# Oral Health Monitoring Using Smartphone Oral Self-Photograph in Teledentistry Model for Solution of School Dental Health Initiative Program in Pandemic Situation

Hendri Susanto<sup>1</sup>\*, Wulan Tri Astuti<sup>2</sup>, Ardhya Nareswari<sup>3</sup>, Dewi Puspita<sup>4</sup>, Tiffany Winata<sup>5</sup>, Tiara Evita Sari<sup>5</sup>, Fariz Attar Aulia<sup>5</sup>, Keysa Izza Kurnia<sup>5</sup>, Rania Banurisya<sup>5</sup>

<sup>1</sup>Department of Oral Medicine, Faculty of Dentistry, Universitas Gadjah Mada <sup>2</sup>Department of French Literature, Faculty of Cultural Science, Universitas Gadjah Mada <sup>3</sup>Department of Architecture and Planning, Faculty of Engineering, Universitas Gadjah Mada <sup>4</sup>Primary Health Center 2 Bantul, Yogyakarta, Indonesia

<sup>5</sup>Dental Study Program, Faculty of Dentistry, Universitas Gadjah Mada \*Corresponding author's email: drghendri@ugm.ac.id4 doi: https://doi.org/10.21467/proceedings.151.19

## ABSTRACT

Restrictions on dental practice during the COVID-19 pandemic impacted the implementation of the School Dental Health Initiative (SDHI), especially in Bantul Regency, where 92.79% of the population barely visited the Dental Clinic. Moreover, the tendency of adolescents to pay less attention to oral and dental health encourages the need for innovation in dental practice. The Dental Online Report (DENTOPORT) program was developed to assist students of Sekolah Menengah Pertama (junior high school) 2 Bantul in raising awareness and creating changes in adolescent oral health behavior as integrated the concept of teledentistry in SDHI. DENTOPORT is an oral health monitoring and education program that utilizes the LINE application, which teenagers widely use. Students are trained to take oral/dental photographs correctly. Students send pictures of the condition of their teeth and mouth using smartphones and consult the DENTOPORT team through the LINE application. Report on oral health condition based on photos of the oral cavity condition and recommendations for promotive and preventive behavior. This program has been coordinated to be continued by the Bantul 2 primary Health Center with Sekolah Menengah Pertama 2 Bantul as the center of learning. DENTOPORT has the potential to be adopted as a UKGS program so that it can reach other schools in the Bantul area and its surroundings so that it becomes a national program.

Keywords: Oral Health Monitoring, Oral Self-Photograph, Pandemic, School Dental Health Initiative Program, Teledentistry

## 1 Introduction

The COVID-19 pandemic significantly impacted to Health care system, including the National School Dental Health Initiative (SDHI) in Indonesia. Approximately 96% of Indonesians did not regularly visit dental health facilities [1]. This pandemic situation may cause dental health professionals to worry about people oral health including teenager's oral health who cannot be monitored due to the pandemic situation. During the pandemic, dental practice is almost limited since the high risk of COVID-19 infection spreading not only for the dental health professional and team but also for dental patients. The close contact and the aerosol-generation procedure of dental practice allow dental health professionals only to deliver emergency care, which is why dentists practice in dental clinics in every health care facility [2, 3]. The restriction for patients to visit dental clinics forced patients to switch the way to visit dental clinics using online facilities, which is growing rapidly in the era of Industry disruption 4.0 [4].

The National School Dental Health Initiative (SDHI) is an Indonesian Government program that aims to monitor oral health by dental health professionals in the primary health center for teenagers' oral health in the school's corresponding region of dental health professional duty. Junior high school students are also



© 2023 Copyright held by the author(s). Published by AIJR Publisher in "Proceedings of the 3<sup>rd</sup> International Conference on Community Engagement and Education for Sustainable Development" (ICCEESD 2022). Organized by the Universitas Gadjah Mada, Indonesia on December 7-8, 2022.

the target population for the SDHI program in Indonesia. This SDHI is regularly programmed by public health centers at certain times within the school's public health program. In SDHI, the school students, the dental health professional target from the corresponding public health center region, were monitored for oral health and followed by oral health care in the dental clinic of the public health center [5]. However, the SDHI in the COVID-19 pandemic may be compromised since there is a tight regulation to have physical contact to visit and examine students in the school. Hence, a strategy is needed to help dental health professionals deliver SDHI sustainably by adjusting to the situation of students and dental health professionals to facilitate the SDHI. Indeed, many teleconsultations applications in teledentistry have been launched and delivered from healthcare facilities using information technology and are easily and widely accessed by all people with an internet connection using their gadgets [6]. However, those applications may have a cost that people probably must pay for health consultations. There are not many such applications that can be used for community services. For adults, teledentistry facilities may easily access using their handphones or gadgets. Since the teledentistry application system may be paid for from their pocket, this application may not be suitable for students dependent on their parents to pay for health consultations using teledentistry or telemedicine applications.

Moreover, students' gadgets may be in the middle range of sophisticated technology in public junior high schools. Students may have difficulty installing the paid application on their gadgets due to not having enough space or memory for the application. Hence, the strategy to facilitate students and dental health professionals to communicate to monitor students' oral health during the pandemic may use the familiar and trending application that students may use for communication in daily activities [6].

Dental students have developed a Dental Online Report (DENTOPORT) from the Faculty of Dentistry, Universitas Gadjah Mada, which has been used to help dental health professionals monitor oral health during the pandemic. This program is initially in partnership with Sekolah Menengah Pertama 2 Bantul and public health center 2 Bantul to increase awareness and induce a change in dental hygiene practices among teenagers. DENTOPORT is an oral health monitoring and education program that utilizes android based application, namely the LINE app, one of the free popular mobile applications among adolescents in Indonesia. A dental health professional may use the LINE application to educate and monitor students' oral health. The DENTOPORT may facilitate students to consult with dental health professionals by capturing the oral cavity using a student handphone and privately communicating their oral photograph to dental health professionals in DENTOPORT [7]. DENTOPORT's LINE Official Account integrates oral health educational material, which students can access and learn for free. It also has a manual for oral photograph capture to training the student to take proper oral cavity photographs. Since junior high school students efficiently operate this program, this DENTOPORT needs support from all stakeholders to adopt this system to integrate with the National health system for community service during the pandemic or to facilitate people in rural or unreachable by Dental health professionals.

## 2 Research Methodology

The application of appropriate technology design and implementation-based community service started with students' socialization during online learning activities. The criteria for students who participated in the DENTOPORT program were 12-14 years old and had obtained recommendations guidance counselling teacher. This activity was carried out through the official LINE account named "DENTOPORT". The official account (OA) feature facilitates data collection through one channel and page to provide and broadcast information while protecting student data privacy with a private message feature to send dental photographs and reports. Video tutorial links were also sent via LINE Official Account, while the manual was prepared online. The manual contains dental health educational materials

and links to pre-arranged infographic slides and videos. The materials included in the program kit include a flashlight, toothbrush and toothpaste, tongue scraper, cheek retractor, disclosing agent, and an intraoral photo guide card given to students to support teledentistry activities [7]. The students whose parents have permitted them to join this program will join the LINE application operated by DENTOPORT team members. The team member has organized according to the DENTOPORT system. The DENTOPORT team is divided into two divisions. The administrator may facilitate the educational material in the LINE chat and photo organizer of students who consult with DENTOPORT. The second division may facilitate consultation based on questions from a student in the LINE chat. The dentist verifies all consultation of oral cavity photographs taken by students. The photographs will be saved in the DENTOPORT clouds and kept as confidential materials that only the DENTOPORT team can access. DENTOPORT also encourages students to improve oral health care and educate and then evaluate students' behavior toward oral health care using toothbrushes and toothpaste properly given by DENTOPORT. All education materials are available for students and contain evidence-based knowledge in dentistry. The students may receive oral health recommendations after sending the oral cavity photograph to DENTOPORT's LINE Official Account.

The students would send two sets of oral cavity photographs and receive a report based on their photograph, as well as promotive and preventive recommendations for further steps according to the identification in the oral cavity photograph [7]. Regarding their oral health condition, students may follow up by visiting the dentist in the public health center 2 Bantul Onward, DENTOPORT has excellent potential to be adopted as part of the national SDHI program, able to reach other schools in Bantul Regency and its surrounding areas then eventually expanding into a national program. This program in as well as to integrate teledentistry into the national SDHI.

# 3 Results and Discussion

The DENTOPORT program regularly provides educational content through videos and infographic slides that can be accessed through handbooks distributed to students and communities and through the DENTOPORT LINE official account (Figure 1). This educational content is obtained from problems that exist in students through preparatory surveys to increase their understanding of dental and oral health, which will affect changes in students' behavior.



Figure 1: Oral self-photograph using smartphone tutorial (a) the guidance book (b).

After socializing the program to the Sekolah Menengah Pertama 2 Bantul students through the online meeting (Figure 2), the students communicated with the DENTOPORT team regarding the oral health consultations in DENTOPORT's Official Account.



Figure 2: Socialization of the program to students via Zoom Meeting.

We also found that junior high school students never visit their dentist during the COVID-19 pandemic. In addition, 77% of students have not seen a dentist in the last year (Figure 3). 95% of students have yet to make online consultations with the dentist using the application on their smartphone (Figure 4). This result is the study that may the percentages of Indonesians who visited dentists were very low during the pandemic [1].



Figure 3: The percentage of students who booked consultations with dentists during the COVID-19 pandemic.



Figure 4: The percentage of students who booked consultations with dentists using the smartphone application in the past year.

During the program, students may learn about oral health care through the educational material available at DENTOPORT's LINE Official Account (Figure 5). After they have their oral self-photograph using their smartphone, students may send it directly to chat communication and have feedback regarding their oral health. This method was encouraged during the pandemic due to the limited contact between dentists, patients, and other staff and to reduce the spread of COVID-19 transmission in the dental clinic [7].

Proceedings of the 3<sup>rd</sup> International Conference on Community Engagement and Education for Sustainable Development (ICCEESD 2022)

Oral Health Monitoring Using Smartphone Oral Self-Photograph in Teledentistry.....



Figure 5: Educational material on DENTOPORT's LINE Official Account.

As displayed in Figure 6, the DENTOPORT team will identify behavioral developments in each oral selfphotograph-taking period to maintain oral health and provide suggestions based on the problems seen in the photograph and easy for students to understand.



# Figure 6: Oral self-photograph of students during the program.

The oral self-photograph taken by smartphone students will be referred to the responsible dentist from National School Dental Health Initiative (SDHI) program in Primary Health Care 2 Bantul. The data from oral self-photograph will further follow up for treatment according to the degree of oral diseases found in the oral photograph. During the program, some students sent their self-photograph and consulted with DENTOPORT. They mainly asked for the dentist's suggestions and treatment regarding their problems. As shown in Table 1, we found that most problems listed in the oral cavity of students in junior high school based on oral self-photograph were:

Condition/Cases in the oral	Student's percentages with cases		
cavity	based on Class		
	7	8	9
Tooth decay Tooth malposition	40% 62.5%	60% 90%	60% 65%

 Table 1: Oral conditions of students

These conditions were detected using an oral photograph; the conditions of the picture students took may compromise this visualization. Hence, other oral conditions may not be seen clearly. Moreover, other conditions may not be seen in oral self-photographs, such as gum diseases or gingival inflammation, or different normal variation of oral tissue and lesions that may probably exist in the student's oral cavities. Hence, the dentist must recheck and examine the student's oral cavity for confirmation before making a diagnosis since it is hard to make a definitive diagnosis only from oral photographs. The other factor was the quality of the picture that students have taken, which may affect the visualization of oral self-photograph and may mask the actual condition of their oral cavities.

# 4 Conclusions

The Dental Online Report (DENTOPORT) program has succeeded in training students on how to take oral self-photograph to monitor oral health conditions and introducing the concept of teledentistry to the students. Through further collaboration, the sustainability of the DENTOPORT program has been ensured thanks to its successful integration with the School Dental Health Enterprise (UKGS) program.

## 5 Declarations

# 5.1 Study Limitations

- a. The school has started teaching and learning activities offline in the 2022/2023 academic year, which coincides with the implementation of community service of implementation of appropriate technology based on DENTOPORT, which is being carried out at SMPN 2 Bantul, therefore the use of gadgets in the learning process or other school activities online is reduced and causing students to become less motivated to take part in community service programs based on the application of appropriate DENTOPORT technology.
- b. The variety of gadgets for students at SMPN 2 Bantul has caused not all of them to have the LINE application or install the LINE application due to limited memory on their smartphones.
- c. Some students have expressed their willingness to participate in the DENTOPORT program but are reluctant to consult through photos because they are embarrassed about the condition of their oral cavity.
- d. There was a lack of offline interaction at Sekolah Menengah Pertama 2 Bantul. The program had not planned regular offline visits but preferred online activities through the LINE or WhatsApp application.

## 5.2 Acknowledgments

We want to thank all students and teachers of Sekolah Menengah Pertama (Junior High School) 2 Bantul, all staff of primary health care 2 Bantul, Faculty of Dentistry, Universitas Gadjah Mada for their support of our program.

Proceedings of the 3rd International Conference on Community Engagement and Education for Sustainable Development (ICCEESD 2022)

## 5.3 Funding Source

This program was funded by Direktorat Pengabdian Kepada Masyarakat, Universitas Gadjah Mada (No: 439/UN1/DPM/YANMAS/PM/2022)

## 5.4 Competing Interests

None

## 5.5 Publisher's Note

AIJR remains neutral with regard to jurisdictional claims in published map and institutional affiliations.

## How to Cite

Susanto *et al.* (2023). Oral Health Monitoring Using Smartphone Oral Self-Photograph in Teledentistry Model for Solution of School Dental Health Initiative Program in Pandemic Situation. *AIJR Proceedings*, 128-134. https://doi.org/10.21467/proceedings.151.19

## References

- C. M. A. Santoso, T. Bramantoro, M. C. Nguyen, Z. Bagoly, and A. Nagy, "Factors affecting dental service utilization in Indonesia: A population-based multilevel analysis," Int J Environ Res Public Health, vol. 17, no. 15, pp. 1–11, Aug. 2020, https://doi.org/10.3390/ijerph17155282.
- [2] M. K. AL-Omiri et al., "COVID-19 and Dentistry: An Updated Overview of Dental Perspectives and a Recommended Protocol for Dental Care and Emergency Dental Treatment," Journal of Contemporary Dental Practice, vol. 22, no. 5, pp. 572–586, May 2021. https://doi.org/10.5005/jp-journals-10024-3076.
- [3] M. Falahchai, Y. Babaee Hemmati, and M. Hasanzade, "Dental care management during the COVID-19 outbreak," Special Care in Dentistry, vol. 40, no. 6. Blackwell Publishing Inc., pp. 539–548, Nov. 01, 2020. https://doi.org/10.1111/scd.12523.
- [4] M. Javaid, A. Haleem, R. P. Singh, and R. Suman, "Dentistry 4.0 technologies applications for dentistry during COVID-19 pandemic," Sustainable Operations and Computers, vol. 2, pp. 87–96, Jan. 2021. https://doi.org/10.1016/j.susoc.2021.05.002.
- [5] A. S. Pan, A. Suri, K. Masyarakat, and F. Kesehatan, "EFEKTIVITAS USAHA KESEHATAN GIGI SEKOLAH (UKGS) DI MASA PANDEMI," Jurnal Medika Hutama, vol. 3, no. 2, 2022. https://jurnalmedikahutama.com/index.php/JMH/article/view/451
- [6] M. Estai et al., "End-user acceptance of a cloud-based teledentistry system and Android phone app for remote screening for oral diseases," J Telemed Telecare, vol. 23, no. 1, pp. 44–52, Jan. 2017. https://doi.org/10.1177/1357633X15621847.
- D. Maret, O. A. Peters, J. P. Auria, F. Savall, and E. Vigarios, "Smartphone oral self-photography in teledentistry: Recommendations for the patient," *J Telemed Telecare*, 2021. https://doi.org/10.1177/1357633X211028513.