



COVID-19 Virus Transmission Rate in a Los Angeles County Hospital Dental Clinic: A Retrospective Study

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ABSTRACT

The advent of SARS-CoV-2 has dramatically reshaped the healthcare landscape over the past two and a half years. Through global efforts, COVID-19 appears to have been successfully contained, primarily through the deployment of physical barriers, distancing measures, and, subsequently, widespread vaccinations. This transformative period has also impacted the field of dentistry, which, despite its vigilance in preventing infectious disease spread, faced unprecedented challenges. This study assesses potential transmission rates among patients attending a hospital dental clinic, employing early interventions and adherence to local and international guidelines.

A retrospective search of Electronic Medical Records (EMR) was conducted in a county hospital dental clinic over two distinct date ranges, spanning pre-vaccination and the Delta/Omicron variants. Of 3,016 patient visits, nine tested positive for COVID-19 within two weeks of their appointments, yielding a potential transmission rate of 0.17%-significantly lower than the 7-8% community spread rate. It is crucial to note that this correlation does not imply causation, given the challenge of pinpointing the exact source of infection.

Key words: COVID-19, Dental, Aerosol, Pandemic, Dentistry, HEPA filters, Extra oral suction

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INTRODUCTION

Over the past two years, healthcare has significantly transformed due to the SARS-CoV-2 virus, primarily transmitted through aerosolized respiratory droplets. It can spread through coughing, sneezing, talking, and breathing. Guidelines from global health organizations have emphasized the

importance of measures like mask-wearing, social distancing, and hand hygiene to mitigate transmission. While compliance has shown to be effective in controlling transmissibility (CDC, 2020), there are certain activities, such as eating, where these precautions are not feasible. Eating requires a person to remove their mask and face shields. Receiving dental treatment is also one of these activities. A dentist needs access to the patient's oral cavity to examine and treat any oral diseases properly [1]. Although Personal Protective Equipment (PPE) in dentistry dates back to the 1950s, and its watershed moment in the early 1980s when HIV/AIDS appeared, the profession was cognoscente of what COVID-19 can mean to the practice of dentistry. Because dentistry requires close

provider-patient contact, involves bodily fluids such as saliva and blood, and produces high amounts of aerosol during procedures, the dental field quickly adapted to the required PPE and other environmental controls that local and national health organizations have recommended (CDC, 2020; OSHA, 2020). Because dental treatment has high potential for transmission to both the patient and provider, it is important to note if going to the dentist is safe [2].

Disease transmission within a healthcare setting like a dental office is an understandable concern to patients and staff alike. Safety is a paramount obligation for practitioners to instill confidence that there is minimal to no risk of disease transmission when patients are receiving their dental care. Given the high likelihood of exposure to bodily fluids, coupled with aerosolizing procedures, dentists were proactive to mobilize their resources to comply with the WHO and CDC recommendations to minimize transmission by adapting the use of N95 masks and face shields during dental treatments (CDC, 2020) [3]. Many have also installed environmental controls like HEPA filters, extra oral vacuums, and UV light to minimize the spread of aerosol (OSHA, 2020) at great financial cost. Past studies that have investigated transmission in a dental office have been limited. Froum and Froum (2020) reported no virus transmission in a private practice setting where 2,810 patients were seen in a span of 6-months. They also note that 69% of these subjects that have pre-existing medical conditions. Other studies related to this topic have focused on the prevalence of dentists that have tested positive. In these studies, the prevalence of testing positive to COVID-19 among US dentists remains low, less than 1%. Los Angeles County had 2.66 million cases as of February 28, 2022 against a population of 10,040,000 [4]. Past studies have been done in private practice clinics, but there have been no investigations of transmission rates in a hospital clinic setting. Generally, patients that are seen in a hospital clinic or a hospital setting are more at risk due to extensive prior medical history and higher rate of immunocompromised conditions. Public hospitals mainly treat economically disadvantaged patients. Patients that are low in socioeconomic status have traditionally been

more susceptible to chronic diseases. This study aims to quantify possible transmission rates in patients after they have been to the dentists in a hospital clinic setting [5].

METHODS

This study was approved by the Institutional Review Board, The Institute at Harbor-UCLA Medical Center (32305-01, revision March 2022). Data was gathered from Electronic Medical Records (EMR) during the date ranges July 1, 2020–December 31, 2020, and July 1, 2021–February 28, 2022. These date ranges were chosen to include the different stages of the pandemic from pre-vaccination to the Delta and Omicron variants. A retroactive chart review search was performed to produce two data sets between the date ranges: 1) the total number of patient visits by Hospital Dentistry and Oral Maxillofacial Surgery clinics; and 2) if these patients per visit had a COVID + test or diagnosis within 2-weeks after their dental appointment [6]. ICD10 codes were used to search for COVID + lab finding or diagnosis. There were many patients that had multiple dental visits during the timeframes and each visit was counted separately. All patients seen in the clinic were included in the study except for neonatal (0-2months old). Lastly, comorbidities that increased risk for acquiring COVID were recorded including 65 years or older, diabetes, dialysis patients, COPD, and other conditions that lower immune function [7].

Multiple environmental controls were already implemented during these time periods. Controls were established from CDC, county, other local, and departmental recommendations including proper PPE(N95, surgical gowns, head protection, and face shields) use, donning and doffing, HEPA filters, enclosures to contain aerosol produced during dental procedures, extra oral suction, and pre-procedural COVID test a few days prior to appointments. All staff was required to complete training in infection control. In cases where patients presented with symptoms during the pre-appointment questionnaire, patients were rescheduled according to the guidelines set forth by the hospital [Table 1] when it was deemed safe to continue treatment. Patients that tested COVID + during their pre-procedural COVID test were also rescheduled. Patients were advised to consult with their medical provider follow up care.

Table 1: Patients treated in GPR and OMS clinics Clinic dates and COVID.

Patient	Clinic	Date Seen	Clinic Procedure Performed	Date of COVID +
1	GPR	07/06/20	Exam	07/08/20
2	OMS	12/14/2020 and 12/21/2020	Extraction and Follow up	12/22/20
3	GPR	12/27/20	Fillings	12/30/20
4	OMS	9/16/21	Exam	9/19/21
5	OMS	1/20/22	Follow up	1/30/22
6	OMS	01/06/22	Follow up	1/14/22
7	OMS	7/27/21	Extraction	7/28/22
8	OMS	12/17/2021 and 12/23/2021	Extraction and Follow up	01/03/22
9	OMS	12/30/21	Follow up	01/09/22

Data was also collected from the Los Angeles County COVID19 Dashboard as reference for community acquisition of COVID-19. The Dashboard provides day-to-day reports on COVID ranging from community transmission, hospital stays, and number of vaccinations [8].

RESULTS

The total number of patient visits in the Hospital Dentistry and OMS clinics within the date ranges was 3,016. 1168 patients were seen between July 2020 and December 2020, and 1848 were seen between July 2021 to February 2022. The incidence of COVID positivity in this patient pool within 2 weeks of being seen totaled [9]. It describes the date(s) patient was seen, the date when a COVID + test or diagnosis was confirmed, and the type of dental procedure done on that appointment. Between July and December 2020, 2 positive cases were noted within the 2-week mark (1 in the Hospital Dentistry and 1 in OMS clinics). Between July 2021 and February 2022, there were 7 positive cases: 1 and 6 in the respective clinics [10].

The number of possible transmissions is 0.17% in July–December 2020 date range and 0.37% between July 2021–February 2022 date range. In contrast, the Los Angeles County Cumulative % of Positivity Person in those date ranges was ~8% and ~7% respectively (LAC Dashboard). According to Table 1, 5 of the 9 patients received exams or follow ups while the other 4 received dental treatment. Lastly, of the 3,016 visits, 28.4% had one comorbidity and 27.9% had 2 or more comorbidities [11].

DISCUSSION

Infectious pathogens are ubiquitous in the environment. From pandemics like COVID-19 to the more common like influenza or the common cold, the health care team must stay vigilant to reduce the risk of transmission in areas where

patients are seen. This is particularly important for patients with multiple chronic medical conditions that impair the immune system, the aged, and those that have lower socioeconomic status, as there have been correlations between socioeconomic status and infection rates.

Dentistry and Infectious Diseases

The profession of dentistry is procedural in nature that demands direct patient contact. From diagnosis and treatment, a dental provider must access the oral cavity in order to provide proper care. With close contact, the risk of any disease transmission increases. However, dentistry and dentists have traditionally been proactive to prevent such occurrence through careful training and implementation of infection control, even long before the onset of COVID-19. Dentists adhere to strict protocols set forth by the dental board and the Occupational Safety and Health Administration (OSHA), following the principles of universal precaution. These include, but not limited to, proper cleaning and sterilization of dental tools, waterline testing and maintenance, blood borne protocols, surface disinfection, and personal protective equipment. When these precautions are not followed, it is often accompanied with a heavy price professionally, socially, economically, and legally; not to mention undue harm to the patient. Thus, dental professionals are keen to minimize or prevent disease transmission at their workplace.

Although results from this retrospective study show possibilities of transmission in a hospital dental clinic, it is difficult to determine whether or not transmission took place in the clinic. One must consider the length of time spent at the dental clinic, the type of procedure performed, social exposure around the time of positive test, and the type of variant that was present at the time.

Length of time spent in the clinic: length of time for exams and follow-ups are minimal and moderate for procedures.

Social and Community Exposure: none of the patients were interviewed nor any social or community status is known around the date of their positive test. The possibility of acquiring an infection from attended social events, affected family members, work, or any other community activities must be considered.

Type of Variant: Seven of the nine patients were seen at the height of the Delta and Omicron variants, which are thought to be far more contagious than the initial variant.

Thus, it may be more likely that acquisition of the virus was from a non-dental clinic visit source.

Dentistry and COVID-19

Dentistry has quickly addressed concerns of transmitting this novel virus in the office setting. The goal was the same, to minimize the spread of a pathogen. The difference was that the pathogen profile was largely unknown, assumed to be very contagious, and lethal. Dentistry has complied with CDC and WHO recommendations from pre-appointment intake interviews to PPE and hand hygiene protocols (OSHA, 2020). Many dentists also invested in engineering controls to minimize the spread of aerosol through great financial cost. Extra oral suction, HEPA filtration units, UV light, closed-bay operatories, etc. were all considered to as a refit to combat COVID-19 spread.

Hospital Dental Clinic

Patients that are seen in a hospital dental clinic generally have more extensive medical history compared to those seeking care at private practices.

The hospital clinic strictly followed protocol set up by the Department of Health Services and Department of Public Health in collaboration with state and federal agencies. This includes:

Pre-procedural COVID-19 tests 2-3 day prior to patients' dental appointment when they became available. All patients were tested at during the early days of the pandemic, but the policy was modified to only aerosolizing procedures when patients started to get vaccinated. Patient who tested positive were informed and referred to their medical providers.

Screening questionnaires prior to being treated both by phone and when patients came to their appointments.

Use fitted N95 masks, face shields, and gowns when treating a patient. Training for donning and doffing and proper use of other PPEs was done.

Hand hygiene was strictly enforced.

Aerosolizing procedures were performed in operatories with doors instead of open bay ops to prevent aerosol distribution to the hallways.

Extra oral suction was utilized to capture aerosol during a procedure.

HEPA filters were turned on continuously during clinic sessions to filter the clinic air.

Staff had refresher training to dispose of contaminated materials, disinfect the room, and set up for the next patient.

Staggered use of rooms to allow for HEPA filter to disinfect the room air [12].

LIMITATIONS

Within the limitations of this study, COVID-19 transmission rate for patients in a hospital dental clinic seem to be well below the public transmission rate of 7-8% percent. This study and the study from Froum and Froum (2020) seem to suggest that dentist and dental offices are proactive in preventing transmissible diseases by staying up to date with the latest infection control guidelines and other environmental controls. It should be noted that this study made certain sets of assumptions.

Patients are empaneled to the hospital for their medical and dental needs. Any positive test results and/or diagnoses performed outside of the system and not reported by the patient was not counted.

Asymptomatic patients may have been excluded in the analysis if they did not take a COVID test. This is the same restriction with any public health prevalence reporting (i.e. If not reported, or not tested, then it is not counted).

Any positive results within the examined 2-week time frame could have been from a non-dental clinic related source.

Showing minimal to no identifiable transmissions in a hospital dental setting is a source of

encouragement, that prompt adherence to public health recommendations and preventive actions seem to be effective. Undoubtedly, there will eventually be another pandemic or widespread infectious disease event in the future. Quick action by any health profession is imperative in preventing exponential exposures. Within the limitation of this study, data seem to show that, at worst, there was a minimal transmission of COVID-19 in a dental setting. And that is far below the transmission rate in the public.

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