


BRIEF COMMUNICATION

Trends in dental insurance claims in the United States before and during the SARS-CoV-2 pandemic in 2020

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Abstract

Objectives: The SARS-CoV-2 pandemic disrupted health care services. Previous reports estimated reductions in demand and supply of dental care services, but actual changes have not been reported. The present report depicts a perspective of trends in claims from private dental practice in the United States during 2019 and 2020.

Methods: Private dental insurance paid claims data from a data warehouse (encompassing 66+ carriers in the United States) were obtained for children and adults (treatments identified by their American Dental Association Code of Dental Procedures and Nomenclature [CDT]), encompassing a 5% random sample of all records between January 2019 and December 2020. A market-based treatment classification placed CDT codes into one of four categories based on the likelihood of being associated with urgent/emergency care.

Results: Claims for 3.8 million patients constituted the 5% random sample for analyses. Substantial drops in the provision of treatment items were quantified for a large segment of private dental insurance plans at a national level, showing differential impacts in dental care categories.

Conclusions: Week-by-week, detailed descriptions of demand/availability changes in dental care throughout the first year of the 2020 SARS-CoV-2 pandemic were obtained through contrasting perspectives in 2019. Provision of dental care and associated impacts fluctuated over time subject to treatment urgency, but also modified as the weeks/months of dental office lockdowns ebbed in and out of the dental market.

KEYWORDS

dental care, health care economics, SARS-CoV-2

INTRODUCTION

The SARS-CoV-2 pandemic disrupted health care services throughout the world, including dental care [1–4]. In the United States, most in-person outpatient visits were canceled for various time intervals [5], with a ~US \$15.1 billion cost estimate to offset revenue losses among primary medical care practices. The impact for dental care services is only beginning to be understood. Two non-systematic reviews of worldwide reports concluded dental practices were suffering marked financial losses [4,6] and that a more proactive stance was necessary to support dental care provision under pandemic constraints [7,8]. An empirical report using a Markov model fitted with 146 German dentists reporting data for March/April 2020 extrapolated ~30% negative net profits into a

yearlong scenario [9]. Another health economic model from Italy followed a similar profile [4]. The American Dental Association (ADA) conducted a poll, with about 19,000 dentists participating in March 2020, about 6000 in April 2020 [10], and declining numbers steadily over 2020 and into April 2021 (latest figure found, 1983 dentists) [11]. The survey found that 66%–80% of dentists reported dental offices being closed and seeing emergency patients only, with little differences between March and April 2020. The percentage of semi-closed and closed offices across states were similar, with consequential financial impacts—for billing, income, and staff compensation. A sample representing US adults in a national panel survey indicated about half of the patients had delayed dental care during the spring of 2020 [12]. The type of care varied: 74.7% reported delaying a checkup, 12.4%

delayed addressing something that was bothering them, and 10.5% delayed planned treatment. A confirmatory appraisal using geographic information from cellular smartphones mobile applications indicated that weekly visits to dental offices were 33% lower between March and August 2020, with the limited rebound of rates up until the end of the follow-up period (August 2020) [13].

It is noteworthy that the above-mentioned reports are surveys of patients and dentists, estimates based on the geographic location of patient cellphones, or projections from statistical models fitted with partial data. An examination of the actual impacts on the US dental market has not been reported. The present study provides an interrupted time series perspective of actual changes in the provision of dental care paid by ~40% of the private dental insurance plans in the United States during 2019, contrasted with trends in 2020 during the SARS-CoV-2 pandemic.

MATERIALS AND METHODS

Data were obtained from a commercial dental insurance data warehouse that accrues claims from 66+ national and regional dental payers in the United States (IU IRB approval 1,508,889,495). It does not include all private

dental plans in the country but a considerable proportion of them (~40%). De-identified nationwide data for children and adults were obtained for dental treatment items (identified by their ADA Code of Dental Procedures and Nomenclature [CDT], codes [14], a billing industry standard in the United States) and date of treatment; age in years; location of the dental office; and CDT usual and customary price for each treatment item. The data extraction encompassed a 5% random sample of all records between January 2019 and December 2020; although using all data available could constitute a census sample of about half of private dental insurance plans in the United States, the unwieldy size of the dataset forced us to work with a sample. This random selection purported to offer a window into private insurance dental care; it is not a nationwide representative assessment of all dental care items, neither of all private dental insurance claims. The lack of a unified repository of dental care items makes the latter assessment unfeasible at this time in the United States.

A treatment classification was created by P&R, LLC as part of its Commercial Dental Market Recovery Tracking Report [14], based on a clinical and health services research review of the ADA CDT billing system. The classes of services are broadly assigned as Diagnostic (D0100–D0999), Preventive (D1000–D1999), Restorative

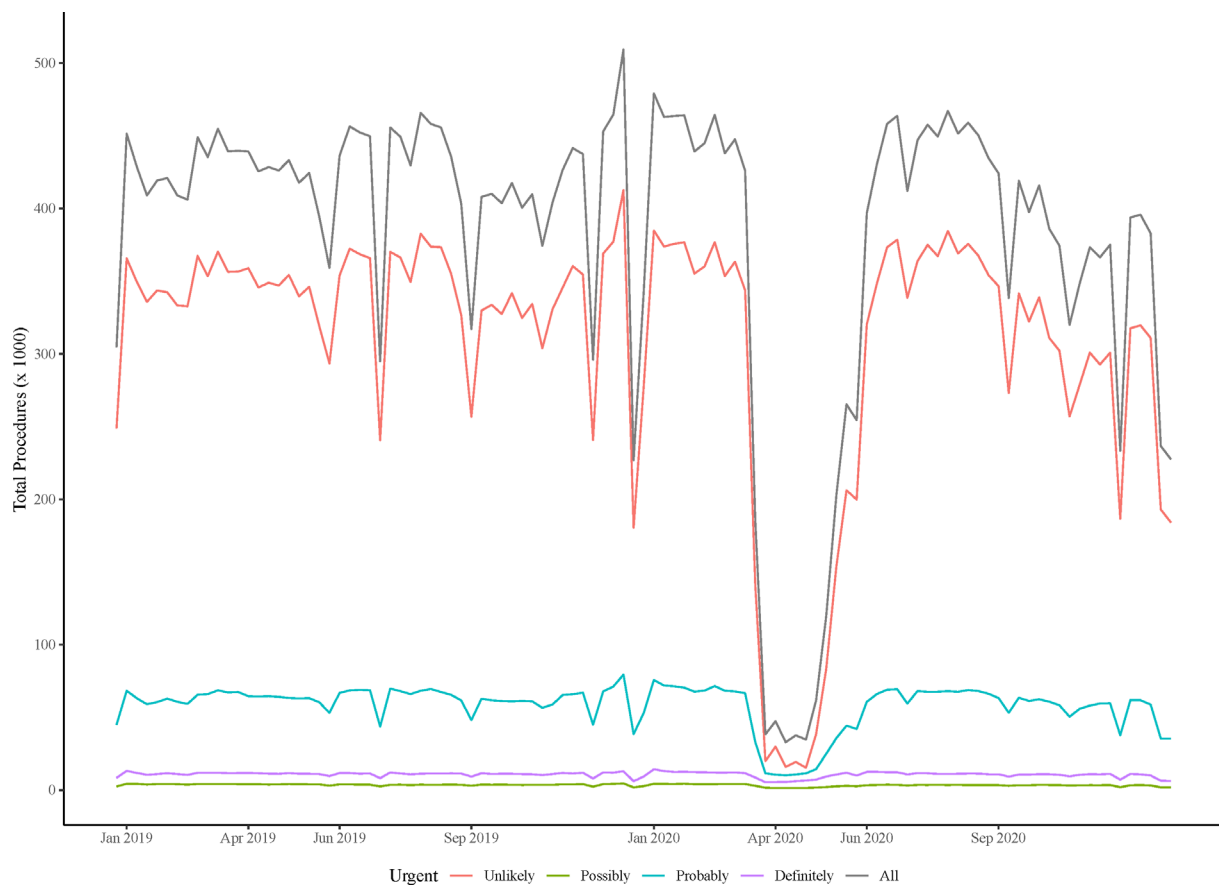


FIGURE 1 Total number of procedures during 2019 and 2020 [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

(D2000–D2999), Endodontics (D3000–D3999), Periodontics (D4000–D4999), Prosthodontics (removable) (D5000–D5899), Maxillofacial Prosthetics (D5900–D6000), Implant Services (D6000–D6199), Prosthodontics (fixed) (D6200–D6999), Oral and Maxillofacial Surgery (D7000–D7999), Orthodontics (D8000–D8999), and Adjunctive General Services (D9000–D9999). The codes in the study dataset were placed into one of four categories based on the likelihood that a code was associated with urgent/emergency care: Definitely/Highly Likely, Probably, Possibly, and Unlikely/Not. CDT codes D0140, D0170, D0171, D0460, D7270, D7911, D7912, D9110, D9430, D9440 were Definitely/Highly Likely emergency; Probably (D0220, D0230, D0270, D1354, D2799, D2910, D2915, D2920, D2929–D2934, D2941, D2951, D2980–D2983, D4320, D4321, D7111, D7140, D7210, D7250, D7220, D7230, D7240, D7241, D7251, D7510, D7511, D7520, D7521, D6930, D6980, D8701, D8702); Possibly (D3220, D3221, D3230, D3240, D3310, D3320, D3330, D3346, D3347, D3348, D3355–D3357, and all D34** group except for D3460; D6090–D6093, D6095, D5511, D5512, D5520, D5611–D5671, D6253, D6793); and Unlikely/Not (all D21** and D23**, as well as any other CDT codes not included in the previous three categories, which defaulted to the Unlikely/Not category). The differential utilization of dental treatment sought and offered was based on how urgent the oral condition

was, in the context of a pandemic situation in which person-to-person contact is not a trivial decision. More urgent care needs would then be less likely to be postponed. Such rationale behind the treatment classification in the Commercial Dental Market Recovery Tracking Report [15] has been separately replicated in various reports examining dental care use and demand in 2020 in the United States [11], in the United States and countries in Latin America and Europe [8], in Brazil [2], in Spain [3], and in Italy [4], as well as depending on whether dental care was offered in the public versus the private sector [1,3].

Data were analyzed using SAS (version 9.4; SAS Institute) and RStudio (RStudio Team, Boston, MA). Data were summarized at the procedure and visit levels. For the visit-level summaries by urgent/emergency care category, the highest urgency/emergency level of all procedures for the patient at that visit was used. Analysis of variance was used for comparisons of the amount paid per visit, and χ^2 tests were used for comparisons of the distribution of the urgent/emergency care categories.

RESULTS

The 5% patient random sample of this large segment of the US private dental insurance market yielded 3.8 million patients, broadly representing 68 million patients.

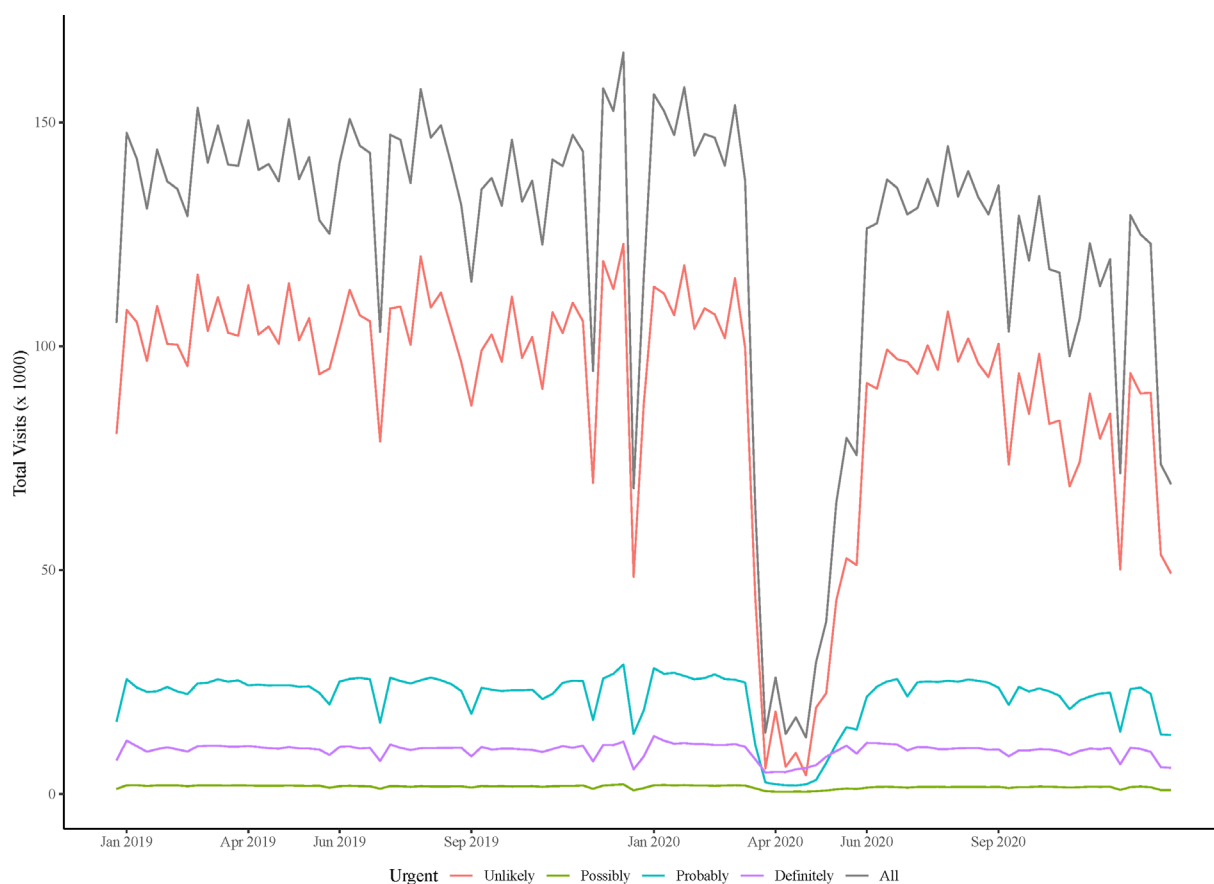


FIGURE 2 Total number of dental visits during 2019 and 2020 [Color figure can be viewed at wileyonlinelibrary.com]

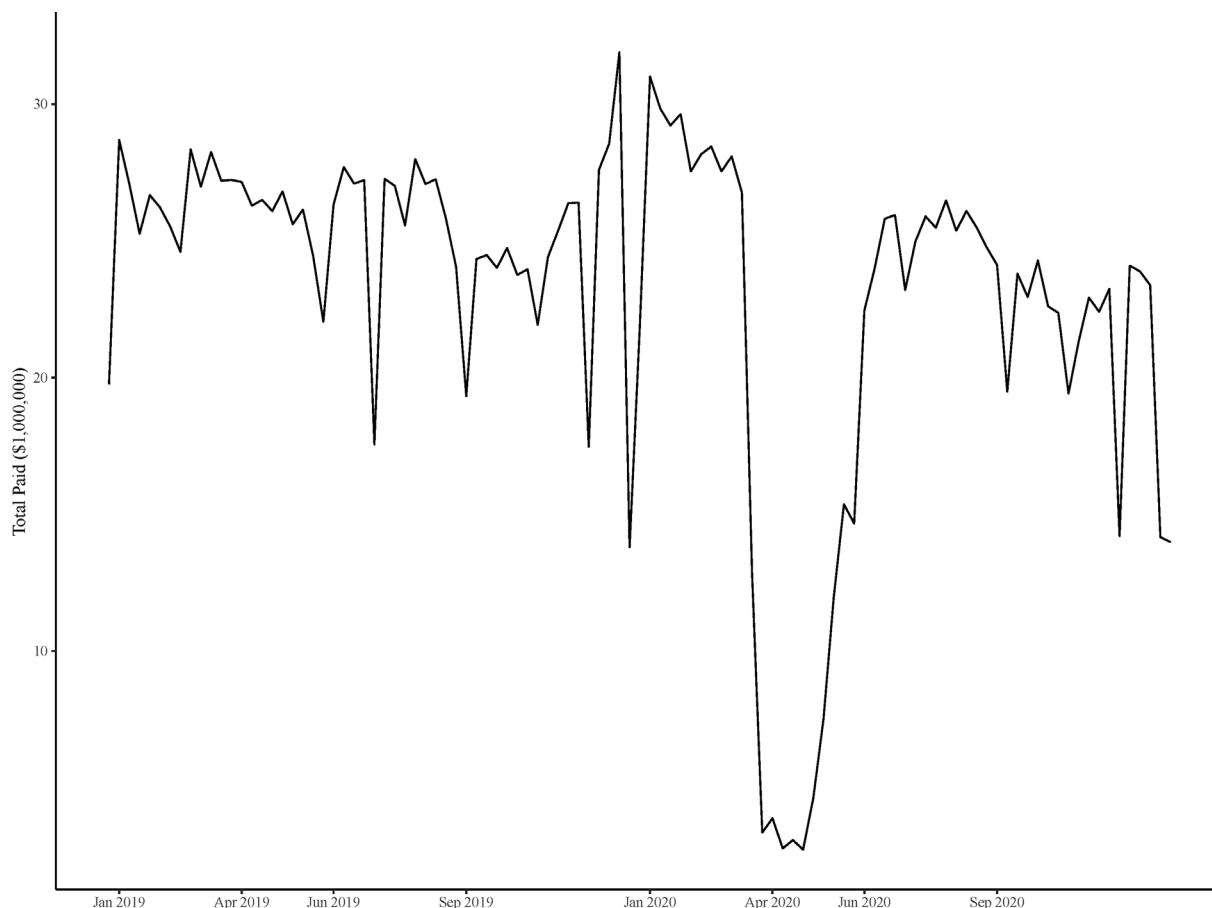


FIGURE 3 Amount paid for procedures during 2019 and 2020

Patients were 54% female, mean age 40 SD 22 years. Race/ethnicity is not available in our data. The sample had a total of 40 million treatment items (i.e., claim lines) in the analytic period, or an average of 10.6 treatments per patient, representing all US states and dental specialties. Briefly, an average of 1.8 million treatment items took place per month (range 1.6–2.0 million) prior to the Spring 2020 shutdown (Figure 1); April and May reports had only 175,000 and 867,000 treatment items, respectively. By June, treatment item volume had returned to normal levels (1.95 million), and maintained such trend through September before showing a slight drop-off again for October–December. Similar patterns were seen for dental visits across 2019 versus 2020 (Figure 2). The actual number of visits and of procedures across the four categories of treatment per week are in Table S1. During the height of the Spring 2020 shutdown when very few offices were open, dental insurance claims were disproportionately skewed toward the “Definitely/Highly Likely” and “Probably” urgent/emergency treatment categories (Figures 1 and 2), with consequent impacts in the total amount for billed and paid services (Figure 3). Actual amounts paid per visit, and for all visits and procedures per week are in Table S2; percentages of visits during aggregated intervals critical during the 2020

pandemic are contrasted with similar blocks of time in 2019 (Table 1). Note that drops in billings for holiday times are well represented in 2019 and in well-established dental care “voids,” that is, end of year season, Fourth of July, Thanksgiving, and so forth, when dental visits decline seasonally.

DISCUSSION

This is the first large-scale study of private insurance dental claims in the United States depicting variations between the advent of the SARS-CoV-2 pandemic, the lockdown in the Spring, and until December 2020, against claims filed throughout 2019. Because this is a health services research project incorporating a nationwide sample of data from private dental insurers, we are able to provide a *perspective* of visits, treatment trends, and cost impact for that specific segment of the US dental market. This is not a study representing the entire provision of all dental care items neither of all private dental insurance claims during 2019 and 2020. In addition, the secondary data analysis nature of the research precludes incorporation of diagnostic codes, nuances of clinical conditions, or detailed patient

TABLE 1 Percentage of visits within each emergency level category, across blocks of times in 2019 and 2020

	Emergency level			
	Unlikely	Possibly	Probably	Definitely
January–mid-March 2019	74.4	1.3	16.9	7.4
mid-March–mid-May 2019	74.2	1.3	17.2	7.3
Mid-May–August 2019	74.3	1.2	17.3	7.2
September–December 2019	74.2	1.3	17.1	7.4
January–mid-March 2020	73.3	1.3	17.7	7.6
mid-March–mid-May 2020	61.6	2.3	15.4	20.7
Mid-May–August 2020	72.1	1.2	18.5	8.3
September–December 2020	72.0	1.3	18.6	8.1

profiles—as they are not associated with electronic filing of insurance claims.

A large decrease in treatment items was apparent from mid-March through the end of April 2020, when the numbers started to recover (vs. months in 2019); levels in June 2020 appeared to be recovering but were still low compared to June 2019. This finding broadly coincides with the separate cellphone mobile application traffic assessment done through August 2020 [13]. The “Definitely” urgent visits decreased less than the other categories, but still decreased. The different profiles of treatments based on perceived/actual urgency mimics in general the findings from other countries [1–4,8]. The average amount paid per visit is relatively steady from January 2020 until mid-March 2020, when large fluctuations occurred. Costs per visit were more volatile during the shutdown period due to a notably different mix in procedures during that time. The slightly higher costs post-reopening might be due to pent-up demand; additionally, dentists raising their submitted claims during the 2nd half of 2020 may have been a consequence of increased operating costs (e.g., to cover PPE costs). Historically dentists tend to raise rates at the beginning of each year, but dental insurance carriers have noticed “off-cycle” increases in late 2020 (written communication, Tim Downey, May 26, 2021). Some trends in the delivery of treatments correspond to the Centers for Disease Control and Prevention and ADA guidance issued at certain times, when cases appeared to be subsiding and dental offices started operations again: 64.7% and 90.1% of dentists reporting offices were open by May 18 and June 1. More recent data [16] showed more offices opening between May and August, with some decline by October 2020 (40% reporting “business as usual”), based on a survey of ~3000 dentists.

A complete picture of how the dental market changed because of the SARS-COV-2 pandemic cannot be fully depicted at present time. The short-term impact upon the first, large-scale lockdown for social and economic activities has been characterized in the present report; subsequent lockdowns would accrue new opportunities to examine how providers and patients change their ability

to seek and secure dental care. A complementary factor overlaying the picture herein presented is the likelihood that the large increase in unemployment in 2020 could be associated with the loss of employment-related dental insurance (the latter being one of the strongest predictors of seeking dental care). The impact of lost benefits has been modeled through extrapolations from dental practice surveys [17] and the impact of unmet child dental care in small scale caregiver surveys [18] are beginning to emerge; they remain to be confirmed with actual data reports, as economic and employment data are superimposed with trends during 2021 and later.

There were research design limitations in the present study. Besides those pertinent to the sources of data (already described), limitations include the inability to account for publicly funded, out-of-pocket, or donated dental care, as there is no US registry depicting such markets. They would ideally complement the current private insurance data. Because the results are rather apparent as illustrated in the figures, the authors decided not to analyze the data with autoregressive models (e.g., with pre- and post-pandemic onset trend lines, comparing the pre- and post-pandemic onset intercepts and slopes) due to resource constraints. A defining factor to limiting analyses to be largely descriptive was the lack of detailed demographic and socio-economic data ascribable to individual records. The present study is a secondary data analysis representing a large proportion of the market; but the records are not a universal collection of claims.

The findings offer week-by-week, detailed descriptions of how a large segment of dental practice in the United States changed throughout the 2020 SARS-COV-2 pandemic, in contrast to 2019 utilization and cost data. The present report sets a baseline for longer-term appraisals, encompassing subsequent lockdowns or pandemic variations, to inform clinical and public health practice.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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