


Swedish dental health care workers' sense of safety and satisfaction with the information they received during the COVID-19 pandemic

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ABSTRACT

Objective: The aim was to explore what affected dental health care workers' sense of safety while working during the COVID-19 pandemic and examine their satisfaction with the information they received on COVID-19 and pandemic protocols.

Material and method: An invitation to participate in the survey was distributed to 2,990 dental health care workers in Sweden. Open-ended questions were analyzed using the Theoretical Domains Framework, closed-ended questions with Pearson's chi-squared test.

Results: The response rate was 41.7%. Of the respondents, 78.7% were 'very satisfied' or 'fairly satisfied' with the information they received. Conflicting messages were reported as a problem, especially regarding how highly prioritized the pandemic protocols were. 'Fairly safe' or 'very safe' were the responses chosen by 70.9%, while 54.2% recounted situations that made them feel unsafe. The sense of safety was mainly related to one's own knowledge, self-perceived skills, and support in the workplace. The feeling of not being safe was foremost related to resources: primarily PPE shortages and time-related shortages. Respondents who reported being asked to forego surgical face masks and/or economize with gloves/hand rub because of shortages were more likely to have felt unsafe ($p = .001$).

Conclusions: Most were satisfied with the information they had received, and most felt safe during the pandemic, but several respondents reported situations where they felt pressured to make compromises with their infection control. Future pandemic protocols should have ethics clearly incorporated regarding situations when there is a shortage of resources and include better planning for the provision of supplies for infection control.

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Introduction

On the 11th of March 2020, the World Health Organization declared COVID-19 a pandemic [1]. The pandemic put pressure on dental health care workers (DHCW) and affected the delivery of dental care services globally [2]. Due to the proximity to the mucous membranes and respiratory secretions of patients, and the use of aerosol-generating procedures, DHCW are exposed to infectious disease agents when performing dental treatments [3,4]. The SARS-CoV-2 outbreak further increased the risk of infection [4].



During the pandemic, DHCW had to adjust their services and infection control practices to minimize the risk of transmission. Such measures included triage and screening of patients, point-of-care testing for COVID-19, avoiding aerosol-generating procedures, additional infection control measures, and increased use of personal protective equipment (PPE) [5–8].


In Sweden, the early pandemic responses in dentistry varied; some clinics closed for all but emergency treatments,

while others remained open as usual. The capacity of dental care was negatively affected by staff on sick leave and shortages of PPE. A reluctance among patients to visit dental care also added to an overall decrease in visits. However, by the end of 2021, the number of dental care visits had slowly returned to more normal levels, albeit still not pre-pandemic levels [9].

Although dealing with the risk of infectious disease could be seen as part of the job, research has shown that many DHCWs have experienced stress and anxiety during the COVID-19 pandemic. Various reported contributory factors to include fear of contagion, lack of pandemic preparedness, lack of infection control training in the workplace, concerns for self/family wellbeing, and decreased access to PPE [2,10–15].

Since several viruses have pandemic potential, learning from previous outbreaks and improving preparedness for future outbreaks is of utmost importance [16]. As pandemic preparedness efforts focus on changing behaviors in ways

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that reduce risk, the management of pandemics includes a behavior change component [17]. The Theoretical Domains Framework (TDF) is a behavior change framework developed for implementation within health care [18]. The TDF can be used as an evaluation tool to retrospectively identify factors that contributed to the success and/or failure of an intervention [19].

The aim of the present study was to investigate the DHCW's own experiences of the pandemic response in dentistry in Sweden, with the aid of the TDF. Specifically, it was to explore which behaviors/situations affected the DHCW's sense of safety while working during the pandemic, and also examine how satisfied the DHCW were with the information they received regarding infection control, pandemic protocols, and COVID-19.

Materials and methods

Data collection was performed by means of a questionnaire containing both open-ended and closed-ended questions. No demographic questions, apart from the respondent's profession, were asked. The project received ethical approval from the Swedish Ethical Review Authority (DNR 2021-00389).

During the construction, a volunteer group of 15 DHCW tested and gave feedback on the questionnaire. Then 38 DHCW filled out the questionnaire twice, with two weeks in between. The data was reviewed to evaluate item range and variance and to assess score reliability. For calibration of content analysis, inter-rater reliability was assessed and confirmed at >80% agreement. Agreement between scores at the test and retest was assessed using percentage agreement, which was confirmed at $\geq 70\%$ agreement between the test and retest.

The minimum sample size for DHCW as a group was calculated at 378 respondents (95% CI, 5% margin of error, 0.5 SD). Sample size for subgroups was calculated at 365 dentists, 370 dental assistants, and 351 dental hygienists. With an expected response rate of 50%, it was estimated 3,000 DHCW would need to be invited. A non-probability sampling method was used, where organizations/clinics were approached and enrolled, aiming to ensure a relatively even distribution across the country, including both urban and rural areas.

During July–October 2021, invitations to participate in the survey were distributed by the respondents' respective employers to 2990 DHCW in Sweden (918 dentists, 574 dental hygienists, and 1498 dental assistants); 10.7% in private dental care and 89.3% in public dental care. The questionnaire was made available through the web-based survey tool Sunet Survey (Artisan Global Media, Växjö).

Content analysis of open-ended questions was performed using NVivo qualitative data analysis software (QSR International Pty Ltd.). A single response could contain one or more message units. The mapping of message units to the TDF domains was an interpretive and consensus-driven exercise performed by the authors' LM and CBH. Disagreements (9.2% of the message units) were resolved in

a consensus discussion among all three authors. The qualitative data was then quantitized by enumerating the frequency of message units mapped to the different domains. Statistical analysis was performed using IBM SPSS Version 28.0. (Armonk, NY: IBM Corp.) The level of statistical significance was set at 5%. Descriptive statistics were mainly used, such as frequencies, median, and, when dichotomized, Pearson's chi-squared test. Subgroup variances were analyzed using Kruskal-Wallis H-test.

Results

Of 2,990 invited DHCW, 1325 responded. Of the questionnaires, 79 were returned empty and therefore excluded; 1246 responses were included in the study. The overall response rate was 41.7% (dentists 45.8%, dental hygienists 42.3%, dental assistants 38.9%). Minimum sample size was reached for all groups except the dental hygienist' subgroup. Analysis of variance of the responses showed no statistically significant differences between the subgroups ($H(2) = 1.371\text{--}4.071$, $p = .504\text{--}.131$).

Sense of safety

The majority felt 'fairly safe' or 'very safe' working during the pandemic (Table 1).

The open-ended question 'What has helped you feel safe and/or made you feel unsafe while working during the COVID-19 pandemic?' had a response rate of 92.5% (1153/1246) and 2,162 message units were identified in the responses. The message units were mapped to relevant domains of the TDF. Eight determinants of behavior were identified, and five domains were considered important. Of the identified message units, 54.2% were concerned with behaviors/situations that had contributed to a sense of being unsafe.

The sense of safety was mainly related to the TDF domains 'Knowledge', 'Social influences', and 'Skills' (Table 2). Feeling in control was a recurring theme in relation to an increased sense of safety, and the sense of control was mainly assigned to the domains 'Knowledge' (own knowledge of Covid-19 and infection control), and 'Skills' (in infection control and/or receiving training/feedback on infection control).

The respondents mostly related the feeling of not being safe to the TDF domain 'Environmental context and resources'; primarily PPE shortages and time-related shortages (Table 2). The 179 (14.4%) respondents who reported having

Table 1. Sense of safety during the COVID-19 pandemic.

Have you felt safe working during the COVID-19 pandemic?		
	Frequency	Valid Percent
Very safe	283	22.7
Fairly safe	586	47.0
Both safe and unsafe	175	14.0
Fairly unsafe	139	11.2
Very unsafe	63	5.1
Missing	0	0.0
Total	1,246	100.0

Table 2. What contributed to the sense of being safe/unsafe.

TDF Domain Percentage of respondents	Summary of message units (No. of message units mapped to domain)	Exemplar quotes
Knowledge 48.0%	Safe (456): Transparency regarding knowledge; updates on policies and guidelines; follow-up on information; clear communication channels; availability of education and information; reliable sources. Unsafe (98): Contradictory/ambiguous information; unclear dispersion of information; lack of education, lack of knowledge (own/co-worker/leader); skepticism towards protocols/guidelines; conflicting messages.	<i>'We received updates on hygiene guidelines and info on COVID-19. Our boss made sure that everyone was in the loop, which made me feel safer.'</i> <i>'Especially at the beginning of the pandemic, the information was confusing and sometimes contradictory. Still, we were expected to work as usual, not a great feeling ... it has made me feel very unsafe.'</i>
Skills 23.2%	Safe (137): Proficiency acquired through practice; skill assessment; ability to follow infection control protocols (because of practice). Unsafe (131): Lack of training; lack of assessment/feedback; co-workers lacking ability/skills in infection control; uncertain of own competence.	<i>'We practiced hand hygiene and donning of PPE. It was good with some repetition. Made me feel more confident.'</i> <i>'Covid put the spotlight on how many need training on infection control. We just got information, no training.'</i>
Beliefs about consequences 15.9%	Safe (82): Belief in infection control measures being effective to avoid anticipated consequences; motivated to follow guidelines to avoid anticipated consequences; following guidelines will keep one safe. Unsafe (101): Measures ineffective; fear of getting infected, not motivated to follow guidelines as anticipated consequences are unavoidable; expecting certain people/themselves being at greater risk.	<i>'I followed the guidelines meticulously; I was VERY careful. I did not want to be the one infecting someone else.'</i> <i>'I really don't think our face masks and flimsy gloves protect against Covid. So not knowing who was contagious, and me being part of a risk group, I was really afraid of getting infected.'</i>
Environmental context and resources 58.9%	Safe (98): Sufficient resources (staff, PPE, hand hygiene products, time to complete tasks); adapting work to availability of commodities; organizational culture creating positive environmental context. Unsafe (591): Shortages in resources (staff/PPE/hand hygiene products); not enough time to complete tasks; interaction with environment hindered infection control measures; workplace crowding.	<i>'When the PPE shortages were at their worst, the clinical activity was adjusted so we only treated emergencies. No one wanted to compromise our patients' and our own safety.'</i> <i>'Greater risks among staff in cramped spaces, such as the lunchroom, corridors, and the reception. We protected the patients but not each other.'</i>
Social influences 33.7%	Safe (201): Support /encouragement from manager/co-workers; co-workers being good influence; receiving reassurance/support in the workplace. Unsafe (188): Leaders not supportive; protective measures not being the highest priority in the workplace; fears not being acknowledged/respected; negative influences in the workplace; conflicting messages.	<i>'The feeling was that we were in it together and that we would do our best to keep each other safe. That support made me feel better.'</i> <i>'We were asked to economize with hand rub and gloves. We were asked to consider if we truly needed a face mask. They didn't say it explicitly, but the message was clear, safety was not really their top priority ...'</i>

been asked to forego surgical face masks and/or economize with gloves and hand rub were significantly more likely to have felt 'fairly unsafe' or 'very unsafe' ($p = .001$). Some commented that even if it had been unclear if surgical face masks truly protected against transmission of the virus, 'not having a face mask could not possibly be an upgrade'. A few respondents stated they were expected to use the same face mask for extended periods of time.

Noteworthy is that many reported having felt unsafe at the beginning of the pandemic, mainly because of a lack of knowledge of the disease and whether or not the infection control measures were effective, but their confidence and sense of safety increased after a while.

Satisfaction with received information

Most respondents were 'very satisfied' or 'fairly satisfied' with the information they received regarding infection control, pandemic protocols, and COVID-19 (Table 3).

The open-ended question 'What has contributed to your satisfaction, and/or dissatisfaction, with the information you have received regarding infection control, pandemic protocols, and COVID-19?' had a response rate of 82.3% (1025/1246), and 1,657 message units were identified. The message units were mapped to relevant domains of the TDF.

Table 3. Satisfaction with the information they received.

Are you satisfied with the information you have received on infection control, pandemic protocols, and COVID-19?			
	Frequency	Percent	Valid Percent
Very satisfied	470	37.7	37.9
Fairly satisfied	506	40.6	40.8
Undecided	182	14.6	14.7
Fairly unsatisfied	58	4.7	4.7
Very unsatisfied	25	2.0	2.0
Total	1,241	99.6	100.0
Missing	5	0.4	
Total	1,246	100.0	

Nine domains were identified from the data, of which six domains were considered important (Table 4).

Trust, or lack of trust, was a recurring theme; mainly trust in own knowledge, or trust in the received information/education (Knowledge domain), but also trust in own competence and self-efficacy (Beliefs about capabilities domain). Respect was another theme, often interwoven with trust. Information given in a manner that showed respect for the individual's competence (Professional role domain) and education (Knowledge domain), and also respect in intrapersonal processes (Social influences domain), was important. However, several respondents commented that only receiving information was not enough: 'We also needed training to make sure we were doing it right. But that was not prioritized.'

Table 4. What contributed to satisfaction/dissatisfaction with the information.

TDF Domain Percentage of respondents	Descriptions (No. of message units mapped to domain)	Exemplar quotes
Knowledge 71.8%	Satisfactory (501): Transparent information; regular updates; clear communication channels; increased knowledge of hygiene protocols and guidelines; availability of education/information.	<i>'It has mostly been clear and honest communication, even when there was confusion at the beginning.'</i>
	Unsatisfactory (235): Contradictory/wrong information; unclear dispersion of information; lack of knowledge (among leaders/co-workers); lack of education on infection control.	<i>'We replaced instructions for hand wash before surgery with instructions from the public health authority on how the public should wash their hands, i.e. we went from a higher standard to a lower standard because someone in management thought it was a good idea.'</i>
Professional role and identity 18.3%	Satisfactory (125): Professional commitment; positive group identity; staying informed is a duty; perceived professional competence.	<i>'As professionals we are used to dealing with the risk of infection. It's nothing new. It is my professional duty to stay informed and to know these things.'</i>
	Unsatisfactory (63): Perceived disrespect towards professional role/identity; lack of commitment in organization/workplace.	<i>'It felt as we we being mocked when we were informed that we could work without a surgical face mask. Unprofessional!'</i>
Belief about capabilities 9.5%	Satisfactory (68): Perceived ability to follow guidelines received from information, self-confidence; perceived competence of sources behind information.	<i>'I know my knowledge and skills are good, I felt confident that I could reduce the risks. The information we received was nothing new, but it confirmed I was doing it right.'</i>
	Unsatisfactory (29): Perceived inability of co-workers/leaders to understand information/put knowledge to use; perceived incompetence of sources behind information.	<i>'The sloppy ones are probably clueless, no one gives them any feedback and our supervisor doesn't care. Information is wasted on people who won't listen.'</i>
Intentions 16.5%	Satisfactory (64): Clear intentions; a sense of preparedness in organization; ability to adapt protocols/guidelines to different circumstances.	<i>'Management has been transparent with everything (...) it has been easy to understand the reasoning, and the planning has been really good.'</i>
	Unsatisfactory (106): Lack of planning /readiness; unclear intentions and goals; confusion/conflicting messages regarding plans.	<i>'The lack of a plan on how to handle the situation was obvious. The information has sometimes been contradictory and VERY confusing.'</i>
Social influences 30.6%	Satisfactory (147): Support from leaders and/or co-workers; acting as a good influence (by sharing information); receiving good influences.	<i>'Colleagues helped each other to stay informed. We were in it together; that support and commitment was inspiring.'</i>
	Unsatisfactory (167): Leaders not supportive; conflicting messages in the workplace on importance of pandemic protocols; disinformation spread in the workplace; negative role models.	<i>'Our manager doesn't think it's important to follow all recommendations. He thinks those who want to follow the protocols are being difficult since it's too time consuming.'</i>
Personal Factors/ Emotions 10.9%	Satisfactory (73): Raises positive emotions; lessens fear; acknowledges fear/uncertainty.	<i>'I'm very satisfied with the information. It helped quell my fears. I was afraid in the beginning, but the frequent updates helped me a lot.'</i>
	Unsatisfactory (39): Raised negative emotions or contradictory emotions; generated a fear reaction.	<i>'New information kept coming, sometimes contradictory, which created confusion. It put a lot of emotional strain on us. It made me anxious!'</i>

Conflicting messages was another theme, which was mainly mapped to the TDF domains 'Knowledge' and 'Social influences'. Several respondents received conflicting messages regarding the importance of pandemic protocols: *'It was as if they said: Infection control is VERY important, but we won't give you time or means to follow the protocols, and since we've run out of face masks, you won't need a face mask anymore.'*

Other respondents commented on information being more than just official communications and that it could result in conflicting messages: *'Information is also what is spread among co-workers. That's not always a good thing. Some people believe anything they read on Facebook.'*

Discussion

The present study is—to the best of our knowledge—the first to publish Swedish data on DHCW's sense of safety during the pandemic, and to assess their satisfaction with the information they received on infection control, pandemic protocols, and COVID-19. Several studies indicate the pandemic put a strain on dentistry, not least a psychological strain, with DHCW reporting feelings of fear and anxiety during the pandemic [2,11–15]. However, most respondents in

the present study reported feeling very safe, or fairly safe, working during the pandemic. This difference could be the result of the survey taking place when the pandemic had been ongoing for more than a year. A survey performed among Australian dentists one year into the pandemic also reported relatively high numbers (58.7%) of respondents feeling 'not at all' or 'slightly concerned' about contracting COVID-19 [20].

Resources, or rather a lack thereof, was the main domain to which statements regarding the sense of being unsafe could be mapped. Many DHCW have been asked to assume greater risks to their personal safety during the pandemic, which has been exacerbated by a shortage of PPE. It is noteworthy that 14.4% of the respondents reported being asked to work without a surgical face mask, and/or to economize with medical gloves and antiseptic hand rub. It is not surprising that those respondents were more likely to have felt unsafe while working during the pandemic. The aspect of being provided adequate infection control resources (PPE, hand rub, sufficient time to perform infection control measures) has been found to affect the amount of experienced fear and anxiety among health care workers [21,22]. It is deeply problematic to even suggest DHCW should economize with essential aspects of infection control. Apart from

the possibility that it could compromise patient safety and staff safety, the sense of fear it may evoke should also be considered. For future pandemic plans, consideration should be given to the specific ethical challenges that may arise when there is a scarcity of resources.

Knowledge was important for the sense of safety among the respondents. Lessons learned from previous outbreaks confirm this, as knowledge alleviates uncertainty and lessens experienced anxieties and fears [22]. Furthermore, among the respondents there appeared to be a high level of trust in the received information, although conflicting messages were mentioned as a problem. The conflicting messages could be information perceived as being incorrect, or not fully adapted to dentistry, which left some respondents feeling disrespected or made them lose trust in the information. Conflicting messages could also be regarding how highly prioritized the pandemic protocols truly were. Ideally, the importance of infection prevention and control should permeate every aspect of clinical activities, which also seems to have been the case for most respondents. However, some respondents experienced the pandemic protocols not being treated as a top priority. Some felt pressured to cut corners on infection control to handle conflicting demands and possibly risking their own and their patients' safety. It is important to address the underlying value judgements behind such situations and compromises. Consideration should be given to ethics and values, ensuring they are explicitly incorporated in future pandemic protocols, to facilitate consensus regarding the order of priority of conflicting demands.

Although the information is key, it is not enough to only provide information on guidelines and protocols; adequate and continuous training is also needed to reinforce that knowledge [23], a notion supported by several respondents who called for more practical infection control training. Among respondents who had received training and feedback on infection control measures, many stated it had contributed to a sense of safety. Although the DHCW are used to employing PPE, they are still likely to benefit from additional training. The effectiveness of PPE in protecting from infection is dependent on the user, and studies have shown that health care workers are frequently contaminated because of doffing errors [24,25]. Inadequate training can also significantly impact compliance with PPE recommendations [26].

This study has certain limitations. Although enough responses were collected to reach power for the DHCW as a group, a response rate below 50% means the results should be interpreted with caution, as the study may be prone to a non-response bias. The invitation to participate in the survey being distributed by the respondents' employers may have deterred some respondents from answering—or answering truthfully. Furthermore, a sampling bias may have been produced since a non-probability sampling method was used. There are also communication barriers in a written questionnaire that can give inaccurate results, as both questions and responses may be understood differently than was intended. Especially factors contributing to a sense of safety would likely benefit from a follow-up with an interview study.

To sum it up, a majority of the respondents felt safe or fairly safe working during the pandemic and were reasonably satisfied with the information they received on infection control and COVID-19. However, conflicting messages were found to be a problem. More than half of the respondents recounted behaviors/situations which contributed to a sense of being unsafe; the most commonly reported was a lack of resources for infection control. In most cases, clinical activities were reduced when infection control commodities were scarce, but one in seven DHCWs reported being asked to adjust their infection control measures instead. This highlights the importance of having specific and well-thought-out pandemic protocols, which should be based on universal safety practices and take possible ethical challenges into consideration. Future pandemic preparedness should also include better planning for the provision of PPE and other commodities for infection control.

Disclosure statement

The authors report no conflict of interest.

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