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ANALYSIS OF SATISFACTION TOWARDS THE APPLICATION OF DENTAL HEALTH INFORMATION SYSTEM

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Abstract

Dental and oral health has become one of the important parameters of general health. The latest data from the Indonesia Health Survey in 2023 shows that dental oral health problems affect 56.9%, while those who come to health facilities to be treated are only 11.2%. Therefore, there is an imbalance in the number of them, and some patients are not getting the treatment. This study aims to digitalize health management to cover the promotive, preventive, and curative aspects of dental health through an application named My Dental Hygiene Care and test the eligibility of the application by respondent satisfaction. The methodology used was a total sampling of dental hygienists in Manado City who carry out individual dental and oral health care for as many as 30 respondents. The application was built with promotive preventive aspects through educational materials related to dental health and curative in the form of disease diagnoses, medical records, and treatment for the patient. The satisfaction method used PIECES, which analyzed the application by its Performance, Information, Economy, Control, Efficiency, and Service. The results show that the respondent's satisfaction is 4.58, showing that the dental hygienists are satisfied with My Dental Hygiene Care. In conclusion, the digitalization of health management at My Dental Hygiene Care is eligible.

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Introduction

Oral health is essential to the general health and well-being of people, as the health of the mouth reflects a person's holistic health. Bad dental conditions can result in discomfort during activities (Hertanto et al., 2022). Dental diseases, when left untreated, can lead to problems in eating, speaking, and ability to work and impact the quality of life (Naavaal et al., 2020). In children, dental problem is associated with reductions in school performance and psychosocial well-being. Children who suffer from dental problems are prone to problems at school and miss school hours, as well as a degrading inner being to finish homework. Dental problems made school children 82% missed school for less than two weeks and 18% miss more than two weeks of school (Çoğulu et al., 2023). Besides, it is also correlated with dental problems and the feeling of shyness, unhappiness, and unreadiness to face people (Shah, 2020). Moreover, in adults, that have degenerative changes that are more severe with the increase of age. Older adults can also suffer from dementia and depression which creates hardship in the delivery of dental treatment. Caries in adults increased by 60% with low resting pH and low stimulated flow rate of salivary and systemic diseases (Chan et al., 2021). The systemic disease in older adults increases the progression of periodontitis by 86% (Nascimento et al., 2018). Specifically, in Indonesia, dental and oral disease is fairly large in prevalence at 56.9% in 2023 (Kemenkes BKPK, 2023). The biggest number of dental and oral diseases that people of Indonesia suffer from is dental caries, and the second place is periodontal disease. Meanwhile, the awareness to come to health facilities is only 11.2% besides the unavailability of health facilities problem (Kemenkes BKPK, 2023). In conclusion, the number of dental workers and the dental oral health problems are not balanced.

Dental and oral health care services are care services planned over a certain period on an ongoing basis in the areas of promotive, preventive, and simple curative to improve the level of optimal dental and

oral health in individuals, groups, or communities (Petersen et al., 2020). Supervision and observation of dental and oral health are important. Besides, caries prevention, sedation, and pharmacological management are also prominent. Good maintenance of dental and oral hygiene from childhood can help greatly to maintain good oral and dental hygiene in the future (Jiang et al., 2023). In the digitalization era, the use of mobile technology has become an important resource for health services delivery and public health for its ease of use and wide reach. Health information and service with the application of mobile wireless technologies is referred to as mHealth (Istepanian, 2022). The use of mHealth has been spread in the health sector such as to support midwives in the management of women with pre-eclampsia in rural and remote areas (White et al., 2019), self-monitoring pregnancy which helps midwives after the Post-Covid-19 pandemic to point out the risks of the patients (Vickery et al., 2020), public health (Cao et al., 2022) and Covid-19 management and medical education (Jembai et al., 2022). mHealth in dentistry was also performed using IoDT (Internet of Dental Things) which works as teledentistry to provide peer education, consultation, and referral channelizing (Campos et al., 2020; Jha et al., 2021), self-care oral health (Mohammadzadeh et al., 2023; Nayak et al., 2019). However, few applications of mHealth in dental health diagnosis, especially in Public Health Centers.

The dental and oral health care process is the basis for the implementation of professional dental and oral health therapy practice and is a framework for providing high-quality dental and oral health care services for all types of clients in various forms of professional health service facilities. This process requires decision-making where the dental and oral therapist is responsible for identifying and resolving client problems through dental and oral health care (Ghoneim et al., 2023; Uguru et al., 2020). In the problems of unbalance number of dental and oral health problem and dental workers as stated in latest Basic Health Research Indonesia in 2018, our study aims to build digitalization of dental and oral health management by creating an information system named My Dental Hygiene Care to diagnose dental health in the Public Health Center and analyze the respondents' satisfaction with the application using PIECES method.

Method

Participant characteristics and research design

The information system design in this research uses a prototyping system design approach, namely a modern engineering-based design approach which is an iterative process that involves a close working relationship between designers and users. The name of the m-Health is My Dental Hygiene Care whose feature is to diagnose the client's dental health and for the health record. There are 3 accounts in the application: for registration, the operator (dental hygienist), and the client. The registration section plays the role of inputting operator data in the form of name, telephone number, and email address as well as setting operator access rights. The operator is a dental hygienist who will and is currently practicing Dental and Oral Health Care whose role is to input client data by the needs for recording dental and oral health care of the client. The workflow of the application is shown in Figure 1.

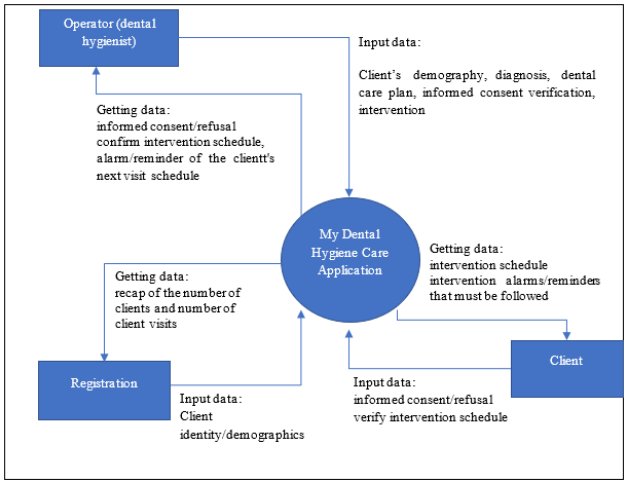


Figure 1. Workflow of The Application

The software used to build this application is Glide. Meanwhile, Google Sheets is used for data storage. The database applied in the application is shown in Table 1.

Table 1. Database Menu in The Application

Menu	Detail
Registration	Input operator data in the form of name, telephone number, email address, and operator access rights
Login	Log into the account for the operator
Demography of client	Client's identity includes full name, identity number (NIK/SIM/Passport), place/date of birth, gender, home address, telephone number and email address, occupation, marital status, number of dependents, nationality, ethnicity/customs, religion and latest education, weight body, height, blood type, insurance, name, address and telephone number of the treating doctor/dentist and referral source if any
Medical history	Questionnaire of recent health for the anamnesis
Social history	For the operator to choose the client being in charge based on the client's identity number

Diagnosis	Input data for diagnosis comprising NIK (identity number) of the client, the cause, symptoms, the aim of dental care, intervention, and education
Intervention	A care plan that must be followed by the client complete with the necessary educational materials
Informed consent	For the client or parent of the child to approve dental care has been given based on the diagnosis. This menu utilizes the touchscreen feature on the user's cellphone/smartphone as a writing tool for affixing the signature. This signature feature is also equipped with the ability to clarify handwriting so that the results will be more natural as if we were signing on paper.

The information system analysis research design uses the PIECES method. The PIECES method is used to analyze the level of respondent satisfaction with the application. The variables used are Performance, Information, Economy, Control, Efficiency, and Service. This research applies the Likert measurement scale in a questionnaire with a measurement scale of 1 – 5. There are two types of questions that use the Likert scale, namely positive questions used to measure positive interest with the highest score of 5 and the lowest score of 1. Meanwhile, negative questions are given the highest score of 1 and the lowest score of 5. The Likert Scale answers consist of Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree (Taluke et al., 2019).

The study was conducted at the Public Health Center of Manado City. The inclusion criteria of the respondents are those who were willing to participate in the study as dental hygienists and have Android-based smartphones. Respondents who were unavailable at the moment to respond to the questionnaire were automatically excluded.

Sampling procedures

The population in this study were all dental therapists in Manado City. The sample in this study was taken as a total sampling of all dental therapists in Manado City who carried out individual dental and oral health care practices, as many as 30 dental therapists. The data collection was conducted in November 2023. Ethical clearance was obtained from Ethical Committee Poltekkes Kemenkes Manado No. KEPK.01/06/073/2023.

Measures and covariates

A structured questionnaire was created as the instrument. The questionnaire includes the breakdown of PIECES i.e. Performance, Information, Economy, Control, Efficiency, and Service as shown in Table 2. The total number of questions is 30 that must be answered by the respondents.

Table 2. Questions of The Questionnaire for The Respondents

Variable	Detailed Question
Performance	1) The available menu and navigation options make it easier to use My Dental Hygiene Care application
	2) The menus and navigation provided can be operated easily and interactively
	3) Available menus instantly can display information accordingly
	4) The My Dental Hygiene Care application has an attractive appearance
	5) The writing is difficult to read
Information	1) My Dental Hygiene Care application is easy to use
	2) My Dental Hygiene Care application requires a complicated data input process
	3) The My Dental Hygiene Care application is easy to learn
	4) The resulting output is easy to understand
	5) My Dental Hygiene Care application provides the required information
Economy	1) My Dental Hygiene Care application speeds up the data input process (time efficiency)
	2) My Dental Hygiene Care application has accurate results (Target efficiency)
	3) My Dental Hygiene Care application saves costs compared to conventional/paper (cost efficiency)
	4) By using the My Dental Hygiene Care application, work becomes easier to complete (Efficiency of energy and mind)
	5) Must spend funds to purchase the My Dental Hygiene Care application
Control	1) My Dental Hygiene Care application never experiences errors when used
	2) My Dental Hygiene Care application is free from viruses
	3) Data contained in the Application cannot be changed by other users (guaranteed confidentiality)
	4) The data search process is fast
	5) Each user has an account to log in the application
Efficiency	1) My Dental Hygiene Care application according to the needs
	2) My Dental Hygiene Care application provides relevant information
	3) The My Dental Hygiene Care

	application is used by all users 4) The My Dental Hygiene Care application provides various benefits for users 5) The My Dental Hygiene Care application makes it easy to access health history for users
Service	1) Use the search feature to easily search for patient data 2) The program is equipped with a system for correcting/updating patient data 3) Information can be accessed easily 4) Every submenu in the application menu can be accessed easily 5) The application is equipped with health news

Data analysis

Each variable in Table 2 is used to get the average level of satisfaction using the Equation (1) (Anwardi et al., 2020; Muliansah & Budihartanti, 2020).

$$Average = \frac{Total\ of\ questionnaire\ score}{Total\ questionnaire} \quad (1)$$

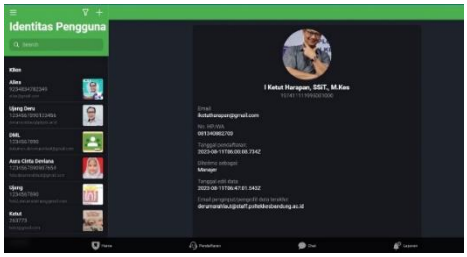
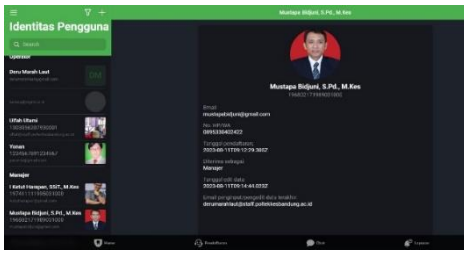
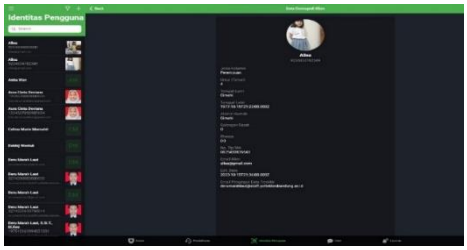
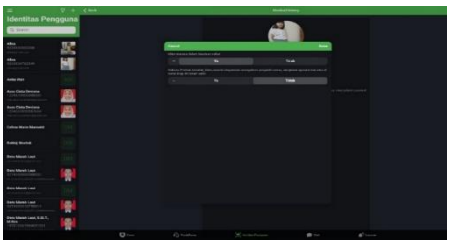
Then the satisfaction level conversion was carried out with the following levels (Prayogi et al., 2021):

1 – 1.79 : Very dissatisfied
1.8 – 2.59 : Dissatisfied
2.6 – 3.39 : Doubtful
3.4 – 4.91 : Satisfied
4.92 – 5 : Very satisfied

Result

My Dental Hygiene Care is an innovation applied in the Public Health Center in Manado City to help dental hygienists and patients with the medical record and diagnosis of dental and oral disease. The medical record functions to show the four histories of dental health including Dental History I: Dental health experiences and symptoms, Dental History II: Dental health self-care, Dental History III: Snacks between meals, Dental History IV: Confidence in dental and oral health. Besides, the application also provides information on the pharmacologic history of the patient, OHI-S index, plaque control score, oral/facial soft tissue, odontogram, periodontal bleeding on probing, periodontal attachment loss, and a calculus score.

Table 3. Design of My Dental Hygiene Care

Menu	Display
Login	
Operator menu	
Client menu	
Input demography data	
Medical history data	

Diagnosis menu

The results of assessing the level of respondent satisfaction based on the variables Performance, Information, Economy, Control, Efficiency, and Service are shown in Table 4.

Table 4. Results of Variables of PIECES

Variable	Score					Average
	Q1	Q2	Q3	Q4	Q5	
Performance	5.2	5.1	5	5.1	4.3	4.9
Information	5.36	4.52	5.28	4.28	4.56	4.8
Economy	4.32	4.4	4.68	4.48	4.44	4.464
Control	4.76	4.64	4.48	4.08	4.32	4.46
Efficiency	4.48	4.36	4.28	4.48	4.36	4.39
Service	4.36	4.48	4.4	4.48	4.48	4.44

The level of satisfaction with the Performance variable, based on Table 4, shows a value of 4.9, which means that the majority of respondents feel satisfied with the level of satisfaction with the performance of the My Dental Hygiene Care application. Meanwhile, in Information, it shows a value of 4.8, which indicates that the respondents are satisfied. It is also seen in the variable of Economy with the value of 4.464, which shows the satisfied category. In Table 4, the variables of Control, Efficiency, and Service show the value of 4.46, 4.39, and 4.44, respectively.

Table 5. Variables PIECES Total Average

Variable	Average
Performance	4.9
Information	4.8
Economy	4.464
Control	4.46
Efficiency	4.39
Service	4.44
Total Average	**4.58**

Recapitulation of the average level of satisfaction for each variable, Performance, Information, Economy, Control, Efficiency, and Service, obtained a value of 4.58, as seen in Table 5. The conclusion from the recapitulation results is that the level of user satisfaction with My Dental Hygiene Care is that the respondents are “satisfied”.

Discussion

Dental and oral health are correlated to the general health of individuals. Dental and oral diseases that are not treated properly can lead to caries lesions, pain, discomfort, and the spreading risk of infections throughout the body, which in the end can lead to hospitalization. Besides the pain, the disease of dental and oral health problems can cause aesthetic issues which for the person can influence their confidence. The aforementioned problems can be avoided by preventive measures to educate people about dental and oral health maintenance, such as toothbrushing properly twice a day, in the morning and at night before sleeping. Besides, the consumption of meals should avoid being sticky and sweet, as well as the supply of vitamins, especially vitamin D, which has a crucial role in dentin formation and to stimulate anti-microbial peptides (Swapna & Abdulsalam, 2021).

Creating application menus that contain promotive, preventive, and curative features is a new challenge. Curative treatment is a treatment for patients that aims to cure or avoid worse consequences (Fuller, 2022; Husereau & Reed, 2019). Meanwhile, preventive promotive actions include actions that prevent the occurrence of disease or reduce the impact of a disease (Lestari et al., 2022; Wendimagegn & Bezuidenhout, 2019). Promotive preventive actions are actions that need to be prioritized and require innovation strategies, one of which is using telemedicine to increase compliance and access to quality health. Curative treatment is treatment that is considered crucial and is more detailed in treatment because curative treatment is

carried out through therapy and the necessary medication based on the patient's complaints (Babatunde et al., 2021).

The results of the functionality of the My Dental Hygiene Care application show that the application can run, referring to the menu features that have been completed. As for the test results of the My Dental Hygiene Care application, it was found that the simple interface provides easy access for users and, based on the functional test results, the functions of the menu are in working condition. The testing of applications using the PIECES method has been conducted by (Anwardi et al., 2020; Muliansah & Budihartanti, 2020; Prayogi et al., 2021) to assess the level of user satisfaction with the application created. These studies analyzed applications used for financial purposes and registration at the Community Health Center with the result that respondents were satisfied with the application. Regarding the results of this research with a satisfaction value of 4.58, which means that the respondents are satisfied with the My Dental Hygiene Care application, indicates that the development of the application is worth continuing. This research is by (Anwardi et al., 2020) that cre who created a website for business promotion and analyzed using the PIECES method to compare the use of traditional promotion and an internet-based system. The results show the respondents are satisfied with the website. Besides, by paired sample t-test, with p value result of 0.0000015 indicates that there is a significant difference between traditional and internet-based promotion. It shows that internet-based involvement in management can help increase the ease of access.

Health management is the comprehensive process of managing the health risk factors of an individual or a group. Health management aims to mobilize health treatment and to use effectively limited resources to achieve maximum health effects (Chen et al., 2023). According to Indonesia Health Survey 2023, it is noted that dental and oral health problems are reaching 56.9%; meanwhile, who were treated are only 11.2% (Kemenkes BKPK, 2023). This number is not enough to cover the problems of dental and oral health. Therefore, the digitalization of health management is needed. The Internet is the source of medical information for the public and patients for its speed and cost-effectiveness. This is important to remind the patient for example to take the medicine or the treatment to heal the pain. Besides, the use of the internet can also backup the data in the cloud to record the medical check which can be monitored by the health worker and also the patient. As in healthcare, the incompleteness data of in patient medical records can lead to medical errors during care and hamper further analysis. This thing can cause an inaccurate diagnosis of the patient's condition. It is stated in that evaluating the completeness of medical record information and the accuracy of the main diagnostic code is positively associated with p p-value of 0.001 (Putrianda et al., 2021). Therefore, medical records are indispensable to avoid inaccurate diagnoses.

Conclusions and Suggestions

Amidst the high number of dental and oral problems in Indonesia, which reached 56.9% according to the Indonesia Health Survey 2023, those who were treated are only 11.2%. This unbalanced number between dental oral health problems and dental workers can lead to the worst case of national health. Therefore, digitalization of health management is needed. Our study has contributed to the promotive, preventive, and curative aspects of dental health management and covers the absence of patient supervision built into the application website named My Dental Hygiene Care. This application helps dental workers record and educate patients via the website. As well as the patient who can be notified for the treatment and get the dental education. The results of the survey analysis of respondents' satisfaction toward My Dental Hygiene Care using the PIECES method resulted in point 4.58, which is categorized as "satisfied" under the parameters of Performance, Information, Economy, Control, Efficiency, and Service of the My Dental Hygiene Care. Based on the research, it is recommended that dental health workers start using dental health management especially in Public Health Centers to cover the absence of supervision of the patient so that the patient is monitored well and ensure their compliance towards the treatment.

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