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Research Article

Post-COVID Strategies Based on Clinical Dentistry in South Korea

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ABSTRACT

Introduction: The United Kingdom is in the process of gradually lifting the lockdown, and a lot of uncertainties and concerns exist in the field of dentistry in terms of clinical management of patients due to the high risk of work-related transmission. Learning from the strategies of clinical dental practice in other countries may help in the development of national recommendations.

Aims: South Korea managed to contain COVID-19 without full-scale lockdown. This article aims to provide a comprehensive overview of clinical practice of dentistry and orthodontics in South Korea and compare it with information from other countries throughout the world.

Design: An anonymous 21-item questionnaire covering post-COVID strategies was sent to the orthodontic departments of eleven University Dental Hospitals in South Korea for completion.

Results: Three of the eleven hospitals completed the survey. All hospitals provided information on their post-COVID strategies in terms of staff and patient considerations, clinical working environment, clinical arrangements, dental procedures, personal protective equipment and disinfection.

Conclusion: The current evidence on COVID-19 is limited and the risk of its transmission through aerosol generating procedures is still unclear. In the meantime, robust post-COVID strategies must be in place in order to minimize the risk of spread.

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Introduction

The outbreak of COVID-19 originated in Wuhan city in the Peoples Republic of China, in December 2019 and rapidly spread to other Nations [1]. The World Health Organization announced COVID-19 a pandemic on 12th March 2020 and the UK went into full-scale lockdown on 23th March 2020 [2]. Routine clinical practice of dental practitioners ceased from that point due to the high risk of transmission in their working environment. COVID-19 is commonly spread by direct transmission (cough, sneeze and droplet) or contact transmission (oral, nasal and ocular contact) [3]. The potential risk of airborne transmission through Aerosol Generating Procedures (AGPs) is a concern in a medical field, and NHS England recommends avoidance of AGPs unless

absolutely necessary [4]. Any dental procedures involving use of high-speed air turbine, slow speed rotary, 3 in 1 syringe spray, ultrasonic and intra-oral sandblasting are considered AGPs [5].

An opinion piece published on-line by Mark Steven-Howe demonstrated that the dental profession suffers less respiratory disease than other peers, especially those not working in the healthcare sector, while their working environment poses a high risk of exposure to it. He concluded that this was due to a high degree of cross-infection training and careful use of Personal Protective Equipment (PPE) [6]. This report demonstrates the importance of having a strategic approach when treating patients in dental clinics on exit from the lockdown to reduce the risk of transmission. Cochrane Oral Health published a report on national recommendations for the restructuring of dental services based on 11

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countries including the US, Canada, Australia and a number of European countries [7]. This report gave recommendations on infection control measures in five different domains including practice preparation and patient considerations, PPE, management of clinics, dental procedures and disinfection. South Korea contained COVID-19 without the degree of lockdown instituted by many countries and has been effectively controlling the new cases of COVID-19 as well as the mortality rate. This survey-based study is designed to provide an overview of how University Dental Hospitals in South Korea have managed dentistry and orthodontics. This article is for information only and does not give any recommendations or guidelines.

Methodology

A questionnaire was produced to investigate the strategy of clinical dental practice in South Korea. The questionnaire comprised 21 questions and was designed to assess 7 main domains of

- i. Staff considerations.
- ii. Patient considerations.
- iii. Clinical working environment.
- iv. Clinical arrangement.
- v. Dental procedures.
- vi. Personal Protective Equipment (PPE).
- vii. Disinfection.

All questions were closed-ended to allow for greater uniformity of responses and free text was permitted for answers where a reply did not clearly fit one category. Eleven University Dental Hospitals in South Korea were identified, and the orthodontic department of each hospital was directly contacted along with the questionnaire for completion. The email was sent on 5th May 2020 and two weeks were given for response. No statistical analysis was required, and findings of each hospital were summarized in a table.

Results

Three of the eleven hospitals responded to the survey, and information provided are as shown in (Table 1). All hospitals have strict protocols in place to control the spread of COVID-19. They restrict the number of hospital entrances to one or two and check the temperature of everyone entering the hospital. Sanitizer dispensers are placed all around the hospital for use and all staff, patients and visitors are advised to wear a face mask within the hospital premises. One hospital provides a mask at the entrance. Any staff members who had previously been in self-isolation must test negative with COVID-19 in order to return to work. One hospital checks the temperature of all staff twice a day, when they arrive and leave the hospital. All patients must be symptom-free to be seen by clinicians.

Table 1: Details of clinical practice of University Dental Hospitals in South Korea.

Domains \ Hospitals		A	B	C (15 clinicians answered)
Staff	Testing	Returning staff from 14 days self-isolation must be tested negative	Check temp twice daily	- Check symptoms and travel history - Staff with symptoms must be tested negative
	Training?	Yes	Yes	Yes: 11, No: 3
Patient	Testing	At the entrance: - Temp check - Taking history of symptoms - Obtain address and contact details	- Temp check at the entrance - Taking history of symptoms	- Temp check at the entrance - History taking - Symptoms - Travel
Clinical environment	Hospital arrangements	- Sanitiser at the entrance, lifts and in front of clinics - Everyone to wear masks in hospital - Full disinfection of lifts and clinics twice daily	- Restrict to one entrance - Provision of sanitiser and mask at the entrance - Sanitiser at toilet and along corridor	- Restrict to two entrances - Provide sanitiser and check mask at the entrance
	Number of chairs in clinic	> 8 chaired polyclinic	>8 chaired polyclinic	2-3 chairs: 6 4-5 chairs: 1 6-7 chairs: 3 > 8 chairs: 5
	See multiple pts at the same time	Yes	Yes	Yes: 13 No: 2
	Keep 2m between pts?	Unsure	Yes	Yes: 7 No: 6
	Ventilation	- Opened windows - Air conditioners	- Opened windows - Air purifiers	- Opened windows - Air conditioners - Air purifiers (Brand: LG)
Clinical arrangement	Lag time between pts?	0-15 mins	No	Yes (15mins): 2 No: 13

	Number of pts per session (4hours)	No change in numbers compared to pre-COVID	> 15	<10: 7 >10: 3 No change from pre-COVID: 5
	Virtual clinic?	No	No	No
Dental procedures	AGP?	Yes	Yes	Yes: 13 No: 2
	If yes to AGP, special precautions?	Yes - Enhanced PPE - Restrict AGPs (including 3 in 1) if possible - High vol. suction - Pre-treatment Chlorhexidine/ 0.25% povidone mouthwash	Yes - Enhanced PPE	Yes: 11 - Restrict the use of handpieces + U/S scalers - Enhanced PPE - Aerosol extractor
	Procedures	No restrictions	No restrictions	No restrictions: 8
PPE	AGP	Scrubs, mask (KF-94/ N-95), visor, gown, hair cover, apron	Mask, gown, apron, air shield	Mostly mask and gown ± scrubs, apron, visors, wipeable shoes & protector shield
	Non AGP	Scrubs, mask (KF-94/ N-95), visor, gown, hair cover, apron	Mask	Mostly mask and gown ± scrubs, apron, visors, wipeable shoes
Disinfection	AGP	Ethanol spray, wipe	Spray, wipe	Soap, spray, wipe
	Non AGP	Ethanol spray, wipe	Wipe	Soap, spray, wipe

The three hospitals treat their patients in a polyclinic and the number of chairs in each clinic can be more than eight. Multiple patients are seen at the same time and some clinicians believe the distance between patients are less than 2 m. All hospitals keep the windows open for ventilation and also use air conditioners, air purifiers or both. A large variation exists between the number of patients that clinicians see per session, and some clinicians reported that there have been no changes in numbers compared to the pre-COVID time. None of the hospitals run a virtual clinic to reduce the number of patients attending the hospital.

One hospital requests the patient to use mouthwash prior to any dental procedure. All three hospitals do not prohibit performing AGPs and have no restrictions on orthodontic procedures. Two hospitals reported minimizing the use of handpieces, ultrasonic scalers and the 3 in 1 syringe tips if possible. For instance, during bond up, one hospital reported that they restricted the use of the water-air spray to reduce the amount of splatter and washed the acid etch away with gentle water and a light air to dry the tooth.

High volume suction or aerosol extractors were used in two hospitals and all three hospitals used enhanced PPE for staff protection. Generally, the minimum PPE was masks and gown, and they complemented it with scrubs, apron, visor/ tight sealed goggles, air/protected shield, hair cover or wipeable shoes. One hospital provided information of masks they used, KF-94, N-95 or any mask equivalent to these meeting the approved standard of protection against particulate matter. All hospitals provided information on disinfection of clinics, however, did not include details of products or active agents.

Discussion

The outbreak of COVID-19 has had a significant impact on the routine clinical practice of dental practitioners and it is likely to continue to do so following the exit from full lockdown. Varying levels of guidance and standard operating procedures have been introduced in the different countries of the world to manage dental patients during COVID-19. Recommendations for working in the post-COVID environment are still under development. South Korea follows three guiding principles for management of COVID-19 'test, trace and contain', and successfully reduced the spread of the virus without full-scale lockdown as imposed in the United Kingdom and many other countries. South Korea recently had a second wave of the outbreak; however, this was contained within a few days and the number of new cases has been kept below 15 [8]. This survey-based study viewing the clinical practice of dentistry and orthodontics in South Korea, together with information from other countries throughout the world, may help in the development of post-COVID strategies in the United Kingdom.

In the latest guidance for England, the General Dental Council (GDC) instructs dental professionals to refer to the document produced by NHS England [9]. This document provides information on urgent dental care systems applicable to the delay phase of COVID-19 management, and covers guidance for patients and the public, infection control and management, and dental care settings [4]. AGPs are recommended to be avoided where possible. This recommendation is in line with the advice given by the Chief Dental Officer [10]. The document 'COVID-19: infection prevention and control guidance' published by Public Health England states that based on previous studies on MERS-CoV and SARS-CoV, human coronaviruses could survive on inanimate objects and

remain viable for up to 5 days depending on environmental conditions including surface type [11]. Therefore, aerosols produced by dental procedures could result in extensive contamination of the clinic.

The GDC and Royal College of Surgeons of England [RCS (Eng)] and Edinburgh provide the link to the Scottish Dental Clinical Effectiveness Programmed for management of acute dental problems during COVID-19 [9, 12-14]. This document does not mention anything about AGPs but seems to suggest not offering urgent dental procedures involving handpieces therefore recommends possible management of irreversible pulpitis by extraction with no mention of pulp access. NHS England suggests remote consultation and triage services for patients to avoid visiting a clinical environment, thereby minimizing the risk of viral exposure to patients, health care workers and the public [9]. The Faculty of General Dental Practice (UK) and British Dental Association strictly follow the National guidance on the triage system, routine/urgent dental care and AGPs [15, 16]. The British Orthodontic Society and RCS (Eng) recommend managing orthodontic patients remotely if possible and see them only for urgent orthodontic care with no AGPs preferably in secondary care or local urgent care center [17, 18]. NHS England advises use of Level 2 and Level 3 PPE for non-AGPs and AGPs respectively [9]. The Level 3 PPE includes disposable gown and Filtered Face Piece 3 (FFP3) respirator on top of the Level 2 PPE.

The Cochrane Oral Health reviewed 12 guidance documents produced by 11 countries to aid production of national guidance on the restructuring of dental services and to provide information on recommended requirements [7]. 11/12 sources provided information on remote triage of patients to assess their potential COVID-19 status and 7/12 sources recommended temperature screening of patients. 2/12 sources advised to screen temperature of staff on a daily basis. 7/12 sources advised patients to keep a mask on in the hospital/practice premises, and 5/12 sources recommended the supply of surgical masks to patients. 10/12 sources provided information on patient hand hygiene including provision of sanitizer at the entrance. 8/12 and 4/12 sources advised all staff to wear a mask and eye protection at all times respectively. PPE recommended in a clinical area included a mask, gown, apron, eye protection, hat/hood, visor/face shield, gloves, long sleeves and shoe cover. The level and type of face mask depended on the risk of dental procedures and the COVID-19 status of patients.

Most sources recommended FFP2 or a mask equivalent to N95/KN95 and a few sources recommended use of FFP3 or a mask equivalent to N99 for AGPs. 9/12 sources suggest the use of pre-operative mouthwash to reduce the risk of transmission. 4/12 resources discussed the importance of air ventilation. Two sources advised ventilation of a room for at least 15 minutes between patients and one source for 120 minutes after AGPs. One source even recommended a switch between different rooms after AGPs. All sources indicated to reduce or avoid AGPs if possible and 7/12 sources suggested avoidance of a 3 in 1 syringe, especially a water-air spray. Most of the sources indicated to use rubber dam or high-volume suction to reduce the amount and spread of aerosols produced by dental procedures. A regular disinfection of all areas of practice/hospital premises was recommended and disinfection products listed in the documents included >60% alcohol/ethanol, 0.1-9.5% sodium hypochlorite, 0.12-0.24% chloroxylonol, viricide agents (EN14476) and EPA-registered hospital grade disinfectants.

Conclusion

South Korea managed to control the spread of COVID-19 without full-scale lockdown and viewing their clinical practice in dentistry and orthodontics may help to develop post-COVID strategies in the United Kingdom. This article provides information of the current clinical practice of three out of eleven university dental hospitals in South Korea; therefore, findings of the survey may not represent all dental and orthodontic practices. One interesting finding is that AGPs are not completely prohibited. The current evidence on aerosol transmission of COVID-19 is limited, therefore more studies will be required to assess the risk of COVID-19 transmission through AGPs. In the meantime, robust post-COVID strategies must be in place before exit from the lockdown in order to minimize the risk of spread which may include restricting AGPs and continued promotion of remote clinics via telephone or video calls. This study may conclude that the key to success of controlling COVID-19 in South Korea is the test, trace and contain strategy and civic consciousness of keeping social distancing and the use of face masks.

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Conflicts of Interest

None.

Key Points

- i. Learning from clinical strategies of other countries is important to manage dental practice in the post-COVID environment.
- ii. More evidence is required to assess the risk of COVID-19 transmission through aerosol generating procedures.
- iii. The test, trace and contain strategy and civic consciousness of keeping social distancing and the use of face masks are important to control the spread of COVID-19.

REFERENCES

1. Zhu N, Zhang D, Wang W, Li X, Yang B et al. (2020) A Novel Coronavirus From Patients With Pneumonia in China, 2019. *N Engl J Med* 382: 727-733. [Crossref]
2. <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>.
3. Peng X, Xu X, Li Y, Cheng L, Zhou X et al. (2020) Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci* 12: 9. [Crossref]

4. <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0282-covid-19-urgent-dental-care-sop.pdf>.
5. <https://www.bos.org.uk/Portals/0/Public/docs/Advice%20Sheets/COVID19%20FACTSHEETS/Recovery%20Phase%20Advice/AGP%20BOS%20guide%20Version%20May%206th%202020%2016.30aw.pdf>.
6. <https://www.nationalelfservice.net/dentistry/dental-workforce/occupations-highest-potential-exposure-covid-19/>.
7. https://oralhealth.cochrane.org/sites/oralhealth.cochrane.org/files/public/uploads/covid19_dental_reopening_rapid_review_07052020.pdf.
8. <https://www.worldometers.info/coronavirus/country/south-korea/>
9. <https://www.gdc-uk.org/information-standards-guidance/covid-19/covid-19-latest-information>.
10. <https://www.fgdp.org.uk/sites/fgdp.org.uk/files/editors/2020.03.18%20CDO%20Scotland%20COVID-19%20letter%20on%20remuneration%20and%20AGPs.pdf>.
11. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881489/COVID-19_Infection_prevention_and_control_guidance_complete.pdf.
12. <https://www.rcseng.ac.uk/dental-faculties/fds/coronavirus/>.
13. <https://www.rcsed.ac.uk/professional-support-development-resources/covid-19-resources/protecting-your-patients/clinical-guidelines-dentistry>.
14. <https://www.sdcep.org.uk/wp-content/uploads/2020/03/SDCEP-MADP-COVID-19-guide-300320.pdf>.
15. <https://www.fgdp.org.uk/news/covid-19-latest-guidance-news-and-resources-gdps#Recent updates>.
16. <https://bda.org/advice/Coronavirus/Pages/faqs.aspx>.
17. <https://www.bos.org.uk/Portals/0/Public/docs/Advice%20Sheets/COVID19%20FACTSHEETS/BOS%20Covid-19%20Logo%20Orthodontic%20Emergencies%20Protocol%20final.pdf>.
18. <https://www.rcseng.ac.uk/-/media/files/rcs/fds/guidelines/orthodontics-covid19.pdf>.