



GLOBAL HEALTH STARTER KIT FOR DENTAL EDUCATION

Module 7 COVID-19: Global Lessons for a Global Profession

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Hello and welcome to Module 7 of the Global Health Starter Kit for Dental Education, authored by Bree Zhang and Tooka Zokaie.

This Module covers COVID-19's impact on oral health and the field of dentistry and is designed to be presented in approximately 30 minutes. While there are numerous resources and references available about these topics, for the purpose of this module, we have curated a small sample of high-quality resources to support the learning outcomes. We encourage learners (and educators) to explore the literature further, beyond what is contained in this module.

All images in this module were originated by the authors via Canva or Piktochart, or utilized open-access images, unless otherwise noted.



Competencies:

1.2.3. Identify and describe reciprocal links among oral diseases, systemic diseases, and general health.

3.1.2. Recognize the different roles and responsibilities of medical and non-medical professionals in oral health promotion, disease prevention, and, if applicable, treatment, care, and referral.

2.3.2. Identify and advocate to address specific oral health needs and reduce inequities and health care system deficits.

This module is related to the three competencies from the Global Oral Health Competency Matrix. While these competencies cannot be met through a single teaching module, this module is working toward competency-based best practices in global health for dental education.

From:

Benzian, H., Greenspan, J.S., Barrow, J., Hutter, J.W., Loomer, P.M., Stauf, N. and Perry, D.A., 2015. A competency matrix for global oral health. Journal of dental education, 79(4), pp.353-361

Seymour B, Shick E, Chaffee B, Benzian H. Going global: toward competency-based best practices for global health in dental education. J. Dent. Educ. 2017;18(6):707-15.

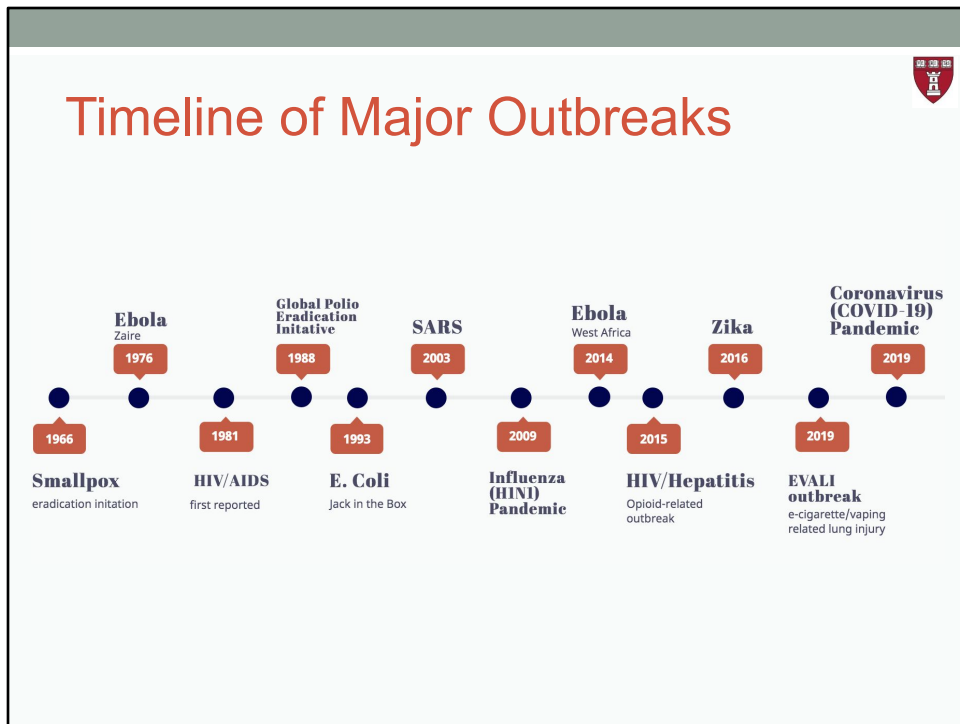


Learning Objectives

By the end of this module, students should be able to do the following:

- **Describe** the reciprocal links between oral health and COVID-19 risk and severity
- **Evaluate** the impacts of the pandemic on the dental workforce and global oral health.
- **Identify** shortcomings within the oral healthcare system and opportunities for growth highlighted by COVID-19.

By the end of this module, students should be able to describe the reciprocal links between oral health and COVID-19 risk and severity, evaluate the impacts of the pandemic on the dental workforce and global oral health, and identify shortcomings within the oral healthcare system and opportunities for growth.

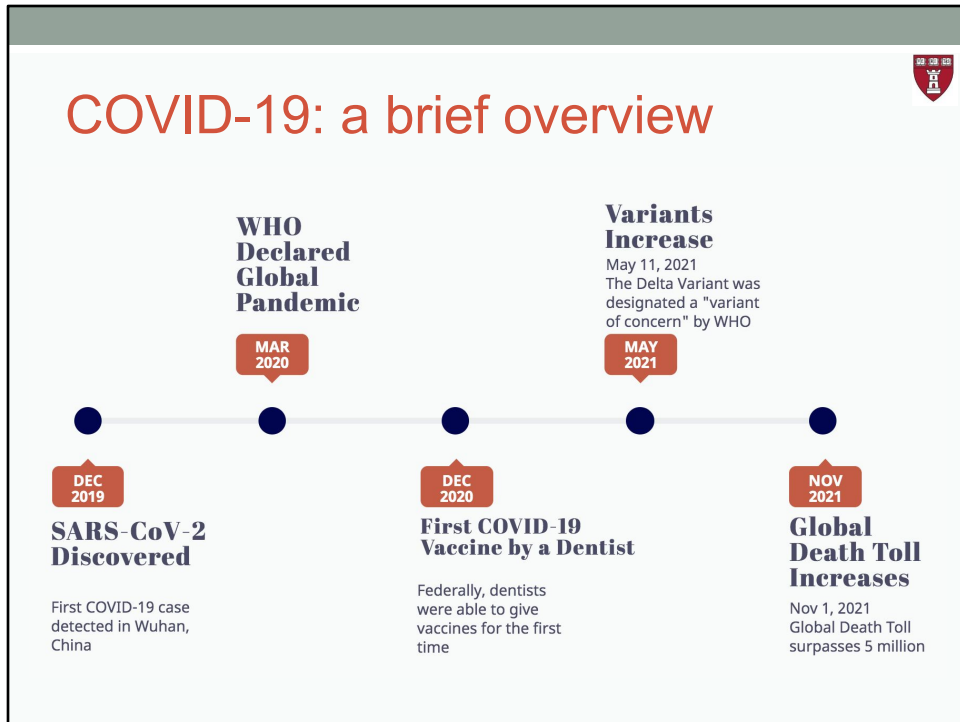


Major Disease Outbreaks and Pandemics are a part of our history and future. These diseases have sparked the invention of vaccines and vaccination campaigns rooted in equity. A major development in the US during COVID-19 was that dental providers were approved to administer vaccines for the first time in history. Outbreaks like HIV sparked the use of greater infection control in dental offices, and COVID-19 has been another inflection point in infection control measures. While epidemics and pandemics are devastating diseases, they offer opportunities for scientific advancement, greater infection control, and social change.

Graphic Reference:

Centers for Disease Control and Prevention. A History of Success: Investigating and Responding to Public Health Threats Since 1951.

Available at: <https://www.cdc.gov/eis/about/history.html>. Accessed 11.22.2021




COVID-19 is a disease caused by the virus, SARS-CoV-2, which was first discovered in December 2019. The World Health Organization (WHO) declared a global pandemic on March 11, 2020, resulting in school closures, economic lockdown, and the restriction of country borders. On December 16, 2020, Dr. Ryan Thrower became the first dentist to administer a COVID-19 vaccine, yet while vaccine access increased, vaccine nationalism and stockpiling among high-income countries left low-income countries with little bargaining power to combat the emergence of more transmissible and dangerous COVID-19 variants. By November 1, 2021, the global death toll had reached 5 million individuals.

References:


World Health Organization. (n.d.). Tracking sars-COV-2 variants. World Health Organization. Available at: <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/>. Accessed 2021-09-16.

James Darwin N Lagman, Vaccine nationalism: a predicament in ending the COVID-19 pandemic, *Journal of Public Health*, Volume 43, Issue 2, June 2021, Pages e375–e376. Available at <https://doi.org/10.1093/pubmed/fdab088>. Accessed 2021-09-16.

Koumoue, Christelle. (2020). Historic moment: Oregon dentist first dentist in the US to administer COVID-19 vaccine. KGW8. <https://www.kgw.com/article/news/health/coronavirus/oregon-is-the-only-state-in-the-nation-where-your-dentist-is-authorized-to-give-you-a-vaccine-other-than-a-flu-shot/283-26f77398-740f-4932-9acd-0e342c79eca>. Accessed 2021-11-22.



Transmission and Symptoms



Transmission

Via infected secretions
(respiratory and saliva
droplets)

- Think **aerosols** in dental
practices

The oral cavity is important both in transmission and symptoms of COVID-19: SARS-CoV-2 is transmitted through direct or indirect human-to-human contact via infected secretions such as respiratory and saliva droplets, or contaminated surfaces. This is relevant for dental practices, as most dental procedures generate significant amounts of droplets and aerosols, posing potential risks of infection transmission for dental health workers.

References:

Nathalie Botros, Parvati Iyer, David M. Ojcius, Is there an association between oral health and severity of COVID-19 complications?,

Biomedical Journal, Volume 43, Issue 4, 2020, Pages 325-327, ISSN 2319-4170.

Available at <https://doi.org/10.1016/j.bj.2020.05.016>. Accessed 2021-09-16.

Ren YF, Rasubala L, Malmstrom H, Eliav E. Dental Care and Oral Health under the Clouds of COVID-19. JDR Clinical & Translational Research. 2020;5(3):202-210.

Available at <https://doi.org/10.1177%2F2380084420924385>. Accessed 2021-09-16.



Transmission and Symptoms



Transmission

Via infected secretions
(respiratory and saliva
droplets)

- Think **aerosols** in dental
practices



Symptoms

Fever, chills, dry cough,
fatigue, shortness of breath,
muscle pain and diarrhea

Ageusia: loss of taste + smell
→ implications of oral mucosa

SARS-CoV-2 enters the body by binding to ACE2 receptors and can manifest with a range of symptoms including fever, dry cough, fatigue, muscle pain, and diarrhea. In particular, ageusia, the loss of taste and smell, is a key symptom that can predict positive COVID-19 diagnosis more so than self-reported fever. Given that taste organs are widely distributed in the tongue, where 96% of the oral ACE2-positive cells reside, loss of taste as an early COVID-19 symptom supports that the oral cavity may be an initial site of infection by SARS-CoV-2.

References:


Nathalie Botros, Parvati Iyer, David M. Ojcius Is there an association between oral health and severity of COVID-19 complications?,

Biomedical Journal, Volume 43, Issue 4, 2020, Pages 325-327, ISSN 2319-4170.



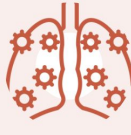
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Ren YF, Rasubala L, Malmstrom H, Eliav E. Dental Care and Oral Health under the Clouds of COVID-19. JDR Clinical & Translational Research. 2020;5(3):202-210.

Available at <https://doi.org/10.1177%2F2380084420924385>. Accessed 2021-09-16.



Transmission and Symptoms

 <p>Transmission</p> <p>Via infected secretions (respiratory and saliva droplets)</p> <p>- Think aerosols in dental practices</p>	 <p>Symptoms</p> <p>Fever, chills, dry cough, fatigue, shortness of breath, muscle pain and diarrhea</p> <p>Ageusia: loss of taste + smell → implications of oral mucosa</p>	 <p>Mortality</p> <p>Severe pneumonia and acute respiratory distress syndrome (ARDS)</p> <p>Linked with cytokine storm</p>
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While COVID-19 can affect multiple organs in the body, the main causes of mortality are severe pneumonia and acute respiratory distress syndrome, which is linked with the cytokine storm, an excessive immune reaction that causes extensive tissue damage, particularly in the connective tissue of the lungs. This is where oral health comes into play....

References:

Nathalie Botros, Parvati Iyer, David M. Ojcius Is there an association between oral health and severity of COVID-19 complications?,

Biomedical Journal, Volume 43, Issue 4, 2020, Pages 325-327, ISSN 2319-4170.

Available at <https://doi.org/10.1016/j.bj.2020.05.016>. Accessed 2021-09-16.

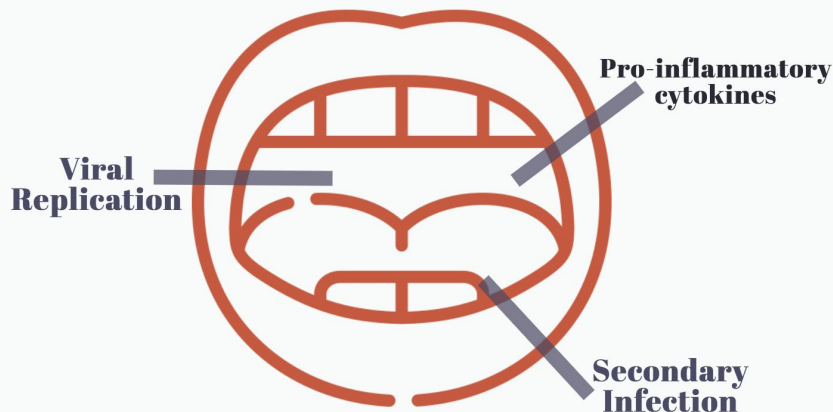
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Available at <https://doi.org/10.1177%2F2380084420924385>. Accessed 2021-09-16.

Oral Health Affects COVID-19



The oral cavity is a source and reservoir for:



One's oral health influences COVID-19 risk and severity. Patients with periodontal disease are more likely to develop hospital-acquired pneumonia and have elevated levels of cytokines linked to more severe disease outcomes. One reason is that the oral cavity is a significant reservoir for viral replication, which predisposes patients to secondary infections. Within severe COVID-19 cases, one study found that more than 50% of deaths manifested bacterial superinfections (Kamel 2021).

The other reason is that systemic inflammation is a main characteristic of periodontitis. For patients with periodontal disease, a large amount of cytokines are continuously produced into circulation, which can modify mucosal surfaces, decrease lung function, and make it more susceptible to secondary bacterial infections. In particular, periodontitis produces high levels of the cytokine IL-6, and one study showed that high IL-6 levels increased the risk by 22 times for pulmonary complications and mechanical ventilation in hospitalized patients (Molayem 2020).

References:

Nathalie Botros, Parvati Iyer, David M. Ojcius, Is there an association between oral health and severity of COVID-19 complications?,

Biomedical Journal, Volume 43, Issue 4, 2020, Pages 325-327, ISSN 2319-4170.

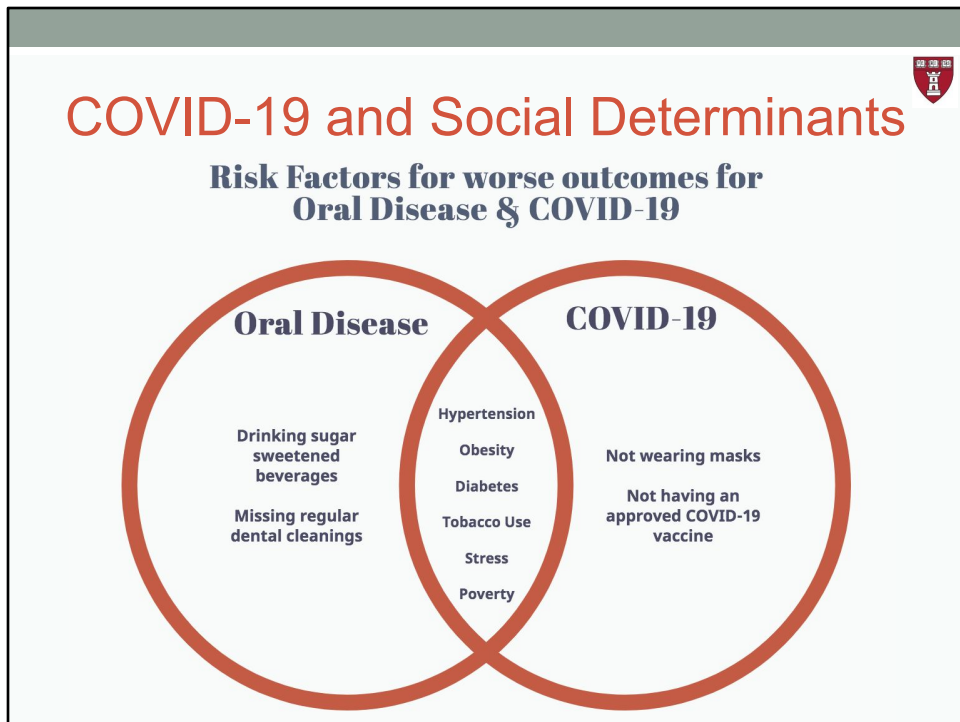
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Kamel, A., Basuoni, A., Salem, Z. et al. The impact of oral health status on COVID-19 severity, recovery period and C-reactive protein values. Br Dent J (2021).

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Molayem S, Pontes C. The Mouth-COVID Connection: IL-6 Levels in Periodontal Disease — Potential Role in COVID-19 -Related Respiratory Complications. *CDA Journal - October 2020: Dentistry and COVID-19*. September 2020.

Available at https://issuu.com/cdapublications/docs/cdapubs_journal_2020_october/s/11067174.
Accessed 2021-09-16.



COVID-19 cannot be considered without addressing social determinants of health. For instance, hypertension, obesity, and diabetes are the three major underlying conditions with the most unfavorable outcomes in COVID-19 patients requiring hospitalization. These conditions are also risk factors for dental diseases, linked to “lifestyle practices deeply rooted in social and economic circumstances that limit the selection of healthier choices and impact oral health status” (Singh 2021).

Common risk factors include stress, poor diet, substance use disorders, behavioral health issues, domestic violence, and poverty. These risk factors are especially high in vulnerable populations like low socioeconomic groups, minority groups, older adults, low-literacy individuals, and rural residents. Preventing disease for high risk groups not only impacts oral health but also risk for COVID-19. We encourage you to review Module 4 on Social Determinants for more in-depth information.

References:

Nathalie Botros, Parvati Iyer, David M. Ojcius Is there an association between oral health and severity of COVID-19 complications?,

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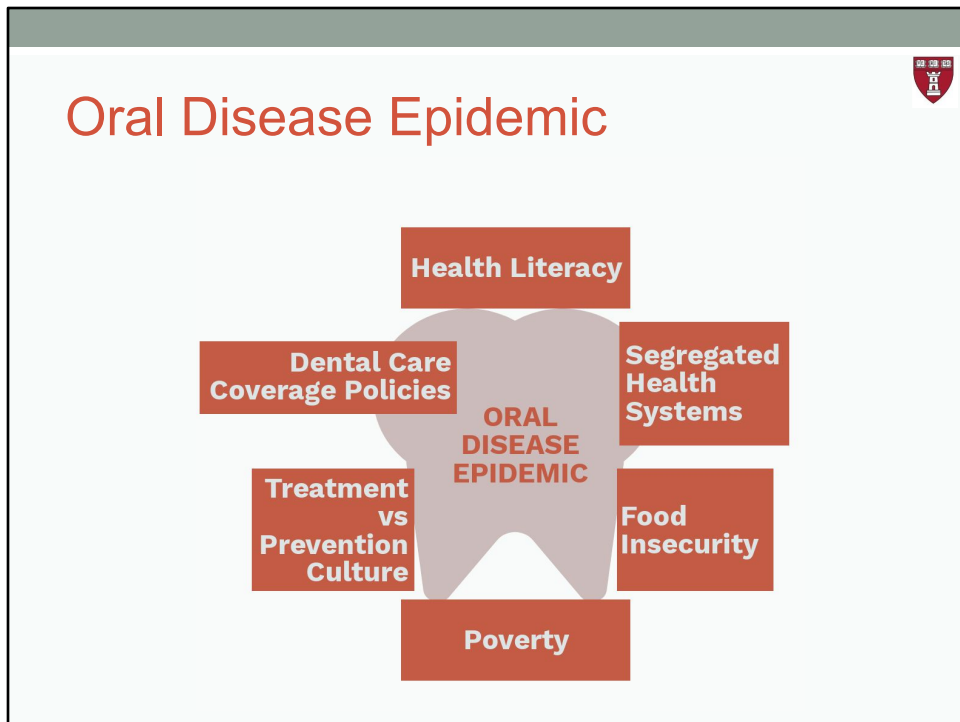
Singh S. Public Oral Health Care During COVID-19: Time for Reflection and Action. Front Med (Lausanne). 2021;8:610450. Published 2021 Mar 17.

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Brian Z, Weintraub JA. Oral Health and COVID-19: Increasing the Need for Prevention and Access.

[Erratum appears in Prev Chronic Dis 2020;17. http://www.cdc.gov/pcd/issues/2020/20_0266e.htm.] Prev Chronic Dis 2020;17:200266.

Available at: <http://dx.doi.org/10.5888/pcd17.200266> Accessed 2021-09-16.



Oral diseases are influenced by social disparity epidemics that include poor health literacy, segregated health systems, food insecurity, poverty, a treatment vs. prevention culture, and inequitable dental care coverage policies. These epidemics do not happen in isolation. For example, segregated health systems in the US disproportionately burden vulnerable communities and exacerbate health disparities, contributing to the 33% of Emergency Department visits that are not managed appropriately. Even now, the percentage of emergency department visits due to dental pain continues to rise each year.

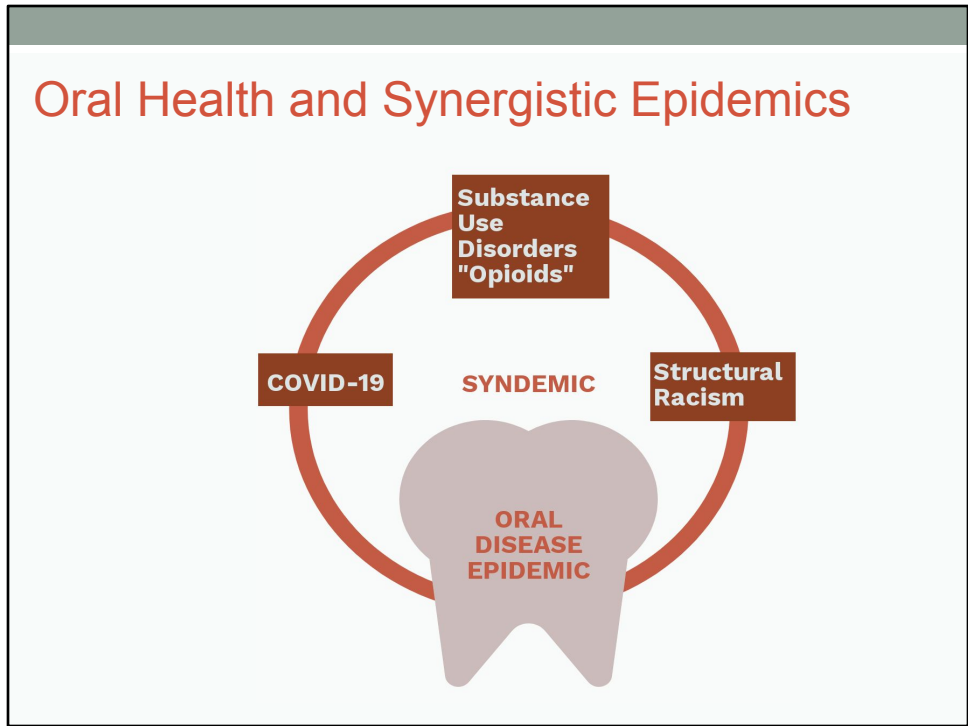
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Nalliah, R.P., Allareddy, V. Dentists in the US should be Integrated into the hospital team. British Dental Journal. Available at: <https://doi.org/10.1038/sj.bdj.2014.245>. Accessed January 16, 2022.



Syndemics, or synergistic epidemics, are the aggregation of two or more concurrent or sequential disease clusters in a population. Syndemics can be in the context of epidemics and pandemics. They have biological interactions, which exacerbate the prognosis and burden of disease. COVID-19 and dental decay are syndemic, and part of larger social disparity epidemics.

For instance, COVID-19 has presented a model of three underlying public health crises in the United States that intersect all other epidemics. The “COR syndemic” is the concurrent interaction of COVID-19, Opioids (or substance use disorders), and racism. Individually, the COVID-19 pandemic and opioid epidemic have each been responsible for hundreds of thousands of deaths. Systemic racism, including public perceptions about people who use opioids, inadequate substance abuse prevention and treatment efforts, heightened risks for COVID-19 exposure, and barriers to testing and health care, has contributed to the ongoing disparities underlying these health crises. Racism impacts oral health by creating inequitable access to oral health services, worsening psychophysiological outcomes of marginalized communities, and undermining provider-patient relationships—all of which were exacerbated during the pandemic. While other epidemics continue to impact oral health, addressing the COR syndemic can lead to improved oral and total health.

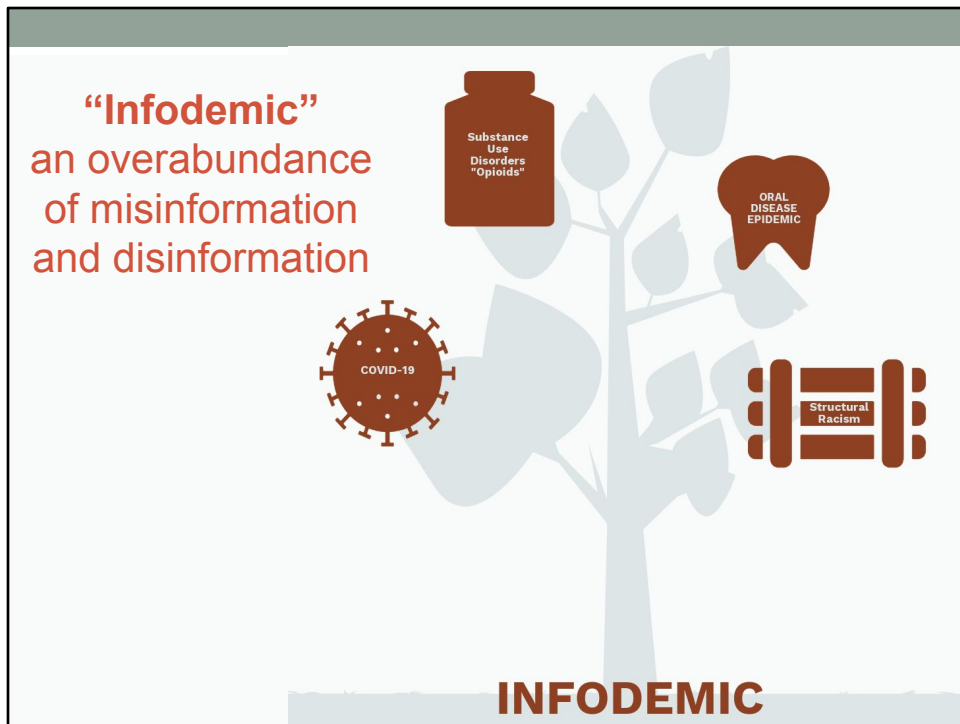
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Leibowitz-Lord, S. The COR Syndemic: The overlap of COVID-19, Opioids, and Systemic Racism in Healthcare. Available at: <https://alcoholstudies.rutgers.edu/the-cor-syndemic-the-overlap-of-covid-19-opioids-and-systemic-racism-in-healthcare/>. Accessed December 12, 2021.

Hien, D. Bauer, A. Franklin, L. Lalwani, T. Pean, K. [Conceptualizing the COVID-19, Opioid Use, and Racism Syndemic and Its Associations With Traumatic Stress](https://ps.psychiatryonline.org/doi/abs/10.1176/appi.ps.202100070). Available at: <https://ps.psychiatryonline.org/doi/abs/10.1176/appi.ps.202100070>. Accessed December 12, 2021

Kline, N., There's nowhere I can go to get help, and I have tooth pain right now: The oral health syndemic among migrant farmworkers in Florida. *Annals of Anthropological Practice*. Available at: https://anthrosource.onlinelibrary.wiley.com/doi/abs/10.1111/napa.12010?casa_token=puumO9jEHowAAA:cTik1UAkwHC86iT0kHT7Ut19RBA0fpSx1XdifDbEKZo2frpkWDo2U7rdnxuezzFvo1IM6H6_9row
Accessed December 5, 2021

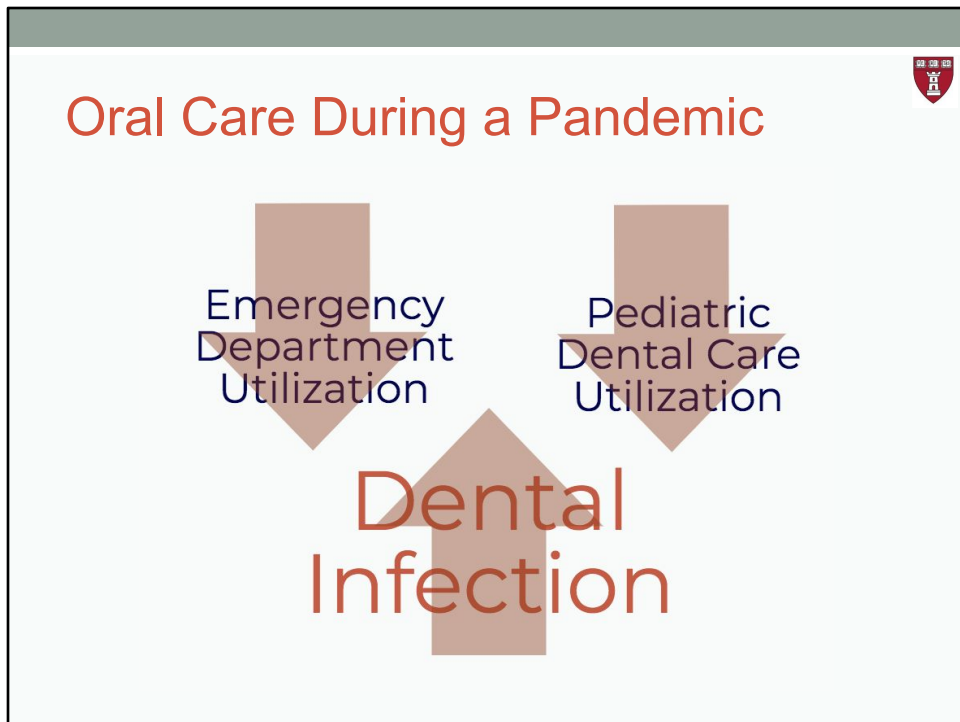
Jamieson, L., Peres, M., Guarnizo-Herreno, C., Bastos, J. Racism and oral health inequities; An overview. *EClinical Medicine*. Available at: <https://doi.org/10.1016/j.eclinm.2021.100827>. Accessed January 16, 2022.



At the root of syndemics, COVID-19 has sparked an awareness of “infodemics”: an overabundance of misinformation and disinformation that has increased hesitancy, stigmatization, and poor observance of public health measures. Infodemics influence the perception of different, connected, epidemics. Research shows that vaccine hesitancy overlaps and correlates with topical fluoride hesitancy, both of which are linked with structural racism, lack of supply, and barriers to culturally competent care. Furthermore, disinformation has also amplified hate speech and violence. Given that immunizations and fluoridation are front-line preventive strategies in pediatric medicine and dentistry, the growing sentiment of vaccine and fluoride refusal is a significant public health concern.

References:

WHO, Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation. Available at: <https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviors-and-mitigating-the-harm-from-misinformation-and-disinformation> Accessed December 12, 2021



Over the course of the pandemic, utilization of dental services decreased while dental infection increased, with higher global levels of caries, periodontal disease, and stress-related symptoms such as bruxism, chipped teeth, cracked teeth, and TMD symptoms. For instance, in Beijing, China, emergency departments saw a 38% decrease in dental pain related utilization at the start of the COVID-19 pandemic, yet dental and oral infection increased from 51% to 71.9% during the pandemic. This trend highlights how emergencies such as pandemics cause a disruption in care accessibility.

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Dental disaster: One year after first lockdowns dentists around the world confront the consequences of the COVID-19 pandemic on people's oral health. Published March 18, 2021.

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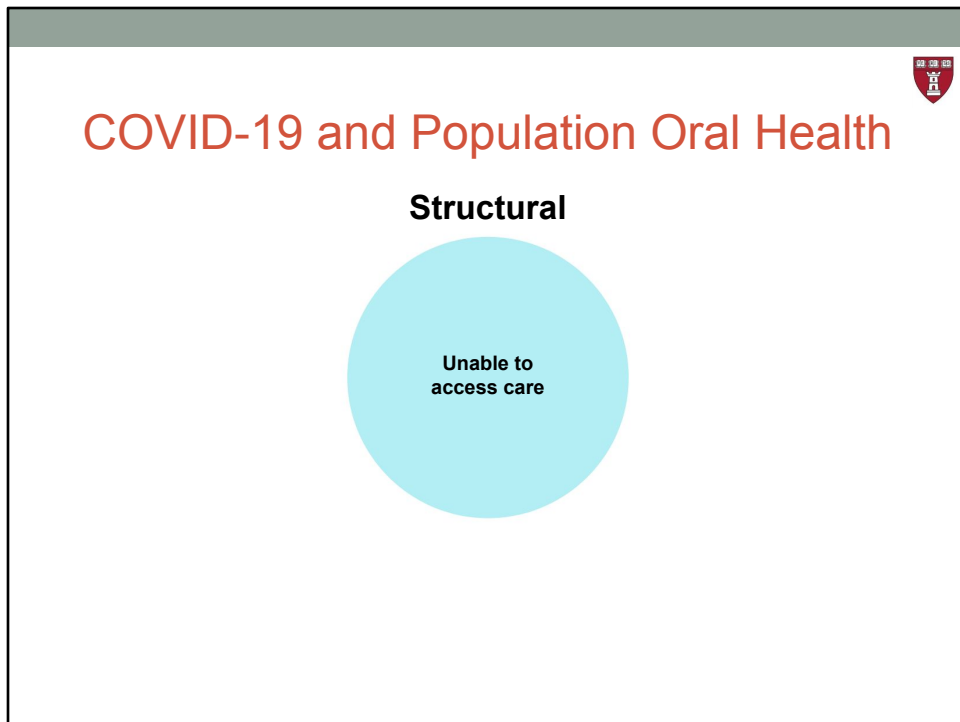
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Available at:

https://www.researchgate.net/profile/Maurizio-Bossu/publication/340381747_COVID-19_Pediatric_Oral_Health_During_and_After_the_Pandemics/links/5e9f024092851c2f52b6d73b/COVID-19-Pediatric-Oral-H

[ealth-During-and-After-the-Pandemics.pdf](#)

Accessed 2021-11-28.



Let's start by considering structural barriers, such as mitigation and suppression policies. A survey of 20 countries revealed that 75.9% of dentists reported practice closure (Abdelrahman 2021), with lower income countries closing more than higher income countries. When re-opening, practices often postponed non-emergency routine care, like preventative cleanings and checkups. Dentists were also forced to decrease patient capacity and space out appointments. This, in combination with backlogged dental work from lockdown, made it very difficult to find available providers.

References:

Daly J, Black EAM. The impact of COVID-19 on population oral health. *Community Dent Health*. 2020 Nov 30;37(4):236-238. PMID: 33269826.

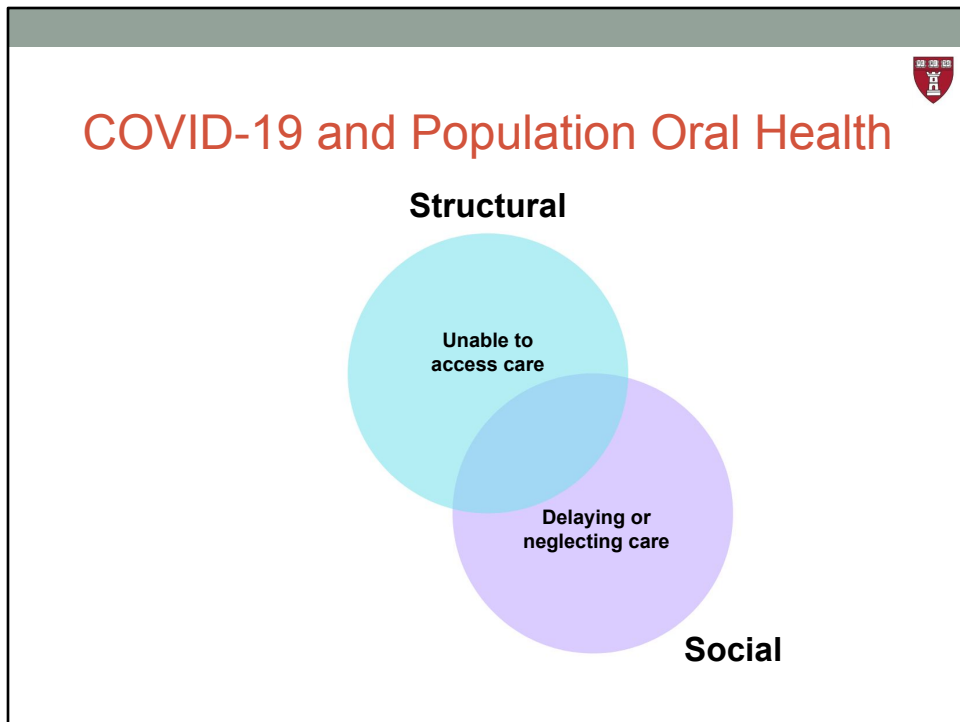
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Schwendicke F, Krois J, Gomez J. Impact of SARS-CoV2 (Covid-19) on dental practices: Economic analysis. *J Dent*. 2020 Aug;99:103387. doi: 10.1016/j.jdent.2020.103387. Epub 2020 May 27. PMID: 32473182; PMCID: PMC7255191.

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Additionally, patients avoided or postponed dental appointments out of fear of being infected with COVID-19. Quarantine also worsened people's oral hygiene routines and increased dietary patterns like snacking and sugar consumption, linked with food insecurity that forced families to buy cheap, unhealthy options. Furthermore, the pandemic worsened people's sleep hygiene and escalated their stress levels. Stress releases cortisol, which reduces salivary flow and raises risk of gum disease, tooth decay, and mouth infections, which are reciprocally linked with mood conditions like anxiety, depression, and loneliness. Alcohol consumption and domestic violence rates also rose, leading to increased injuries like orofacial trauma.

References:

Daly J, Black EAM. The impact of COVID-19 on population oral health. *Community Dent Health*. 2020 Nov 30;37(4):236-238. PMID: 33269826.

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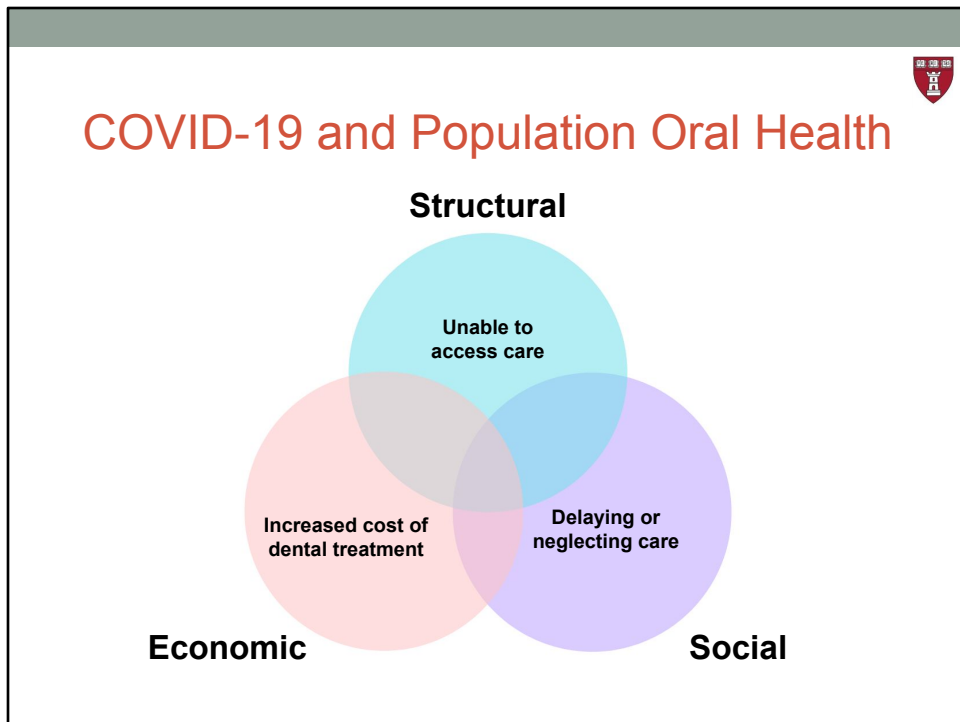
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Shigeyama C, Ansai T, Awano S, et al. Salivary levels of cortisol and chromogranin A in patients with dry mouth compared with age-matched controls [published correction appears in *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2009 Apr;107(4):597]. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;106(6):833-839. doi:10.1016/j.tripleo.2008.07.005

Available at <https://pubmed.ncbi.nlm.nih.gov/18755621/>. Accessed 2021-10-05

Northridge, M. E., Kumar, A., & Kaur, R. (2020). Disparities in access to oral health care. *Annual Review of Public Health*, 41(1), 513–535.

Available at: <https://doi.org/10.1146/annurev-publhealth-040119-094318> Accessed 2021-03-21.



While oral complications increased, people's ability to afford care decreased, due to economic decline, reduced income, job loss, and compromised government funding and service availability. Dental providers also struggled financially due to shutdowns and higher overhead costs, which made them **increase** dental care costs for patients.

References:

Daly J, Black EAM. The impact of COVID-19 on population oral health. *Community Dent Health*. 2020 Nov 30;37(4):236-238. PMID: 33269826.

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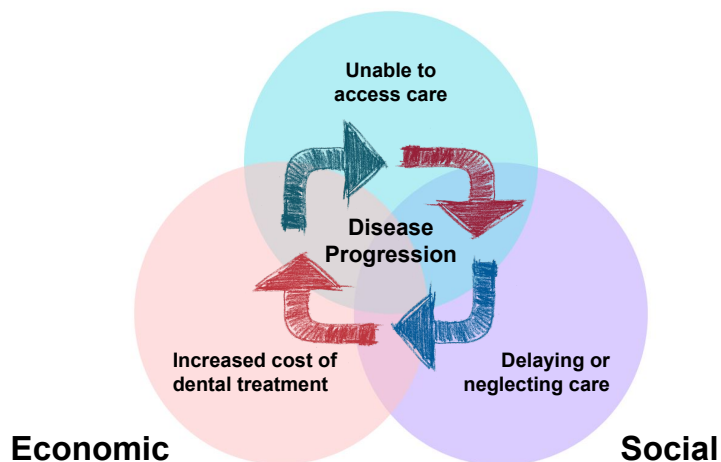
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COVID-19 and Population Oral Health

Structural



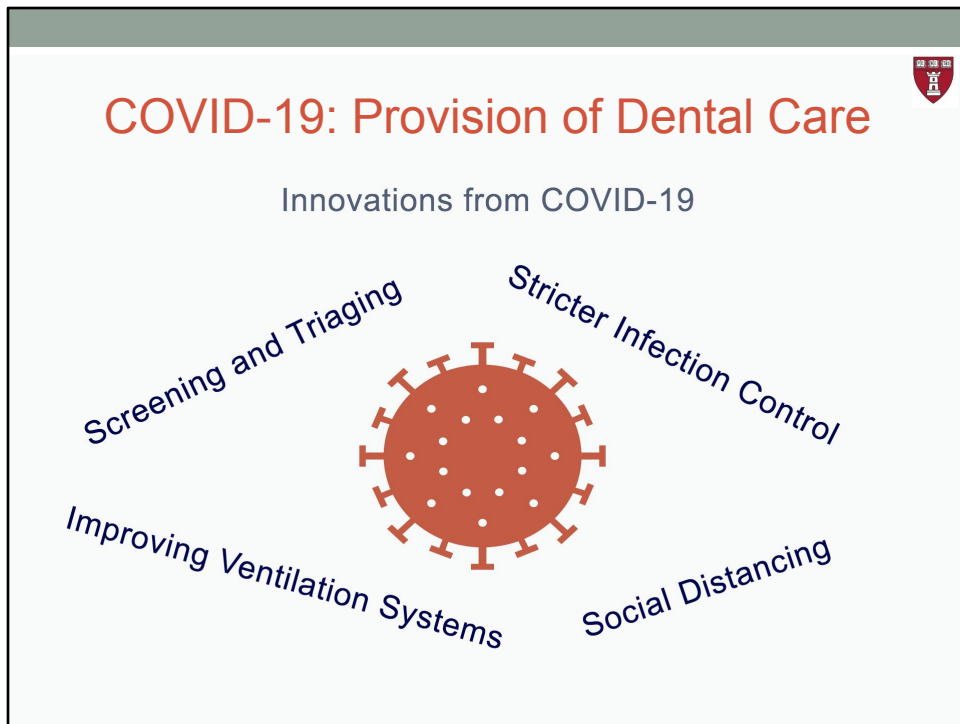
Now, let's start thinking how these barriers are interconnected. How do lockdowns influence oral health hesitancy? How does social isolation impact job performance and income? How do layoffs, staff redeployment, and workflow interruptions lead to shutdown of services or increased dental fees? How does provider fatigue affect quality of care? Imagine these barriers forming a vicious cycle, in which easily preventable tooth decay can snowball into periodontitis or abscesses that require more invasive, traumatic, and costly treatments.

Reference:

Dental disaster: One year after first lockdowns dentists around the world confront the consequences of the COVID-19 pandemic on people's oral health. Published March 18, 2021.

Available at:

<https://www.fdiworlddental.org/dental-disaster-one-year-after-first-lockdowns-dentists-around-world-confront-consequences-covid-19>. Accessed 2021-09-27.



COVID-19 also impacted *how* dental care was provided. Globally, dental practices established screening and triaging protocols. Strict social distancing was implemented. Ventilation systems were improved. Infection control measures were increased, involving bio-aerosols, pre-treatment antiseptic rinses, and increased PPE like N95 masks, face shields, shoe covers, or even isolation gowns. Aerosol-generating procedures were minimized, but if they were deemed necessary, rubber dam isolation and high-volume evacuators were often used during procedures. Many countries also transitioned to teledentistry, which we will cover in a later slide. Before we get there, take some time to reflect on the usefulness, feasibility, and accessibility of teledentistry.

Reference:

Jiang, C. M., Duangthip, D., Auychai, P., Chiba, M., Folayan, M. O., Hamama, H. H., Kamnoedboon, P., Lyons, K., Matangkasombut, O., Mathu-Muju, K. R., Mathur, V. P., Mei, M. L., Morgan, M., Poolthong, S., Rahul, M., Srinivasan, M., Takahashi, T., Yaklai, S., Zhang, S., ... Lo, E. C. (2021). Changes in oral health policies and guidelines during the covid-19 pandemic. *Frontiers in Oral Health*, 2. Available at: <https://doi.org/10.3389/froh.2021.668444> Accessed 2021-09-16.

A Case Study of Canada vs Nigeria



	Canada	Nigeria
Universal Healthcare	Provides treatment for health care (dental) providers exposed to COVID-19	No UHC
Governing Body for guidelines	Canadian Dental Association (non-regulatory authority)	Federal Ministry of Health of Nigeria
Reopening Process	Reopened early May, when curve was flattened	Reopened May, 4 2020 when cases were increasing (forced by socioeconomic issues)
Routine Dental Care	Recommended that routine dental visits should not be delayed	Recommended that all non-emergency visits (routine dental) should be postponed
HVAC (Heating, ventilation, and air conditioning)	Guidelines set by Canadian Standards Association. Dentists encouraged to consult HVAC specialist	No guidelines

Here, we have taken a case study of Canada vs Nigeria from the article [“Changes in Oral Health Policies and Guidelines During the COVID-19 Pandemic.”](#) Think about some of the differences, such as **Universal Healthcare**, which affects how providers receive care if exposed to COVID-19.

Take note of reopening strategies: while Canada reopened when cases were **decreasing**, Nigeria reopened when cases were **increasing**. Because Nigeria is largely driven by the informal economic sector, the lockdown disproportionately impacted the economy and caused social unrest, forcing the country to reopen early. Given these circumstances, think about why routine dental visits were **encouraged** in Canada and **postponed** in Nigeria. Furthermore, consider differences in air filtration guidelines: what infrastructure enables one country to better protect dental providers and patients from contracting COVID-19? For the next few minutes, we encourage you to pause your video to compare and contrast two other countries, using a Venn Diagram, table, or any method of choice.

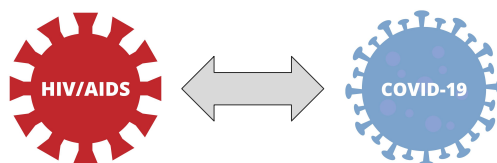
Reference:

Jiang, C. M., Duangthip, D., Auychai, P., Chiba, M., Folayan, M. O., Hamama, H. H., Kamnoedboon, P., Lyons, K., Matangkasombut, O., Mathu-Muju, K. R., Mathur, V. P., Mei, M. L., Morgan, M., Poolthong, S., Rahul, M., Srinivasan, M., Takahashi, T., Yaklai, S., Zhang, S., ... Lo, E. C. (2021). Changes in oral health policies and guidelines during the covid-19 pandemic. *Frontiers in Oral Health*, 2. Available at: <https://doi.org/10.3389/froh.2021.668444> Accessed 2021-09-16.



COVID-19 and HIV: Lessons Learned

	HIV/AIDS	COVID-19
Infection Control	Barehanded dentistry → Introduction of PPE and UP	Additional PPE & disinfection, staggered scheduling, triaging, teledentistry
Education and Awareness	Improved understanding of bloodborne transmission	Improved understanding of aerosol + droplet transmission
Lockdowns	No global collapse/lockdown	Global lockdown → teledentistry (virtual evaluations)
Social Unrest	Blaming gay men	Blaming Chinese community (anti-Asian sentiment)



A comparison of COVID-19 and HIV/AIDS can provide insight on the longitudinal impacts of pandemics. Just as COVID-19 introduced greater infection control, HIV/AIDS introduced Universal Precautions and Personal Protective Equipment to the common practice of barehanded dentistry. But pandemics can also give rise to social profiling and discrimination. Just as COVID-19 sparked Anti-Asian sentiment and hate crimes, HIV sparked homophobia and violence against gay and bisexual men, who, even now, still face prejudice when accessing oral health care.

Today, HIV infects about 36.9 million people worldwide, and those with HIV are 30–50% more likely to die from COVID-19. Two-thirds of this population live in Sub-Saharan Africa, a region that is completely left behind from worldwide deployment of COVID-19 diagnostics, therapeutics, and vaccines. Failing to control COVID-19 in places with high rates of advanced HIV increases global risk for the emergence of SARS-CoV-2 variants. Public health measures need to tackle COVID-19 and HIV as a syndemic, rather than separate pandemics. Given that over 50% of HIV-positive people develop oral symptoms early in the course of the disease, oral healthcare workers sit in a valuable position to facilitate early detection and decrease the stigma associated with HIV-AIDS.

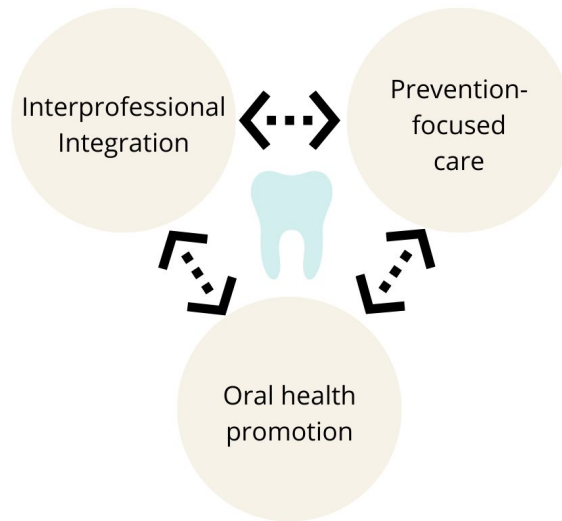
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COVID-19: Opportunities for Growth



Now, let us examine how we can restructure our oral health systems. While COVID-19 has exposed major shortcomings, it also presents many opportunities for growth towards more inter-professional integration, prevention-focused care, and oral health promotion.

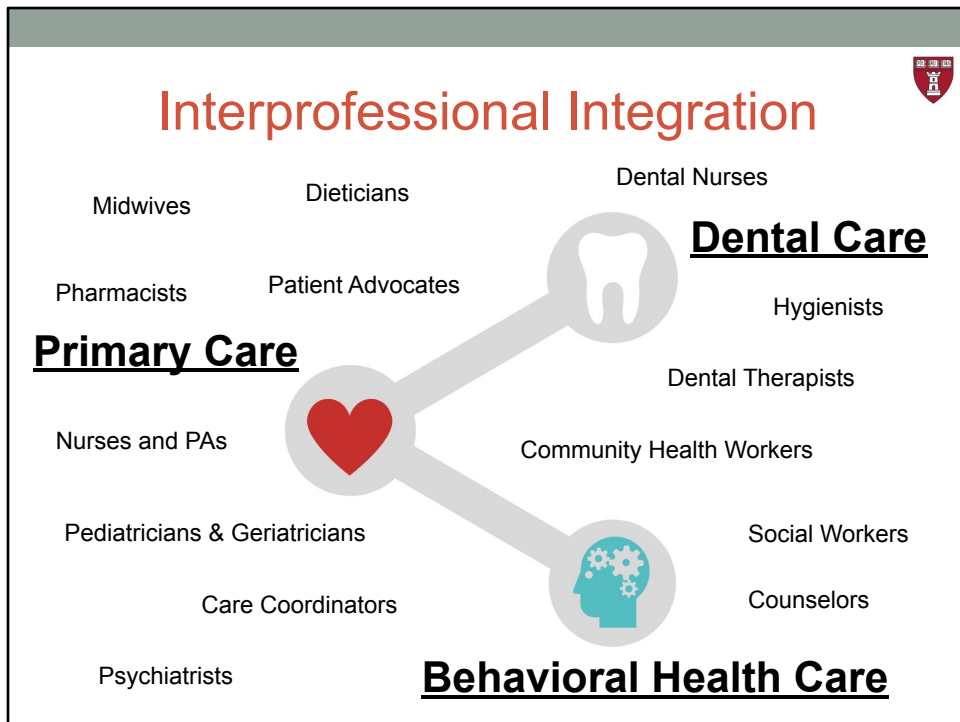
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Singh S. Public Oral Health Care During COVID-19: Time for Reflection and Action. *Front Med (Lausanne)*. 2021;8:610450. Published 2021 Mar 17.

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Brian Z, Weintraub JA. Oral Health and COVID-19: Increasing the Need for Prevention and Access. [Erratum appears in *Prev Chronic Dis* 2020;17. http://www.cdc.gov/pcd/issues/2020/20_0266e.htm.] *Prev Chronic Dis* 2020;17:200266.

Available at: <http://dx.doi.org/10.5888/pcd17.200266> Accessed 2021-09-16.



One shift that COVID-19 sparked globally was increased dental-medical engagement. In Singapore, dental workers were deployed to work collaboratively with clinicians, nurses, pharmacists, radiographers, and social workers to screen cases, provide consultations, and conduct swabbing operations. In the UK, dental staff were deployed in maternity, critical care, and emergency units. In the US, dental volunteers assisted with critical emergency care needs and were authorized to administer vaccines in 44 states.

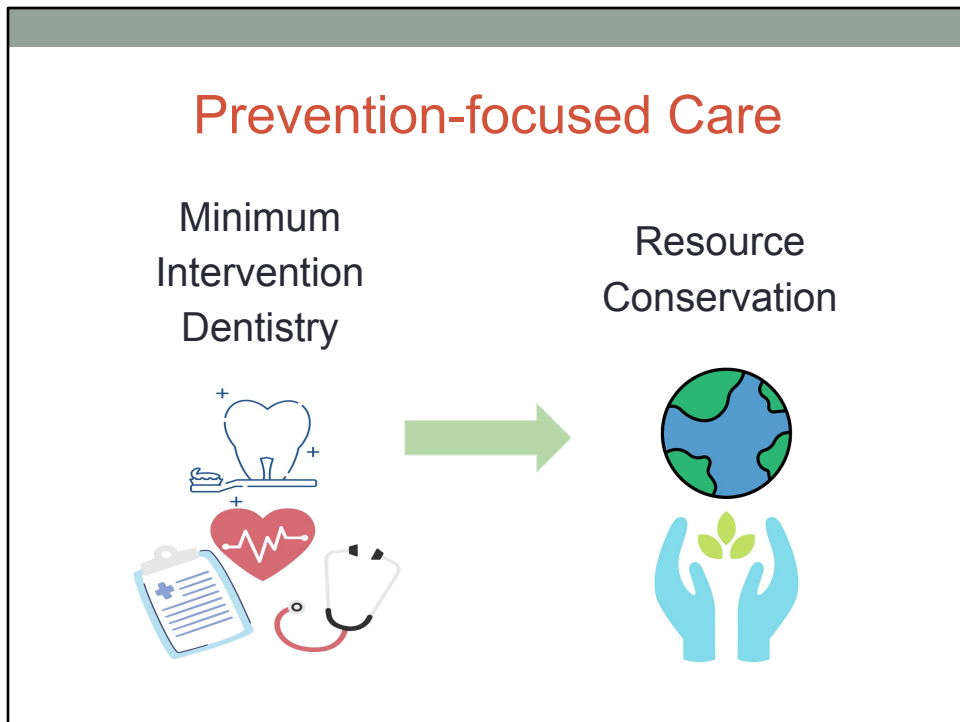
This dental-medical engagement offers an opportunity for the dental team to be integrated within the broader healthcare system, facilitated by cross-referrals, centralized booking systems, multi-directional service training, and future pandemic preparedness. Given COVID-19's impact on mental health, dental providers can also play an important role in detecting distress, depression, anxiety, and eating disorders while supporting patients' psychosocial needs. Thus, beyond primary care, integration should be expanded to behavioral health in collaboration with social workers, counselors, and other clinicians.

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Seneviratne, C. J., Lau, M. W., & Goh, B. T. (2020). The role of dentists in covid-19 is beyond dentistry: Voluntary Medical Engagements and future preparedness. *Frontiers in Medicine*, 7. Available at <https://doi.org/10.3389/fmed.2020.00566>. Accessed 2021-09-26.

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Another change that COVID-19 sparked was the increase in non-aerosol-generating procedures, such as atraumatic restorative treatment, chemo-mechanical caries removal, and silver diamine fluoride application, all of which do not require electricity, local anesthesia, or rotary handpieces. These cost-effective techniques conserve tooth structure, minimize trauma, and reduce pain, and they have been found to be especially useful in children, the elderly, special needs populations, and patients with dental fear or anxiety.

The use of non-aerosol generating techniques can kickstart a shift towards Minimum Intervention Dentistry, built upon 4 principles: 1) Recognition and early identification of risk factors. 2) Reduction of risk factors through diet and lifestyle. 3) Regeneration by arresting and reversing lesions through topical means. 4) Repair using conservative caries removal to restore structure and promote healing. Due to its low cost, minimum intervention dentistry can greatly improve access to services and reduce health inequities, and it shifts dentistry's role to the entire dental team—rather than the dentist as the main provider of care.

Prevention-focused care also conserves resources. During COVID-19, plastic consumption and dental waste increased due to heightened PPE and infection control protocols. Historically, the environment has not been prioritized in the face of disaster relief. Given that health and human well-being are intimately linked with the environment, dental professionals should reflect more on sustainable dentistry and risk-reduction strategies. This is explored in more detail in Module 6.

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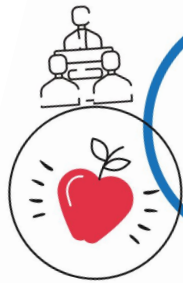
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Available at <https://doi.org/10.1038/s41415-020-2055-z>. Accessed 2021-09-26.

Oral Health Promotion

Macro-level



Micro-level

Meso-level



The shutdown of dental practices and clinics during COVID-19 allows us to reevaluate the power of oral health promotion, which can address oral hygiene, nutrition intake, tobacco and alcohol cessation, fluoridation, and more. Oral Health Promotion can function on a macro, meso, and micro level:

- The **macro level** involves policy development, agenda setting, and mass media communications to reduce common risk factors for non-communicable disease.
- The **meso level** involves a community-based approach, reinforcing oral health habits and behavior in community health centers, schools, workplaces, primary care facilities, and pediatric offices.
- The **micro level** involves dentists, hygienists, therapists, nurses, assistants, social workers, and all members of the healthcare workforce providing preventative messaging inside healthcare settings and in other parts of daily life.

Reference:

Singh S. Public Oral Health Care During COVID-19: Time for Reflection and Action. *Front Med (Lausanne)*. 2021;8:610450. Published 2021 Mar 17.

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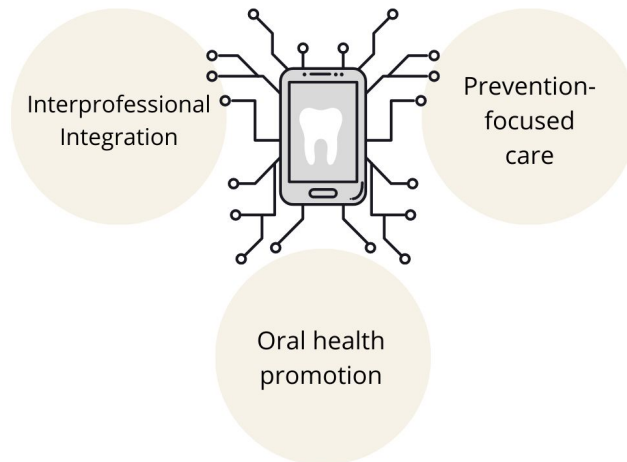
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COVID-19 and Digital Oral Health



Teledentistry



Teledentistry and digital oral health can simultaneously enable integration, prevention, and health promotion. COVID-19 accelerated a shift towards teledentistry, which allowed continuous dental care during shutdown and minimized risk of contamination. Teledentistry can facilitate early detection of oral problems, reduce costs and wait times, improve longitudinal care, link service providers, enable contact tracing, disseminate preventive messages, combat the spread of misinformation, and deliver care when travel is difficult. However, barriers to implementation include internet connectivity, availability of data, licensure issues, insurance coverage, patient liability, and data exploitation.

To create an effective teledentistry and digital oral health program, it's essential to first conduct a needs assessment. For instance:

1. What existing national oral health programs are in place? What are their objectives, constraints, institutional resources, and available funding?
2. Are there any geographical, religious, language, literacy and cultural barriers for your population?
3. What is a region's ICT capacity, and what are the levels of mobile communication and available networks?
4. What are the regulations and legal framework on data management, privacy, security, and consent?

Reference:

Giraudeau N, Varenne B. Advocacy for a Digital Oral Health That Leaves No One Behind [published online ahead of print, 2021 Jul 8]. *JDR Clin Trans Res.* 2021;23800844211026610.

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As part of the 74th World Health Assembly's "Be He@lthy Be Mobile" initiative, the WHO developed an mOralHealth program structured into 4 modules.

Module 1, **the literacy module**, aims to improve oral health literacy, awareness, and advocacy on an individual, community, and policy level.

Module 2, **the training module**, aims to train and raise awareness about oral health for general health professionals.

Module 3, **the early detection module**, provides information on remote diagnostic tools to increase access.

Module 4, **the surveillance module**, uses mobile technology to strengthen oral health surveillance systems and collection of epidemiological data, as well as monitoring of quality patient care and service delivery.

The mobile phone market penetration globally means that almost anyone can now be reached via SMS text messaging. It's important to "ensure that the digital health revolution is safe, sustainable and leaves no one behind" (Bernardo Mariano Jr., director of Digital Health & Innovation at WHO). If universal access to digital health is promoted globally, it can work to accelerate universal health coverage implementation.

Reference:

Giraudeau N, Varenne B. Advocacy for a Digital Oral Health That Leaves No One Behind [published online ahead of print, 2021 Jul 8]. *JDR Clin Trans Res.* 2021;23800844211026610.

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An Interconnected Future



Disease will spread so long as our health systems and communities are fragmented. An interconnected system where professionals, industry leaders, community organizations, and social support programs work together can prevent both oral disease and COVID-19 spread. Population health can be explained through the fable of the elephant in the dark by Rumi. In this fable, eight wise people are in an unlit room to touch an animal they have never seen before: an elephant. As each person examines a different part of the elephant, they come to a different conclusion of what the animal is. One says it is a strong pillar when touching the leg, one smooth and firm when touching the tusk, another like a throne when touching the back. It is not until the torches are lit that they can see the entire, complex creature for what it is. COVID-19 provides an opportunity to light these torches and create an interconnected health system to address the needs of populations together.

Graphic Source:

Art owned by Tooka Zokaie- drawn by Hope Glastric Creative. Accessed December 5, 2021.



Takeaways and Reflection

Increase Partnerships
across Disciplines

Explore Digital Oral Health

What is *my*
role?

Connect with Community
Health Organizations

Reflect on Oral Health in
Syndemic Context



So ask yourself:

1. How has COVID-19 impacted the way you view dentistry, global health, and oral health advocacy?
2. Where do you see dentistry going from here, and where are you in the picture?
3. What steps will you be taking as a health professional, student, or prospective student to address syndemics?

Whether it's increasing partnerships across disciplines, connecting with community organizations, incorporating digital oral health options, or continuously reflecting on our role in the syndemic context—let's take the lessons from COVID-19 and integrate them into our global health advocacy.