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Nurses' Perceptions of Oral Health Care Provision After the COVID-19 Lockdown

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ABSTRACT

Objective: This study aimed to investigate nurses' perceptions of oral health care provision to inpatients in Japanese hospitals and the infection control measures taken by them after the coronavirus disease 2019 (COVID-19) lockdown to promote collaborative oral health care.

Method: The participants were 1037 nurses working in inpatient wards at 4 hospitals in Fukuoka Prefecture, Japan. Data were collected through a questionnaire survey approximately 6 months after the first COVID-19 lockdown.

Results: More than 90% of the 734 nurses participating in this study positively perceived the preventive effect of oral health care on aspiration pneumonia, ventilator-associated pneumonia, and viral infection. However, approximately half of them had negative perceptions about their knowledge and confidence regarding the control of COVID-19 with oral health care provision, and 84.7% expected to be provided with the necessary information by oral health professionals. Further, 537 nurses (73.2%) provided oral health care to their patients; 9 nurses (1.7%) responded that those patients who received oral health care decreased after the lockdown; and 12 (2.4%) responded that they could no longer collaborate with oral health professionals because of the lockdown. Additionally, 41.7% of them used neither protective glasses nor face shields even after the lockdown began.

Conclusions: This study showed that almost all the nurses perceived the benefcial effect of oral health care for the prevention of viral infection and pneumonia. However, some nurses perceived that their oral health care provision and collaborative oral health care were negatively affected. It also showed that most nurses' knowledge, confidence, and use of infection control measures were insufficient. The results indicate that oral health professionals should support nurses in providing oral health care by providing them with information on COVID-19 infection control measures to prevent infection transmission.

Introduction

Coronavirus disease 2019 (COVID-19), a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),[1] was first identified in Wuhan, China, in December 2019.[2] It became a pandemic[3] and continues to spread across the world, with more than 84 million confirmed cases in 190 countries and nearly 1.8 million deaths by the end of 2020.[4] In Japan, the first wave of COVID-19 struck in March 2020.[5] In response, the Japanese government declared a state of emergency and announced a lockdown in 7 prefectures on 7 April 2020, which was extended to all prefectures on 16 April 2020.[6] Under the declaration, prefectural

governors requested residents to refrain from going out for non-essential purposes; instructed non-essential commercial facilities to remain closed; encouraged companies to allow employees to work from home; tightened restrictions on holding large events and gatherings; and closed public places like parks, museums, libraries, and public schools.[6] This measure decreased the number of confirmed domestic cases of COVID-19 infection from 248 to 56 daily cases by the end of the lockdown on 14 May 2020.[7]

Oral health care is important, as it prevents not only dental diseases but also other diseases, such as ventilator-associated pneumonia (VAP), and aspiration pneumonia.[8-10] Some studies have reported that oral health care is important in preventing viral infections, including the COVID-19 infection. [11-13] In Japan, pneumonia was the fifth leading cause of death in 2019 and aspiration pneumonia was the sixth.[14] A previous study reported that 80.1% of pneumonia patients aged 70 and older experienced aspiration pneumonia.[15] Therefore, promoting collaborative oral health care for inpatients contributes not only to their oral health but also to their general health and prevents death from diseases, during and after COVID-19.[10]

However, some studies have reported the negative impact of the pandemic on the provision of oral health care services to dental patients, dependent older adult patients, and older adults in long-term care facilities.[16-18] In one of the two 24-hour emergency dental centres in China, it was reported that 38% fewer patients visited the clinic with dental emergencies at the beginning of the pandemic compared to before the pandemic.[16] However, no studies have investigated nurses' perceptions on provision of oral health care to their patients in hospitals after the lockdown. A previous study reported that inappropriate oral health care could contribute to the transmission of the virus.[19] Therefore, proper use of infection control measures, such as personal protective equipment (PPE), is essential for nurses whilst they provide oral health care, to prevent infection transmission in hospital wards. However, no studies discuss nurses' infection control measures when providing oral health care after the lockdown.

This study aimed to investigate nurses' perceptions of oral health care provision to inpatients in general hospitals in Fukuoka Prefecture, Japan, and the infection control measures taken after the COVID-19 lockdown to promote collaborative oral health care.

Methods

Design and sample

A cross-sectional study was conducted using self-administered questionnaires, which were issued to nurses working at 4 general hospitals in Fukuoka Prefecture between November 28 and 12 December 2020. Fukuoka Prefecture has the ninth largest population amongst Japan's prefectures, with a population of approximately 5.1 million as recorded in 2020. It was 1 of 7 prefectures where the lockdown was declared on 7 April 2020.

In this study, the researchers considered 4 hospitals, A, B, C, and D. Whilst A, B, and C were public hospitals with special

wards for patients with COVID-19, D was a private general hospital. The 4 hospitals had convalescent wards; perioperative wards, including radiotherapy and chemotherapy; and emergency wards, including an intensive care unit. Hospitals A, B, and D had other wards, including paediatric and psychiatric wards. Nurses who worked in outpatient departments and in haemodialysis units were excluded from the study because they did not provide oral health care to their patients.

To improve the validity of the questionnaire, it was pilot-tested using 10 nurses who worked at a nursing school and had more than 5 years of experience working at a hospital. They were not included in this study. Furthermore, the questionnaire content was checked by dentists who worked at general hospitals. Cronbach's alpha value was used to assess the reliability of the questionnaire. The Cronbach's alpha value of the questionnaire in each section was 0.61 to 0.76; hence, there was good internal consistency.

Ethical considerations

The purpose of this study was explained to the participants through documents enclosed with the questionnaire. A returned questionnaire was considered as consent to participate. This study was approved by the Ethics Committee of Fukuoka Gakuen, Fukuoka, Japan (approval #520).

Instrument

The questionnaire items comprised the following sections: sociodemographic information (gender and age); work experience (length of work experience, workplace, and whether they were providing oral health care for patients); perceptions regarding the effects of oral health care as well as their knowledge, confidence, and willingness regarding COVID infection control; impact of the COVID-19 lockdown on nurses' oral health care practice; and use of infection control measures in oral health care practice before and after the lockdown.

Regarding their oral health care perceptions, they were asked whether they thought oral health care was effective in preventing aspiration pneumonia, VAP, or viral infections. Concerning their knowledge, confidence, and willingness about infection control when providing oral health care, they were asked whether they thought their knowledge on ways to control COVID-19 infection was sufficient, whether they were confident about preventing the infection with oral health care provision, and whether they wanted oral health professionals to provide them with information on infection control through oral health care. The participants had to choose one option from "very much," "somewhat," "not very much," or "not at all" for each question. To investigate the association between using infection control measures and the levels of knowledge and confidence regarding the infection control, the choices in the questions on knowledge and confidence were ranked as 4, 3, 2, and 1. A score of 4 meant that their knowledge or confidence regarding infection control was high.

Regarding the impact of the COVID-19 lockdown on nurses' oral health care provision to their patients, the

participants were asked whether the number of patients requiring oral health care, the time they spent providing oral health care per patient, and the frequency of oral health care per day and per patient decreased, remained unchanged, or increased after the lockdown. They were also asked whether they were able to collaborate with oral health professionals after the lockdown, and they replied with either "yes" or "no."

Regarding infection control measures, they were asked to choose from 6 items they used for PPE whilst administering oral health care before and after the lockdown. From 6 items of infection control measures, they were asked to choose what they were more careful with when providing oral health care to patients after the lockdown. Their choices whilst answering the questions on PPE and infection control measures were summed and considered as their level of using infection control measures. The levels ranged from to 0 to 12.

Data collection

The questionnaire was distributed to 1037 participants, of whom 734 nurses participated, with an average response rate of 74.5% (77.0% in hospital A, 79.7% in hospital B, 52.7% in hospital C, and 88.4% in hospital D).

Data analysis

A Chi-square test was conducted to compare the differences in nurses' oral health care perceptions; their knowledge, confidence, and willingness to control the spread of COVID-19 through oral health care; and their use of infection control measures when providing oral health care. Spearman's rank correlation coefficient was used to investigate how the level of using infection control measures was associated with age, term of work experience as a nurse, level of knowledge regarding infection control, and level of confidence in infection control measures. Data were analysed at a 5% significance level. All statistical analyses were performed using the SPSS Statistics software programme (version 21.0; IBM Corporation).

Results

Of the 734 nurses participating in the study, the majority (93.6%) were women (Table 1). The mean age and the term of work experience were 33.8 ± 11.8 years and 11.0 ± 17.2 years, respectively. The mean values were the highest in hospital D. The majority (52.2%) of the participants worked in convalescent wards; 24.1% worked in perioperative wards; 15.4% worked in emergency wards; and 5.9% worked in COVID-19 wards. More than half (50.0%–89.6%) of them provided oral health care for their patients in each hospital.

Table 2 shows the ward-specific comparison of nurses' perceptions, confidence, and willingness regarding oral health care in hospitals. More than 90% of them positively perceived the preventive effects of oral health care on aspiration pneumonia, VAP, and viral infection, whilst only 38.4% were confident about the effectiveness of the preventive measures they took to control COVID-19 infections with oral health care provision. Additionally, 51.8% of them perceived their knowledge of the COVID-19 infection control measures in oral health practice as sufficient, and 84.7% expected oral health professionals to provide information on COVID-19 infection control measures in oral health care practice. There were no significant differences in the perception, confidence, and willingness amongst wards.

Of the 537 nurses who provided oral health care to their patients in hospital wards, 9 (1.7%), 523 (97.4%), and 5 (0.9%) responded that the number of patients requiring oral health care decreased, was unchanged, and increased, respectively; 2 (0.4%), 529 (98.5%), and 6 (1.1%) responded that the time they spent providing oral health care per patient decreased, was unchanged, and increased, respectively; and 4 (0.7%), 531 (99.2%), and 2 (0.4%) responded that the frequency of their oral health care provision per day and per patient decreased, was unchanged, and increased, respectively, after the lockdown. Twelve nurses (2.4%) responded that they could no longer collaborate with oral health professionals due to the lockdown.

Table 3 shows ward-specific comparison of nurses' use of PPE whilst providing oral health care to patients before and

Table 1 – Characteristics of the participants according to hospitals.

	Total (n = 734)	Hospital A (n = 208)	Hospital B (n = 204)	Hospital C (n = 192)	Hospital D (n = 130)
Gender					
Male, n (%)	47 (6.4)	6 (2.9)	11 (5.4)	14 (7.3)	16 (12.3)
Female, n (%)	687 (93.6)	202 (97.1)	193 (94.6)	178 (92.7)	114 (87.7)
Age					
Years, mean ± SD	33.8 ± 11.8	30.8 ± 8.5	32.0 ± 9.9	31.9 ± 8.4	44.6 ± 13.7
Term of work experience as a nurse					
Years, mean ± SD	11.0 ± 17.2	8.4 ± 7.6	9.4 ± 8.8	9.3 ± 7.7	20.7 ± 13.4
Workplace					
Convalescent ward, n (%)	383 (52.2)	89 (42.8)	96 (47.1)	92 (47.9)	106 (81.5)
Perioperative ward, n (%)	177 (24.1)	69 (33.2)	44 (21.6)	44 (22.9)	20 (15.4)
Emergency ward, n (%)	113 (15.4)	32 (15.4)	36 (17.6)	42 (21.9)	3 (2.3)
COVID-19 ward, n (%)	42 (5.7)	14 (6.7)	14 (6.9)	14 (7.3)	0 (0.0)
Other, n (%)	19 (2.6)	4 (1.9)	14 (6.9)	0 (0.0)	1 (0.8)
Practicing oral health care					
Yes, n (%)	537 (73.2)	80 (61.5)	102 (50.0)	183 (88.0)	172 (89.6)
No, n (%)	197 (26.8)	50 (38.5)	102 (50.0)	25 (12.0)	20 (10.4)

Table 2 – Comparison of nurses' perceptions regarding oral health care and their knowledge, confidence, and willingness regarding COVID-19 infection control according to ward.

Ward	Total (n = 734)	Convalescent ward (n = 383)	Perioperative ward (n = 177)	Emergency ward (n = 113)	COVID-19 ward (n = 42)	Other (n = 19)	P value*
Do you think oral health care is effective in preventing aspiration pneumonia?							
Very much	80.2%	78.9%	81.4%	78.8%	90.5%	84.2%	.966
Somewhat	18.9%	20.1%	18.1%	20.4%	9.5%	15.8%	
Not very much	0.7%	0.8%	0.6%	0.9%	0.0%	0.0%	
Not at all	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Missing value	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	
Do you think oral health care is effective in preventing ventilator-associated pneumonia?							
Very much	75.6%	74.2%	76.8%	70.8%	92.9%	84.2%	.242
Somewhat	22.8%	23.2%	22.0%	29.2%	7.1%	15.8%	
Not very much	1.1%	1.8%	0.6%	0.0%	0.0%	0.0%	
Not at all	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Missing value	0.5%	0.8%	0.6%	0.0%	0.0%	0.0%	
Do you think oral health care is effective in preventing viral infection?							
Very much	58.6%	60.6%	62.1%	47.8%	57.1%	52.6%	.069
Somewhat	32.8%	31.3%	30.5%	40.7%	33.3%	36.8%	
Not very much	6.0%	5.7%	5.1%	9.7%	2.4%	5.3%	
Not at all	0.5%	0.3%	0.6%	0.9%	0.0%	5.3%	
Missing value	2.0%	2.1%	1.7%	0.9%	7.1%	0.0%	
Do you think your knowledge of controlling COVID-19 through oral health care is sufficient?							
Very much	6.3%	5.2%	9.6%	5.3%	7.1%	0.0%	.536
Somewhat	45.5%	47.8%	39.5%	43.4%	57.1%	42.1%	
Not very much	42.4%	40.5%	45.8%	44.2%	35.7%	52.6%	
Not at all	5.3%	5.7%	4.5%	7.1%	0.0%	5.3%	
Missing value	0.5%	0.8%	0.6%	0.0%	0.0%	0.0%	
Are you confident about the preventive measures you took to control COVID-19 infection when providing oral health care?							
Very much	3.8%	3.4%	4.5%	3.5%	7.1%	0.0%	.616
Somewhat	34.6%	34.2%	32.8%	35.4%	50.0%	21.1%	
Not very much	53.0%	53.3%	52.5%	54.9%	40.5%	68.4%	
Not at all	8.3%	8.6%	10.2%	6.2%	2.4%	10.5%	
Missing value	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	
Do you want oral health professionals to provide information on COVID-19 infection control?							
Very much	23.7%	23.8%	24.3%	20.4%	21.4%	42.1%	.398
Somewhat	61.0%	62.9%	61.6%	57.5%	59.5%	42.1%	
Not very much	13.4%	11.2%	12.4%	21.2%	14.3%	15.8%	
Not at all	1.6%	1.6%	1.7%	0.9%	4.8%	0.0%	
Missing value	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	

* Chi-squared test.

after the lockdown. More than 96% of them used gloves and face masks, 80.3% used aprons, and 7.6% used disposable caps whilst providing oral health care to patients after the lockdown. Fewer than half of them used protective glasses or face shields, and 41.7% did not use either after the lockdown. However, all nurses in the COVID-19 wards used gloves, face masks, protective glasses or face shields, and disposable aprons. There was a significant difference in their use of face shields in wards, before and after the lockdown (P < .001), and the emergency wards had the highest percentage of those using face shields. There were significant differences in the use of face shields, protective glasses, disposable aprons, and disposable caps in wards before and after the lockdown (P < .05), and the COVID-19 wards had the highest percentages of those using PPE.

Table 4 shows ward-specific comparison of nurses who were more careful about infection control when providing oral health care after the lockdown. More than 80% of nurses were more careful about hand hygiene, and fewer than 50% were careful about other infection control measures. There were significant differences in ventilation, distance with patients, and waste treatment methods amongst wards (P < .01).

The level of infection control measures in oral health care practice was significantly correlated with the levels of knowledge and confidence regarding these measures (P < .001), with the Spearman's rank correlation coefficients being 0.149 and 0.169, respectively. However, it was not significantly correlated with age or term of work experience.

Discussion

This study presents the first attempt to explore nurses' perceptions of oral health care provision and infection control measures in hospitals after the COVID-19 lockdown. It found that, after the lockdown, most nurses continued to provide oral health care to their patients, with an adequate understanding of the effects of oral health care in preventing diseases. However, the lockdown negatively affected some

Table 3 – Comparison of nurses' use of personal protective equipment when providing oral health care before and after the COVID-19 lockdown according to ward.

	Total (n = 537)	Convalescent ward (n = 263)	Perioperative ward (n = 138)	Emergency ward (n = 92)	COVID-19 ward[**] (n = 31)	Other (n = 13)	P value[*]
Gloves							
Before	99.3%	98.9%	99.3%	100.0%	-	100.0%	.740
After	99.4%	99.2%	99.3%	100.0%	100.0%	100.0%	.906
Face masks							
Before	96.1%	95.8%	96.4%	96.7%	-	92.3%	.880
After	98.0%	98.5%	97.8%	96.7%	100.0%	92.3%	.439
Protective glasses							
Before	14.9%	14.1%	15.2%	19.6%	-	0.0%	.264
After	23.6%	22.4%	25.4%	25.0%	16.1%	38.5%	.544
Face shields							
Before	20.9%	14.4%	15.9%	33.7%	-	15.4%	.001
After	43.6%	36.1%	44.9%	43.5%	93.5%	61.5%	< .001
Protective glasses or face shields							
Before	31.3%	23.2%	29.0%	47.8%	-	15.4%	< .001
After	58.3%	49.4%	62.3%	59.8%	100.0%	84.6%	< .001
Disposable aprons							
Before	75.2%	73.4%	74.6%	75.0%	-	69.2%	.964
After	80.3%	79.5%	80.4%	75.0%	100.0%	84.6%	.050
Disposable caps							
Before	3.0%	1.5%	0.7%	3.3%	-	0.0%	.469
After	7.6%	3.4%	4.3%	6.5%	54.8%	23.1%	< .001

[*] Chi-squared test
[**] There were no COVID-19 wards in the hospitals before the lockdown.

nurses' practice of oral health care provision and collaboration with oral health professionals. Providing collaborative oral health care to patients is important not only for their oral health but their general health as well.[8-13] Oral health professionals provide care to patients, taking appropriate infection control measures.[20] Therefore, it is suggested that oral health professionals should share that information with nurses to promote collaborative oral health care in hospitals.

In Fukuoka Prefecture, the cumulative number of confirmed cases of COVID-19 infection was 199 at the time of the lockdown on 7 April 2020, which was lower than that in other more populated prefectures, like Tokyo (1214) and Osaka (481), during that period.[21] Therefore, the lockdown might have had a greater impact on oral health care provision by nurses in those communities and other countries where COVID-19 infection was more widespread and also on oral health care for older adults in long-term care facilities in Japan.[18] Therefore, it is suggested that further studies are required to investigate the effect of COVID-19 on oral health care in other communities and facilities.

Almost half the nurses perceived their knowledge of infection control measures as insufficient, and more than 60% were unsure about the effectiveness of the preventive measures they undertook to control COVID-19 infection when providing oral health care. It is suggested that all nurses should

Table 4 – Comparison of measures that nurses take for controlling infection when providing oral health care after COVID-19 lockdown according to ward.

	Total (n = 537)	Convalescent ward (n = 263)	Perioperative ward (n = 138)	Emergency ward (n = 92)	COVID-19 ward (n = 31)	Other (n = 13)	P value[*]
Hand hygiene							
	86.8%	84.4%	93.5%	83.7%	83.9%	92.3%	.091
Ventilation							
	49.0%	58.9%	55.1%	23.9%	16.1%	38.5%	<.001
Distance with patients when providing oral health care							
	40.6%	39.2%	44.9%	27.2%	67.7%	53.8%	.001
Waste treatment methods							
	27.7%	22.8%	28.3%	31.5%	51.6%	38.5%	.009
Cleaning methods of oral health care tools							
	6.1%	4.9%	8.0%	6.5%	6.5%	7.7%	.820
Places of providing oral health care							
	4.7%	3.8%	6.5%	4.3%	0.0%	15.4%	.170

[*] Chi-squared test.

have sufficient knowledge regarding infection control measures during the provision of oral health care.

Several studies have reported that the SARS-CoV-2 virus may potentially be transmitted through eye exposure. The disease can also be transmitted by saliva, either directly or indirectly.[22-26] However, except in COVID-19 wards, 37.7% to 50.6% of nurses did not use either protective glasses or face shields in wards. These nurses potentially risked contracting COVID-19 whilst treating patients. Therefore, oral health professionals should recommend the use of PPE including protective glasses or face shields for nurses caring for patients in all wards to prevent infections that would result from oral health care.

Fewer than half of the nurses were careful about ventilation, distance from patients when providing oral health care, cleaning methods using required instruments, and where to practise oral health care after the lockdown. These infection control measures might be important, as COVID-19 infection spreads through droplet- and fomite-based transmission.[27] It is suggested that nurses should not be too close to patients when providing oral health care to reduce droplet exposure, should not provide oral health care in the vicinity of other patients to reduce the risk of droplet infection amongst patients, and should store oral health care instruments hygienically. Previous studies reported that disinfecting the brush head with povidone iodine at 0.2% or with hydrogen peroxide diluted at 1% for 1 minute is effective in maintaining good cleanliness.[28,29] Information on cleaning methods should also be provided. In addition, aerosols and airborne transmission may be considered as possible routes through which COVID-19 spreads.[30] Therefore, ventilation in oral health care practice is important to prevent spreading COVID-19 infection in wards.[31] Our study showed that more than 80% of nurses expected oral health professionals to provide requisite information, and information on the positive use of infection control measures, to improve their knowledge and confidence whilst caring for patients in wards.

Several limitations are associated with this study. Participation in the study was voluntary and the data were self-reported. Maintaining anonymity was paramount; however, the response rates were strongly affected by the self-motivation to participate. The achieved overall response rate of 74.5% was within the normally accepted range for surveys.[32] Only 4 hospitals in the prefecture were selected, without random sampling. Therefore, this study's results may have selection bias. These hospitals had a strong collaborative relationship, in terms of education and research, with the institute that conducted this study. Thus, it might be difficult to conduct such investigations in many hospitals without such strong relationships, amidst the spread of COVID-19 infection. Other factors, such as the nurses' education, community background, the spread of COVID-19, or the lockdown measures, may also be associated with their practice of oral health care provision and use of infection control measures.

Conclusions

Our study showed that whilst some nurses perceived that their oral health care provision and collaborative oral health care were negatively affected by the lockdown, almost all nurses perceived that they were unchanged after the lockdown. Many nurses' knowledge, confidence, and use of infection control measures to provide oral health care were found to be insufficient, even after the lockdown, and more than 80% expected oral health professionals to provide relevant information regarding preventive measures. It is suggested that oral health professionals should make known that collaborative oral health care should be provided to patients, with appropriate infection control measures taken, even after the COVID-19 pandemic. This will help prevent not only oral diseases but also other diseases, such as aspiration pneumonia and VAP. Nurses should also be instructed on infection control measures to be taken to prevent their contracting oral health care–related infections. Further studies are needed to conduct these investigations in other Japanese communities or other countries dealing with the spread of COVID-19.

Author contributions

SH searched and reviewed the literature, analysed the data, and wrote the manuscript; HA, FN, and SU assisted in finding documents, issuing questionnaires, analysing data, and examining the manuscript; AJ assisted in making the questionnaire in this study and advised conducting the investigations in hospitals amidst the spread of COVID-19; and KK and TN negotiated with the hospitals to conduct this study, critically reviewed the manuscript, and supervised the entire study process. All authors read and approved the final manuscript.

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Conflict of interest

None disclosed.

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