Journal of Current Research in Oral Surgery
2025, Volume 5, Page No: 146-160

Available online at: www.tsdp.net

ISSN: 3062-3480

Review Article

A Comparative Review of Oral Health Policy Modifications Across Countries During the COVID-19 Pandemic

Daniel K. Moore[1]*, Lucia F. Romano[1], Ahmed S. Farouk[1]

[1]Department of Oral Surgery, Faculty of Medicine, University of Otago, Dunedin, New Zealand.

***E-mail** ✉ daniel.moore@gmail.com

Received: 29 May 2025; **Revised:** 28 August 2025; **Accepted:** 02 September 2025

ABSTRACT

This study aimed to examine how oral health policies and clinical guidelines evolved in response to the Coronavirus disease 2019 (COVID-19) pandemic across various countries and regions worldwide. Data were compiled from nine countries—Canada, China (including Hong Kong), Egypt, India, Japan, New Zealand, Nigeria, Switzerland, and Thailand—drawing primarily on information issued by national or regional health authorities and dental councils or associations. Modifications to oral health guidance corresponded to the intensity of the pandemic, ranging from the suspension of non-urgent dental services during peak transmission periods to the gradual reintroduction of elective and non-essential procedures once the situation improved. Key mitigation measures included stringent infection control protocols (such as the use of hand sanitizers, facemasks, and physical distancing), strategies to minimize aerosol generation in dental settings, and approaches to enhance air quality in treatment rooms by limiting air-conditioner use and improving ventilation. The pandemic has profoundly influenced dental practice, prompting practitioners to adjust to new standards of care. However, the medium- and long-term implications of COVID-19 for dentistry remain to be clarified.

Keywords: Oral health policy, COVID-19, Oral health guidance, Review, Pandemic

How to Cite This Article: Moore DK, Romano LF, Farouk AS. A Comparative Review of Oral Health Policy Modifications Across Countries During the COVID-19 Pandemic. J Curr Res Oral Surg. 2025;5:146-60. https://doi.org/10.51847/QAAdLbOn6m

Introduction

In December 2019, a novel pneumonia outbreak of unknown etiology was first detected in China, later identified as being caused by a highly contagious betacoronavirus designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The resulting disease, coronavirus disease 2019 (COVID-19), rapidly escalated into a global pandemic, infecting approximately 1% of the world's population (79,231,893 confirmed cases as of 27 December 2020) and profoundly disrupting socioeconomic systems worldwide [1]. Consequently, controlling and mitigating the COVID-19 crisis has become a primary governmental priority across nations.

SARS-CoV-2 primarily spreads through direct or indirect person-to-person transmission via respiratory droplets, saliva, or contaminated fomites [2]. The virus predominantly targets the respiratory tract [3], with transmission occurring mainly during close contact (within 1–2 meters) through droplets expelled from the mouth or nose of infected individuals [4]. The incubation period typically ranges from 5 to 6 days, though it may extend to 14 days [5], prompting most countries to adopt a standard 14-day quarantine protocol. Clinical manifestations commonly include fever, dry cough, and dyspnea, which can progress to acute respiratory failure and death. Additional reported symptoms encompass fatigue, myalgia, sore throat, gastrointestinal disturbances, and anosmia or ageusia [6]. Patients with pre-existing conditions such as cardiovascular disease, chronic lung disease, or renal impairment are at substantially higher risk of severe or critical illness [3].

Beyond its public health implications, COVID-19 has exerted profound economic repercussions. Global gross domestic product was projected to contract by an

average of 5% across countries [7]. In dentistry, mitigation and suppression measures have caused significant operational and financial disruptions [8]. Modeling studies indicate that preventive services (−80% on average), periodontics (−76%), and prosthodontics (−70%) have experienced the most severe reductions in utilization [9]. Supply-chain interruptions, surging demand for personal protective equipment, escalating healthcare costs, and shortages of medical personnel and equipment have further strained already vulnerable healthcare systems [10]. Maintaining equitable access to essential health services during this crisis therefore represents a critical challenge for governments worldwide.

To curb viral transmission, governments have implemented a wide array of public health interventions, including border closures, domestic travel restrictions, social distancing mandates, remote work policies, school closures, and economic lockdowns [11, 12]. Evidence suggests that quarantine measures alone have prevented 44–81% of incident cases and reduced mortality by 31–63% [13]. Concurrently, unprecedented fiscal support has been mobilized; for instance, the World Health Organization secured more than USD 200 billion for global preparedness and response efforts [14].

Despite extensive research on the broader effects of COVID-19, relatively limited data exist regarding its specific impact on the dental sector—an area particularly vulnerable due to the high risk of SARS-CoV-2 transmission through aerosol-generating procedures and exposure to saliva and blood [4]. In the United States, the Centers for Disease Control and Prevention issued interim guidance prioritizing emergency dental care while minimizing risks to patients from treatment deferral and to oral health professionals from occupational exposure [15]. Comparable updated protocols have been adopted internationally, encompassing patient screening, clinical workflow modifications, and enhanced infection prevention and control measures [16, 17]. Specialty-specific recommendations for disciplines such as orthodontics and endodontics have also been developed and disseminated [18, 19].

Despite the proliferation of clinical guidelines and infection-control protocols issued by dental governing bodies and professional organizations during the COVID-19 pandemic, their broader influence on national and regional oral health strategies has received scant attention. This narrative review synthesizes experiences from areas that faced markedly different levels of epidemic intensity, identifies transferable policy insights, and offers actionable recommendations for updating national oral health frameworks to ensure sustainable, safe dental care delivery in both pandemic and post-pandemic contexts.

COVID-19 burden in selected countries and regions

The pandemic remained active worldwide through the end of 2020, with the World Health Organization recording more than 79 million confirmed infections and over 1.7 million deaths by December of that year [14]. The epidemiological profile of each studied country and region as of 27 December 2020 is outlined in **Table 1** [1]. Local experts from each jurisdiction independently gathered and verified information on evolving oral health policies and practice-level recommendations specific to their settings.

Table 1. Updated situations of COVID-19 in different countries as of 27 December 2020 (by alphabetical order).

Country	Cumulative confirmed cases	Cumulative cases per 1 million population	Cumulative deaths	Cumulative deaths per 1 million population	Cross infection from dental treatment
Canada	539,298	14,289	14,781	392	Yes*
China (Hong Kong included)	96,324	65	4,777	3	No
Egypt	131,315	1,283	7,352	72	No
India	10,187,850	7,382	147,622	107	No
Japan	217,312	1,718	3,213	25	No
New Zealand	1,788	371	25	5	No
Nigeria	83,576	405	1,247	6	No
Switzerland	426,199	49,245	6,508	752	No
Thailand	6,020	86	60	1	No

Data in this table was derived from the WHO, COVID-19 Weekly Epidemiological Update.

*October 14, 2020, outbreak in dental service setting in Ontario, Canada with 3 cases linked [20].

Canada

Canada, the world's second-largest country by land area, comprises 10 provinces and 3 territories. Under the Canadian Constitution, health professions—including dentistry—are regulated at the provincial/territorial level, resulting in 13 independent

dental regulatory authorities that establish licensure requirements and practice standards [21]. Despite this decentralized structure, COVID-19-related infection prevention and control (IPAC) guidelines issued by these regulatory colleges have shown remarkable consistency across the country [22-26].

The Canadian Dental Association (CDA), which represents more than 21,000 dentists through its federation of provincial and territorial associations, has played a key advisory (non-regulatory) role. Upon gradual reopening of dental practices in mid-2020, the CDA emphasized that oral health care should not be unnecessarily deferred, given its importance to overall health.

Key operational changes implemented nationwide include:

- **Pre-appointment and point-of-entry screening**: Patients are screened by telephone for symptoms, recent travel, and known exposure. Screening is repeated upon arrival, together with temperature checks. Hand hygiene (alcohol-based rub or soap and water) is mandatory upon entry, and patients keep facemasks on until seated in the treatment room.
- **Enhanced physical distancing and traffic flow**: A minimum 2-meter distance is maintained in waiting areas; appointment scheduling is adjusted to prevent patient overlap.
- **Treatment modifications to reduce aerosol generation**: Preference for extra-oral radiographs, minimal use of air/water syringes, mandatory high-volume suction, rubber dam isolation when feasible, and four-handed dentistry for all aerosol-generating procedures (AGPs).
- **Personal protective equipment (PPE)**: For AGPs, clinicians use ASTM Level 3 masks or N95/KN95 respirators, face shields, disposable gowns, hair covers, and gloves. Non-clinical staff wear appropriate PPE based on risk, and many clinics require staff to change into scrubs or cover street clothes with gowns.
- **Environmental and administrative controls**: Contactless payment, elimination of magazines/toys in waiting rooms, enhanced surface disinfection, and staggered staff breaks to maintain distancing.
- **Staff health monitoring**: Daily symptom screening and temperature recording for all team members; symptomatic staff are instructed to self-isolate and contact public health authorities.
- **Testing and contact tracing**: Testing capacity varies by province but reached approximately 200,000 tests per day nationally. Confirmed post-visit cases are managed by provincial public health units.

Canada's publicly funded healthcare system covers diagnostic testing and treatment for any dental professional who contracts COVID-19 or requires quarantine due to workplace exposure. The combination of uniform regulatory guidance, strong professional leadership from the CDA, and integration with the broader public health response has enabled Canadian dentistry to resume most services while maintaining a low rate of documented clinic-associated transmission [23-26].

Facility and ventilation standards

In Canada, minimum standards for heating, ventilation, and air-conditioning (HVAC) systems in healthcare facilities are established by the Canadian Standards Association (CSA). The actual air-change-per-hour rate in any treatment room is determined by factors such as room volume, ceiling height, the presence of operable windows, and overall clinic layout. As a result, the required fallow time after aerosol-generating procedures differs significantly from one clinic to another. Provincial dental regulatory authorities have therefore recommended that practitioners consult qualified HVAC professionals for individualized assessments before modifying clinic infrastructure or adopting generic fallow-time schedules. Regardless of ventilation performance, source-control strategies to reduce aerosol generation remain essential.

Environmental modifications widely adopted in dental offices include strict limits on the number of patients permitted in waiting areas, replacement of fabric-upholstered furniture with surfaces that can be easily disinfected, removal of shared items such as magazines and toys, and installation of transparent protective barriers at reception desks [23-26].

Practice-level adaptation and ongoing uncertainty

Private dental practices across Canada have swiftly integrated these heightened infection prevention measures. Given the markedly different pandemic trajectories among provinces and territories, the operational and financial consequences have also varied considerably. During the earliest phase of restrictions, only emergency and urgent care were allowed in most jurisdictions, with routine and elective procedures deemed non-essential.

Current directives from provincial Chief Medical Officers of Health now permit the full range of dental services, including elective treatment. Nevertheless, the enhanced protocols have substantially raised operating costs, exacerbated periodic shortages of personal protective equipment, and reduced patient volume due to longer appointment intervals and mandatory post-treatment fallow periods. Although Canadian dental practices have largely restored routine care with minimal documented in-clinic transmission, the lasting economic repercussions, potential changes in scope of practice, and future workforce implications remain unclear [23-26].

China

The COVID-19 outbreak originated in Wuhan, Hubei Province, in late December 2019, with the first cluster of unexplained pneumonia cases reported by local health authorities [27]. The central government responded rapidly by dispatching expert teams and establishing a national coordination mechanism. The National Health Commission (NHC), in collaboration with the National Administration of Traditional Chinese Medicine and other agencies, has continually updated its Diagnosis and Treatment Protocol for COVID-19, reaching its eighth edition by November 2020 [28, 29].

In late January 2020, the NHC classified SARS-CoV-2 as a Category A infectious disease—the highest level of biosafety risk, equivalent to cholera and plague—for the purpose of healthcare worker protection [30]. Consequently, the Chinese Stomatological Association (CSA) immediately directed all dental facilities to suspend non-emergency services and restrict care to emergencies only in designated public hospitals and departments [31]. Dentists were required to adopt the strictest protective measures, including N95 or higher-grade respirators, full-face shields, and disposable isolation gowns, while aerosol-generating procedures were to be avoided whenever possible [32]. To reduce unnecessary visits, the CSA actively promoted self-management strategies for common oral conditions through online platforms and social media, and many institutions launched remote consultation services [33, 34].

By late February 2020, as domestic transmission declined sharply, dental services began phased resumption across the country. Updated guidelines incorporated evolving scientific evidence and introduced a structured risk-stratified approach [35-37]. A mandatory pre-appointment triage system was established to classify patients into high-, medium-, and low-risk categories, determining the corresponding level of personal protection for dental personnel: Level 1 (standard precautions), Level 2 (enhanced), or Level 3 (maximum barrier protection). Regardless of risk level, all patients are required to perform a pre-treatment antiseptic mouthrinse.

During treatment, aerosol generation is minimized through routine use of rubber dams, high-volume suction, four-handed dentistry, and preference for hand instrumentation or chemomechanical caries removal when feasible [35-37]. Post-treatment protocols mandate sequential doffing of PPE, rigorous hand hygiene according to national standard WST313-2019, and instrument reprocessing compliant with WS 506-2016. Environmental disinfection includes wiping all high-touch surfaces, flushing dental unit waterlines for at least two minutes with 100 mg/L chlorinated water, maintaining continuous ventilation, wet-mopping floors every two hours, and segregating potentially infectious medical waste for treatment with 1,000 mg/L chlorine solution [36]. This highly systematic, centrally coordinated response enabled China to restore comprehensive dental services relatively early while maintaining stringent infection prevention standards [35-37].

Egypt

The practice of dentistry in Egypt faced severe disruption during the COVID-19 pandemic, largely due to prolonged lockdown measures and widespread patient anxiety over the risk of infection. The alarming surge of cases in nearby Europe, particularly Italy and other Mediterranean countries, further intensified concerns. Compounded by the global shortage of personal protective equipment (PPE) at the peak of the crisis (March–April 2020), the majority of Egyptian dentists suspended routine care and restricted services to emergency treatment only, often operating on an on-call basis.

To reduce transmission risk, stringent protocols were adopted, especially in restorative dentistry. These included comprehensive updating of patients' medical histories, routine temperature screening, treatment in well-ventilated operatories, mandatory use of high-volume suction and air-purification systems, and universal application of rubber dam isolation. For managing deep carious lesions—a particularly high-risk procedure during the pandemic—clinicians increasingly adopted minimally invasive approaches such as selective (partial) caries removal to preserve pulp vitality while achieving well-sealed restorations, even when some bacteria remained beneath the sealing layer [38]. Non-aerosol-generating techniques gained prominence, including chemomechanical caries

removal [39, 40] and the use of silver diamine fluoride to arrest progression [41]. These strategies enabled dentists to provide essential conservative care with significantly lower infection risk.

Hong Kong

Hong Kong, one of the world's most densely populated cities with more than 7 million residents, experienced recurring waves of COVID-19 transmission. By late 2020, the city had recorded over 5,000 confirmed cases and more than 100 deaths [42]. Community transmission was a persistent challenge, with numerous local cases lacking clear epidemiological links and a proportion of asymptomatic infections complicating containment efforts.

In response, the government implemented rigorous public health interventions, including mandatory mask-wearing on public transport and in all indoor public spaces, strict limits on group gatherings, temperature screening at building entrances, and periodic closure of high-risk venues such as bars and nightclubs. These measures, combined with enhanced contact-tracing and mass testing initiatives, created a highly cautious environment that profoundly influenced the delivery of dental care throughout the pandemic.

Hong Kong (continued)

Since January 2020, the Hong Kong Department of Health has maintained close communication with the dental profession, issuing regular updates and reinforced infection-control recommendations [43]. Authorities have emphasized strict adherence to core principles, including proper use of personal protective equipment, meticulous hand hygiene, and avoidance of aerosol-generating procedures unless adequate mitigation measures are in place.

Key aerosol-reduction strategies strongly promoted include pre-operative mouthrinses with virucidal agents (e.g., 0.5–1% povidone-iodine, 1% hydrogen peroxide, or 0.2% chlorhexidine), mandatory high-volume suction, rubber dam isolation (with split-dam techniques where full isolation is impractical), and cautious use of the 3-in-1 syringe. Dentists have also been encouraged to defer non-urgent elective treatments during periods of heightened community transmission.

Additional patient-flow measures implemented universally across clinics comprise compulsory temperature screening, completion of a detailed travel, occupation, contact, and cluster (TOCC) history questionnaire, and inquiry about respiratory symptoms or recent COVID-19 exposure. Patients presenting with fever or suggestive symptoms are immediately masked, isolated, and referred for medical evaluation; only pain-relieving or infection-controlling emergency interventions are permitted, and aerosol generation is strictly prohibited in such cases.

India

India has one of the world's largest dental workforces, with approximately 278,000 registered dentists, 81,000 senior undergraduate students and interns, and 18,000 postgraduate trainees actively involved in clinical care [44].

From the outset of the pandemic, multiple bodies—including the Indian Dental Association (IDA), Dental Council of India, and Ministry of Health and Family Welfare—released advisory documents on infection prevention and clinical practice modification [45-47]. Early guidelines (March–May 2020) were largely precautionary and consensus-driven rather than evidence-based, uniformly recommending restriction of services to emergency and urgent care only, with postponement of all elective procedures.

As the pandemic persisted, recommendations evolved considerably. The IDA's September 2020 guidelines represent the most comprehensive update to date [48]. They explicitly address transmission pathways within dental settings and shift emphasis from blanket suspension of care toward risk-mitigated delivery of a broader range of treatments. Core recommendations now include rigorous pre-appointment tele-screening and rescheduling of suspected cases, mandatory pre-procedural antiseptic mouthrinses, routine use of rubber dam and high-volume evacuation, enhanced personal protective equipment (including N95/FFP2 respirators and face shields for aerosol-generating procedures), minimization of triple-syringe use, and strict adherence to sterilization and surface disinfection protocols. These measures have enabled Indian dentists to progressively resume routine care while prioritizing safety in a resource-constrained environment.

Japan

Japan experienced two distinct waves of COVID-19, with the second peaking in early August 2020. Although the national situation improved after the state of emergency was lifted in late May 2020, regional differences in transmission persisted. The government adopted a strategy of balancing infection control with gradual socioeconomic reopening, centered on promoting a "new lifestyle" that emphasizes avoidance of the "3 Cs" (closed spaces, crowded places, close-contact settings), universal mask-wearing, physical distancing, and frequent hand hygiene [49].

The Japan Dental Association (JDA) has maintained guidance urging clinics to postpone non-urgent treatments, routine check-ups, and domiciliary visits

when delay would not lead to serious complications [50]. Core infection-control recommendations during the pandemic reinforce strict standard precautions with particular focus on aerosol management [51]. These include mandatory high-volume intraoral and extraoral suction, rubber dam isolation whenever feasible, pre- and post-treatment antiseptic gargles (povidone-iodine or benzalkonium chloride; chlorhexidine limited to 0.05% due to anaphylaxis concerns), and full facial protection (surgical mask plus goggles or face shield) to prevent mucosal exposure. Intraoral radiographs are discouraged in patients prone to gagging or coughing. Environmental measures require wiping dental units and high-touch surfaces after every patient with ≥60% alcohol or 0.05% sodium hypochlorite, regular ventilation, removal of waiting-room items, strict appointment timing to prevent overlap, and twice-daily temperature checks for all staff. To date, no confirmed cases of patient-to-patient or patient-to-staff transmission through dental treatment have been reported in Japan.

New Zealand

New Zealand has recorded no documented instances of COVID-19 transmission within dental settings (as of 31 August 2020) [52]. The country rapidly implemented strict border controls in March 2020 and introduced a four-tier alert level system on 21 March 2020 to guide public health restrictions and healthcare delivery [53]. Levels 1 and 2 permit near-normal operation, while Levels 3 and 4 require significant curtailment of services.

Dental practice is governed by joint guidance from the Ministry of Health and the Dental Council [54]. The framework specifies permissible procedures, patient risk stratification, screening protocols, and PPE requirements at each alert level. At Levels 3 and 4, only emergency and urgent care is allowed; aerosol-generating procedures (AGPs) must occur in negative-pressure rooms with minimum PPE comprising N95/FFP2 respirators, eye protection, gloves, and fluid-resistant long-sleeved gowns. Non-AGPs require a single-patient closed room and surgical mask-based protection. Even at Levels 1 and 2, high-risk patients are managed under Level 3/4 protocols, whereas low-risk patients may receive full routine care using standard IPC precautions plus surgical masks, eye protection, and outer protective clothing. Closed doors, rubber dam, high-volume suction, and four-handed dentistry are strongly encouraged for all AGPs. Pre-procedural mouthrinses were initially mandated but later deemed non-essential and removed from recommendations.

Electronic prescriptions and tele-dentistry were rapidly enabled to support remote care. A national contact-tracing app and widespread testing availability further bolstered the system. The combination of clear, alert-level-specific guidance, early border closure, effective PPE supply chains, and rigorous aerosol-management protocols has enabled New Zealand dentistry to operate with an exemplary safety record throughout the pandemic [55, 56].

Nigeria

Nigeria reported its index COVID-19 case on 27 February 2020 in Lagos. The federal government responded swiftly, establishing a Presidential Task Force on 17 March 2020 and progressively imposing travel bans, airport closures, and a nationwide lockdown by the end of March 2020. With more than 83% of the workforce engaged in the informal sector and limited reach of palliative support, the lockdown triggered severe economic hardship, leading to phased reopening from 4 May 2020 despite rising case numbers [57].

In June 2020, the Federal Ministry of Health, in partnership with the Nigerian Dental Association, released national guidelines for dental practice resumption. Key provisions include postponement of all non-emergency care, daily health screening of staff and patients, referral of any symptomatic individual to designated isolation centres, mandatory use of full PPE, pre-procedural 30-second rinsing with 1% hydrogen peroxide, strict avoidance or mitigation of aerosol-generating procedures through rubber dam application and high-volume suction, physical distancing in clinics, scheduled appointments only, and enhanced biomedical waste management. These protocols apply uniformly to public and private facilities and have enabled gradual restoration of routine dental services under constrained resources [58].

Switzerland

Between 24 February and 4 December 2020, Switzerland recorded 344,497 laboratory-confantly confirmed cases, 14,041 hospitalizations, and 4,848 deaths [59]. After an initial peak in late March, cases declined until a second wave began in mid-June. Following the transition from an “extraordinary” to a “special” situation, nationwide rules were supplemented by minor cantonal variations. Core measures included compulsory mask-wearing on public transport, 10-day quarantine for close contacts and travellers from high-risk areas, and widespread adoption of the SwissCovid tracing app [60].

Since March 2020, the Swiss Dental Association (SSO) and the Association of Cantonal Dentists (VKZS) have jointly maintained continuously updated practice guidelines [61]. These reinforce strict adherence to existing SSO hygiene quality standards while introducing additional requirements: hourly disinfection of all high-touch surfaces, elimination or strict spacing of waiting-room seating, mandatory mask-wearing and hand disinfection upon entry, precise appointment scheduling with an extra 15-minute buffer to avoid patient overlap, and restriction of accompanying persons. Clinics are required to maintain at least a three-month stockpile of PPE.

Patient screening involves detailed history-taking for symptoms, recent contacts, quarantine status, and travel. Patients with fever (>38 °C) are rescheduled. For aerosol-generating procedures, full room ventilation with at least 15 minutes of air exchange is mandated afterward. Treatment is prohibited if essential protective materials (respirators, gloves, goggles, disinfectants) are unavailable. The combination of rigorous national hygiene standards, cantonal oversight, and proactive professional guidance has allowed Swiss dental practices to continue delivering comprehensive care throughout both waves with minimal documented clinic-associated transmission.

Pre-procedural mouthrinses with 1.5% hydrogen peroxide (30 seconds) or povidone-iodine (according to manufacturer instructions) are recommended whenever feasible. Rubber dam isolation remains the gold standard for all restorative and endodontic procedures; when it cannot be applied, alternative aerosol-reducing devices with demonstrated efficacy must be employed. During aerosol-generating procedures without rubber dam, the clinical team must wear at least valve-less FFP2 respirators in addition to full protective ensemble (gown, gloves, eye protection).

Patients aged ≥65 years or those with comorbidities (hypertension, chronic respiratory disease, diabetes, immunosuppression, cardiovascular disease, cancer, or obesity) are classified as high-risk; the anticipated benefit of dental intervention must be carefully balanced against infection risk. Confirmed or suspected COVID-19 cases may receive only urgent emergency care in dedicated isolation rooms, with immediate masking upon arrival and direct escort to the treatment area. Clinicians wear FFP2 respirators, fluid-resistant gowns, gloves, and eye protection throughout contact; respirators are retained for an additional 30 minutes after any aerosol-generating procedure. Depending on cantonal requirements, such patients may be referred to hospital-based or specialized clinics [61].

Staff with suspected symptoms are tested immediately. Positive individuals isolate for 10 working days from symptom onset and at least 48 hours after resolution; those testing negative remain off work until 24 hours symptom-free. Close contacts (unmasked exposure <1.5 m for ≥15 minutes) quarantine for 10 days. Asymptomatic, non-contact staff continue clinical duties under heightened precautions [60].

Thailand

Thailand successfully contained community transmission for much of 2020, maintaining approximately 3,500 cumulative cases and fewer than 60 deaths until a large outbreak among migrant workers in a seafood market near Bangkok in late December 2020 triggered a new wave. Provinces are now stratified into four risk-based zones (with red-zone areas under the strictest controls), and nationwide precautionary measures have been re-escalated.

Early success relied on stringent lockdowns (February–May 2020), high public compliance with mask-wearing, hand hygiene, and distancing, and an extensive network of village health volunteers who supported surveillance and containment in rural communities.

In May 2020, the Department of Medical Services, Ministry of Public Health, in collaboration with the Thai Dental Council, dental faculties, the Royal College of Dental Surgeons, and other professional bodies, released comprehensive COVID-19 dental practice guidelines [62]. An updated version in July 2020—issued after 50 consecutive days of no local transmission—permitted resumption of routine care for low-risk patients under enhanced protocols [63].

The guidelines establish a four-tier risk-stratified management framework aligned with local and global epidemic status:

- Pre-appointment telephone or messaging screening and teleconsultation whenever possible.
- High-risk or symptomatic patients: defer non-emergency care, refer for testing, and provide only life-threatening emergency treatment in airborne infection isolation rooms (AIIR) or negative-pressure facilities with maximum barrier protection.
- Moderate-risk/emergency cases: treat in separate rooms with full PPE and rigorous source control.
- Low-risk patients: deliver emergency and routine care in well-ventilated operatories

using standard precautions plus N95/equivalent respirators for aerosol-generating procedures, rubber dam, high-volume suction, and four-handed technique. Additional provisions cover clinic zoning, instrument reprocessing, environmental disinfection, and ventilation upgrades. The Ministry of Public Health has published freely accessible engineering plans, specifications, and cost estimates for operatory ventilation improvements to facilitate rapid implementation [64]. COVID-19 testing is available for exposed dental personnel but is not required routinely. This structured, evidence-informed approach has enabled Thai dentistry to adapt flexibly to fluctuating transmission risk while maintaining service continuity.

Results and Discussion

Despite the differences in the severity of the COVID-19 pandemic, the policy implications in the nine countries **(Table 2)** are similar in some extent as follow:

Table 2. Summary of oral health policies and guidelines during the COVID-19 pandemic in each country/region.

Country/Region	Patient Screening	Personal Protective Equipment (PPE)	Specified Clinical Procedure Requirements	Suspension/Postponement of Non-Emergency Care	Ventilation & Environmental Requirements
Canada	Mandatory pre-appointment and on-site screening (symptoms, travel, exposure) with temperature check	Level 3 surgical masks or N95 respirators, face shields, disposable gloves, long-sleeved gowns, scrubs, surgical caps	Minimal air/water syringe use; mandatory high-volume suction; rubber dam strongly recommended; four-handed dentistry required for all AGPs	Initially yes; now full range of care permitted under enhanced protocols	No national mandate; clinics urged to obtain professional HVAC assessment for accurate fallow-time calculation
China	Mandatory pre-check triage with risk stratification (low/medium/high)	Tiered protection: Low-risk: standard precautions Medium-risk: N95/equivalent + eye protection + gown High-risk: full medical protective clothing + shoe covers	Rubber dam, high-volume suction, and antiseptic mouthrinse required irrespective of risk level	Yes for medium- and high-risk patients; only emergencies treated	Treatment rooms must remain adequately ventilated throughout procedures
Egypt	Yes (symptoms, temperature, exposure history)	Full PPE mandatory per Ministry of Health guidelines	Rubber dam, high-volume suction, air purifiers; preference for non-AGPs and minimally invasive techniques (e.g., chemomechanical caries removal, SDF)	Yes; routine care severely restricted, only emergencies treated during peak	Reliance on natural ventilation with maximal fresh air; limited use of air-conditioning
Hong Kong	Mandatory temperature check + TOCC history + symptom questionnaire	No specific escalation beyond standard precautions (PPE level not explicitly tiered)	Pre-procedural antiseptic mouthrinse; rubber dam; high-volume suction; cautious 3-in-1 syringe use	Encouraged to postpone non-urgent elective treatment during community outbreaks	No specific requirement
India	Pre-appointment tele-screening mandatory	Tiered: Examination/non-AGP: triple-layer mask + eyewear + gloves Moderate-	0.5% povidone-iodine mouthrinse; rubber dam encouraged; high-volume extra-oral	Initially yes; now risk-stratified resumption permitted	Detailed air-quality guidance: HEPA filtration, UV disinfection, strong exhaust

		risk: N95 + full coverage High-risk: N95 + coverall	suction; anti-retraction handpieces/valves; four-handed dentistry		systems, regular AC maintenance
Japan	Yes (symptoms, temperature, exposure)	Surgical mask + goggles/face shield; disposable gloves; waterproof apron	Extra-oral + intra-oral high-volume suction; rubber dam when feasible; povidone-iodine or benzalkonium chloride gargle (chlorhexidine restricted)	Postponement of non-urgent care strongly recommended	Strict avoidance of "3 Cs"; regular window opening for natural ventilation
New Zealand	Risk-based screening at each alert level	AGP: N95/FFP2, eye protection, impervious gown, gloves Non-AGP: surgical mask + standard IPC outer clothing	Rubber dam, high-volume suction, four-handed dentistry strongly encouraged; closed doors preferred	Yes at Alert Levels 3–4; risk-stratified at Levels 1–2	Closed-door operatories encouraged; negative-pressure rooms required for AGPs at higher alert levels
Nigeria	Daily staff and patient screening; referral of symptomatic individuals	N95 masks, full face shields/head covers, disposable gowns/aprons, gloves, scrubs, shoe covers for AGPs	1% H_2O_2 30-s rinse; rubber dam; high-volume suction mandatory when AGPs unavoidable	Yes; only emergencies initially, gradual resumption under strict protocols	Emphasis on good general ventilation (no specific technical requirement)
Switzerland	Detailed history (symptoms, contacts, travel) + temperature check	FFP2 (valve-less) mandatory for AGPs and known/suspected cases; standard precautions otherwise	Rubber dam whenever feasible; effective suction; pre-procedural antiseptic rinse (1.5% H_2O_2 or povidone-iodine)	High-risk and confirmed/suspected cases limited to emergencies only	Minimum 15-minute full air renewal (ventilation pause) after every AGP
Thailand	Pre-appointment telephone/messaging screening; risk stratification	Standard or full PPE (N95 + double gloves + leg covers) according to patient risk tier	Rubber dam, high-volume suction, antiseptic mouthrinse required across risk levels	Yes for high/moderate-risk and non-emergency cases; tiered resumption protocol	Clinic zoning; official ventilation-upgrade blueprints with specifications and budget provided by Ministry of Public Health

Common themes and lessons learned

Heightened occupational risk and proximity concerns

The COVID-19 pandemic has profoundly disrupted dental practice worldwide, primarily because SARS-CoV-2 is a respiratory pathogen readily transmitted via aerosols and droplets—exposure routes inherent to routine dental procedures. Dental professionals work in extremely close proximity to patients' oral and nasal cavities, placing dentistry among the highest-risk healthcare professions for SARS-CoV-2 acquisition [65].

Rigorous surface and instrument disinfection

Transmission within dental settings can occur through direct contact, inhalation of contaminated aerosols generated during treatment, or exposure to dental unit waterlines [66]. Consistent, thorough cleaning and disinfection of all clinical surfaces, meticulous reprocessing of instruments, and proper maintenance of waterlines have emerged as critical non-PPE

interventions for reducing environmental contamination and indirect transmission risk.

Rapid development and implementation of infection-control guidance

A striking observation across the reviewed jurisdictions is the speed and decisiveness of the dental profession's response. In most countries, professional associations and regulatory bodies issued detailed COVID-19-specific guidelines within one to two months of the first domestic case. During peak transmission periods, the near-universal initial strategy was to restrict services to emergencies only, dramatically increase PPE utilization, and suspend elective care. As community transmission declined, services were cautiously reopened using risk-stratified protocols. Notably, only one documented instance of clinic-associated transmission was identified across the ten countries examined, underscoring the apparent effectiveness of these measures.

Early screening, triage, and patient-flow management

Pre-appointment and on-site screening (symptoms, exposure history, travel, temperature checks) combined with structured triage systems proved central to safe practice resumption. These mechanisms enabled identification and isolation of potentially infectious individuals—including asymptomatic carriers—before they entered clinical areas. While empirical evidence of their precise contribution remains limited, their widespread adoption and the observed low transmission rates suggest substantial protective value. National oral health policies should consider formalizing and evidence-validating such screening frameworks for both COVID-19 and future respiratory pathogens.

Risk-stratified precautionary measures and long-term implications

The pandemic prompted a shift from uniform restrictions toward nuanced, exposure-based protocols that balance access to care with safety. Many of the enhanced precautions—universal pre-procedural mouthrinses, routine rubber dam use, high-volume suction, four-handed dentistry, upgraded ventilation, and rigorous environmental cleaning—represent best-practice upgrades that could meaningfully reduce nosocomial transmission of multiple pathogens even after COVID-19 recedes.

The remarkably low reported incidence of dental clinic-acquired infections may also reflect behavioral changes among patients: fear of contagion led many to defer non-urgent visits, effectively lowering clinic attendance by potentially infectious individuals [67]. Future research should quantify the relative contributions of professional interventions versus patient self-selection to this outcome.

In conclusion, although most current dental COVID-19 guidelines remain consensus-driven rather than fully evidence-based, their rapid implementation appears highly successful in protecting both practitioners and patients. Sustaining selected enhancements—particularly engineering controls (ventilation, airflow management) and systematic screening—offers a practical pathway to strengthen routine infection prevention and improve resilience against emerging infectious threats in oral healthcare settings. Targeted studies on viral viability in dental aerosols, the efficacy of specific mitigation techniques, and the long-term impact of modified patient behavior are now needed to refine and permanently integrate these lessons into national oral health policy.

Policy implications and future directions

Deferral of non-emergency care and the rise of teledentistry

The widespread suspension of routine and elective dental services during peak transmission periods, while effective in reducing risk, has created a significant backlog of unmet oral health needs. The long-term consequences—such as increased incidence of dental pain, pulpal pathology, and progressive disease—are not yet fully understood. To mitigate harm during restrictions, many practitioners in the reviewed jurisdictions rapidly adopted teledentistry platforms, offering remote triage, advice, and prescriptions via telephone, messaging apps, and social media. This shift represents a promising innovation that could be formalised and integrated into national oral health systems beyond the current crisis, particularly for initial assessment, follow-up, and management of non-urgent conditions. Rigorous evaluation of clinical outcomes, patient satisfaction, diagnostic accuracy, and cost-effectiveness is now essential to guide its permanent institutionalisation.

Infrastructure upgrades and ventilation enhancement

The pandemic has compelled clinics worldwide to re-examine airflow dynamics and aerosol containment. Investments in improved ventilation (natural, mechanical, HEPA filtration, or negative-pressure systems) and operatory redesign have varied according to clinic size, budget, and regulatory guidance. Although implementation has been uneven, these modifications are likely to become enduring standards of care, progressively raising the baseline for infection

prevention in dental facilities globally. The crisis has thus provided a rare impetus for modernising infrastructure that might otherwise have evolved slowly.

Exacerbation of oral health inequalities

COVID-19 has amplified existing disparities in access to care. Vulnerable populations—particularly rural, low-income, minority, and marginalised communities—have been disproportionately affected by service suspensions, travel restrictions, and the cessation of outreach programmes. The additional financial burden of enhanced PPE, extended appointment times, and facility upgrades is expected to increase treatment costs, potentially pricing essential care out of reach for those without insurance or subsidised coverage. These developments underscore the urgent need for stronger universal health coverage mechanisms that explicitly include oral health and for contingency planning to ensure continuity of basic dental services during future public health emergencies.

Limitations of the review

This analysis is based on a convenience sample of ten countries and regions, selected through purposeful collaboration rather than random global representation. Although the included jurisdictions span diverse epidemiological and socioeconomic contexts, the findings may not fully reflect the worldwide experience. Moreover, the data reflect the situation only up to December 2020; policies and practices have continued to evolve with subsequent waves, vaccination rollout, and emerging variants. Ongoing surveillance and periodic updates are therefore required.

Conclusion

Despite marked differences in the timing, severity, and duration of COVID-19 outbreaks across the reviewed countries and regions, the core adaptations in oral health policy and clinical practice exhibit striking convergence: initial restriction to emergency care only, universal strengthening of infection prevention and control, systematic aerosol mitigation, enhanced screening and triage, improved clinic ventilation, and strict physical distancing. These shared responses have proven remarkably effective in minimising documented nosocomial transmission in dental settings. Many of the measures introduced—risk-stratified protocols, teledentistry, engineering controls, and heightened hygiene vigilance—represent durable improvements that should be retained and refined post-pandemic. Incorporating evidence from ongoing research into national oral health strategies will help strike an optimal balance between infection control and equitable access, ensuring greater resilience against future respiratory pathogens while addressing the persistent challenge of oral health inequality.

Acknowledgments: We would like to thank Dr. Ashraf Azab from the Egyptian Ministry of Health and Population for providing all the archived official dental protocols and the required information in writing this manuscript.

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

References

1. World Health Organization. Coronavirus disease (COVID-19) Weekly Epidemiological Update and Weekly Operational Update. (2020). Available online at: https://www.who.int/publications/m/item/weekly-epidemiological-update (accessed December 29, 2020).
2. World Health Organization. Transmission of SARS-CoV-2: Implications for Infection Prevention Precautions (2020). Available online at: https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions#:~:text=Current%20evidence%20suggests%20that%20transmission,%2C%20talks%20or%20sings (accessed January 20, 2021).
3. Li J, Huang DQ, Zou B, Yang H, Hui WZ, Rui F, et al. Epidemiology of COVID-19: a systematic review and meta-analysis of clinical characteristics, risk factors, and outcomes. J Med Virol. (2020) 93:1449–58. 10.1002/jmv.26424 [DOI] [PMC free article] [PubMed] [Google Scholar]
4. Manigandan S, Wu MT, Ponnusamy VK, Raghavendra VB, Pugazhendhi A, Brindhadevi K. A systematic review on recent trends in transmission, diagnosis, prevention and imaging features of COVID-19. Process Biochem. (2020) 98:233–40. 10.1016/j.procbio.2020.08.016 [DOI] [PMC free article] [PubMed] [Google Scholar]
5. Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China,

20–28 January 2020. Eurosurveillance. (2020) 25:2000062. 10.2807/1560-7917.ES.2020.25.5.2000062 [DOI] [PMC free article] [PubMed] [Google Scholar]
6. Lovato A, de Filippis C, Marioni G. Upper airway symptoms in coronavirus disease 2019 (COVID-19). Am J Otolaryngol. (2020) 41:102474. 10.1016/j.amjoto.2020.102474 [DOI] [PMC free article] [PubMed] [Google Scholar]
7. Nuno F. Economic Effects of Coronavirus Outbreak (COVID-19) on the World Economy. Barcelona: IESE Business School Working Paper NoWP-1240-E; (2020). [Google Scholar]
8. Quiñonez C, Vujicic M. COVID-19 has clarified 2 foundational policy questions in dentistry. JDR Clin Trans Res. (2020) 5:297–9. 10.1177/2380084420941777 [DOI] [PubMed] [Google Scholar]
9. Schwendicke F, Krois J, Gomez J. Impact of SARS-CoV2 (Covid-19) on dental practices: economic analysis. J Dent. (2020) 99:103387. 10.1016/j.jdent.2020.103387 [DOI] [PMC free article] [PubMed] [Google Scholar]
10. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): a review. Int J Surg. (2020) 78:185–93. 10.1016/j.ijsu.2020.04.018 [DOI] [PMC free article] [PubMed] [Google Scholar]
11. Esakandari H, Nabi-Afjadi M, Fakkari-Afjadi J, Farahmandian N, Miresmaeili SM, Bahreini E. A comprehensive review of COVID-19 characteristics. Biol Proc Online. (2020) 22:19. 10.1186/s12575-020-00128-2 [DOI] [PMC free article] [PubMed] [Google Scholar]
12. Weible CM, Nohrstedt D, Cairney P, Carter DP, Crow DA, Durnová AP, et al. COVID-19 and the policy sciences: initial reactions and perspectives. Policy Sci. (2020) 53:225–41. 10.1007/s11077-020-09381-4 [DOI] [PMC free article] [PubMed] [Google Scholar]
13. Nussbaumer-Streit B, Mayr V, Dobrescu AI, Chapman A, Persad E, Klerings I, et al. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. Cochrane Database Syst Rev. (2020) 4:CD013574. 10.1002/14651858.CD013574 [DOI] [PMC free article] [PubMed] [Google Scholar]
14. World Health Organization . WHO Coronavirus Disease (COVID-19) Dashboard (2020). Available online at: https://covid19.who.int/ (accessed January 20, 2021).
15. Center for Disease control and Prevention . Coronavirus Disease 2019 (Covid 19), Guidance for Dental Settings. (2020). Available online at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html (accessed January 20, 2021).
16. Lee YL, Chu D, Chou SY, Hu HY, Huang SJ, Yen YF. Dental care and infection-control procedures during the COVID-19 pandemic: the experience in Taipei City Hospital, Taiwan. J Dent Sci. (2020) 15:369–72. 10.1016/j.jds.2020.05.011 [DOI] [PMC free article] [PubMed] [Google Scholar]
17. Pan Y, Liu H, Chu C, Li X, Liu S, Lu S. Transmission routes of SARS-CoV-2 and protective measures in dental clinics during the COVID-19 pandemic. Am J Dent. (2020) 33:129−34. Available online at: https://www.amjdent.com/Archive/ReviewArticles/2020/AJD%20%20JUNE%202020%20Pan.pdf [PubMed] [Google Scholar]
18. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus disease 19 (COVID-19): implications for clinical dental care. J Endod. (2020) 46:584–95. 10.1016/j.joen.2020.03.008 [DOI] [PMC free article] [PubMed] [Google Scholar]
19. Guo Y, Jing Y, Wang Y, To A, Du S, Wang L, et al. Control of SARS-CoV-2 transmission in orthodontic practice. Am J Orthod Dentofacial Orthop. (2020) 158:321–9. 10.1016/j.ajodo.2020.05.006 [DOI] [PMC free article] [PubMed] [Google Scholar]
20. Banger C. COVID-19 Outbreak Declared at Waterloo Region Dental Service; Region Reports 20 New Cases. (2020). Available online at: https://kitchener.ctvnews.ca/covid-19-outbreak-declared-at-waterloo-region-dental-service-region-reports-20-new-cases-1.5144674~ (accessed January 20, 2021).
21. Canadian Dental Association . Laws, Regulations and Guidelines in Health Care. (2020). Available online at: https://www.cda-adc.ca/en/services/internationallytrained/laws/ (accessed January 20, 2021).
22. Allison P, de Souza RF. Evidence to Support Safe Return to Clinical Practice by Oral Health Professionals in Canada During the COVID-19 Pandemic: A Report Prepared for the Office of the Chief Dental Officer of Canada. (2020). Available online at: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/evidence-safe-

return-clinical-practice-oral-health.html (accessed January 20, 2021).

23. Royal College of Dental Surgeons of Ontario . COVID-19: Managing Infection Risks During In-Person Dental Care. (2020). Available online at: https://www.rcdso.org/en-ca/rcdso-members/2019-novel-coronavirus/covid-19–managing-infection-risks-during-in-person-care (accessed January 20, 2021).
24. College of Dental Surgeons of British Columbia . COVID-19 Resources for Registrants. (2020). Available online at: https://www.cdsbc.org/Pages/covid-19-info.aspx (accessed January 20, 2021).
25. Newfoundland & Labour Dental Association . Pandemic Plan, Covid-19 for Return to Dental Practice. (2020). Available online at: http://www.nlda.net/Pandemic%20Plan%20-%20COVID-19%20For%20Return%20to%20Dental%20Practice.pdf (accessed January 20, 2021).
26. Alberta Dental Association . Dental Practice Guidelines During the Covid-19 Pandemic. (2020). Available online at: https://www.dentalhealthalberta.ca/wp-content/uploads/2020/07/Dental-Practice-Guidelines-during-the-COVID-19-Pandemic-2020-08-01.pdf (accessed January 20, 2021).
27. China's State Council Information Office . Fighting Covid-19 China in Action. (2020). Available online at: http://www.xinhuanet.com/english/2020-06/07/c_139120424.htm (accessed January 20, 2021).
28. National Health Commission (NHC) of the PRC National Administration of Traditional Chinese Medicine of the PRC . Guidance for Corona Virus Disease 2019: Prevention, Control, Diagnosis and Management (In Chinese). 1st ed. Beijing: People's Medical Publishing House; (2019). [Google Scholar]
29. National Health Commission of People's Republic of China . Diagnosis and Treatment Protocol for COVID-19 (tentative 8th edition). (2020). Available online at: http://regional.chinadaily.com.cn/pdf/DiagnosisandTreatmentProtocolforCOVID-19Patients(Tentative8thEdition).pdf (accessed January 20, 2021).
30. China's State Council Information Office . Notice of National Health Commission. (2020). Available online at: http://www.nhc.gov.cn/jkj/s7916/202001/44a3b8245e8049d2837a4f27529cd386.shtml (accessed January 20, 2021).
31. Chinese Stomatological Association . A Letter to Dental Patients During the Outbreak of the COVID-19. (2020). Available online at: http://www.cndent.com/archives/66974 (accessed January 20, 2021).
32. Chinese Stomatological Association . How to Provide Oral Practices During the Outbreak of the COVID 19. (2020). Available online at: http://www.cndent.com/archives/66971 (accessed January 20, 2021).
33. Chinese Stomatological Association . Tips for Keep Healthy Teeth During the Epidemic of COVID-19. (2020). Available online at: http://www.cndent.com/archives/66971 (accessed January 20, 2021).
34. Chinese Stomatological Association . Oral Health and General Health During the Period of Prevention and Control of the COVID-19. (2020). Available online at: http://www.cndent.com/archives/67680 (accessed January 20, 2021).
35. Guo CB, Zhou YS, Cai ZG. Handbook of Prevention and Control of Coronavirus for Dental Institutions. 1st ed. Beijing: People's Medical Publication House; (2020). [Google Scholar]
36. Zhang XH, Ling JQ. Guidelines on the prevention and control of disease in dental practice during the coronavirus outbreak. Chin J Dent Res. (2020) 23:89–94. 10.3290/j.cjdr.a44743 [DOI] [PubMed] [Google Scholar]
37. Chen XC, Ding JF, Xu DH, Cai ZG, Li XE, Shi ZD, et al. Preventive and control measures for the coronavirus pandemic in clinical dentistry. Chin J Dent Res. (2020) 23:99–104. 10.3290/j.cjdr.a44745 [DOI] [PubMed] [Google Scholar]
38. Banerjee A, Watson TF, Kidd EA. Dentine caries: take it or leave it? Dent Update. (2000) 27:272–6. 10.12968/denu.2000.27.6.272 [DOI] [PubMed] [Google Scholar]
39. Hamama H, Yiu C, Burrow M. Current update of chemomechanical caries removal methods. Aust Dent J. (2014) 59:446–56. 10.1111/adj.12214 [DOI] [PubMed] [Google Scholar]
40. Hamama HH, Yiu CK, Burrow MF, King NM. Chemical, morphological and microhardness changes of dentine after chemomechanical caries removal. Aust Dent J. (2013) 58:283–92. 10.1111/adj.12093 [DOI] [PubMed] [Google Scholar]

41. Hamama HH, Yiu CK, Burrow MF. Effect of silver diamine fluoride and potassium iodide on residual bacteria in dentinal tubules. Aust Dent J. (2015) 60:80–7. 10.1111/adj.12276 [DOI] [PubMed] [Google Scholar]
42. Centre for Health Protection . Coronavirus Disease (COVID-19) in HK. (2020). Available online at: https://chp-dashboard.geodata.gov.hk/covid-19/zh.html(accessed January 20, 2021).
43. Centre for Health Protection . Coronavirus disease (COVID-19) - Letters to Dentists. (2020). Available online at: https://www.chp.gov.hk/en/features/102648.html (accessed January 20, 2021).
44. Dental Council of India . Available online at: https://dciindia.gov.in/ (accessed January 20, 2021).
45. Inida Dental Association . Covid-19 Alert. (2020). Available online at: https://ida.org.in/Home/Covid19Alert (accessed January 08, 2021).
46. Dental Council of India . COVID-19 Guidelines for Dental Colleges, Dental Students and Dental Professionals by Dental Council of India. (2020). Available online at: https://dciindia.gov.in/Admin/NewsArchives/DCI%20Guidelines%20on%20COVID-19.pdf (accessed January 12, 2021).
47. Ministry of Health and Family Welfare Government of India New Delhi India . National Guidelines for Infection Prevention and Control in Healthcare Facilities New Delhi (2020). [Google Scholar]
48. India Dental Association . Indian Dental Association's Preventive Guidelines for Dental Professionals on the Coronavirus Threat. (2020). Available online at: https://www.ida.org.in/pdf/IDA_Recommendations_for_Dental_Professionals_on_the_Coronavirus_Threat.pdf (accessed January 20, 2021).
49. Ministry of Health Labor and Welfare . Basic Policies for Novel Coronavirus Disease Control. (2020). Available online at: https://www.mhlw.go.jp/content/10900000/000634753.pdf (accessed September 22, 2020).
50. Japan Dental Association . Message to Patients: Coronavirus Disease 2019 (COVID-19). (2020). Available online at: https://www.jda.or.jp/en/pdf/Message-to-Patients.pdf (accessed September 22, 2020).
51. Japan Dental Association . Dental Practice Guidelines Based on New Infectious Disease. (2020). Available online at: https://www.jda.or.jp/dentist/anshin-mark/pdf/guideline.pdf?v01 (accessed January 20, 2021).
52. Ministry of Health . COVID-19 Current Cases. (2020). Available online at: https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-data-and-statistics/covid-19-current-cases (accessed January 20, 2021).
53. New Zealand Government . COVID-19 Alert System. (2020). Available online at: https://covid19.govt.nz/alert-system/ (accessed January 20, 2021).
54. New Zealand Dental Council . Guidelines for Oral Health Services at COVID-19 Alert Levels. (2020). Available online at: https://www.dcnz.org.nz/covid-19/guidelines-for-oral-health-services-at-covid-19-alert-levels/ (accessed January 20, 2021).
55. Ren Y, Feng C, Rasubala L, Malmstrom H, Eliav E. Risk for dental healthcare professionals during the COVID-19 global pandemic: an evidence-based assessment. J Dent. (2020) 101:103434. 10.1016/j.jdent.2020.103434 [DOI] [PMC free article] [PubMed] [Google Scholar]
56. Helmis CG, Tzoutzas J, Flocas HA, Halios CH, Stathopoulou OI, Assimakopoulos VD, et al. Indoor air quality in a dentistry clinic. Sci Total Environ. (2007) 377:349–65. 10.1016/j.scitotenv.2007.01.100 [DOI] [PubMed] [Google Scholar]
57. International Labour Organization . Women and Men in the Informal Economy: A Statistical Picture. Geneva: (2018). [Google Scholar]
58. Federal Ministry of Health . Covid-19: guidelines/Standard Operational Procedures for Dental Practice I Nigeria. (2020). Available online at: https://www.health.gov.ng/doc/COVID-19-FOR-DENTAL-PRACTICE-IN-NIGERIA.pdf (accessed January 20, 2021).
59. Federal Office of Public Health of the Swiss Confederation FOPH . Status Report, Switzerland and Liechtenstein. (2020). Available online at: https://www.covid19.admin.ch/en/overview?detTime=total&ovTime=phase2 (accessed January 20, 2021).
60. Federal Office of Public Health of the Swiss Confederation FOPH . New Coronavirus. (2020). Available online at: https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov.html# (accessed January 20, 2021).

61. Swiss Dental Association SSO . Covid-19 Vorgaben zum Betrieb einer Zahnarztpraxis während der Covid-19 Pandemie. (2020). Available online at: https://www.sso.ch/fileadmin/upload_sso/5_Newsletter/2020/Covid-19-Positionspapier-5-6_D.pdf (accessed January 20, 2021).
62. Department of Medical Services Ministry of Public Health Thailand . Dental Treatment in the Situation of the Outbreak of COVID-19. (2020). Available online at: http://dentalcouncil.or.th/images/uploads/file/5F7VSJ8HPWBYTSNS.pdf (accessed January 20, 2021).
63. Department of Medical Services Ministry of Public Health Thailand . Guideline of Relief Measures for Dental Treatment in the Situation of COVID-19 Pandemic. (2020). Available online at: http://dentalcouncil.or.th/images/uploads/file/MF5PQXQLIC0PBD17.pdf (accessed January 20, 2021).
64. Ministry of Public Health Thailand . Dental Unit: Dental Room Improvement Model. (2020). Available online at: http://dentalcouncil.or.th/images/uploads/file/MF5PQXQLIC0PBD17.pdf (accessed January 20, 2021).
65. Gamio L. The Workers Who Face the Greatest Coronavirus Risk. (2020). Available online at: https://www.nytimes.com/interactive/2020/03/15/business/economy/coronavirus-worker-risk.html (accessed January 20, 2021).
66. Volgenant CMC, de Soet JJ. Cross-transmission in the dental office: does this make you ill? Curr Oral Health Rep. (2018) 5:221–8. 10.1007/s40496-018-0201-3 [DOI] [PMC free article] [PubMed] [Google Scholar]
67. Guo H, Zhou Y, Liu X, Tan J. The impact of the COVID-19 epidemic on the utilization of emergency dental services. J Dental Sci. (2020) 15:564–7. 10.1016/j.jds.2020.02.002 [DOI] [PMC free article] [PubMed] [Google Scholar]