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COVID-19 and dental workers: The Italian Society of Periodontology and Implantology (SIdP) survey

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Abstract

Objectives: To evaluate the proportion of COVID-19 infections among a population of Italian Dental workers across different geographical area of Italy and to analyze the impact of both the preventive measures/strategies adopted and the psychological influences.

Subjects and Methods: The current cross-sectional survey was administered with a web-based form. To be eligible for the study, participants had to be 18 years and being dentists or dental hygienists members of the Italian Society of Periodontology and Implantology (SIdP). A 23-item questionnaire concerning positiveness to COVID-19, clinical strategies and psychological attitude within the pandemic was administered. Sub-group analysis was conducted according to geographical macro-area.

Results: A total of 790 dentists and dental hygienists were included. A total of 4.7% participants developed a positive diagnosis to COVID-19. The Northwest of Italy experienced almost double of COVID-19-positive participants ($p < 0.05$). Preoperatory mouthwashes together with natural air change/ventilation were the most frequent approaches used to prevent COVID-19 outbreak. Positive and proactive attitudes were predominant among participants. Only a reduced proportion feels some concerns for the future.

Conclusions: Prevalence of positive COVID-19 among dental workers in Italy was double in Northwest area in comparison with the whole country proportion. Preventive strategies comprise mainly ultrasound reduction and preoperative mouthwashes.

KEYWORDS
COVID-19, cross-sectional, prevalence

1 | INTRODUCTION

Newly emerging virus diseases have become a major public health threat around the world in recent years. In December 2019, the first cases of an unknown disease were reported in Wuhan, China. The causative agent was identified to be a coronavirus species, SARS-CoV-2, which can promote a clinical condition that was named on January 12, 2020, by the World Health Organization (WHO) Coronavirus disease 2019 (COVID-19)(WHO, 2020). The main clinical characteristics in humans are highly heterogeneous with a plethora of clinical manifestations, from asymptomatic (never symptomatic or mild symptomatic) infection to severe disease with respiratory and multi-organ failure and death. Globally, as of July 19 (2021), there have been more than 190.000.000 of confirmed cases, including 4.000.000 deaths, and Europe results the second macro-area for number of cases, behind Americas. Italy was the first country out of Asia to be involved in the outbreak of the pandemic; currently, more than 4000000 cases were detected (WHO, 2021) resulting from the

very beginning in a lockdown in a bid to stop the virus from continuing to spread and to mitigate the impact on society. Indeed, the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) throughout the world has been extremely rapid, suggesting the hypotheses of a crucial role played by those infected persons who remain asymptomatic even if contagious (Buitrago-Garcia et al., 2020). The main transmission dynamics is owing to the airborne in both asymptomatic and pre-symptomatics (Clementini et al., 2020; Kissler et al., 2020; Prather et al., 2020). Small virus-containing droplets (5–12 micro) and aerosols (<=5 micro) from infected people are transmitted into the environment through breathing, speaking, and coughing (Kutter et al., 2018) and also by touch of contaminated surfaces and eventually transfer viral fragments/particles to their mucus membrane (Barbato et al., 2020).

In many epidemics, healthcare workers (HCWs) have been reported to be at increased risk of occupational infection and have been suggested to be a source of onward transmission to other HCWs, patients and within their community. The latter tendence was observed also for early reports of COVID-19, where the incidence of infection was higher in HCWs than the general public (Nguyen et al., 2020; Rudberg et al., 2020; Zheng et al., 2020).

For what concerns the dental community, a recent piece of evidence claims that the prevalence of COVID-19 among US dentists as of June 2020 (i.e., first wave of pandemic) was 0.9% (95% confidence interval, 0.5–1.5) (Estrich et al., 2020); the latter figure was comparable to those coming from other countries, such as China (1.1%) (Lai et al., 2020) and the Netherlands (0.9%)(Kluytmans-Van Den Bergh et al., 2020).

The outbreak of COVID-19 has also adversely affected the lives of people in different ways such as economy, global health, and human live as a whole. In fact, It is widely discussed that the pandemic has forced countries to adopt lockdowns, quarantines, and restrictive measures, contributing to worsen the world economy, inducing long term negative effects even in the recovery period (Wei et al., 2021). Furthermore, given the high level of contagiousness, almost every country has adopted different containment measures such as physical distancing, cases isolation, quarantine, and contact tracing according to the infected population and number of deaths. The latter have caused fear, frustration, anger, and long list of complex negative emotions (Fiorillo & Gorwood, 2020; Rubin & Wessely, 2020; Xiong et al., 2020).

Trying to understand pandemic is key for dental teams, as is the need to put strategies and protocols in place for treating patients and protecting healthcare workers while vaccination programs are being developed. In this perspective, several critical issues characterize the dental setting in terms of occupational risk for COVID-19 outbreak. Droplet generation, during routinely operative procedures, comprises spatter (>100 μm in diameter), "droplet" (5–100 μm in diameter), and "aerosolized particle" (<5 μm). These droplets reach the highest concentration within 0.6m around the patient, that at the light of the proximal working distance during dental practice, heighten the potential contamination risk suffered by the dental workers (Leggat & Kedjarune, 2001; Pierre-Bez et al., 2021). Until the date, despite Italy was the first country in Europe to be overwhelmed by the COVID-19, sparse information is available on the effect of the pandemic's breakthrough among dentists in different geographic area of Italy. A recent piece of evidence quantifies the SARS-Cov-2 antibody prevalence in a sample of dentists, dental hygienists, and other personnel employed among the dental staff in Lombardy region. It shows that the prevalence of infection was around 10%, in line with estimates on other healthcare professionals (Gallus et al., 2021).

For such background, the present investigation aims to evaluate the proportion of COVID-19 infections among a population of Italian Dental workers (Dentists, Dental Hygienists) across different geographical area of Italy. Furthermore, the impact of both the preventive measures/strategies adopted by dental offices and the psychological influences that pandemic had on the dental private practice were also analyzed.

2 | MATERIAL AND METHODS

The current descriptive cross-sectional survey was administered with a web-based form from January 13 through February 20, 2021, during the late phase of second "wave" of COVID-19 pandemic in Italy. For the preparation of the present analysis, we followed the STROBE guidelines for cross-sectional studies(von Elm et al., 2014). To be eligible for the study, participants had to be 18 years or older and to be part of the following working categories: Ordinary and Active Members of the Italian Society of Periodontology and Implantology (SIdP), dentists, dental hygienists (both dental office owner and collaborator were admitted).

A digital inform consent was signed before participants starts to fulfill the 23-questions survey that was designed for the current research. Study participants were categorized in the following geographic areas: Northwest (Piemonte, Liguria, Valle d'Aosta), Northeast (Lombardia, Veneto, Friuli VG, Trentino Alto Adige), Center (Toscana, Emilia-Romagna, Marche, Lazio, Abruzzo), and South and Island (Campania, Basilicata, Molise, Puglia, Calabria, Sardegna, Sicilia). The survey subministers were articulated in six different sections. Demographic section included age (categoric variable), current professional status, and number of dental chairs per dental office (continuous variable). COVID-19 prevalence based on self-declaration was identified according to information organized as SARS-CoV-2 experience for the individual, the dental office team and for the patients; they were turned into a positive answer in relation to a positive result after any SARS-CoV-2 tests available. The survey also asked for information regarding a positive case of the dental staff after direct contact with a positive patient. According to the time span, the survey was administered and the Italian Minister of Public Health policy on vaccinations; dental workers were not vaccinated.

The second section comprises details about the source of information regarding the guidelines to adopt in the dental clinic against

the spread of the pandemic and in which measure they were followed/implemented. The third section relates to the personal protective equipment that operative and administrative staff are asked to wear. The fourth section deals with the clinical strategies applied to reduce aerosol and the disinfection of solid surfaces. Furthermore, it was implemented with information regarding the changes that pandemic has induced in the organization of the dental practice. The fifth section comprises the information about performing diagnostic tests settled out by the dental office for monitoring the SARS-Cov-2 infection. The last section of the investigation was written to obtain information about the psychological state and changes in attitude during the pandemic.

2.1 | Statistical analysis

Stata software (Stata© 15 IC) was used to conduct statistical analysis (Descriptive and inferential). Continuous variables were described as mean and confidence interval at 95%. Categorical and dichotomous variables were described as proportions and Wilson's confidence interval at 95%.

The normal distribution of variables was evaluated with Shapiro–Wilk test for normality (*command swilk*). Differences between continuous variable were tested using analysis of variance and between categorical variables using chi-square tests, with statistical significance set at.05 (*commands oneway* and *prtest/mgof*). Multivariate regression analysis was modeled considering the proportion of infected case as dependent variable. The final model who best fit for the data was chosen according to the lower value of AIC (*Akaike information Criterion*). The independent variables of the initial model were as follows: age, patient positive to COVID-19 test, team component positive to COVID-19 test, use of personal protective equipment, use of ultrasounds/air abrasive/rotatory instruments, and use of COVID-19 diagnostic tests (*command allsets*).

3 | RESULTS

A total of 790 dentists and dental hygienists answer to the web-based survey, through an original sample of 1784, with a response rate of 44.3%.

3.1 | Demographics and prevalence of infection

The more representative age category was 50–59, with 75% of dentists who are owner of the dental clinic. Dental clinics allocated in Northeast have more dental chairs in comparison with center and northwest of Italy (Table 1). A total of 4.7% participants developed a positive diagnosis to COVID-19: Northwest of Italy experienced almost double of COVID-19-positive participants than the other geographic area (Table 1).

3.2 | Source of information

The most frequent source of information about COVID-19 and its preventive measure were webinars and scientific literature. Dentist of southern Italy has used webinars as a source of information more extensively. Globally, dentists perceived to have a satisfactory level of information and admit having follow, and in half of the cases implemented, official recommendations with no differences among regions. Eventually, the dental settings were deemed as low-risk environment (Table 2).

3.3 | Personal protective equipment

Patients were kept informed about dental office preventive strategies mainly via verbal instructions and information (Table 3). To prevent COVID-19 breakthrough, visors and FFP2/3 masks were implanted in the daily routine both for the clinical and for the administrative staff. Italy southern area used more visors and FFP2 masks also for the administrative staff (Table 3). Half of the cohort changes FFP2 masks every 5–6 hours, and they were reconditioned only by a limited proportion of dentists (24%). The latter procedure was more used in the center area of Italy.

3.4 | Strategies to reduce the infection

Preoperatory mouthwashes together with natural air change/ventilation were the most frequent approaches used. Mouthwashes were implemented less on southern Italy (Table 4). Among dental instruments whose use has been reduced for preventive purposes, the abrasive air system was the most, particularly on Northwest ($p = 0.032$). South of Italy was the region that reduces the least both Ultrasonic instrument and Air abrasive system (Table 4). As this regard, the combined strategy ultrasound plus antimicrobial solution was the most frequently deployed. Additional time dedicated to implement all the strategies within the daily routine was around 10–20 minutes for the most of participants, and the rate table was maintained unaltered for 76% of participants.

3.5 | Diagnostic tests

Half of the participants carried out diagnostic tests in the dental clinic, mainly in case of suspicion: The most used were the serological test and the rapid salivary antigenic test. Only a small proportion of participants will refuse to get vaccinated.

3.6 | Attitude during the pandemic

The main attitude that arises from the participants can be defined as positive and proactive. Only a reduced proportion feels some

TABLE 1 Demographic characteristics and prevalence of COVID-19 infection among participants/geographic area

Characteristics		North West	North Est	Centre	South/Island	*p*-value
Age, years category	Freq/%					
24–30	33/4.18%					
30–39	152/19,4%					
40–49	159/20.13%					
50–59	256/32.41%					
60–69	163/20.63%					
>=70	27,/3.42%					
Current professional status	%, CI (95%)					
Dental clinic owner	74.7 (71.6–77.6)	78.88 (72.8–83.7)	76.1 (70.2–81)	65.9* (58.6–72.5)	80 (72.7–857)	0.0144
Dental Hygienist	7.6 (5.9–9.6)	5.53 (3.2–9.5)	8.3 (5.4–12.5)	13.07* (8.8–18.9)	3.45 (1.5–8.1)	0.0062
Periodontist/ collaborator	17.7 (15.2–20.5)	15.69 (11.4–21.1)	15.7 (11.6–20.9)	21 (15.6–27.7)	16.6 (11.2–23.5)	
Number of dental chairs per dental office	Mean, CI (95%)					
	3.91 (3.7–4.1)	3.61 (3.2–4.1)*	4.61 (4.1–5.4)*§	3.45 (3.1–3.7)§	3.81 (3.3–4.3)	
COVID–19 disease experience	%, CI (95%)					
Reported Positive Test	4.7 (3.4–6.4)	8.76 (5.7–13.3)*	4.13 (2.3–7.4)	2.27 (0.8–5.7)	2.76 (1.1–6.8)	0.000
COVID–19 Dental team experience	%, CI (95%)					
No members rpt	73.8 (70.7–76.8)	70.1 (63.6–75.8)	76.4 (70.7–81.4)	76.7 (69.9–82.4)	72.4 (64.6–79.1)	
One member rpt	18 (15.4–20.1)	19.8 (15–25.6)	15.7 (11.6–20.9)	17 (12.2–23.3)	20 (14.3–27.3)	
More than one	8.2 (6.5–10.3)	10.1 (6.7–14.9)	7.9 (5.1–12)	6.3 (3.5–10.9)	7.6 (4.2–13.2)	
COVID–19 Patients experience	%, CI (95%)					
Dental Clinic patient's rpt	49.94 (46.5–53.4)	43.8 (37.3–50.5)	50.82 (44.5–57.1)	51.7 (44.3–59)	53.8 (45.6–61.2)	

*Statistically significant for (*P* < 0.05).

concerns for the future (Table 5). The main doubts concern the changes that the profession will have to undergo in economic terms and the chance that they will last another year (Table 5).

3.7 | Multivariate logistic regression

The final model obtained (Figure 1) acknowledges the role of one or more contagions occurred at dental team's stakeholder as covariates able to augment the probability to be COVID-19 positive with an OR of 3.53 and 4.76, respectively (*p* < 0.00). A patient with a positive diagnosis of COVID-19 demonstrates a protective role against the probability to develop an infection for the dentist/dental hygienist (OR = 0.46). The model obtained shows a Pseudo-R^2 of 13%.

4 | DISCUSSION

To the author's best knowledge, this is the first investigation aimed to compare COVID-19 outbreak across different Italian's geographical area. In fact, the current web-based cross-sectional survey estimates the proportion of dentists/dental hygienists SARS-CoV-2 infected in a cohort of participants belonging to the Italian dental Community. The proportion of positive cases was in line with that of healthcare workers in Washington (U.S.A) by a molecular test (PCR) (U.S Seattle, 5.3%) (Mani et al., 2020) but significantly higher than that reported retrospectively by information derived from a molecular test (PCR) for health workers of China (1.1%) (Lai et al., 2020) and in U.S dentists (0.9%) (Estrich et al., 2020). In the latter investigation, positiveness to COVID-19 was reported to be assessed either with nasal or throat swab test, blood sample, or saliva.

According to the Italian Superior Health Institute, the number of health workers infected as of 23 of July (2021) amounted to 138.275 (ISS), representing the highest proportion in Europe. The proportion of positive tests in our experiment resulted highly heterogeneous among different geographical areas and tendentially higher in comparison with European countries. In fact, the northern part of the country experienced 2–4 times greater proportion of COVID-19-infected dental workers in comparison with the Centre/South. This tendence resembles the geographical outbreak of the pandemic

TABLE 2 Source of Information and followed recommendations among participants and geographic area

COVID−19 Update		Northwest	North Est	Centre	South/Island	p value
Source of information	%, CI 95% (Wilson)					
SIdP website	45.13 (41.7–48.6)	40.1 (33.8–46.7)	41.7 (35.7–48.1)	54.5 (47.2–61.8)*	49.7 (41.6–57.7)	0.018
Italian Ministry of Health	42.10 (38.7–45.6)	45.6 (39.1–52.3)	40.1 (34.9–47.2)	44.3 (37.2–51.2)	38.6 (31.1–46.7)	
Newspaper	37.04 (33.7–40.5)	41.9 (35.6–48.6)	34.3 (28.6–40.5)	36.9 (30.2–44.3)	35.2 (27.9–43.2)	
Scientific literature	85.46 (82.8–87.7)	87.6 (82.5–91.3)	85.1 (80.1–89.1)	86.4 (80.5–90.6)	82.1 (75.1–87.5)	0.049
Webinars	70.54 (67.3–73.6)	72.4 (66.1–77.9)	67.8 (61.6–73.3)	66.5 (59.2–73.1)	77.9 (70.5–83.9)*	
COVID−19						
Level of acquired information	%, CI (95%)					
Low	3.41 (2.4–4.9)	3.22 (1.5–6.6)	2.9 (1.4–5.9)	4.0 (1.9–8.1)	4.1 (1.9–8.9)	
Enough	62.58 (59.2–65.9)	61.3 (54.6–67.6)	63.6 (57.4–69.5)	67.6 (60.3–74.1)	56.6 (48.4–64.4)	
High	34.01 (30.8–37.4)	35.5 (29.4–42.1)	33.5 (27.8–39.7)	28.4 (22.3–35.5)	39.3 (31.7–47.5)	
Followed recommendations						
Completely followed	%, CI (95%)					
Implemented	49.18 (45.7–52.7)	47.47 (40.9–54.1)	53.72 (47.4–59.9)	51.14 (43.8–58.5)	41.38 (33.6–49.6)	
Partially Followed	42.29 (39.4–46.3)	45.62 (39.1–52.3)	38.84 (32.9–45.1)	40.91 (33.9–48.3)	48.3 (40.2–56.4)	
Partially (Organization)	6.32 (4.9–8.2)	4.61 (2.5–8.4)	6.20 (3.8–10.1)	5.68 (3.1–10.2)	9.70 (5.8–15.7)	
Followed (Few DPI)	1.64 (0.9–2.8)	2.30 (0.9–5.4)	1.24 (0.4–3.8)	2.27 (0.9–5.9)	.10 (0.0–4.7)	
COVID−19 risk for the dental office	%, CI (95%)					
Safe environment	15.24 (12.9–18)	14.43 (11.9–19.5)	15 (12.8–19.2)	14.8 (12–18.7)	13.9 (11.9–19.3)	
Low risk	63.15 (59.7–66.5)	60.15 (55.7–69.5)	63.77 (59.7–66.5)	63.22 (59.4–67.6)	63.15 (59.7–66.5)	
Probable	21 (18.2–24)	19.8 (17.5–26.6)	20.7 (18.2–24)	21.1 (18–24.7)	21 (18.2–24)	
Unsafe	0.66 (0.3–1.5)	0.88 (0.6–2.1)	0.52 (0.3–1.5)	0.56 (0.2–1.7)	0.66 (0.3–1.5)	
Official Preventive measures proposal was:	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Excessive	3.54 (2.4–5.0)	4.02 (2.2–5.8)	3.77 (2.4–5.3)	3.4 (2.2–4.8)	3.5 (2.3–5.1)	
Necessary	69.86 (66.5–73.0)	67.54 (65.6–76.1)	68.8 (66.2–73.2)	69.6 (66.2–72.8)	69.7 (66.3–72.7)	
Necessary but with too high costs	26.7 (23.6–29.9)	24.7 (23–31.9)	26.4(23.1–28.9)	26.3 (23.7–28.8)	26.9 (23.4–30)	

*Statistically significant for (P < 0.05).

observed in the general population, with a substantial gradient at the latitude levels with the highest spread in the northern regions and the lowest in the southern regions/main islands (Prezioso et al., 2020). The proportion of COVID-19 infections among dental workers observed in our experiment could be explained keeping into consideration the timing pandemic has spread throughout the country and the difference in density of population that characterizes these two different areas. As a matter of fact, Italy's first case of COVID-19 disease was recorded in Lombardy on February 20, 2020, but recent data confirm that it was present in the north of Italy on asymptomatic individuals weeks before (Apolone et al., 2020). Furthermore, the North of Italy (Northeast and Northwest) is the richest Italian area, with the highest number of international trades, the largest number of residents, and the highest population density. Recently, Gallus and co. published a cross-sectional analysis about antibody prevalence in a sample of dental workers in Lombardy region. Lombardy remains today among the regions most hit by COVID-19

areas worldwide, in which the pandemic has killed almost 20.000 people and infected more than 400.000 (Task Force COVID-19, ISS 2020) by far the highest rate in Italy (Remuzzi & Remuzzi, 2020). The prevalence found by Gallus and co. was 10.8%, that is double as high in comparison with that obtained in our general sample (4.7%, IC 95%: 3.4–6.4) and comparable with that obtained in the Northwest area of Italy. The reason of discrepancy can be owing to the different way to assess prevalence: Indeed, seroprevalence can be considered far more accurate than a self-declaration. Comparing the previous data, it seems plausible that a considerable proportion of dentists/dental hygienists that participate to our survey were asymptomatic and so unaware of experiencing a COVID-19 infection. The role of asymptomatic/paucisymptomatic in the outbreak of SARS-Cov-2 infection was deemed to be crucial. Recently, a systematic review was conducted to assess the prevalence of people who became infected and does not experience symptoms at all (Buitrago-Garcia et al., 2020): The results show that 20% (CI: 17–25) of people were

TABLE 3 Information to patients and personal protective equipment (PPE)

Dental office organization	Total Sample	Northwest	North Est	Centre	South/Island	p value
Information to patients	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	
Yes, the Dental office informs the patients	95.58 (93.9–96.8)	94.93 (91.1–97.1)	95.04 (91.5–97.1)	96.59 (92.8–98.4)	96.6 (92.2–98.6)	
Yes, Verbally	82.43 (79.6–84.9)	81.11 (75.4–85.8)	83.47 (78.3–87.6)	85.23 (79.2–89.7)	80.7 (73.5–86.3)	
Yes, by video/poster	40.45 (37.1–43.9)	38.25 (32.1–44.9)	41.32 (35.3–47.6)	38.63 (31.8–46)	42.76 (34.9–50.9)	
Yes, by social network/mailing	25.03 (22.1–28.2)	27.2 (21.7–33.5)	26.4 (21.3–32.3)	21.6 (16.2–28.2)	24.83 (18.5–32.5)	
DPI adopted for the operating staff						
(Dentists, Dental hygienists, Assistants)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Surgical Masks	64.60 (61.2–67.9)	63.59 (57–69.7)	68.18 (62.1–73.7)	62.5 (55.2–69.3)	62.01 (54–70)	
FFP2/FFP3 Masks	97.97 (96.7–98.8)	96.77 (93.5–98.4)	98.76 (96.4–99.6)	98.3 (95.1–99.4)	97.93 (94.1–99.3)	
Single-use TNT Gowns	79.64 (76.7–82.3)	77.88 (71.9–82.9)	78.92 (73.4–83.6)	81.82 (75.5–86.8)	81.38 (74.3–86.9)	
Washable TRT Gowns	51.58 (48.1–55)	55.3 (48.6–61.8)	51.66 (45.4–57.9)	51.71 (44.4–59)	46.21 (38.3–54.3)	
Visors	97.72 (96.4–98.6)	97.23 (94.1–98.7)	98.35 (95.8–99.4)	98.29 (95.1–99.4)	96.55 (92.2–98.5)	
Goggles	78.12 (75.1–80.9)	82.03 (76.4–86.6)	81.41 (76.1–85.8)	75 (68.1–80.8)	71.7 (63.9–78.4)	
DPI adopted for the administrative staff	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Surgical Masks	62.32 (58.9–65.6)	60.83 (54.2–67.1)	66.52 (60.4–72.2)	60.8 (53.4–67.7)	58.62 (50.5–66.3)	
FFP2/FFP3 Masks	74.33 (71.2–77.3)*	70.97 (64.6–76.6)	70.66 (64.6–76.1)	78.41 (71.8–83.5)	82.1 (75.1–87.5)*	0.033
Single-use TNT Gowns	30.09 (26.9–33.4)	26.73 (21.3–33)	27.27 (22–33.2)	35.8 (29.1–43.1)	33.0 (26–41.1)	
Washable TRT Gowns	17.44 (15–20.2)	17.51 (13–23.1)	17.36 (13–22.6)	17.61 (12.7–23.9)	17.93 (12.5–25)	
Visors	58.15 (54.7–61.6)*	55.76 (49.1–62.2)	52.07 (45.8–58.3)	64.2 (56.9–70.9)	66.21 (58.2–73.4)*	0.049
Goggles	34.51 (31.3–37.9)	33.64 (27.7–42.2)	32.23 (26.7–38.4)	35.8 (29.1–43.1)	38.62 (31.1–46.7)	
Dental team behavior in case of FPP2 use	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
FPP2 wear together with SM	71.93 (68.7–75)	66.82 (60.3–72.7)	73.96 (68.1–79.1)	76.14 (69.3–81.8)	70.34 (62.5–77.2)	0.049
Changed every 5–6 h	50.57 (47.1–54)	55.29 (48.6–61.8)	49.17 (42.9–55.5)	52.27 (44.8–59.6)	43.45 (35.6–51.6)	
Changed every day	49.43 (46–53)	44.70 (38.2–51.4)	50.82 (44.5–57.1)	47.72 (40.4–55.1)	47.72 (40.4–55.1)	
Reconditioned (Alcohol, UV, Autoclave)	24.27 (21.4–27.5)*	18.43 (13.8–24.1)*	30.17 (24.7–36.2)*	18.75 (13.7–25.2)	30.34 (23.4–38.3)	

*Statistically significant for (P < 0.05).

asymptomatic during infection. Moreover, half of the participants of the current experiment belongs to age categories of less than 49 y.o; epidemiologically, both the severity and the symptomatology are more pronounced in elderly (Kluytmans-Van Den Bergh et al., 2020).

Interestingly, the proportion of dental workers resulted positive after a contact with a confirmed positive patient was extremely low (0.08%, IC (95%) 0.03–2.2). The latter data seem to account for both a tangible sign of the dental setting's safety in terms of Pandemic's diffusion and for the high response of dental workers in terms of followed recommendations (Table 2).

In the struggle to reduce the risk of SARS-CoV-2 infection in the dental setting, the personal protection equipment most frequently adopted was the surgical masks together with filtering facepiece 2 or 3 masks (FFP2-FFP3); no differences were detected among the different area of Italy analyzed. This strategy was already described for dental settings and is in line with previous data acknowledging the protective measures adopted among dentist in Lombardy, Italy (Cagetti et al., 2020). Likewise, the concern about wearing a filtering mask was addressed in a cross-sectional on-line based survey completed by 650 dentists from 30 countries

TABLE 4 Strategy to prevent infection (aerosol reduction) and changes of the dental clinic management

Dental office clinical strategies	Total Sample	Northwest	North Est	Centre	South/Island	p-value
Aerosol reduction	%, CI 95%	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95%	%, CI 95% (Wilson)	
Natural ventilation	86.22 (83.6–88.5)	83.87 (78.4–88.2)	86.78 (78.4–88.2)	87.5 (81.7–91.6)	88.28 (81.9–92.6)	
HEPA filters	27.68 (24.7–30.9)	25.35 (19.9–31.6)	28.51 (23-2–34.5)	29.55 (23.3–36.7)	26.9 (20.3–34.7)	
Forced ventilation	25.92 (23–29.1)	28.11 (22.5–34.5)	29.34 (24–35.4)	21.02 (15.6–27.7)	23.45 (17.3–31.1)	
Preoperatory mouthwashes (Clorhexidine, Hydrogen Peroxide, Cetylpyridinium chloride, Povidone iodate)	86.85 (84.3–89.1) *	90.78 (86.1–94)	88.43 (83.7–91.1)	85.8 (79.8–90.2)	80 (72.7–85.7) *	0.014
High-speed ventilatory system	55.12 (51.7–58.6)	58.25 (51.8–64.9)	57.44 (51.1–63.5)	49.43 (42.1–56.8)	51.72 (43.6–59.8)	
Rubber dam	81.29 (78.4–83.9)	83.4 (77.8–87.8)	85.54 (80.5–89.4)	75.6 (68.7–81.4)	78.62 (71.2–84.6)	
High-speed rotatory instrument reduction/ elimination	34.01 (30.8–37.4) *	42.86 (36.4–49.5)	36.36 (30.5–42.6)	25 (19.1–31.2) *	27.6 (20.9–35.4)	0.011
Ultrasonic instrument reduction/ elimination	29.84 (26.8–33.1) *	36.87 (30.7–43.5) *	29.34 (23.9–35.4)	27.84 (21.7–34.9)	21.34 (15.4–28.8) *	0.023
Air abrasive instrument reduction/ elimination	49.56 (46.1–53) *	56.22 (49.5–62.7) *	47.52 (41.2–53.8)	51.7 (44.3–59)	40.69 (32.9–48.9) *	0.032
Ultrasound instruments usage	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
As before	25.13 (22.2–28.3)	21.86 (16.8–27.9)	23.83 (18.8–29.7)	25.43 (19.5–32.5)	31.69 (24.6–39.8)	
Together with antimicrobic solutions	45.75 (42.3–49.3)	46.05 (39.5–52.8)	48.51 (42.2–54.9)	43.35 (36.2–50.8)	43.66 (35.7–51.9)	
Only on selected cases	26.7 (23.7–29.9)	28.84 (23.2–35.3)	25.11 (20–35.5)	28.33 (22.1–35.5)	23.94 (17.6–31.7)	
Never used again	2.45 (1.6–3.8)	3.26 (1.6–6.7)	2.55 (1.2–5.6)	2.89 (1.2–6.8)	.7 (.0–4.8)	
Disinfection of solid surfaces	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Alcoholic solutions	82.93 (80.2–85.4)	86.18 (81–90.1)	82.64 (77.4–86.9)	78.98 (72.4–84.3)	84.14 (77.3–89.2)	
Sodium Hypochlorite	42.22 (38.8–45.7)	41.47 (35.1–48.1)	41.74 (35.7–48.1)	43.20 (36.12–50.6)	44.14 (36.3–52.3)	
Hydrogen Peroxide	32.11 (29–35.4)	27.65 (22.1–34)	36.78 (30.1–43)	31.81 (25.4–39)	31.72 (24.7–39.7)	
Quaternary ammonium	33.75 (30.6–37.1)*	31.34 (25.5–37.8)	38.43 (32.5–44.7)	26.14 (20.2–33.1)*	32.64 (30.5–39.1)	0.033
As before	38.44 (35.1–41.9)	35.94 (29.9–42.5)	39.67 (33.7–45.9)	39.77 (32.8–47.1)	39.31 (31.7–47.4)	
Additional time dedicated to preventive strategies	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
<=10 minutes	22.28 (19.5–25.4)*	14.49 (10.4–19.9)*	28.38 (22.9–34.6)	21.05 (15.6–27.8)	26.81 (20.1–34.8)	
10–20 minutes	66.45 (63–69.7)	70.09 (63.6–75.9)	63.32 (56.9–69.3)	67.83 (60.5–74.8)	62.32 (53.9–70.1)	
>20 minutes	11.27 (9.22–13.7)	15.42 (11.2–20.9)	8.3 (5.4–12.6)	11.11 (7.2–16.8)	10.87 (6.65–17.3)	

TABLE 4 (Continued)

Dental office clinical strategies	Total Sample	Northwest	North Est	Centre	South/Island	p-value
Rate table changes following preventive measures adoption	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI CI (95%)	
Globally Increased	4.6 (3.3–6.3)	3.27 (1.6–6.7)	3.95 (2.1–7.4)	4.11 (2–8.4)	6.52 (3.4–12.1)	
Increased only on specific treatments	15.51 (13.1–18.3)	12.15 (8.4–17.3)	20.61 (15.8–26.4)	17.01 (12.1–23.5)	10.87 (6.7–17.3)	
Fixed Ticket	3.29 (2.2–4.8)	5.14 (2.9–9)	2.63 (1.2–5.7)	1.17 (.3–4.6)	4.35 (2–9.4)	
As before	76.61 (73.5–79.5)*	79.44 (73.5–84.3)	72.8 (66.7–78.2)*	77.64 (70.8–83.3)	78.26 (70.6–84.4)	0.003
Changes in the schedule of the dental office	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Single treatment time optimization	73.96 (70.8–76.9)	69.12 (62.7–74.9)	78.93 (73.4–83.6)	74.43 (67.5–80.3)	73.10 (65.4–79.7)	
Increase of dental office daily hours	29.7 (26.6–33)	29.03 (23.4–35.4)	27.69 (22.4–33.6)	27.84 (21.7–34.8)	35.86 (28.5–43.9)	
Increase of dental office working days	16.69 (14.25–19.4)	11.98 (8.31–17)	22.31 (17.5–27.9)	13.07 (8.86–18.9)	18.62 (13.1–25.7)	0.019
As before	18.1 (15.6–20.9)	15.21 (11.04–20.6)	19.42 (14.9–24.9)	18.18 (13.2–24.5)	20.69 (14.9–28)	

*Statistically significant for (P < 0.05).

worldwide. The vast majority of the sample (84%) was aware about the importance to wear a filtered mask during the dental practice (Ahmed et al., 2020).

Considering both the high risk level of cross-infection in dentistry (Harrel et al., 1998; Szymańska, 2007), owing to aerosols produced during a variety of dental procedures, and the way of transmission of SARS-CoV-2, great attention was early dedicated to the prevention of splatters and aerosol to reduce the potential risk of SARS-CoV-2 outbreak. The most frequent strategies from our cohort were the use of natural ventilation between patients and the use of preoperatory mouthwashes (Table 3). The latter were used with high frequency throughout the whole national territory, but more consistently in the North. Evidence demonstrates, indeed, that mouthwashes have the capability to decrease the infectivity of airborne transmitted microorganisms in saliva, including SARS-CoV-2 (Muñoz-Basagoiti et al., 2021; Statkute et al., 2020); they are relatively expensive and easy to deployed in the clinical setting thus contributing to decrease the oral transmission chain. This finding is comparable with the results obtained in a survey of dentists in Lombardy (Cagetti et al., 2020), in which the majority of participants used preoperatory chlorhexidine-based mouthwashes: Interestingly, chlorhexidine resulted the most used, albeit its efficacy against SARS-CoV-2 is still debatable (Carrouel et al., 2020), and other active agents have proven their in vitro superiority (Muñoz-Basagoiti et al., 2021).

The clinical approach for aerosol limitation has also included the reduction/elimination of mechanical/rotatory instruments. The World Health Organization has recommended droplet and contact precautions when caring for patients with COVID-19 and airborne

precautions during the delivery of aerosol-generating procedure (AGPs; World Health Organization Europe (WHO Europe), 2020). Contamination produced by ultrasonic scaling and air polishing was recently systematically reviewed (Johnson et al., 2021): The results obtained demonstrated that both procedures produce contamination even in the presence of suction, and that droplets take between 30 min and 1 hour to settle. As such, in the current group of participants, air abrasive devices received the higher attention, with half of the participants that, at least, limit their use during pandemic with a statistically significant discrepancy between north and south of Italy (Table 3). The usage of ultrasonic devices was also reduced asymmetrically between north and south of Italy, with almost one half of the participants that choose to apply antimicrobic solutions to supposed virulence charge. Only a reduced proportion of dental workers have completely abandoned their use.

Organization of the dental office agenda was also modified during the pandemic: Preventive measures applied have changed noticeably the timetable of the daily routine. For most participants, the time needs to cushion these changes was between 10 and 20 minutes and no additional costs were charged to the patients. The letter was homogeneous across the different geographical area, except for the Northeast, in which rate table changes were more frequent than in other regions. Dental practice re-organization seems to be mandatory for cost reducing and profitability owing to the financial distress that affects dental clinic private practice with a greater negative influences on those with higher operational costs, like those from northern area (Schwendicke et al., 2020). The dental cost fluctuation during pandemic was evaluated throughout several

TABLE 5 Psychologic attitude during pandemic among participants/geographic area.

Psychologic state during/after COVID-19 pandemic	Total Sample	Northwest	North Est	Centre	South/Island	p-value
Psychological attitude of patients toward the dental team/clinic	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	
As before	3.18 (2.1-4.7)	1.87 (.7-4.8)	4 (2.1-7.5)	4.2 (2-8.5)	2.96 (1.1-7.6)	
Positive, they trust on the dental team	75.73 (72.5-78.6)	81.31 (75.5-86)	73.45 (67.3-78.8)	76.2 (69.2-82)	71.85 (63.8-78.8)	
They trust, but they ask more	19.23 (16.6-22.2)	16.35 (12-22)	19.91 (15.2-25.6)	18.45 (13.3-25.1)	21.48 (15.3-29.2)	
Negative, they are afraid of contagion	1.86 (1.1-3.1)	.47 (.01-3.2)	2.65 (1.2-5.8)	1.19 (0.3-4.6)	3.7 (1.5-8.6)	
Your/Dental team psychological attitude	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Proactive, motivated, and confident for the future	68.13 (64.7-71.4)	70.89 (64.4-76.6)	65.49 (59.1-71.4)	73.81 (66.6-79.9)	60.74 (52.3-68.6)	
Less motivated, if the emergency will continue	26.7 (23.7-30)	25.35 (20-31.6)	28.76 (23.2-35)	21.43 (15.9-28.3)	31.85 (24.6-40.2)	
We are tired and we have some concerned for the future	5.18 (3.8-7)	3.76 (1.9-7.3)	5.75 (3.4-9.7)	4.77 (2.4-9.2)	7.41 (4-13.2)	
The pandemic will change our profession:	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Yes	97.45 (96.1-98.4)*	99.1 (96.6-99.7)	99.1 (96.8-99.8)	95.24 (90.9-97.6)	94.7 (89.3-97.5)*	0.044
No	2.55 (1.6-3.9)	.09 (.02-3.7)	.09 (.02-3.5)	4.76 (2.4-9.2)	5.3 (2.5-10.7)	
If yes, In which sense?	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Positively, for the prevention of cross-infection	50.44 (47-53.9)	48.39 (41.2-55)	52.48 (46.2-58.7)	50.57 (43.2-57.9)	49 (40.9-57.1)	
Positively, for patient perception of dental clinic safety	49.05 (45.6-52.5)	47.47 (47.4-59.9)	53.72 (47.4-59.9)	48.3 (40.1-55.7)	43.45 (35.6-51.6)	
Positively, in terms of management's improvement	36.28 (33-39.7)	37.79 (31.6-44.4)	34.3 (28.6-40.5)	33 (26.4-40.2)	41.38 (33.6-49.6)	
Negatively, for costs increase	45.76 (42.3-49.2)*	52.53 (45.8-59.1)*	45.87 (39.7-52.2)	45.45 (38.2-52.9)	37.24 (29.8-45.4)*	p < 0.05
Negatively, for imposition of more safety procedures	11 (9-13.4)	12.9 (9.1-18.1)	12.81 (9.2-17.6)	7.39 (4.3-12.3)	9.66 (5.8-15.7)	
The pandemic will have a negative economic impact on our profession:	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Yes, a lot	30.72 (27.6-34)	30.41 (24.7-36.9)	28.93 (23.6-35)	33 (26.4-40.2)	31.72 (24.6-39.7)	
Yes, but the dental team can react	47.41 (44-50.1)	50.23 (43.6-56.9)	50 (43.7-56.3)	41.48 (34.4-48.9)	44.14 (36.3-52.3)	
No	6.2 (4.7-8.1)	5.53 (3.2-9.5)	5.4 (3.1-9)	9.1 (5.7-14.3)	5.52 (2.8-10.7)	
Don't know	15.68 (13.3-18.4)	13.82 (9.8-19.1)	15.7 (11.6-20.9)	16.48 (11.7-22.7)	18.62 (13.1-25.8)	

(Continues)

TABLE 5 (Continued)

Psychologic state during/after COVID–19 pandemic	Total Sample	Northwest	North Est	Centre	South/Island	p-value
Preventive measures developed under COVID–19 for how long they will last?:	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
About 6 months	4.84 (3.5–6.6)	3.32 (1.6–6.8)	4.48 (2.4–8.1)	4.79 (2.4–9.3)	8.33 (4.7–14.4)	
About 1 year	47.71 (44.2– 51.3)	50.24 (43.5–56.9)	43.95 (37.6–50.5)	46.11 (38.7–53.7)	50.76 (42.3–59.2)	
About 2 years	22.31 (19.5–25.4)	21.8 (16.7–27.9)	21.97 (17.1–27.9)	24.55 (18.6–31.7)	21.97 (15.7–29.8)	
For ever	25.13 (22.2–28.4)	24.64 (19.3–30.9)	29.6 (24–35.9)	24.55 (18.6–31.7)	18.94 (13.1–26.5)	

*Statistically significant for (P < 0.05).

countries. Contrarily to our findings, Rossato and co. (Rossato et al., 2021) highlight that more than 80% of dental offices in Brazil has increased costs to overcome change of expenditure caused by pandemic emergency. The negative financial impact was also evaluated on a Likert (0–5) scale from a cohort of dentists worldwide (LG et al., 2021); the highlighted mean value for European dentists was 4.7(0.7).

Diagnostics tests were implemented on the dental practice under COVID-19 by half of the participants homogeneously throughout the whole country (Table 6): In particular, serological tests and rapid salivary antigen tests were the most used. The frequency diagnostic tests were applied, changed according to the geographical area: In south and center areas, the frequency was greater at 7 and 15 days in comparison with the other regions. Albeit dentists should be familiar with diagnostic tests options to improve the team infection control and the patient safety, some uncertainty remain on the high frequency rapid serological tests were routinely applied. In fact, rapid diagnostic tests based on antibody detection, due to the high rate of false-negative results, should not be used outside research setting, and they should not constitute the basis of a decision-making process (WHO). To prevent dental staff infections, and to ensure patient safety, molecular tests PCR based and the development of routinely screening methods like interviewing and temperature measurement still remain the most reliable methods (Tysiąc-Miśta & Bulanda, 2021).

The psychological attitude was analyzed in the last section of our survey. Results acknowledged a general positive attitude toward the pandemic outbreak, with 2/3 of the sample showing a proactive and motivated attitude irrespective to the overwhelming impact that COVID-19 has had on our life. Healthcare workers indeed were placed under additional psychological difficulties, such as the risk if being part of the transmitting disease chain and implemented workloads despite personnel reduction and uncertainty of protection equipment availability (Bielicki et al., 2020; Consolo et al., 2020). A survey conducted in north of Italy (Reggio Emilia-Modena) immediately after the first pandemic wave and involving 356 dentists, unveils that half of the participants felt lightly scared (41%) and anxious (23.6%) with 12% felt intensely sad (Consolo et al., 2020). The latter state of mind was not perceivable in our cohort, with only 5% of participants resulted concretely concerned for the future of their profession; moreover, more than 50% of participants has considered pandemic as an opportunity for concretes improvements for the dental office. This different attitude can be related to the period of the pandemic; the survey has been deployed; indeed, we asked to answer to the questionnaires at the beginning of 2021 at the end of the second wave and when vaccination process was already arranged.

The multivariate logistic regression model aimed to evaluate which was the best model to explain the probability of a dental workers to be positive to COVID-19. Interestingly, the OR of being positive was 3 times higher if at least one component of the team was diagnosed as positive for COVID-19; conversely, the presence of one positive patient was protective for the risk of being positive for

Best model (AUC=0.760, AIC=262.6, BIC=313.4)						
	LR chi²	**Prob>chi²**	**Pseudo R²**			
	36.33	.00	.1321			
Positive to COVID-19	**OR**	**SE**	**z**	***p*-value***	**95% CI**	
					Lower	**Upper**
Age 25-29	REF.					
Age 30-39	.44	.29	-1.23	.217	.12	1.63
Age 40-49	.06	.06	-2.50	*.012*	.00	.53
Age 50-59	.38	.25	-1.45	*.147*	0.11	1.40
Age 60-69	.63	.41	-0.70	*.481*	.17	2.29
Age >=70	1.04	1.00	.04	*.964*	.16	6.78
Positive to COVID-19 (Team)						
No	REF.					
Yes, one component	3.53	1.45	3.06	*.00*	1.57	7.91
Yes, more than one	4.76	2.43	3.06	*.00*	1.75	12.93
Positive to COVID-19 (Patients)						
No	REF.					
Yes, one component	0.46	.18	-1.99	*.04*	.21	.98
Use of Surgical Mask						
No	REF.					
Yes	1.46	.62	.88	*.4*	.63	3.36
Use of Diagnostic COVID-19 tests						
No	REF.					
Yes	1.68	.65	1.36	*.18*	.8	3.59
_cons	.05	.04	-3.92	*.00*	.01	.22

FIGURE 1 Multivariate regression model: best model obtained, considering proportion of infection as dependent variable and age of the participants, presence of any component of the dental team positive to COVID-19, use of surgical mask, and use of diagnostic COVID-19 tests

the dental team (OR 0.46, CI95% 0.21–0.98). The latter result could be understood also from one side in terms of effectiveness of quarantine and social isolation that governments have issued following the pandemic outbreak and from the other with the effectiveness of preventive measures in the dental setting (personal protection equipment, distancing, and ventilation).

Current findings should be interpreted with caution with selection bias as a potential drawback of the present report. All participants, indeed, belong to a private scientific society (SIdP), and they cannot be considered representative of whole Italian dental community. Furthermore, an underestimation of the prevalence of positive COVID-19 could have occurred, in virtue of the less probability to participate of dentists that have been hospitalized or eventually have died. Moreover, owing to the web-based survey nature of the current research, our prevalence data are based only on self-declaration of positiveness, without confirming antibody testing.

5 | CONCLUSIONS

The current web-based survey was conducted to determine the prevalence of COVID-19, behavioral practices, and psychological attitudes among a cohort of private dentists and dental hygienists from the members of the Italian Society of Periodontology and Implantology (SIdP) in Italy. Within the limitations of positiveness self-declaration, the prevalence of COVID-19 was 4.7% for the whole sample with a peak of 8.8% from the Northwest area of the country. Preventive clinical strategies (aerosol reduction) and personal protective equipment were homogeneously adopted among the different geographical area of the country. Despite the difficulties caused by the pandemic outbreak, dentists and dental hygienists from this sample have reacted positively and have full confidence in the future of the profession. Future research should monitor the rate of the pandemic and analyze further the risk factors involved in the spread of the pandemics at the dental office level.

TABLE 6 Diagnostic tests among the participants/geographic area

Swab test COVID−19	Total Sample	Northwest	North Est	Centre	South/Island	p-value
Swab test at the dental office	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	%, CI 95% (Wilson)	
Yes	51.13 (47.6–54.7)	55.14 (48.4–61.7)	52.86 (46.4–59.3)	44.1 (36.8–51.6)	55.14 (48.4–61.7)	
Diagnostic methodology of the swab test performed						
Serological tests	33.5 (30.3–36.9)	36.4 (30.3–42.9)	33.88 (28.2–40.1)	28.98 (22.8–36.1)	36.4 (30.3–42.9)	
Rapid antigen nasal /pharynx swabs	18.58 (16.3–21.4)	14.75 (10.6–20.1)	21.9 (17.2–27.5)	19.88 (14.7–26.4)	14.75 (10.6–20.1)	
Rapid antigen nasal swabs	9.23 (7.4–11.4)	6.9 (4.9–32.7)	10.74 (7.4–15.3)	10.8 (7.1–16.2)	6.9 (4.9–32.7)	
Rapid antigen salivary test	51.2 (47.7–54.7)	45.62 (39.2–52.3)	50.41 (44.2–56.7)	57.96 (50.1–65)	45.62 (39.2–52.3)	
None	29.5 (26.9–32.7)	27.65 (22.1–34)	31.8 (27.1–34)	24.43 (18.7–31.3)	27.65 22.1–34)	
Diagnostic test's target	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Dental team	35.27 (32.2–38.6)	38.71 (32.4–45.3)	37.6 (31.7–43.8)	28.9 (22.7–36.1)	35.17 (27.8–43.3)	
Patients	64.73 (61.3–67.8)	61.29 (54.6–67.5)	62.4 (56.1–68.3)	71.02 (63.9–77.3)	64.83 (56.7–72.2)	
Frequency of Testing	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Every 7 days	24.0 (20–28.6)*	25.44 (18.3–34.2)	16.9 (11.2–24.8)*	21.92 (13.9–32.9)	32.8 (22.9–44.7)*	0.022
Every 15 days	23 (19–27.4)*	17.54 (11.6–25.7)	21.19 (14–7.29.5)	34.3 (24.3–45.8)*	24.29 (15.6–35.7)	0.009
Every 30 days	15.04 (11.8–19)	19.3 (13.1–27.6)	13.56 (8.5–25.2)	15.01 (8.5–25.2)	11.43 (5.8–21.3)	
In case of suspicion	38 (33.3–43)*	37.72 (29.3–46.9)	48.3 (39.4–57.3)*	28.77 (19.5–40.2)	31.43 (21.6–43.2)	0.033
When available, will you get vaccinated?	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	%, CI (95%)	
Yes	85.1 (82.4–87.4)	84.79 (79.9–89.4)	82.64 (76.9–86.6)	82.95 (77.3–88.3)	88.96 (84.3–94.2)	
No	2.65 (1.7–4)	3.69 (2.5–8.4)	2.07 (1.1–5.4)	1.7 (.9–5.9)	.69 (.01–4.7)	
Don't know	12.26 (10.2–14.7)	11.5 (6.8–14.9)	15.29 (11.3–20.4)	15.34 (9.8–20.2)	10.34 (5.3–14.8)	

*Statistically significant for (P < 0.05).

AUTHOR CONTRIBUTIONS
Nicola Discepoli: Conceptualization; Data curation; Formal analysis; Methodology; Validation; Writing-original draft; Writing-review & editing. **Mario Raspini:** Conceptualization; Data curation; Methodology; Writing-review & editing. **Luca Landi:** Conceptualization; Data curation; Formal analysis; Funding acquisition; Methodology; Supervision; Validation; Writing-original draft; Writing-review & editing. **Nicola Marco Sforza:** Conceptualization; Data curation; Investigation; Methodology; Supervision; Validation; Writing-review & editing. **Alessandro Crea:** Conceptualization; Data curation; Methodology; Visualization; Writing-review & editing. **Francesco Cairo:** Conceptualization; Data curation; Investigation; Methodology; Supervision; Writing-original draft; Writing-review & editing.

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REFERENCES
Ahmed, M. A., Jouhar, R., Ahmed, N., Adnan, S., Aftab, M., Zafar, M. S., & Khurshid, Z. (2020). Fear and practice modifications among dentists to combat novel coronavirus disease (COVID-19) outbreak. *International Journal of Environmental Research and Public Health*, *17*(8), 2821. https://doi.org/10.3390/ijerph17082821

Apolone, G., Montomoli, E., Manenti, A., Boeri, M., Sabia, F., Hyseni, I., Mazzini, L., Martinuzzi, D., Cantone, L., Milanese, G., Sestini, S., Suatoni, P., Marchianò, A., Bollati, V., Sozzi, G., & Pastorino, U.

(2020). Unexpected detection of SARS-CoV-2 antibodies in the prepandemic period in Italy. *Tumori*, https://doi.org/10.1177/0300891620974755.

Bakaeen, L. G., Masri, R., AlTarawneh, S., Garcia, L. T., AlHadidi, A., Khamis, A. H., Hamdan, A. M., & Baqain, Z. H. (2021). Dentists' knowledge, attitudes, and professional behavior toward the COVID-19 pandemic. *The Journal of the American Dental Association*, *152*(1), 16–24. https://doi.org/10.1016/j.adaj.2020.09.022

Barbato, L., Bernardelli, F., Braga, G., Clementini, M., Di Gioia, C., Littarru, C., Oreglia, F., Raspini, M., Brambilla, E., Iavicoli, I., Pinchi, V., Landi, L., Sforza, N. M., Cavalcanti, R., Crea, A., & Cairo, F. (2020). Surface disinfection and protective masks for SARS-CoV-2 and other respiratory viruses: A review by SIdP COVID-19 task force. *Oral Diseases*, https://doi.org/10.1111/odi.13646.

Bielicki, J. A., Duval, X., Gobat, N., Goossens, H., Koopmans, M., Tacconelli, E., & van der Werf, S. (2020). Monitoring approaches for health-care workers during the COVID-19 pandemic. *The Lancet Infectious Diseases*, *20*, e261–e267. https://doi.org/10.1016/S1473-3099(20)30458-8

Buitrago-Garcia, D., Egli-Gany, D., Counotte, M. J., Hossmann, S., Imeri, H., Ipekci, A. M., Salanti, G., & Low, N. (2020). Occurrence and transmission potential of asymptomatic and presymptomatic SARSCoV-2 infections: A living systematic review and meta-analysis. *PLoS Med*, *17*(9), e1003346. https://doi.org/10.1371/journal.pmed.1003346

Cagetti, M. G., Cairoli, J. L., Senna, A., & Campus, G. (2020). COVID-19 outbreak in North Italy: An overview on dentistry. A questionnaire survey. *International Journal of Environmental Research and Public Health*, *17*(11), 3835. https://doi.org/10.3390/ijerph17113835

Carrouel, F., Conte, M. P., Fisher, J., Gonçalves, L. S., Dussart, C., Llodra, J. C., & Bourgeois, D. (2020). COVID-19: A Recommendation to Examine the Effect of Mouthrinses with β-Cyclodextrin Combined with Citrox in Preventing Infection and Progression. *Journal of Clinical Medicine*, *9*(4), 1126. https://doi.org/10.3390/jcm9041126

Clementini, M., Raspini, M., Barbato, L., Bernardelli, F., Braga, G., Di Gioia, C., Cairo, F. (2020). Aerosol transmission for SARS-CoV-2 in the dental practice. A review by SIdP Covid-19 task-force. *Oral Diseases*, https://doi.org/10.1111/odi.13649

Consolo, U., Bellini, P., Bencivenni, D., Iani, C., & Checchi, V. (2020). Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the Northern Italy districts of modena and reggio emilia. *International Journal of Environmental Research and Public Health*, *17*(10), 3459. https://doi.org/10.3390/ijerph17103459

Estrich, C. G., Mikkelsen, M., Morrissey, R., Geisinger, M. L., Ioannidou, E., Vujicic, M., & Araujo, M. W. B. (2020). Estimating COVID-19 prevalence and infection control practices among US dentists. *Journal of the American Dental Association*, *151*(11), 815–824. https://doi.org/10.1016/j.adaj.2020.09.005

Fiorillo, A., & Gorwood, P. (2020). The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *European Psychiatry*, https://doi.org/10.1192/j.eurpsy.2020.35.

Gallus, S., Paroni, L., Re, D., Aiuto, R., Battaglia, D. M., Crippa, R., Carugo, N., Beretta, M., Balsano, L., & Paglia, L. (2021). Sars-cov-2 infection among the dental staff from Lombardy region, Italy. *International Journal of Environmental Research and Public Health*, *18*(7), 3711. https://doi.org/10.3390/ijerph18073711

Harrel, S. K., Barnes, J. B., & Rivera-Hidalgo, F. (1998). Aerosol and splatter contamination from the operative site during ultrasonic scaling. *Journal of the American Dental Association*, *129*(9), 1241–1249. https://doi.org/10.14219/jada.archive.1998.0421

Johnson, I. G., Jones, R. J., Gallagher, J. E., Wade, W. G., Al-Yaseen, W., Robertson, M., McGregor, S., K. c, S., Innes, N., & Harris, R. (2021). Dental periodontal procedures: a systematic review of contamination (splatter, droplets and aerosol) in relation to COVID-19. *BDJ Open*, *7*(1), https://doi.org/10.1038/s41405-021-00070-9

Kissler, S. M., Tedijanto, C., Goldstein, E., Grad, Y. H., & Lipsitch, M. (2020). *Kissler et al 2020 Projecting the transmission dynamics through the postpandemic period*. Science (New York, N.Y.).

Kluytmans-van den Bergh, M. F. Q., Buiting, A. G. M., Pas, S. D., Bentvelsen, R. G., van den Bijllaardt, W., van Oudheusden, A. J. G., van Rijen, M. M. L., Verweij, J. J., Koopmans, M. P. G., & Kluytmans, J. A. J. W. (2020). Prevalence and Clinical Presentation of Health Care Workers with Symptoms of Coronavirus Disease 2019 in 2 Dutch Hospitals during an Early Phase of the Pandemic. *JAMA Network Open*, *3*(5), e209673. https://doi.org/10.1001/jamanetworkopen.2020.9673

Kutter, J. S., Spronken, M. I., Fraaij, P. L., Fouchier, R. A., & Herfst, S. (2018). Transmission routes of respiratory viruses among humans. *Current Opinion in Virology*, *28*, 142–151. https://doi.org/10.1016/j.coviro.2018.01.001

Lai, X., Wang, M., Qin, C., Tan, L. I., Ran, L., Chen, D., Zhang, H., Shang, K. E., Xia, C., Wang, S., Xu, S., & Wang, W. (2020). Coronavirus Disease 2019 (COVID-2019) Infection Among Health Care Workers and Implications for Prevention Measures in a Tertiary Hospital in Wuhan, China. *JAMA Network Open*, *3*(5), e209666. https://doi.org/10.1001/jamanetworkopen.2020.9666

Leggat, P. A., & Kedjarune, U. (2001). Bacterial aerosols in the dental clinic: A review. *International Dental Journal*, *51*(1), 39–44. https://doi.org/10.1002/j.1875-595X.2001.tb00816.x

Mani, N. S., Budak, J. Z., Lan, K. F., Bryson-Cahn, C., Zelikoff, A., Barker, G. E. C., Grant, C. W., Hart, K., Barbee, C. J., Sandoval, M. D., Dostal, C. L., Corcorran, M., Ungerleider, H. M., Gates, J. O., Olin, S. V., Bryan, A., Hoffman, N. G., Marquis, S. R., Harvey, M. L., ... Cohen, S. A. (2020). Prevalence of Coronavirus Disease 2019 Infection and Outcomes Among Symptomatic Healthcare Workers in Seattle, Washington. *Clinical Infectious Diseases*, *71*(10), 2702–2707. https://doi.org/10.1093/cid/ciaa761

Muñoz-Basagoiti, J., Perez-Zsolt, D., León, R., Blanc, V., Raïch-Regué, D., Cano-Sarabia, M., Trinité, B., Pradenas, E., Blanco, J., Gispert, J., Clotet, B., & Izquierdo-Useros, N. (2021). Mouthwashes with CPC Reduce the Infectivity of SARS-CoV-2 Variants In Vitro. *Journal of Dental Research*, *100*(11), 1265–1272. https://doi.org/10.1177/00220345211029269

Nguyen, L. H., Drew, D. A., Graham, M. S., Joshi, A. D., Guo, C.-G., Ma, W., Mehta, R. S., Warner, E. T., Sikavi, D. R., Lo, C.-H., Kwon, S., Song, M., Mucci, L. A., Stampfer, M. J., Willett, W. C., Eliassen, A. H., Hart, J. E., Chavarro, J. E., Rich-Edwards, J. W., ... Zhang, F. (2020). Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *The Lancet Public Health*, *5*(9), e475–e483. https://doi.org/10.1016/S2468-2667(20)30164-X

Pierre-Bez, A. C., Agostini-Walesch, G. M., Bradford Smith, P., Hong, Q., Hancock, D. S., Davis, M., Marcelli-Munk, G., & Mitchell, J. C. (2021). Ultrasonic scaling in COVID-era dentistry: A quantitative assessment of aerosol spread during simulated and clinical ultrasonic scaling procedures. *International Journal of Dental Hygiene*, https://doi.org/10.1111/idh.12548.

Prather, K. A., Wang, C. C., & Schooley, R. T. (2020). Reducing transmission of SARS-CoV-2. *Science*, *368*(6498), 1422–1424. https://doi.org/10.1126/science.abc6197

Prezioso, C., Marcocci, M. E., Palamara, A. T., De Chiara, G., & Pietropaolo, V. (2020). The "Three Italy" of the COVID-19 epidemic and the possible involvement of SARS-CoV-2 in triggering complications other than pneumonia. *Journal of NeuroVirology*, *26*(3), 311–323. https://doi.org/10.1007/s13365-020-00862-z

Remuzzi, A., & Remuzzi, G. (2020). COVID-19 and Italy: what next? *The Lancet*, *395*(10231), 1225–1228. https://doi.org/10.1016/S0140-6736(20)30627-9

Rossato, M. D. S., Gregorio, D., de Almeida-Pedrin, R. R., Maia, L. P., Poli, R. C., Berger, S. B., & Fernandes, T. M. F. (2021). Evaluation of dental practices changes during the COVID-19 pandemic in Brazil.

Evaluation and the Health Professions, 44(2), 192–197. https://doi.org/10.1177/0163278721994902

Rubin, G. J., & Wessely, S. (2020). The psychological effects of quarantining a city. *The BMJ*, https://doi.org/10.1136/bmj.m313.

Rudberg, A.-S., Havervall, S., Månberg, A., Jernbom Falk, A., Aguilera, K., Ng, H., Gabrielsson, L., Salomonsson, A.-C., Hanke, L., Murrell, B., McInerney, G., Olofsson, J., Andersson, E., Hellström, C., Bayati, S., Bergström, S., Pin, E., Sjöberg, R., Tegel, H., … Thålin, C. (2020). SARS-CoV-2 exposure, symptoms and seroprevalence in healthcare workers in Sweden. *Nature Communications*, 11(1), https://doi.org/10.1038/s41467-020-18848-0

Schwendicke, F., Krois, J., & Gomez, J. (2020). Impact of SARS-CoV2 (Covid-19) on dental practices: Economic analysis. *Journal of Dentistry*, 99, 103387. https://doi.org/10.1016/j.jdent.2020.103387

Statkute, E., Rubina, A., O'Donnell, V. B., Thomas, D. W., & Stanton, R. J. (2020). The Virucidal Efficacy of Oral Rinse Components Against SARS-CoV-2 In Vitro. *BioRxiv*, 11, 123–129.

Szymańska, J. (2007). Dental bioaerosol as an occupational hazard in a dentist's workplace. *Annals of Agricultural and Environmental Medicine*, 14, 203–207.

Tysiąc-Miśta, M., & Bulanda, S. (2021). The utilization of rapid serological tests in covid-19 diagnostics – a high risk of false-negative results in outpatient care, with particular emphasis on dental treatment. *Medycyna Pracy*, 72, 155–162. https://doi.org/10.13075/mp.5893.01034

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2014). The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. *International Journal of Surgery*, 12(12), 1495–1499. https://doi.org/10.1016/j.ijsu.2014.07.013

Wei, X., Li, L., & Zhang, F. (2021). The impact of the COVID-19 pandemic on socio-economic and sustainability. *Environmental Science and Pollution Research*, https://doi.org/10.1007/s11356-021-14986-0

WHO (2020). *WHO Characterizes COVID-19 as A Pandemic. World Health Organization.*

WHO (2021). *WHO Coronavirus (COVID-19) Dashboard Global Situation. WHO.*

World Health Organization Europe (WHO Europe) (2020). *Transmission of SARS-CoV-2: implications for infection prevention precautions.* Scientific brief, 09 July 2020. *Who.*

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, 277, 55–64. https://doi.org/10.1016/j.jad.2020.08.001

Zheng, L., Wang, X., Zhou, C., Liu, Q., Li, S., Sun, Q., Wang, M., Zhou, Q., & Wang, W. (2020). Analysis of the infection status of healthcare workers in Wuhan during the COVID-19 outbreak: A cross-sectional study. *Clinical Infectious Diseases*, 71(16), 2109–2113. https://doi.org/10.1093/cid/ciaa588