural Research may also provide essential information through, for instance, understanding decision-making processes related to vaccine acceptance among dental school staff and students. Insights from behavioural science can inform the design of interventions to address cognitive biases, social influences, and other factors that may impact vaccination decisions.

7. CONCLUSION

The introduction of safe and effective vaccines represented a significant milestone in controlling the COVID-19 pandemic. Despite initial apprehensions regarding the newly developed vaccines, the Canadian population exhibited substantial vaccine acceptance. By December 2021, one year following the introduction of the COVID-19 vaccine in Canada, 87% of the Canadian population had been fully vaccinated [79]. Healthcare providers play a crucial role in fostering vaccine acceptance, as their hesitancy can exacerbate public mistrust in vaccination efforts. Encouragingly, our findings indicate a high acceptance and minimal hesitancy toward the COVID-19 vaccine among future healthcare professionals. The proportion of respondents who accepted vaccination in our study is similar to other studies performed in Canada [39,45,54]. Despite the presence of outliers indicating later vaccination among students, our findings suggest that dental students, faculty, and support staff from Canadian dental schools demonstrated significant acceptance of the COVID-19 vaccine, which is vital for safeguarding public health, ensuring the continuity of dental education and patient care, and promoting a culture of responsibility, professionalism, and ethical practice within the dental community.
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9. APPENDIX

9.1. IRB approval letter



 Medicine and Health Sciences
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Tél/Tel: (514) 398-3124

December 11, 2023

Dr. Paul Allison Faculty of Dental Medicine and Oral Health Sciences 2001 McGill College – Suite 500 Montreal, Quebec H3A 1G1

RE: IRB Study Number A12-M69-20B (20-12-047) COVID-19 experience in Canadian dental schools

Dear Dr. Allison,

Thank you for submitting an application for Continuing Ethics Review for the above-referenced study.

The study progress report was reviewed and expedited re-approval was provided on December 11, 2023. The ethics certification renewal is valid **to December 18, 2024.** The status of your renewal submission including documents can be accessed on eRAP.

Investigators are reminded of the requirement to report all McGill IRB approved study documents to the Research Ethics Offices (REOs) of participating study sites, if applicable. Please contact the individual REOs for instructions on how to proceed. Research funds may be withheld and / or the study's data may be revoked for failing to comply with this requirement.

Should any modification or unanticipated development occur prior to the next review, please notify the IRB promptly. Regulation does not permit the implementation of study modifications prior to IRB review and approval.

Regards,

Robata M. Palmore

Roberta M. Palmour, PhD Chair Institutional Review Board

cc: A12-M69-20B (20-12-047)

9.2. IRB approval letter-Annual renewal letter



 Faculty of
 Faculté de

 Medicine and
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Montreal, QC H3G 1Y6 X011 Molter 4633 X655, Promenade Sir William Osler #633 T: (514) 398-3124 Montreal, QC H3G 1Y6 X611 Montreal, QC H3G 1Y6

December 21, 2020

Dr. Paul Allison Faculty of Dentistry 2001 McGill College – Suite 500 Montreal, Quebec H3A 1G1

RE: IRB Review Number: A12-M69-20B / (20-12-047)

COVID-19 experience in Canadian dental schools

Dear Dr. Allison,

Thank you for submitting the above-referenced study for an ethics review.

As this study involves no more than minimal risk, and in accordance with Articles 2.9 and 6.12 of the 2nd Edition of the Canadian Tri-Council Policy Statement of Ethical Conduct for Research Involving Humans (TCPS 2 2018) and U.S. Title 45 CFR 46, Section 110 (b), paragraph (1), we are pleased to inform you that approval for the study and consent form (December18, 2020) was provided by an expedited/delegated review on December 21, 2020, valid until **December 20, 2021**. The study proposal will be presented for corroborative approval at the next meeting of the Committee.

The Faculty of Medicine and Health Sciences Institutional Review Board (IRB) is a registered University IRB working under the published guidelines of the Tri-Council Policy Statement 2, in compliance with the Plan d'action ministériel en éthique de la recherche et en intégrité scientifique (MSSS, 1998), and the Food and Drugs Act (17 June 2001); and acts in accordance with the U.S. Code of Federal Regulations that govern research on human subjects (FWA 00004545). The IRB working procedures are consistent with internationally accepted principles of good clinical practice.

The Principal Investigator is required to immediately notify the Institutional Review Board Office, via amendment or progress report, of:

• Any significant changes to the research project and the reason for that change, including an indication of ethical implications (if any);

• Serious Adverse Effects experienced by participants and the action taken to address those effects;

Any other unforeseen events or unanticipated developments that merit notification;

• The inability of the Principal Investigator to continue in her/his role, or any other change in research personnel involved in the project;

A delay of more than 12 months in the commencement of the research project, and;

• Termination or closure of the research project.

The Principal Investigator is required to submit an annual progress report (continuing review application) on the anniversary of the date of the initial approval (or see the date of expiration).

The Faculty of Medicine and Health Sciences IRB may conduct an audit of the research project at any time.

If the research project involves multiple study sites, the Principal Investigator is required to report all IRB approvals and approved study documents to the appropriate Research Ethics Office (REO) or delegated authority for the participating study sites. Appropriate authorization from each study site must be obtained before the study recruitment and/or testing can begin at that site. Research funds linked to this research project may be withheld and/or the study data may be revoked if the Principal Investigator fails to comply with this requirement. A copy of the study site authorization should be submitted the IRB Office.

It is the Principal Investigator's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The McGill IRB wishes you and your colleagues every success in your research.

Sincerely,

Robats M. Palmon

Roberta Palmour, PhD Chair Institutional Review Board

cc: Dr. S. Baillet, Associate Dean, Research Medicine A12-M69-20B / (20-12-047)

9.3. Study Questionnaire

BASELINE QUESTIONNAIRE

Section 1. Contact information

The contact information you provide, on this page, will be kept confidential and will only be used for the purpose of communicating matters pertinent to this study.

1. Please enter your contact information

Please write your answer(s) here:

First name: ______

Family name / Surname: _____

Phone:

Please **do not** use country code or leave spaces for your phone number. Example: **5141238888**

E-mail address: _____

2. Please provide the first three digits of the postal code plus the province of your residence: Please write your answer(s) here:

Postal Code (e.g., A1A) ______
Province ______

Section 2. Demographics & Current health status

3. How old are you?

Your answer must be between 18 and 99 Only an integer value may be entered in this field.

Please write your answer here: _____years

4. What was your assigned sex at birth?

Choose one of the following answers Please choose **only one** of the following:

- Female
- Male

5. What is your sex now?

Choose one of the following answers Please choose **only one** of the following:

- Female
- Male
- Prefer to self-describe: ______
- Prefer not to answer

6. What is your gender/how do you currently identify?

Please choose **all** that apply:

- Agender
- Genderqueer
- Gender fluid
- Man
- Non-binary
- Questioning or unsure
- Transgender
- Trans man
- Trans woman
- Woman
- Prefer to self-describe: ______
- Prefer not to answer

7. How would you describe your ethnicity?

- White (Caucasian)
- Indigenous person
- South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)

- Chinese
- Black
- Filipino
- Latin American
- Arab
- Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)
- West Asian (e.g., Iranian, Afghan, etc.)
- Korean
- Japanese
- Prefer to self-describe: ______
- Prefer not to answer

8. Please indicate which group best describes you:

Only answer this question if the following condition is met: Answer was "Indigenous person", to question 7.

- Status First Nations
- Non-status First Nations
- Inuit
- Metis
- Other indigenous
- Prefer not to answer

9. What is the highest level of education you have completed?

Please choose only one of the following:

- Less than high school graduation
- High school graduation
- Trade certificate, vocational school, or apprenticeship training
- Non-university certificate or diploma from a community college, cegep etc.
- University bachelor's degree (such as DDS, DMD, RDH)
- University graduate degree (such as a masters or doctorate)
- Prefer not to answer

10. How many people (including yourself) live at your residence?

Please write your answer here: _____

11. How many bedrooms at your residence?

Please write your answer here: _____

12. How many bathrooms at your residence?

Please write your answer here: _____

13. What is your current weight?

Please write your answer here: _____kg or pounds

14. What is your current height?

Please write your answer here: _____feet/inches or metres

15. Do you currently have a family physician/primary care provider?

- Yes
- No
- Don't know

16. Did you get a flu shot in fall 2020?

- Yes
- No
- Don't know

17. Do you currently smoke tobacco?

Please choose **only one** of the following:

- No
- Yes, less than daily
- Yes, daily

18. Do you currently use e-cigarettes (vape)?

Please choose **only one** of the following:

- No
- Yes, less than daily
- Yes, daily

19. Have you ever been diagnosed by a physician with one of the following disease(s)/condition(s)?

Please choose the appropriate response for each item: (Yes/No/Unknown):

	Yes	No	Unknown
Obesity			
Cancer			
Diabetes			
HIV/other immune deficiency			
Asthma (requiring medication)			
Chronic lung disease (non-asthma)			
Chronic liver disease			

Chronic blood disorder		
Chronic kidney disease		
Chronic neurological impairment/disease		
Organ or bone marrow replacement		
Heart condition		
High blood pressure		

20. Do you have any other disease/condition?

Please write your answer here: _____

21. Are you currently taking any prescribed medication? Please choose **only one** of the following:

- Yes
- No

22. If yes to question 22, what medication(s)

Please write your answer here: _____

23. Are you currently pregnant?

Please choose **only one** of the following:

- Yes
- No
- Unknown

24. If yes to question 23, please specify trimester:

Please choose **only one** of the following:

- First trimester
- Second trimester
- Third trimester

25. If yes to question 23, what is the estimated delivery date?

Answer must be greater or equal to today

Please enter a date:

Section 3: Work Information

26. Please indicate the dental school at which you work/study?

Please choose **only one** of the following:

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

27. What is your primary role in the dental school at which you work/study? Please choose **only one** of the following:

- Dental student
- Dental hygiene student
- Resident (general practice resident or resident in specialty training)
- Graduate student in MSc or PhD program focused on research training (i.e. not clinical or professional training)
- Academic staff
- Support staff (e.g. administrative staff, clinical staff, laboratory staff)
- Other _____
- **28.** How many different settings do you work in each week ("settings" refers to places like at home, in a clinic, in a campus office, in a laboratory. Also, you may work in two different clinics or two different offices. So, for example, if you work at home and work at one clinic, that is two settings; if you work in a private clinic and dental school clinic, that is also two settings; if you work in the dental school clinic and two private clinics, that is three settings)?

Please choose **only one** of the following:

- One per week
- Two per week
- Three per week
- More than three per week

29. What type of settings do you work in each week (using the same definition of settings as in question 28)?

Please choose **all** that apply:

• At home

- In a campus office (including an office linked with a clinic e.g. a reception area)
- In a campus clinic
- In a campus laboratory
- In a private clinic
- In a hospital clinic
- Other _____

30. What year of studies are you in?

Only answer this question if the following conditions are met:

Answer was "Dental student", "Dental hygiene student", "Resident" or "Graduate student in MSc or PhD program focused on research training" to question 27 (What is your primary role in the dental school at which you work/study?)

Please choose **only one** of the following:

- First
- Second
- Third
- Fourth
- Fifth
- Sixth or more

31. Which of the following best describes the work you are doing on a weekly basis as a trainee? Only answer this question if the following conditions are met:

Answer was "Dental student", "Dental hygiene student", "Resident" or "Graduate student in MSc or PhD program focused on research training" to question 27 (What is your primary role in the dental school at which you work/study?)

Please choose **all** that apply:

- Academic studies/course work or research work at home
- Laboratory work on campus
- Clinical work in campus clinic
- Clinical work in a hospital setting
- Clinical work in another community setting

32. What are your main roles at the dental school?

Only answer this question if the following conditions are met:

Answer was "Academic staff" or "Support staff" to question 27 (What is your primary role in the dental school at which you work/study?)

- Clinical teacher
- Non-clinical teacher
- Researcher
- Academic administration
- Clinical support staff
- Laboratory support staff

- Office support staff
- Other _____

33. How many days per week do you work for the dental school? Only answer this question if the following conditions are met:

Answer was "Academic staff" or "Support staff" to question 27 (What is your primary role in the dental school at which you work/study?)

Please choose **only one** of the following:

- Five
- Four
- Three
- Two
- One
- Less than one

34. Which of the following best describes the work you are doing on a weekly basis <u>at the dental</u> <u>school</u>:

Only answer this question if the following conditions are met:

Answer was "Academic staff" or "Support staff" to question 27 (What is your primary role in the dental school at which you work/study?)

Please choose **all** that apply:

- Academic or administrative work at home
- Academic or administrative work on campus
- Laboratory work on campus
- Laboratory work in a hospital setting
- Clinical work on campus
- Clinical work in a hospital setting
- Other _____

35. When you are <u>not working</u> for the dental school, which of the following best describes the activities you are engaged in on a weekly basis?

Only answer this question if the following conditions are met:

Answer was "Four", "Three", "Two", "One" or "Less than one" to question 33 (Which of the following best describes the amount of time per week you work for the dental school?) Please choose **all** that apply:

- I am at home not working for money
- Paid work at home
- Administrative work in a private office setting
- Administrative/office work in a hospital setting
- Laboratory work in a private laboratory setting
- Laboratory work in a hospital setting
- Clinical work in a private clinic setting
- Clinical work in a hospital setting

- Other _____
- **36.** Is the clinic, the office, the laboratory or other place where you worked <u>most of the time over</u> the past week:

Please choose **only one** of the following:

- Open [no walls between dental chairs, office desks or laboratory work spaces]
- Semi-open [some areas are open to each other while others have walls or other barriers separating them]
- Closed concept [all areas are separated by walls]
- I worked at home most of the time

Other _____

Section 4: Potential for exposure

37. Since January 2020, have you travelled and stayed overnight outside the province where you currently live?

Please choose **only one** of the following:

- Yes
- No

38. If yes, please specify how many times?

Please write your answer here: ______

39. If yes, please specify where?

Please choose **all** that apply:

- NFL
- NS
- NB
- PEI
- QC
- ON
- MB
- SK
- AB
- BC
- NUN
- NWT
- YU
- USA
- Other(s) _____

40. Have you shared a living space/residence with someone (family or other), in the past 2 weeks? Please choose **only one** of the following:

- Yes
- No

41. Did any of the people you shared a living space/residence with attend school, college or university in-person or go to work, in the past 2 weeks?

Please choose only one of the following:

- Yes
- No

42. Did any of the people you shared a living space/residence with have a positive test for COVID-19, in the past 2 weeks?

Please choose **only one** of the following:

- Yes
- No
- Unknown

43. Did any of the people you shared a living space/residence with have any symptoms that made you suspect they have COVID-19, in the past 2 weeks? *

Please choose only one of the following:

- Yes
- No
- Unknown

44. In past 2 weeks, have you attended a health care facility (other than the clinics you provide care) for yourself or with someone else?

Please choose **only one** of the following:

- Yes
- No

45. In past 2 weeks, have you attended any private gatherings with a person or persons who do not live at your residence?

Please choose **only one** of the following:

- Yes
- No

46. In past 2 weeks, have you attended any public gatherings/events with 10 or more people? Please choose **only one** of the following:

- Yes
- No

47. Have you ever worked at a facility which knowingly cares for COVID-19 patients? Please choose **only one** of the following:

- Yes
- No

48. Have you ever provided any form of service for people with COVID-19?

Choose one of the following answers Please choose **only one** of the following:

• Yes

- No
- Unknown

Section 5: COVID-19 Tests and symptoms

(Questions 49 to 53 to be asked once only, as part of the baseline questionnaire. Remaining questions to be asked each month)

49. Have you been tested for COVID-19, other than as part of this project?

Please choose **only one** of the following:

- Yes
- No

50. If yes to question 49, how many times have you been tested?

Please write your answer here: ______

51. If yes to question 49, what were the dates of the test(s)?

- 1st test date
- (if applicable) 2nd test date _____
- (if applicable) 3rd test date _____
- (if applicable) 4th test date ______
- Other test dates ______

52. If yes to question 49, what were the results of the test(s)?

- 1st test: positive _____; negative _____; don't know/waiting for the result _____
- 2nd test: positive _____; negative _____; don't know/waiting for the result _____
- 3rd test: positive _____; negative _____; don't know/waiting for the result _____
- 4th test: positive _____; negative _____; don't know/waiting for the result _____
- Other tests: positive _____; negative _____; don't know/waiting for the result ______

53. If yes to question 49, please specify the type of test(s) you have had?

Please choose **all** that apply:

- Nasopharyngeal swab sample and PCR based test
- Nasopharyngeal swab sample and antigen test
- Nasopharyngeal swab sample BUT not sure if PCR or antigen test
- Saliva sample (other than the test performed in this project) and PCR based Test
- Saliva sample (other than the test performed in this project) and antigen Test
- Saliva sample (other than the test performed in this project) BUT not sure if PCR or antigen test
- Serum sample (Blood) and antibody testing
- Other: _____
- Don't know

54. <u>In the last month have you been tested for COVID-19, other than as part of this project?</u> Please choose **only one** of the following:

- Yes
- No

55. If yes to question **54**, what were the results of the test(s)? Please choose **only one** of the following:

- Positive
- Negative
- Don't know/waiting for the result

56. <u>In last month</u>, have you experienced any COVID-19-related symptoms? Please choose only one of the following:

- Yes
- No

If the answer to this question is no, please go directly to question 58

57. If you answered yes to question 56, in last month, have you experienced any of the following symptoms

Please choose the appropriate response for each item:

Symptom	No	Yes	If yes, date of onset (day/month)	If yes, duration (days)
Fever				
Sore throat				
Runny nose				
Shortness of breath				
Chills				
Vomiting				
Nausea				
Diarrhoea				
Headache				
Rash				
Conjunctivitis				
Muscle aches				
Joint aches				
Nosebleed				
Fatigue				
General malaise				
Loss of appetite				
Loss of smell /altered sense of smell				
Loss of taste / altered sense of taste				
Any other symptoms – list				

58. <u>In the last month</u>, have you stopped working for any reason (i.e. taken at least 1 day off work)? Please choose **only one** of the following:

- Yes
- No

59. If you answered yes to question 58, how many days did you stop working?

Please write your answer here: _____

60. <u>If you answered yes to question 58</u>, what was the reason you stopped working? Please choose **all** that apply:

- I had symptoms suggesting COVID-19
- I had been in contact with someone diagnosed with COVID-19
- I had been in contact with someone suspected of having COVID-19
- I tested positive for COVID-19
- I was ill with a condition other than COVID-19
- I took time off for reasons other than illness
- Other_____

Section 6: Activities

These questions are about your activities in the last month.

61. During this period of the last month, did you spend most of your waking time at home? Please choose **only one** of the following:

- Yes
- No

62. During the last month, how many times did you leave your home? Please choose **only one** of the following:

- Never
- Once
- Twice
- 3 to 5 times
- 6 to 10 times
- More than 10 times

63. During the last month, if you left home, what was the purpose?

Please choose **all** that apply:

- To go to work/university
- To do shopping (Including shopping for groceries)
- To engage in physical activity in indoor settings (e.g., gym, sports, dancing)
- To engage in outdoor physical activity
- To engage in wellness or lifestyle services (e.g., spa, hair or nail saloons)
- To visit family or friends indoors
- To visit family or friends outdoors
- To visit family or friends in a residence or long-term care facility
- Other:_____

64. During the last month, in what sort of setting did you work? *

- I worked at home
- I worked in an office on my own
- I worked in an office with other people
- I worked in a classroom, library or other large non-clinic, non-laboratory space
- I worked in a reception area greeting patients for a clinic
- I worked in a laboratory on my own
- I worked in a laboratory with other people
- I worked in the clinical space of a private clinic (i.e. worked in the space providing care for patients, not the reception area or other office space)
- I worked in the clinical space of a large open clinic in a dental school or hospital setting

- I worked in a closed clinical space in a dental school or a hospital setting
- Other _____

65. During the last month, did you provide or accompany somebody else providing any form of inperson dental care (including consultations)?

Please choose **only one** of the following:

- Yes
- No
- 66. During the last month, did you handle any human tissue material (e.g. a saliva or blood sample) or any item that had been in contact with a human (e.g. a prosthetic device or impression)

Please choose **only one** of the following:

- Yes
- No

Section 7: In-person dental care episodes

This section refers to the in-person care you provided or participated in (for example, as an assistant) during the last month.

67. During the last month how often did you provide or participate in in-person dental care? Please choose **only one** of the following:

- I did not provide any in-person dental care (If this is your response, go to section 8, question 84)
- One day per week or less
- Two-three days per week
- Four-five days per week

68. During the last month, during the days you provided or participated in in-person dental care, approximately how many patients did you see per day (e.g. 10 patients per day)?

Your answer must be at least 1 and should be a whole number.

Please write your answer here: _____

69. During the last month, during the days you provided or participated in in-person dental care, approximately <u>how many patients per day required an aerosol-generating procedure (e.g. 10 patients per day)?</u>

Only a whole number may be entered in this field. If none, enter "0".

Please write your answer here: _____

70. During the last month did you provide any in-person dental care for COVID-19 positive patients?

Please choose only one of the following:

- Yes
- No

71. If you answered yes to question 70, for how many COVID-19 positive patients?

Your answer must be at least 1. Only a whole number may be entered in this field.

Please write your answer here:

72. During the last month did any of the patients you cared for, have any symptoms that made you suspect they are infected with COVID-19?

Please choose **only one** of the following:

- Yes
- No

73. If you answered yes to question 72, how many patients?

Your answer must be at least 1. Only a whole number may be entered in this field.

Please write your answer here: _____

74. Please specify the types of in-person dental care you provided during the month:

Please choose **all** that apply:

- Advice and education only
- Tooth extraction
- Radiographs
- Examination and evaluation
- Scaling with hand instruments
- Scaling with ultrasonic scaler
- Abscess drainage
- Mineralized tissue removal with handpiece
- Adjustment of prosthesis or orthodontic appliance
- Pulp removal
- Provision of a prescription for a painkiller
- Provision of a prescription for an antibiotic
- Provision of a prescription for another medication
- Other: _____

75. Please specify the types of facial protection you used at the <u>dental school or hospital clinic</u> where you provided or participated in care during the last month

Please choose all that apply:

Please choose the appropriate response for each item:

	For all	For AGPs	For non-	For none
	procedures	only	AGPs only	
Routine surgical mask				
N-95 [or higher] mask				
Eye-glasses or goggles				
Facial visor				
Other form of hood or complete head coverage				

*AGP = aerosol-generating procedure

76. Please specify the types of facial protection you used at the <u>private clinic</u> where you provided or participated in care <u>the most</u> during the last month

Please choose the appropriate response for ea	ach item:
---	-----------

	For all	For AGPs	For non-	For none
	procedures	only	AGPs only	
Routine surgical mask				
N-95 [or higher] mask				

Eye-glasses or goggles		
Facial visor		
Other form of hood or complete head coverage		

*AGP = aerosol-generating procedure

77. Did you use any other form of facial covering during the provision of in-person care during this period?

Please choose **only one** of the following:

- No
- Yes (Please specify below)
- Make a comment on your choice here:______

(Questions 78 and 81 will be asked at baseline only. Questions 79, 80, 82 and 83 will be asked each month)

78. From the list below, please choose the Infection Prevention and Control (IPC) procedures and amenities in-place at the <u>dental school or hospital clinic</u> where you provided or participated in care during the last month:

- Separate entrance and exit doorways
- Screening or interviewing patients before appointment for COVID-19 related symptoms
- Screening or interviewing staff members for COVID-19 related symptoms
- Checking the temperature of the patients using a thermometer before the appointment
- Checking the temperature of the staff members at least once a day using a thermometer
- Insisting or encouraging patients to wear masks or face covering
 - At all times
 - Only in the waiting area
 - o Only in areas close to where dental care is provided
- Disinfecting of surfaces frequently touched by patients (e.g., doorknobs, switches)
 - After every patient
 - More than once per day but not after every patient
 - Once a day only
 - o Never
- Preprocedural mouthwash rinse
- Installation of special air filtering or purification unit
- Use of extra oral aerosol suction device during procedures
- Installation of physical barriers in areas of frequent staff-patient interaction (e.g., plexiglass frames)
- Plan in place for contact tracing in case of an outbreak at your clinic
- Other:_____
- 79. Have the Infection Prevention and Control (IPC) procedures and amenities in-place at the <u>dental school or hospital clinic</u> where you provided or participated in care changed during the last month

- No
- Yes

80. If you answered yes to question 79, what new IPC measures have been added or removed?

Measure		Added	Removed
Separate entra	nce and exit doorways		
Screening or in	terviewing patients before appointment for COVID-19 related		
symptoms			
Screening or in	terviewing staff members for COVID-19 related symptoms		
Checking the t	emperature of the patients using a thermometer before the		
appointment			
Checking the t	emperature of the staff members at least once a day using a		
thermometer			
Insisting or end	couraging patients to wear masks or face covering		
0	At all times		
0	Only in the waiting area		
0	Only in areas close to where dental care is provided		
Disinfecting of	surfaces frequently touched by patients (e.g., doorknobs,		
switches)			
0	After every patient		
0	More than once per day but not after every patient		
0	Once a day only		
0	Never		
Preprocedural	mouthwash rinse		
Installation of	special air filtering or purification unit		
Use of extra or	al aerosol suction device during procedures		
Installation of physical barriers in areas of frequent staff-patient interaction			
(e.g., plexiglass frames)			
Plan in place for			
Other:			

81. From the list below, please choose the Infection Prevention and Control (IPC) procedures and amenities in-place at the <u>private clinic</u> (if more than one respond concerning the private clinic where you worked the most during the past month) where you provided or participated in care during the last month:

- Separate entrance and exit doorways
- Screening or interviewing patients before appointment for COVID-19 related symptoms
- Screening or interviewing staff members for COVID-19 related symptoms
- Checking the temperature of the patients using a thermometer before the appointment
- Checking the temperature of the staff members at least once a day using a thermometer
- Insisting or encouraging patients to wear masks or face covering
 - At all times

- Only in the waiting area
- o Only in areas close to where dental care is provided
- Disinfecting of surfaces frequently touched by patients (e.g., doorknobs, switches)
 - After every patient
 - More than once per day but not after every patient
 - Once a day only
 - o Never
- Preprocedural mouthwash rinse
- Installation of special air filtering or purification unit
- Use of extra oral aerosol suction device during procedures
- Installation of physical barriers in areas of frequent staff-patient interaction (e.g., plexiglass frames)
- Plan in place for contact tracing in case of an outbreak at your clinic
- Other:_____
- 82. Have the Infection Prevention and Control (IPC) procedures and amenities in-place at the private clinic (if more than one respond concerning the private clinic where you worked the most during the past month) where you provided or participated in care changed during the last month
- No
- Yes

83. If you answered yes to question 82, what new IPC measures have been added or removed?

Measure		Added	Removed
Separate entra	nce and exit doorways		
Screening or in	terviewing patients before appointment for COVID-19 related		
symptoms			
Screening or in	terviewing staff members for COVID-19 related symptoms		
Checking the te	emperature of the patients using a thermometer before the		
appointment			
Checking the te	emperature of the staff members at least once a day using a		
thermometer			
Insisting or end	ouraging patients to wear masks or face covering		
0	At all times		
0	Only in the waiting area		
0	Only in areas close to where dental care is provided		
Disinfecting of	surfaces frequently touched by patients (e.g., doorknobs,		
switches)			
0	After every patient		
0	More than once per day but not after every patient		
0	Once a day only		
0	Never		
Preprocedural	mouthwash rinse		
Installation of s	pecial air filtering or purification unit		
Use of extra oral aerosol suction device during procedures			
--	--		
Installation of physical barriers in areas of frequent staff-patient interaction			
(e.g., plexiglass frames)			
Plan in place for contact tracing in case of an outbreak at your clinic			
Other:			

Section 8: Co-workers

The questions in this section refer to your work with co-workers during the last month.

84. During the last month, <u>when you were working at the dental school or at a setting linked to</u> <u>the dental school (e.g. hospital or university laboratory)</u>, approximately how many other people were working with you in the same room/space (office, laboratory, clinic)?

Please choose **only one** of the following:

- None
- 1-3
- 4-10
- 11-20
- More than 20
- 85. During the last month, as far as you are aware, did any of the people working with you in the same room/space at the dental school or at a setting linked to the dental school (e.g. hospital or university laboratory) have a positive test for COVID-19?

Please choose **only one** of the following:

- Yes
- No
- Unknown

86. During the last month, did any of the people working with you in the same room/space <u>at the</u> <u>dental school or at a setting linked to the dental school (e.g. hospital or university laboratory)</u> have any symptom which made you suspect that they have COVID-19?

Please choose **only one** of the following:

- Yes
- No
- Unknown
- 87. During the last month, when you were working in a space NOT linked with the dental school (if you regularly work in more than one setting, apart from the dental school, this is related to the setting you work in most), approximately how many other people were working with you in the same room/space (office, laboratory, clinic)?

Please choose **only one** of the following:

- I do not work in a space not linked with the dental school (if so, go to section 9, question 90)
- None
- 1-3
- 4-10
- 11-20
- More than 20
- 88. During the last month, as far as you are aware, did any of the people working with you in the same room/space you refer to in question 87 (i.e. NOT linked with the dental school) have a positive test for COVID-19?

Please choose **only one** of the following:

- Yes
- No
- Unknown
- 89. During the last two weeks, did any of the people working with you in the same room/space you refer to in question 87 (i.e. NOT linked with the dental school) have any symptom which made you suspect that they have COVID-19?

Please choose only one of the following:

- Yes
- No
- Unknown

Section 9: Vaccination

The questions in this section refer to receiving a vaccination against COVID-19.

90. Have you been vaccinated against COVID-19?

Answer 'Yes' if you have received at least one dose of the COVID-19 vaccine.

<u>Note</u>: Certain types of vaccines require more than one dose to protect against COVID-19. You would have been informed at the time of vaccination if you needed a second dose.

- Yes
- No

91. How many doses of the COVID-19 vaccine have you received so far?

<u>Note:</u> Certain types of vaccines require more than one dose to protect against COVID-19. You would have been informed at the time of vaccination if you needed a second dose.

- One dose
- Two doses
- More than two doses

92. When did you receive your first dose of the COVID-19 vaccine?

Day	Month	Year

93. When did you receive your second dose of the COVID-19 vaccine?

Day	Month	Year

94. Which vaccine did you receive?

- Pfizer and BioNTech mRNA vaccine
- Moderna mRNA vaccine
- AstraZeneca Oxford vaccine
- Other __
- Don't know

Section 10: COVID-19 Anxiety

95. Please rate the extent to which each statement applies to you over the last month.

					-	
		Not at	Rarely, less	Several	More	Nearly
		all (0)	than a day	days (2)	than 7	every day
			or two (1)		days (3)	(4)
•	I have avoided using public transport because of					
	the fear of contracting coronavirus (COVID-19)					
•	I have checked myself for symptoms of					
	coronavirus (COVID-19)					
•	I have avoided going out to public places (shops,					
	parks) because of the fear of contracting					
	coronavirus (COVID-19)					
•	I have been concerned about not having adhered					
	strictly to social distancing guidelines for					
	coronavirus (COVID-19)					
•	I have avoided touching things in public spaces					
	because of the fear of contracting coronavirus					
	(COVID-19).					
•	I have read about news relating to coronavirus					
	(COVID-19) at the cost of engaging in work.					
•	I have checked my family members and loved					
	one for the signs of coronavirus (COVID-19).					
•	I have been paying close attention to others					
	displaying possible symptoms of coronavirus					
	(COVID-19).					
٠	I have imagined what could happen to my family					
	members if they contracted coronavirus (COVID-					
	19).					
•	I am afraid of getting COVID-19 from a patient or					
	a co-worker					
٠	I am anxious when providing treatment to					
	patients with flu like symptoms					
•	I fear that the PPE I am using may not be					
	sufficient to protect me against COVID-19					
•	I worry about how effective vaccines may be					
	against COVID-19					
•	I worry about the side effects of vaccines against					
	COVID-19					
•	I am anxious about the new strains of COVID-19					
	that are emerging					

Section 11: Comments

96. Please provide any observations you have concerning your work during the COVID-19 pandemic:

Please write your answer here: